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**IS THERE A POT OF GOLD AT THE END OF THE
RAINBOW FOR ASIAN LOW COST AIRLINES**

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2006

A Dissertation presented in part consideration for the degree of

Master of Business Administration

Summary

This market study will seek to understand the impact of the Low Cost Carriers (LCC) model in Asia. There are generally two LCC business models, Value-Based or Deep Discount model. Between the two basic low cost business models is a third variant – the Long-Haul Discount model. Asia Pacific, a far-flung region and accounts for 56% of the world population and favorable macro environments coupled with a large growing affluent population will fuel new demand for discretionary travel. Asian LCC with the right business model and strategies will definitely ride on this huge potential and emulate the success demonstrate in North American and Europe. The current LCC market share is estimated to be about 5% in Asia Pacific and could increase to about 11% in 2010, and could reach higher rates if external macro environment remains favorable. Although the pace of bilateral liberalization is spreading at a much slower pace than in other markets around the world, the emergence of low cost carriers in Asia Pacific is accelerating this trend. This market trend will greatly benefit the aerospace industry suppliers, aircraft lessors and OEM such as Hamilton Sundstrand (HS). HS engineering expertise and capabilities in integrating their whole supply chain to bring added value to their customers has put them in a strong position and a source of their competitive advantage. It is recommended that Hamilton Sundstrand should pursue a differentiation strategy for its unique selling proposition of OEM quality at a guarantee cost and exploit the Internet to reach its customer via e-commerce. Additionally, HS need to have a culture of continuous improvement and consolidate core work to the lower cost HS plants, and outsource non-core products and services to other companies. This will enhance HS ability to better compete in the global marketplace.

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Introduction

Purpose of Study

Many new entrepreneurs are starting low cost carriers (LCC) in Asia to chase for the pot of gold at the end of the rainbow. Sir Richard Branson, the flamboyant British entrepreneur was the first kid off the block in Asia. With A\$10 million investment, he started Virgin Blue venture in Australia in the third quarter of 2000 with a fleet of B737-400. Followed closely behind was Tony Fernandez, who took control of Air Asia in Malaysia, through Tune Air in December 2001. The capital investment in Air Asia is about US\$21 million. Virgin Blue and Air Asia shares were listed in late 2003 and 2004 respectively. With market capitalization of US\$1.4 billion for Virgin Blue and US\$1.0 billion for Air Asia, the two initial investors in the companies derived huge returns on their investments.

Since then, chasing the next pot of gold at the end of the rainbow is the dream for many new entrepreneurs in many parts of Asia. To name a few are Raymond Lee of Hong Kong starting the Oasis Hong Kong Airlines; Kingfisher Airlines in India, which is under the leadership of a successful Indian billionaire, Vijay Mallya (which also owns the popular Indian beer of the same name); Adam Air, which is founded in 2002 by Mr. Agung Laksono, a well-known Indonesian businessman and politician, and Mrs. Sandra Ang. However, at the other end of the spectrum is the rumour of consolidation and merger in the LCC market due to the persistence high oil prices, and slow deregulation of the Asia aviation market. In Singapore, the consolidation has begun to take place with the merger of JetStar Asia and Valuair. Therefore the risks of failures for LCC are very high.

This market study will seek to understand the impact of the LCC model in Asia and provide answers to the following questions. Is the LCC model feasible in Asia? What business model can the Asian LCC adopt to mitigate the risks and continue to thrive in a highly competitive and regulated Asia market? With the Asian LCC adding more than 200 aircrafts in the next few years, is there a risk of overcrowding in the markets? Will

the process be similar to the deregulation experience of the US and European aviation markets. Which key industries will ride on the LCC growth?

This paper will also seek to understand LCC cost structure and how they would spend their money on Maintenance, Repair and Overhaul (MRO) services. Will they build in-house MRO capabilities or outsource to other? Additionally, how can OEM such as Hamilton Sundstrand repackage the aftermarket services to cater to this new business model?

Structure of the Thesis

On the second chapter, a brief outline of the history of low cost carrier (LCC) in various parts of the world and the meaning of a LCC will be made clear. The fundamental concepts of LCC and the various LCC business models will also be presented follow with a detailed analysis of JetBlue competitive advantage using Porter's value chain framework. This is to understand why JetBlue can still be profitable despite pursuing both low cost and differentiating strategies at the same, contrary to Porter's view that organization should avoid being 'stuck in the middle'. Will the LCC model be feasible in Asia since it has been successfully applied in other parts of the world?

There are many books and articles that have been written on LCC model and about the most successful LCC airline in the world, i.e. Southwest Airlines. However, what is LCC market potential in Asia? The third chapter will scan the macro environment to understand the factors that will provide the engine of growth for the LCC in Asia.

In the fourth chapter, an analysis using aircraft fleet data from ACAS database will seek to understand the type of equipment deployed by LCC and determine the future trend.

This will help to understand the potential beneficiaries of LCC growth, which will be discuss in details in the sixth chapter.

The key to LCC survival in Asia will largely depend on how the deregulation progress in this region. The fifth chapter examines if the aviation deregulation process that happen in US and the European market will be duplicated in Asia.

The last chapter conclude how the LCC growth will impact the MRO industry and OEM (Original Equipment Supplier) such as Hamilton Sundstrand. Using Porter's five forces framework, we seek to understand the MRO market structure and then proceed to evaluate Hamilton Sundstrand strength and weakness in relation to the external environment using the SWOT framework. We then present the findings for this study and the recommendations for Hamilton Sundstrand to strengthen its competitive advantage. We also propose business strategies that Hamilton Sundstrand can pursue to win in the MRO market.

Methodology

The methodology that will be adopted to achieve the objectives of this study will include preliminary research, data requirements and collection approach. The preliminary research has been conducted on the topic before the commencement of the study. The research included the insight into successful LCC model such as Southwest Airlines & Ryanair. Existing literature on LCC Model was also explored through the study of books, articles and journals.

In selecting a data collection approach, it is necessary to give careful consideration to the study's data requirements. Due to the existence of many aviation databases, the option of relying on secondary data sources was viewed as adequate. This include but not limited to information from Airline Association, Boeing, Airbus, OEM that the writer work for, such as Hamilton Sundstrand and data archive from ACAS, which is available through subscription. Local Air Authority which keeps detailed database on airline operating characteristics provides another reliable source of information.

Conclusion

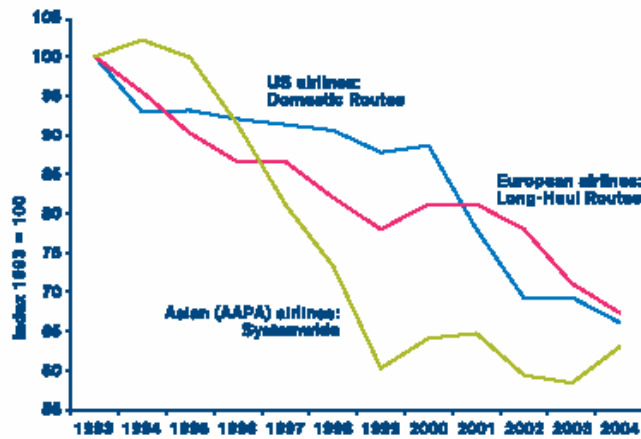
With the structure and methodology for this study explained in this chapter. This will provide an understanding to the underlying process towards the completion of this dissertation. With a better understanding of the analytical framework utilize in this study, it will improve the credibility of the conclusion and the recommendation.

LOW COST CARRIER BUSINESS MODELS

Introduction

Is the low cost carrier model feasible in Asia? Hamel (2000) argues that the age of continuity is over and we have now entered the age of revolution where the value of incumbency is being eroded and those companies that embrace discontinuous change will be the winners. The revolutionaries will win through innovatory business concepts embodied in new business models. This paper will seek to analyze the viability of this new breed of air carrier, the low cost carrier, and the new business model's impact on the Asian airline market. It will also look for the key sectors that will benefit from low cost airline growth in Asia. Although, harsh market conditions and financial turmoil surrounds the global airline industry today, many ambitious entrepreneurs are aspiring to set up low cost carrier (LCC) models in Asia to chase for the pot of gold at the end of the rainbow. The worldwide airline markets continue to evolve with air fares declining globally and almost 30 percent in the leading market of United States since 1993 (see Exhibit 1) and the airline industry size has grown rapidly since 1980.

Exhibit 1: Average Airline Yields per Revenue Passenger



Source: IATA

Airline customers have been the main beneficiaries. The early predictions by economists that airline deregulation would improve consumer welfare have been confirmed to be right (Borenstein 1992). A recent study by United States Government Accountability Office also revealed the change in fares and services since competitive free market system was introduced provides evidence that the vast majority of consumers have benefited, though not to the same level for all (Hecker, June 2006). Today’s airline market has evolved noticeably since the late 1980s, although low cost airlines carry only 23% of the domestic traffic in the United States, their impact on prices is significant and vast majority of the airline customers have benefited (Hecker, June 2006). However, as exhibit 1 illustrated, there are other factors that have appear to lower yields across the airline industry, even on sectors where there is limited competition from LCCs. Rivalry among legacy network airlines, along with efficiency gains passed on to customers, have also seen yields declined to a similar extent on, for example, long-haul flights from Europe and routes operated by Asian network airlines.

History

The first successful low cost carrier was Pacific Southwest Airlines in the United States, which pioneered the concept when their first flight took place on May 6, 1949. Often, this credit has been erroneously given to Southwest Airlines which began service in 1971 and has been profitable every year since 1973. With the advent of deregulation in the aviation industry, the model has spread to Europe as well, the most notable successes being Ireland's Ryanair, which began low-fares operations in 1991, and easyJet, formed in 1995. As of 2000, low cost carriers are now edging into Asia Pacific, led by operators such as Malaysia's AirAsia, and Australia's Virgin Blue.

In 2000, Impulse and Virgin Blue commenced low cost operations bringing fierce competition to Australian cities. Richard Branson begins Virgin Blue with an initial investment capital of A\$10 million and eventually lists it in late 2003 with a market capitalization of US\$1.4 Billion. Impulse operation was short-lived, while Virgin Blue progress to become Australia second largest airline after the demise of Ansett Australia. The dominant carrier in Australia, Qantas has also launched two low cost carriers. JetStar competes with Virgin Blue in the Australian domestic market, while Australian Airlines operates internationally to Asian destinations. Since June 2006, Australian Airlines has also ceased operations, with Qantas preferring to retain the JetStar brand due to the low profit generated by Australian Airlines.

In December 2001, Tony Fernandez, a major investor in Tune Air, took control of Malaysia AirAsia after buying the heavily indebted airline from a government-owned conglomerate DRB-Hicom. His initial investment was about RM81 million (US\$21

million). AirAsia shares were finally listed in November 2004 with a market capitalization of US\$1.0 billion, bringing huge returns to the initial investor. It now operates from Kuala Lumpur, Johor Bahru, Bangkok and Jakarta and has two subsidiaries, Indonesia AirAsia and Thai AirAsia. On March 2006, AirAsia strengthen further its market position when the government of Malaysia announced that AirAsia will take over from Malaysia Airlines and service 96 local destinations in Malaysia, in addition to 19 trunk domestic destinations.

Singapore's first low cost carrier, Valuair started operation on May 5, 2004. In response to the competition, the island flag carrier Singapore Airlines promptly starts its own new low cost carrier, Tiger Airways, to protect its own turf. Not to be left behind, Singapore Changi Airport's second most dominant carrier, Qantas Airways also launched its own LCC, JetStar Asia Airways. JetStar Asia commences operations on December 2004. Consolidation was inevitable in the small Singapore market and Valuair finally succumb to competitive pressure and merged with JetStar Asia in July 2005. Since July 2006, JetStar Asia, Valuair and JetStar International has merged and reposition into one single brand "JETSTAR" and market itself as the long-haul LCC that has international operations to destinations in South East Asia, Japan and the Pacific.

Definition of Low Cost Carrier

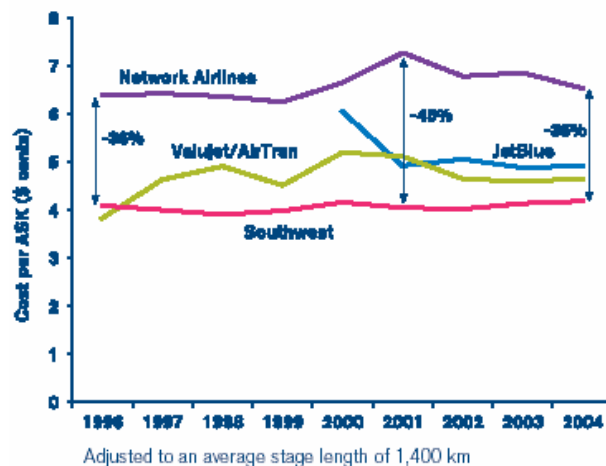
There is no standard business model or definition for an LCC. The term itself covers a wide range of airlines with considerable amount of differences in the type of routes and the level of passenger service offered. Southwest in United States is a good example of a pure no-frills airline, targeting customers through low prices. By contrast, JetBlue

markets itself as the “best service at low prices”, provides some passenger services such as in-flight TVs and flies into major airports. However, both airlines are viewed as LCCs.

This paper defines **Low cost carrier (LCC)** or **low cost airline** (also known as a *no-frills* or *discount* carrier / airline) as an airline that generally provides low fares and does away with many long established passenger services. The model started out in the United States before proliferating to Europe in the early 1990s and subsequently to the rest of the world. Since deregulation in 1978, airlines in United States are allow to openly compete with each other, the most prominent and successful low cost carrier, Southwest, have consistently been profitable for every year. This is partially facilitated by its lower cost structure, which is 36% to 45% lower than the legacy network carriers (exhibit 2) and also the Southwest way of utilizing resources efficiently to provide a consistent reliable service.

Exhibit 2

Adjusted Cost per ASK for US Airlines, 1996-2004

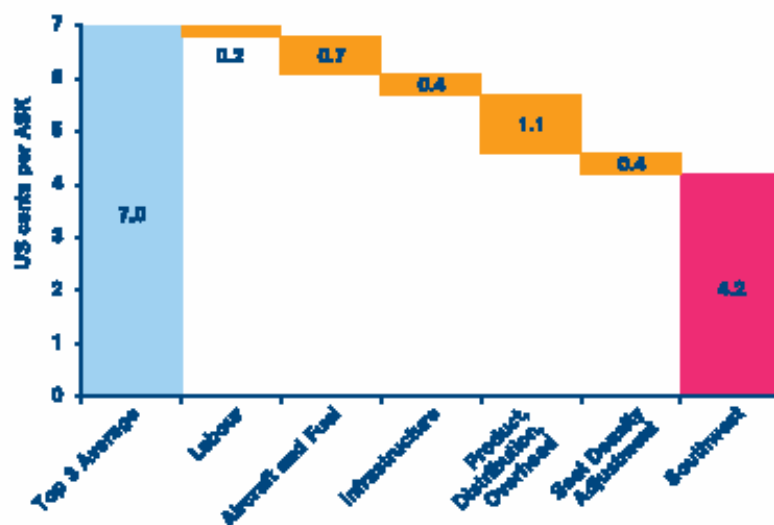


Source: IATA

On the other spectrum of the low cost carrier are the full service network carriers which traditionally operated out of a hub and spoke arrangement. The cost gap between low cost carrier and traditional network carrier is a result of lower seat density, higher labor cost, operating older fleet, higher infrastructure and distribution costs for the legacy carrier. A study commissioned by IATA shows a significant cost gap between Southwest and the legacy carriers such as American, Delta and United Airlines (Exhibit 3A).

Exhibit 3A

Southwest Cost vs. Network Carrier



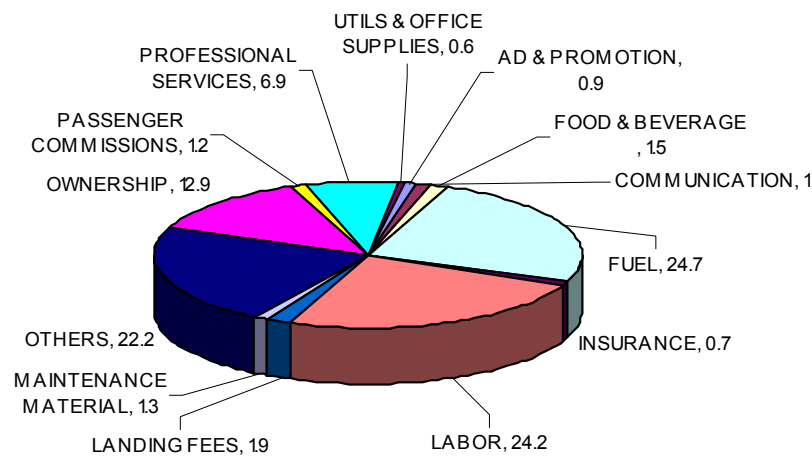
Source: IATA

A traditional major carrier often counteracts the LCC model with a number of tools to deter entry or lessen the competitiveness of recent entrants. These tools include predatory pricing, loyalty programs, and congestion at the nation's most popular airports. However, these tools are not effective against low cost carriers with point-to-point networks. The low cost carrier can successfully neutralize the market power of its competitors, by

competing on price. The lower cost structure can be quantified by aggregating the cost savings of point-to-point networks, wage savings, and savings from not providing numerous frills. While labor costs are one of the largest single cost items for airlines, there are many other costs (exhibit 3B). The difference in cost between the low cost and legacy carriers is not attributable to the wage differential alone. However, controlling labor costs can improve the bottom line as the primary cost for any carrier is labor related.

Exhibit 3B

Airline Cost Distribution



Source: Air Transport Association, 2005

Value versus Deep Discount Business Models

The emergence and growth of no frills, low cost carriers (LCCs) have drastically altered the nature of competition within the airline industry, especially on short-haul flights. The major LCCs have taken advantage of different operational methods such as fewer service

offerings with charges for in-flight catering, distribution efficiencies through internet-only bookings and point-to-point routes from secondary airports etc to bring down their cost base and to drive down the average fares paid by customers. However, not all LCCs are turning in a profit, with only a small number of market-leading LCCs such as Southwest, AirAsia, Ryanair and GOL, producing a consistent level of returns above their cost of capital. Typical low cost carrier business model practices include:

- A simple fare structure (typically ticket price rise as the plane capacity fills up, which rewards early reservations, known as "yield management") with a focus on price competition.
- Typically a single passenger class (typically economy class only) with strong focus on price sensitive traffic, mostly leisure passengers and no (or limited) customer loyalty programs.
- Employed a common fleet, usually the Airbus A320 families or Boeing 737 families to cut down on training and servicing costs.
- Unassigned seating arrangements to influence passengers to board early and speedily.
- Flying to cheaper, less congested secondary airports to evade air traffic delays and take advantage of lower landing fees. In certain region, the local authorities may even reward the LCC in the form of subsidies to bring in traffic to revive the local economy. A win-win situation for both parties. LCC strategic choice to minimize its competitive interactions with legacy full service airlines adds validity to the previous arguments by Borenstein (1989) that legacy airlines have considerable dominance over the market and have the resources to preserve their dominance over lucrative routes with their hub and spoke strategy.

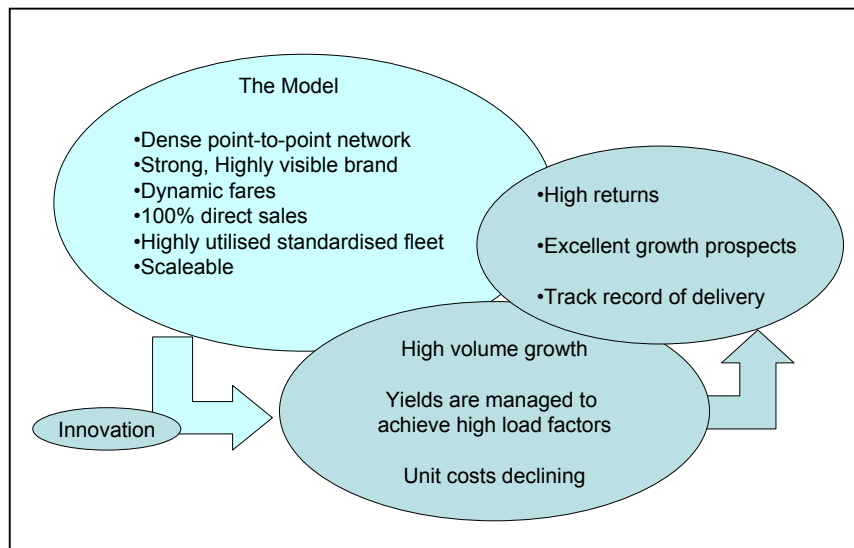
- In-flight passenger services are do away with (or limited), and replaced by optional paid-for in-flight food and drink.
- Simplified routes structure, primarily point-to-point transit instead of transfers at hubs to allow highest utilization of planes.
- Quick turnaround times of aircraft and serving short-haul routes (again enhancing aircraft utilization).
- Emphasis on direct sales of tickets over the Internet (avoiding fees and commissions paid to travel agents and corporate booking systems).
- A simple management and overhead structure with a lean strategic decision-making process.
- Employees have flexible job boundaries, for instance flight attendants also cleaning the aircraft or working as gate agents (limiting personnel costs).

From the analysis of the spectrum of LCC models in the market, it can be deduce that not all LCC models are similar. The term low cost is a misnomer, because there are various degrees of operating cost structures, as well as the services provided by the range of low cost airlines in the market. From a range of Asia Pacific LCC models such as AirAsia, JetStar, Tiger Airways and Virgin Blue. The key distinguishing factor between the two basic LCC business models is cost. AirAsia and Tiger Airways attempt to be the lowest-cost operators in Asia Pacific, while JetStar and Virgin Blue plan for cost structures that are lower than those of the network carriers to take advantage of high-yield traffic.

Value-Based Airlines: easyJet in Europe

The easyJet business model focuses on maximizing yields while trying to maintain operating costs at about 30% or more lower than the traditional full-service network airlines. As indicated in diagram 1, the model focuses on building a high frequency point-to-point network in the higher disposable-income continental European markets to benefit from the higher yield leisure and business traffic.

Diagram 1: Value-based Airline Business Model



Source: easyJet

The fares are dynamic and designed to extract maximum yield from the airline's network. There is no fixed ceiling fare and the airlines can charge as much as the market is willing to pay. The fares start as low as £7 and can increase tenfold just before the flight takes off. Perhaps the most important feature of easyJet's business model is that the airline strives to be the lowest cost airline operator between two airports, and this does not have to be the lowest cost airline operator in the industry. This explains why easyJet operates in both primary and secondary airports in Europe.

In Asia, the best examples of the value-based airlines are JetStar and Virgin Blue where both airlines have focused on supplying to the customer a value product of free in-flight meals and airport lounges at competitive prices to the full-service carriers. However, in contrast to the easyJet business model, there is a cap on the maximum fare for Asian value-based airlines, which is set at about 20-25% below the normal fare by the legacy full-service airlines. The easyJet business model could be changing since the acquisition of a 10% equity stake by Icelandair in October 2004, and the new management team is looking for fresh ideas to improve operating margins.

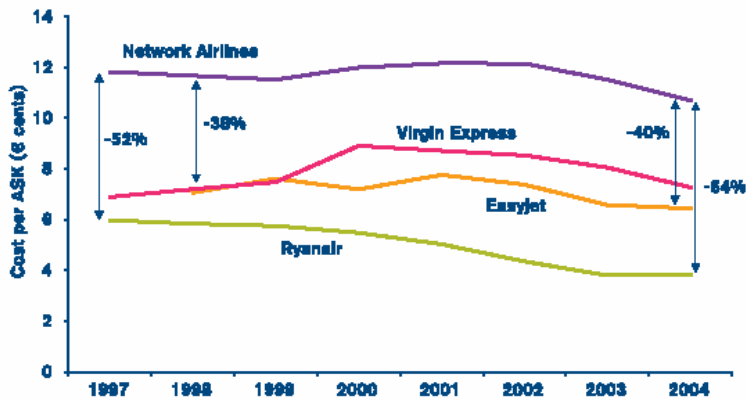
Deep Discount Airlines: Ryanair in Europe

The goal is to be the lowest cost airline operator in the industry (Exhibit 4). The relentless drive to bring unit operating costs down every year has provided Ryanair with the competitive advantage of being able to set the lowest fares in the market. All operating cost components, aircraft equipment cost (depreciation or lease rentals), labor expenses and airport charges are continually monitored to ensure that the unit operating costs will trend downwards every year. Ryanair continued to deliver cost efficiencies from a very low cost base, with its cost gap to the network airlines widening from 52% in 1997 to 64% in 2004 as shown in exhibit 4.

Exhibit 4

Ryanair Cost per Available Seat Kilometer

5.6: Cost per ASK, 1997 to 2004



Source: IATA

In Asia, Tiger Airways and AirAsia are the best examples of deep discount airlines, with both airlines being known as the lowest airline cost operators in the industry. AirAsia currently has the lowest unit cost of 2.11 US cents per available seat kilometer among all the Asia Pacific airlines, despite the sharp rise in jet fuel prices in 2004/05. The main difference between the two basic LCC business models is profitability. In Asia, both AirAsia and Tiger Airways, which emulate Ryanair's business model, have set the goal of having the lowest-cost advantage in the Asia Pacific aviation market, and both airlines aim to consistently keep fares at competitive rates (Table 1).

Table 1: Comparison of Asia Pacific Low Cost Airline

Differences in Low cost Airline Model

	AirAsia	JetStar	Tiger	Valuair	Virgin Blue
Lowest fares in market	X		x		
Lowest costs in market	X		X		
Lowest breakeven in market	X		X		
Standardized fleet		X	x	X	X
Low cost, uncongested airports	X		x		
High frequency	X		x		X
Strong balance sheet	X				X
High ancillary sales	X				
Consistently profitable	X				X

Source: Company data, Hamilton Sundstrand

Between the two basic low cost business models is a third variant – the long-haul discount model. The best example is JetBlue, which flies five to six hours from coast to coast in the US market, in contrast to Southwest, which focuses primarily on short-haul routes (JetBlue, 2002). Since its IPO on the NASDAQ stock exchange in 2002, JetBlue has become one of the most popular airline stocks in history and currently has a multi-billion market capitalization. The revamped JetStar is the best example of the long-haul discount airline model in the Asia Pacific market with flights from Singapore to Perth.

LCC Competitive Advantage

The market position taken by the different LCCs is differentiating them from the incumbent. All their operational strategies are geared towards being the low cost competitor and then pass on some of the consumer surplus to the customers. However, from the review of the LCC business models, it can be seen that the LCCs are very different from each other because of the different target customer and therefore different cost structure. From an academic perspective, it is interesting to note that organization (such as JetBlue),

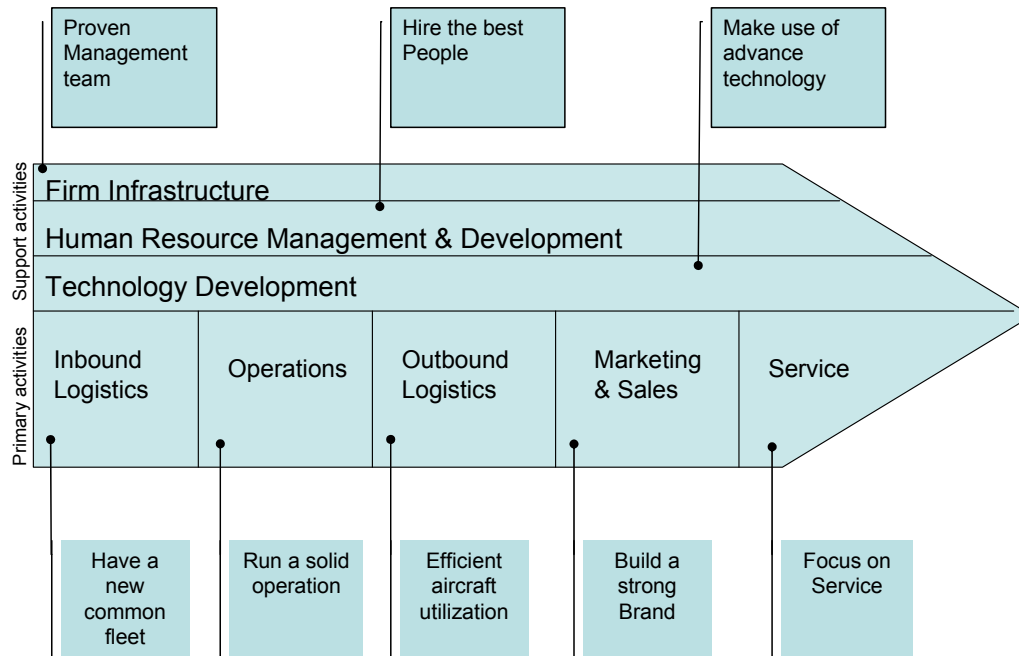
which systematically combine relative cost position and relative differentiation can result in competitive positions and can be successful too.

According to Porter's view, the firm that is stuck in the middle if more than one generic strategy were pursued is almost guaranteed low profitability. Porter's logic was that a strategy aimed at achieving cost leadership precludes the capital investment or operating costs necessary for differentiation. How did JetBlue achieve this competitive advantage? We will examine JetBlue new business concepts based on Porter's value chain. Michael Porter advocates the use of the value chain as the primary tool for diagnosing a firm's competitive advantages. Porter's value chain (Lewis et al. 1999) identifies five primary activities as follows:

- Inbound logistics
- Operations
- Outbound logistics
- Marketing and sales
- Service

JetBlue competitive advantage can be illustrated by means of the Porter's value chain framework as shown on diagram 2 in the following page.

Diagram 2: Analysis of JetBlue Value Chain



'Inbound Logistics'

JetBlue started with an initial funding of US\$128 million and is the best-capitalized airline start-up in history. This means JetBlue is able to invest in the best product available. This is evident from the fleet of new airbus A320 aircraft, leather seats, satellite television programming and fast check-in technology.

Operations

JetBlue run a solid operation and this is demonstrated by their exceptional operational performance. For the year ended December 31, 2005, based on JetBlue data compared to the other major U.S. airlines:

- JetBlue completion factor of 99.2% was higher than any of the other major U.S. airlines, which had an average completion factor of 98.2%, according to the DOT;

- JetBlue incidence of delayed, mishandled or lost bags of 4.06 per 1,000 customers was the lowest as compared to the other major U.S. airlines, which had an average of 6.24 delayed, mishandled or lost bags per 1,000 customers, according to the DOT; and
- JetBlue rate of customer complaints to the DOT per 100,000 passengers of 0.29 was the third lowest as compared to the other major U.S. airlines, which had an average of 0.95 complaints, according to the DOT.

“Outbound Logistics”

JetBlue is relentless in keeping their operating costs low. The key to JetBlue’s low unit costs is the high productivity of their assets and crewmembers. Some of the contributing factors are:

- JetBlue utilize their aircraft efficiently, with average daily utilization of 13.5 hours. By using their aircraft efficiently, they are able to spread their fixed costs over a greater number of flights. This is achieved through the improved reliability of a new fleet of aircraft which also require less maintenance than older aircraft. Quick turnaround of the aircraft at airport gate also increases the number of daily flights per aircraft.
- JetBlue operate only two types of aircraft with a single class of service. Operating a limited number of aircraft types leads to increase cost savings as maintenance issues are simplified, spare parts inventory requirements are reduced, scheduling is more efficient and training costs are lower. A single class of service simplifies their operations, enhances productivity, increases our capacity and offers an operating cost

advantage. The recent addition of EMBRAER 190 aircraft into JetBlue is an extension of JetBlue business strategy. Despite losing some of the cost efficiencies associated with operating only one aircraft type, the additional market opportunities provided by this new aircraft will outweigh these additional costs.

- JetBlue takes great care to hire and train crewmembers that are enthusiastic and committed to serving their customers and motivate them by using appropriate incentives. Crewmember productivity is created by greater fleet commonality, fewer unproductive labor work rules, use of part-time crewmembers and the effective use of advanced technology. For example, most of JetBlue reservation sales agents work from their homes, providing them better scheduling flexibility and allowing crewmembers to customize their desired schedules.
- JetBlue achieves lower distribution costs by employing ticketless travel. Ticketless travel saves paper costs, postage, crewmember time and back-office processing expense. In addition, direct bookings by the customers save computer reservation systems fees. For the year ended December 31, 2005, 77.5% of the sales were booked on their website, and 22.5% were booked through the agents.

Marketing & Sales

Jet Blue builds a strong brand by giving consumers “the things they want, and nothing they don't”. JetBlue distinguish from their competitors as a safe, reliable, low fare airline that is focused on customer service and provides an enjoyable flying experience. To further enhance their brand loyalty, JetBlue implemented loyalty program in mid 2002 which is a rarity in LCC business model. By the end of 2005, over three million customers had joined this program, and that number has been growing steadily since

inception. In 2005, JetBlue were voted the best domestic airline in the Conde Nast Traveler's Readers' Choice Awards for the fourth consecutive year and, for the third year in a row, were voted the best domestic airline in the Conde Nast Traveler Business Traveler Awards. In 2006, they earned the "Passenger Service Award" from Air Transport World.

Service

JetBlue focus on service is evidenced by their devotion and attention to hire crewmembers that will treat customers in a friendly and respectful manner. The importance of providing caring customer service is also emphasized in training. In addition, JetBlue policies and procedures are designed to be customer-friendly. For example:

- Pre-assigned seating arrangement;
- All travel is ticketless;
- Policy of not overbooking flights;
- Fares are low and based on one-way travel;
- No Saturday night stay is required; and
- Low change fees.

Human Resource Management & Development

JetBlue conduct careful and rigorous screening of potential employee using tools such as behavioral interviews and peer assessments. JetBlue assist their employees by offering them flexible work hours, initial paid training, free uniforms and benefits. JetBlue also provide extensive training for their pilots, flight attendants, technicians, airport agents,

dispatchers and reservation agents which emphasize the importance of safety. An important part of their business plan is to reward employee by allowing them to share in JetBlue success and align personal successes with those of JetBlue. JetBlue compensation packages include competitive salaries, wages and benefits, profit sharing and an employee stock purchase plan. In addition, a significant number of their employees participate in the stock option plan. Regular human resource policies reviews are conducted to ensure that JetBlue remain competitive and are able to hire and retain the best people.

Technology Development

As a new airline, JetBlue have made use of advanced technology in many ways. For instance, they are the first US airline to introduce the 'paperless cockpit'. Pilots use mobile laptop in the cockpit to calculate the weight and balance and takeoff performance of the aircraft prior to departure. These laptops also allow the pilots to access manuals in an electronic format during the flight. In addition, all of JetBlue travel is ticketless, saving on distribution cost. In response to the September 11, 2001 terrorist attacks, JetBlue commenced installation of four cabin security cameras on each of aircraft. JetBlue also introduced innovative customer self-service kiosks for check-in.

Firm Infrastructure

JetBlue have a proven management team which has significant airline industry experience, including experience at successful low cost airlines, such as Southwest Airlines. JetBlue Chief Executive Officer, David Neeleman, was also instrumental in developing the Open Skies reservation system.

From above analysis of JetBlue annual reports from 2002 to 2005 (jetblue.com) using Porter's value chain framework, we could identify the sources of JetBlue's competitive strength. This competitive strength permits JetBlue to achieve profitability within their first year of operation and reported an operating margin of 16.5% in 2002, the highest of any domestic U.S. airline. JetBlue differentiated product, which include new planes, more comfortable leather seats, free direct satellite television programming for every passenger, lower fares and friendly service raised the competitive bar against other airlines which were crippled by the tragic September 11 terrorist event that brought a sudden downturn in demand for air travel. Many Airlines are reaching the point where it will be impossible to raise prices, grow the top line, or even significantly reduce costs. There are no strategies for creating wealth in the long term. The challenge is how to use innovation to reinvent the core of your business in a world where strategies die faster than they used to and where any business that's not constantly renewing itself is simply becoming irrelevant. One misconception about innovation is that it is only about the top line. However, Kirkpatrick and Hamel (2004) argue that a lot of the most profound business model innovation over the last few years, has been focused on radical cost-structure changes, citing JetBlue as the example. JetBlue's successful implementation of their business strategies allow it to remains profitable and competitive, contrary to Porter's view.

Food Chain Riding on LCC Growth

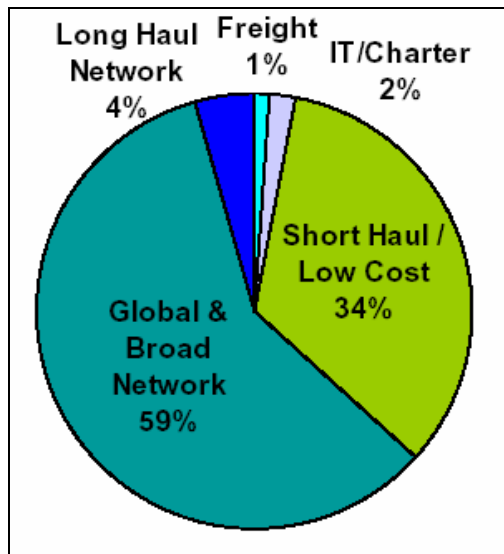
The low cost airline growth is going to drive up demand in other key sectors such as aircraft manufacturers, aircraft engine manufacturers, aircraft leasing companies, aircraft maintenance companies and airports.

Aircraft Manufacturers

Boeing latest estimates shows the global airline industry will need another 27,000 new airplanes in the next twenty years by year 2025 and 34% of these deliveries will be to the low cost or short haul carriers. The need by new LCC entrant to expand the existing fleet quickly to meet growing demand, plus the need by incumbent LCC to replace older aircrafts with newer, more fuel market demand for narrow-body aircraft. While Airbus has been steadily gaining market share with the A320 families of aircraft in Asia over Boeing's B737 aircraft, both Airbus and Boeing as the two major global manufacturers of narrow-body aircraft, should benefit from the strong LCC growth in Asia. Airbus latest Global Market Forecast has a more conservative outlook, predicting a demand for only 17,300 new passenger and freighter efficient aircraft, will creates a rising aircraft but also predicted a 34% deliveries will be to the low cost or short haul operators.

Exhibit 5

New Planes Deliveries by Operating Segments



Source: Boeing

Aircraft Maintenance

Demand for MRO (maintenance, repair and overhaul) services will rise sharply with the increased number of aircraft and higher aircraft utilization. Major OEM with component repair and overhaul centers in Asia, are well placed to gain from the MRO opportunities in the ASEAN and Indian markets given that most are located in Singapore. Operators favor the proximity of the MRO service providers as this will reduce aircrafts and components turnaround times. This will lead to reduction of inventories to meet the aircraft maintenance requirements. In the ASEAN region, Singapore government is aiming to be the aviation hub for aerospace MRO services for both full-service and low cost carriers.

Airports

A study by Morgan Stanley forecast LCCs to grow the number of aircraft and passengers carried at a CAGR of 20%-plus for the next five years. The strong aircraft and passenger volume growth will be positive for the aeronautical and commercial revenues and earnings of airports. In particular, Singapore Changi Airport and Airports of Thailand, as they emerge as key LCC hubs, as potential beneficiaries of the LCC growth in the ASEAN market.

Potential Losers

The appearance of the LCCs has significantly increased competition within the airline industry and forced legacy full-service network airlines to reassess and improve their own operations. However, while the larger LCCs have been very successful in creating a niche for themselves, the low profitability or losses of many smaller LCCs suggests that an effective airline strategy, rather than just the LCC model by itself, is the key to success. The legacy airlines that are most at risk from the sustainable low-fare environment created by low cost airlines are:

- Airlines that are in poor financial health, with high unit operating costs and are unable to lower their operating costs, or raise labor productivity.
- Airlines that generate low percentage of revenue from long-haul sector flights and compete directly with LCCs for short-sector routes.
- Airlines that do not have cargo and other operating revenues to compensate for the low fares from short-sector flights. There could be a consolidation in the Asia airline

industry, if oil prices remain high at more than US\$50/bbl for the next two to three years, and/or there is an external macro shock to the airline industry, particularly for the weaker and less established LCC brands. The brutal competitive environment will make certain that only the airlines with the best business models will outlast the competitors and win market share in long term.

Gold at the End of the Rainbow

In Asia, many new entrepreneurs are starting low cost carriers to chase for the pot of gold at the end of the rainbow. Sir Richard Branson, the flamboyant British entrepreneur was the first kid off the block in Asia. With A\$10 million investment, he started Virgin Blue venture in Australia in the third quarter of 2000 with a fleet of B737-400. Followed closely behind was Tony Fernandez, who took control of AirAsia in Malaysia, through Tune Air in December 2001. The capital investment in AirAsia is about US\$21 million. Virgin Blue and AirAsia shares were listed in late 2003 and 2004 respectively. With market capitalization of US\$1.4 billion for Virgin Blue and US\$1.0 billion for AirAsia, the two initial investors in the companies derived huge returns on their investments. Since then, there are Tiger Air, Valuair and JetStar Asia (Valuair has since merged with JetStar Asia in July 2005), which operate out of Singapore. In other part of Asia, many LCC are beginning to emerge, such as Lion Air, Adam Air, Thai AirAsia, Oasis Airways, Go Air, Kingfisher Airlines etc and many more.

Conclusions

The two LCC business models of value based and deep discount differ primarily in the cost structure. The key question is whether consumer factor in value for money when they travel or they opt for the cheapest fare. In line with European and US markets, the latter is favored, especially for leisure travel market. The Asian travelers would also be no different and would lean towards the same mindset of choosing the cheapest fares. Therefore, cost efficiency becomes an important element to enable an airline to compete and survive. However, this does not mean that every airline should seek to be the lowest cost operator. Instead, it is essential that the costs appropriate for the standard of service provided to the customer are achieved in the most efficient manner. Just as Ryanair & easyJet experiences have demonstrated in Europe.

In ASEAN, the market is already crowded with 11 players, and additional LCCs could enter the market despite the overcrowded field. With the overall global airline industry forecasting to lose at least US\$1.7 billion in 2006 and operating margins remaining well below its cost of capital of 7-8% (IATA, 2006). Will the entrepreneurs dream remains just a dream? From the US & European experiences, strong price competition has meant that only a handful LCCs have been profitable, while several other LCCs have seen low profitability or even turn in losses. The LCC business model by itself is not a guarantor of success. It is the individual airline's strategy that is the key, regardless of the region that the LCC operate in. New or small LCC airlines in Asia must learn to adapt to the tough operating environments, just as JetBlue profound business model innovation has allowed JetBlue to adapt to the external environment and be profitable from the first year of operations. It is crucial that the LCC's own strategy and value proposition fit the target

customers in order to compete successfully and be profitable. The next chapter will examine closely the Asian market environment and verify if there is a potential market for LCC operators.

MARKET POTENTIAL FOR ASIAN LCC

Introduction

Air travel makes it possible for people to travel. The reasons people travel range from the needs to visit friends and relatives, enjoying a relaxing break away from home, to do business in distant cities, or the transportation of goods by air to bring to us the things that we need and want from around the globe. With global economic growth and the trend towards reducing regulation of air travel markets, demand for air transport will rise.

Asia has a huge population base but very low market penetration by low cost airlines. In Asia, 268 cities have over half a million inhabitants compared with 159 cities in Europe and 70 cities in the US (Exhibit 6).

Exhibit 6: Metropolitan Areas Population > 500,000

Region	Number	Total Population
Europe	159	251 million
United States	70	182 million
China	114	181 million
Other North Asia	25	86 million
Southeast Asia	38	97 million
West Asia	91	191 million
All Asian Metros	268	555 million

Source: Center for Asia Pacific Aviation

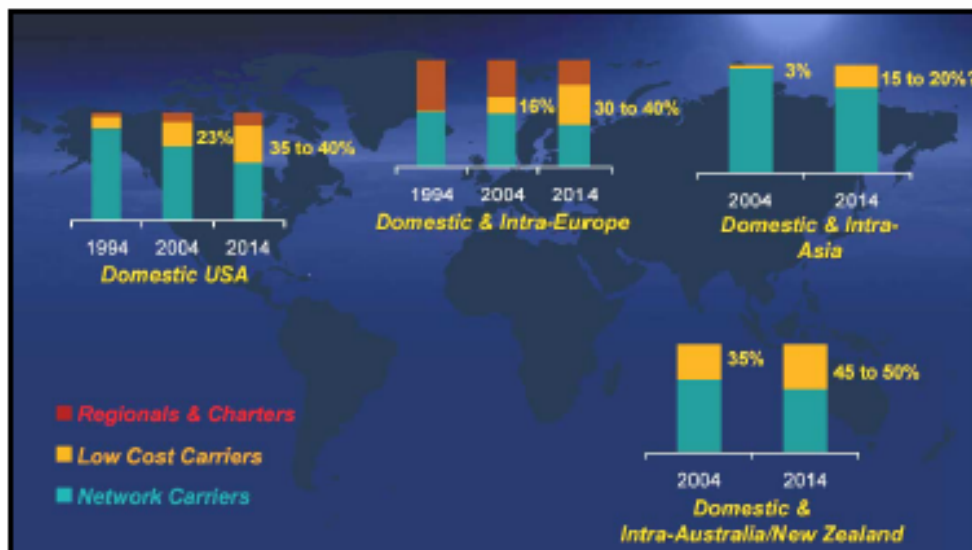
Despite the huge population base in Asia, and the rising per capita income in the region, the market penetration by low cost airlines in Asia is only about 3% (if we exclude Australia) versus 23% and 16% for US and Europe, respectively, according to Airbus's

estimate (see Exhibit 7). This chapter will look at the factors driving the LCC penetration and provides an analysis of the external environment and the LCC market potential. The environment analysis will provide insight to this region unique political, economics, social and technology dynamics.

There are four factors which have been identified to contribute to such huge passenger growth for the low cost airlines in the Asia Pacific region for the next five to ten years. The factors driving the air travel demand include the huge population base over a wide geographical landscape, stable economic growth, relatively low market LCC penetration and rapid growth of LCC due to the air service liberalization. These factors will be discussed in details in this chapter.

Exhibit 7: LCC Market Shares by Region

Market Share of LCCs in US, European and Asia/Pacific Markets



Source: Airbus, Morgan Stanley Research

Huge Population Size and Massive Land Area

Stable annualized growth rate for the population of Asia Pacific (including Australia and New Zealand) was 1.4% for 1990-2000, down from 1.8% for 1980-1990. For 2000-2010, the forecast growth rate by the United States Census Bureau is 1.1% for Asia Pacific. If China is excluded, the forecast growth rate is 1.5%, higher than the 1.1% expected for the world (Exhibit 8). Asia's huge population base, particularly China and India, accounted for about 56% of the world population (only 19% when China and India are excluded). The two Asian giants have been in the midst of an economic expansion that is projected to turn them into the world's largest consumer markets within 25 years.

Exhibit 8

Average Annual Rate of Growth by Region and Development Category: 1950-2050

[In percent]

Region	1950-60	1960-70	1970-80	1980-90	1990-2000	2000-10	2010-25	2025-50
WORLD	1.7	2.0	1.8	1.7	1.4	1.1	0.9	0.6
Less Developed Countries	2.0	2.4	2.2	2.0	1.7	1.3	1.1	0.7
More Developed Countries	1.2	1.0	0.7	0.6	0.4	0.3	0.1	(Z)
AFRICA	2.2	2.4	2.7	2.8	2.5	2.0	1.6	1.4
Sub-Saharan Africa	2.1	2.5	2.7	2.8	2.6	2.0	1.7	1.6
North Africa	2.4	2.4	2.5	2.7	2.1	1.7	1.3	0.8
NEAR EAST	2.7	2.6	3.0	2.9	2.3	2.2	1.9	1.4
ASIA	1.7	2.2	2.0	1.8	1.4	1.1	0.9	0.4
LATIN AMERICA AND THE CARIBBEAN	2.7	2.7	2.4	2.0	1.7	1.3	1.0	0.5
EUROPE AND THE NEW INDEPENDENT STATES	1.1	0.9	0.7	0.5	0.2	0.1	(Z)	-0.2
Western Europe	0.7	0.8	0.4	0.3	0.3	0.2	(Z)	-0.3
Eastern Europe	1.2	0.8	0.8	0.4	-0.1	-0.1	-0.2	-0.5
New Independent States	1.7	1.3	0.9	0.8	0.1	0.1	0.2	(Z)
NORTH AMERICA	1.8	1.3	1.1	1.0	1.2	0.9	0.8	0.7
OCEANIA	2.3	2.1	1.6	1.6	1.5	1.2	0.9	0.5
EXCLUDING CHINA:								
World	1.8	1.9	1.8	1.8	1.5	1.3	1.0	0.7
Less Developed Countries	2.2	2.4	2.4	2.3	1.9	1.6	1.3	0.9
Asia	1.9	2.2	2.2	2.0	1.7	1.4	1.1	0.6
Less Developed Countries	2.0	2.3	2.2	2.1	1.8	1.5	1.1	0.7

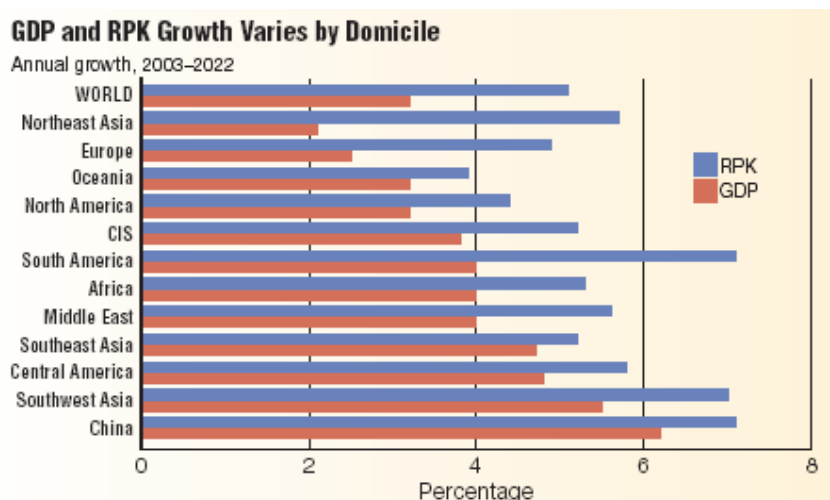
Z: Between -0.05 percent and +0.05 percent.
 Note: Reference to China encompasses China, Hong Kong S.A.R., Macau S.A.R., and Taiwan. Direct access to this table and the International Data Base is available through the Internet at www.census.gov/ipc/www.

Source: U.S. Census Bureau, International Programs Center, International Data Base.

Stable and High-Speed Economic Growth

The travel industry will potentially be reshaped by emerging markets in Asia such as China and India. Their combined purchasing power could be five times greater than that of the United States of America today. Steady economic development in Asia and China entry into the World Trade Organization will fuel demand for commercial airplane. On top of that, the Chinese government’s decision to develop the western region of the country and the success of Beijing’s bid to host the 2008 Olympics will also boost demand. In a market analysis by Boeing (2005), the Southeast & Southwest Asia and China is expected to be growing much faster than the forecasted world GDP growth of 2.9%. GDP for these regions is forecast to grow more than 4 percent annually over the next 20 years, which is above the world average of 2.9 percent. Annual air travel growth is expected to be above the world average of 4.8 percent (Exhibit 9).

Exhibit 9

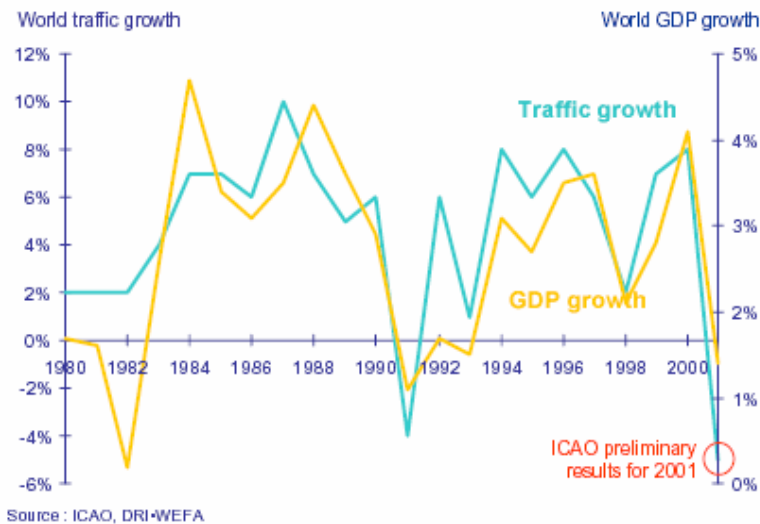


Source: Boeing

A study conducted by DRI.WEFA Forecasting Group has shown that air travel is highly correlated to economic growth measured as GDP (Exhibit 10). Increase international trade within Asia and globally couple with lower airfare, improved network connections and more direct flights would drive air travel.

Exhibit 10

Growth in air travel is strongly correlated with growth in GDP

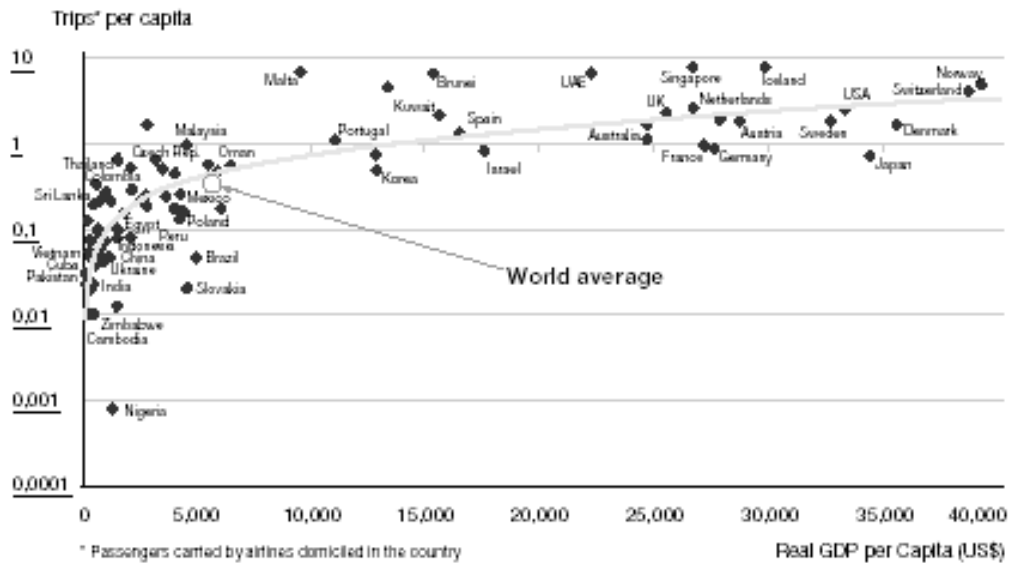


Today, every US citizen travels on average 2.2 air trips each year (Exhibit 11). The equivalent figures are just 0.02 trips per year for India and 0.06 for China. As incomes grow and air travel becomes affordable for more and more people, there will therefore be huge potential for air travel growth by these and other emerging and developing countries. The escalating population growth rate and growing affluence should induce strong growth in air travel for the Asian market, emulating the trend of developed countries as shown in Exhibit 11. Increase international trade and lower fares as a result

of low cost carrier competition will also drive air travel, as do airline network improvements such as increased frequencies and more direct service.

Exhibit 11

Large potential for future growth in air travel



Source: Airbus

Low Market Penetration by LCCs in Asia

It has been estimated in a study by Morgan Stanley that the percentage of the Asia Pacific population that has traveled by air is about 3.5%, in contrast to an estimated 9-11% for the world population in 2004 (Exhibits 12 and 13). In the more developed countries like the US, the UK, France, Ireland and Germany, Morgan Stanley research showed that more than 20% of the population has traveled by air, and the two city-states of Singapore and Hong Kong also have high percentages of their population that are air travelers. The

Asian aviation market, outside the more developed countries of Singapore, Hong Kong and Japan, is immature relative to the US and European aviation markets. This indicates an untapped potential in the emerging Asian economies.

Exhibit 12

Global Population Travel by Air, 1992-2005E

(Millions)	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003P	2004E	2005E
World Population	5,449	5,531	5,611	5,692	5,771	5,850	5,928	6,004	6,080	6,154	6,227	6,300	6,373	6,446
Annual Global Pop Growth		1.5%	1.5%	1.4%	1.4%	1.4%	1.3%	1.3%	1.3%	1.2%	1.2%	1.2%	1.2%	1.2%
Psgs carried - Global	1,146	1,142	1,233	1,304	1,391	1,457	1,471	1,562	1,672	1,640	1,639	1,657	1,819	1,913
Growth		-0.3%	8.0%	5.7%	6.7%	4.7%	1.0%	6.2%	7.0%	-1.9%	-0.1%	1.1%	9.8%	5.2%
Assume 50% of psgs carried travel twice a year (1 return trip) and 50% of psgs carried travel 4 times or more a year (2 return trips)														
Population Travel	430	428	462	489	522	546	552	586	627	615	614	621	682	718
% Global pop travel by air	7.9%	7.7%	8.2%	8.6%	9.0%	9.3%	9.3%	9.8%	10.3%	10.0%	9.9%	9.9%	10.7%	11.1%

P = Preliminary E = ATW estimate/forecast

Sources: ICAO, Air Transport World (Jan 2005), US Census Bureau, International Programs Center, International Data Base, Morgan Stanley Research Estimates

Exhibit 13

Asia/Pacific Population Travel by Air, 2000-2010E

(Millions)	2000	2001	2002	2003	2004E	2005E	2006E	2007E	2008E	2009E	2010E	
Asia/Pacific (P)	3,466	3,504	3,549	3,589	3,628	3,668	3,708	3,749	3,790	3,832	3,874	
Annual Asia/Pac Pop Growth		1.1%	1.3%	1.1%	1.1%	1.1%	1.1%	1.1%	1.1%	1.1%	1.1%	
Psgs carried - Asia/Pacific	247.7	265.8	274.9	282.0	292.8	313.2	337.0	364.6	393.8	422.6	451.1	
Growth		7.8%	7.3%	3.4%	2.6%	3.8%	7.0%	7.6%	8.2%	8.0%	7.3%	6.8%
CAGR (1998-2004)					3.2%							
CAGR (2000-2004)					4.3%							
Assume 75% of psgs carried travel twice a year (1 return trip) and 25% of psgs carried travel 4 times or more a year (2 return trips)												
Population Travel	108.4	116.3	120.3	123.4	128.1	137.2	147.6	159.7	172.5	185.1	197.6	
% Asia/Pac pop travels by air (E)	3.1%	3.3%	3.4%	3.4%	3.5%	3.7%	4.0%	4.3%	4.6%	4.8%	5.1%	

P = Morgan Stanley Research Projections based on U.S. Census Bureau 2000-2010 Asia population growth rate estimate of 1.1% E = MS Estimates for 2005-2010

Sources: AAPA, traffic data from China Eastern Airlines, China Southern Airlines and Air China, US Census Bureau, International Programs Center, International Data Base, Morgan Stanley Research Estimates

Progressive Liberalization in Asia Pacific

Liberalization has also begun to take shape in Asian skies. Progressive liberalization of Asian skies is anticipated to follow a process similar to the deregulation experience of the United States and European aviation skies. ASEAN skies will be liberalized in 2008, and

Thailand and China reached a similar liberal bilateral agreement in 2004. Malaysia and Hong Kong also signed an open capacity agreement for both passenger and cargo flights to operate between the two countries. It is likely that there will be further moves to liberalize traffic rights as other Asian countries explore either open skies or generous bilateral rights arrangements in line with the expansion of market demand. South Asia also appears to be making some gestures towards aviation liberalization. India achieves major milestones in its aviation history when it signs liberalized aviation agreements with China, UK, and US earlier this year. The political forces have wake up to the potential benefits of increased trade and travel as the airline industry becomes more liberalized. A recent study of specific markets around the world that have been liberalized showed that this typically stimulates immediate growth of around 12-35 percent.

Rapid Growth for Low cost Airlines

Two of the world's most populated countries with huge domestic markets, India and China, could provide significant growth opportunities for low cost airlines. North Asia, however, remains a difficult market for low cost airlines to penetrate but this perception could change over time as North Asian governments examine the tradeoff between lost benefits of tourism dollars and restrictive bilateral aviation policies.

To take advantage of market liberalization in the Asian skies, LCCs in Asia Pacific have placed large narrow-body aircraft orders for delivery over the next five years. Based on the announced aircraft orders, it is anticipated the aircraft fleet for Asia Pacific LCCs will more than double to 463 aircrafts in 2008 from 209 aircraft in 2004. If the announced but not yet firm aircraft orders are factor in, the number of aircraft increases to 555 and could

be higher over the next 12 months as more LCCs enter the market. For India, it is determine that there will be 224 aircraft in 2008 with the announced start up of at least 6 new airlines, compared with only 12 aircraft in 2004. This is with the assumption that all aircraft orders by Indian LCCs are taken up.

As Asian skies are liberalized, we project passenger growth for the Asia Pacific market could increase at a rate of 7.5% a year for the next five years, assuming there are no external macro shocks to the airline industry. It is anticipated that low cost airlines will drive the growth with new first time travelers, and a study by Morgan Stanley's simulation model projects a CAGR of 20% for the next five years. The huge increase in narrow-body aircraft ordered supports the 20% growth forecast in passengers carried but the impact of lower fares and yield, especially on the short-sector flights, will be negative for full-service carriers.

The sharp increase in LCCs in the Asian aviation market as a result of progressive deregulation will drive strong passenger growth for the coming years. Morgan Stanley estimated recently that 5.1 percent of Asia Pacific population would be traveling by air by 2010, and this implies a CAGR of 7.5% for the next six years (Exhibit 14).

Exhibit 14

Base Case scenario: Target 5.1% of Asia Pacific Population Travel by Air

	Asia Pacific Population	% Population travel	Passenger Carried	% Growth
2003P	3,589	3.44%	282	2.6%
2004P	3,628	3.53%	293	3.9%
2005E	3,668	3.74%	313	6.8%
2006E	3,708	3.98%	337	7.7%
2007E	3,749	4.26%	365	8.3%
2008E	3,790	4.55%	394	7.9%
2009E	3,832	4.83%	423	7.4%
2010E	3,874	5.10%	451	6.6%
CAGR 2004-2010 (%)	1.1%		7.5%	

Note: Population projected based on US Census Bureau 2000-2010 Asia population growth rate estimate of 1.1%

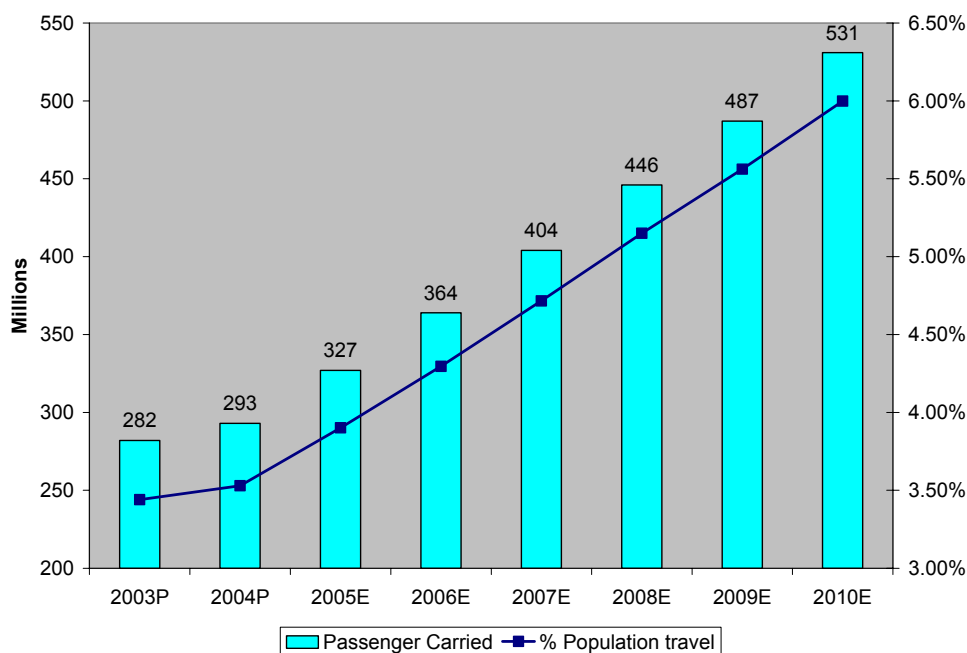
E= Estimate

Sources: AAPA, US Census Bureau, International Programs Center, International Data Base, Morgan Stanley

The base case indicates the number of passengers in Asia Pacific could reach 451 million in 2010. Under the best case, there is an upside of 531 million passengers based on 6.0% of the Asia Pacific population traveling by air that implies a CAGR of 10.4% (Exhibit 15).

Exhibit 15

Best Case Scenario: Target 6% of Asia Pacific Population Travel by Air

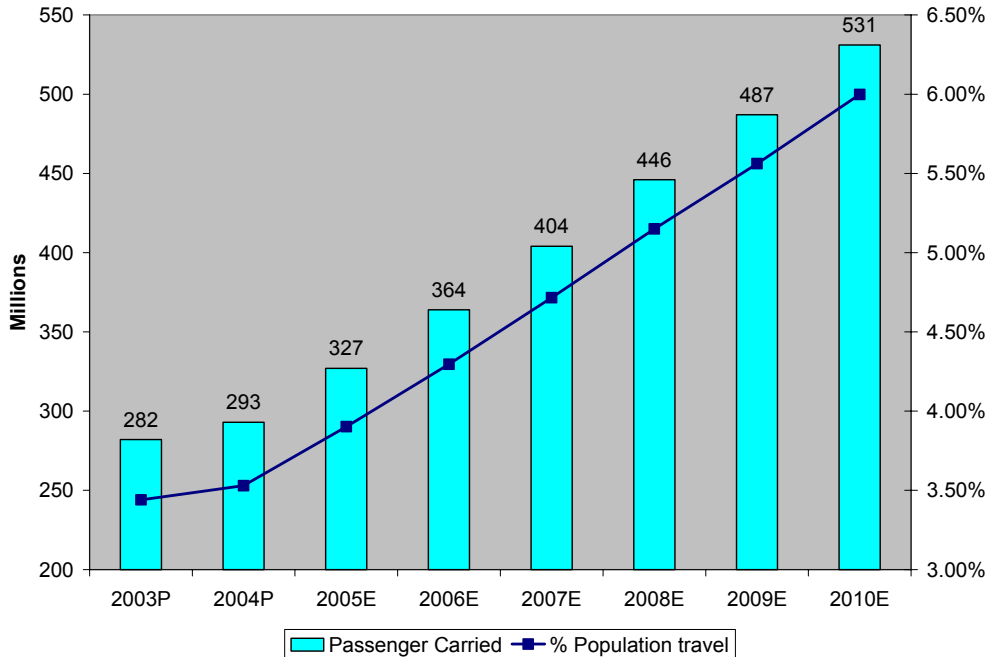


Note: Population projected based on US Census Bureau 2000-2010 Asia population growth rate estimate of 1.1%
 E= Estimate
 Sources: AAPA, US Census Bureau, International Programs Center, International Data Base, Morgan Stanley Analysis

In the event of a slowing global economy, the worst case is for 372 million passengers, based on 4.2% of the Asia Pacific population traveling by air which implies a CAGR of 4.0% (Exhibit 16).

Exhibit 16

Worst Case Scenario: Target 4.2% of Asia Pacific Population Travel by Air



Note: Population projected based on US Census Bureau 2000-2010 Asia population growth rate estimate of 1.1%

E= Estimate

Sources: AAPA, US Census Bureau, International Programs Center, International Data Base, Morgan Stanley Analysis

Projected Market Potential for LCCs

For the next six years (2004-2010), the number of passengers for the Asia Pacific aviation market could increase to a range of 372 million and 531 million, or an implied annual compounded growth rate (CAGR) of 4-10%, from an estimated base of 293 million in 2004. For the past six years (1998-2004), the CAGR for Asia Pacific passengers was 3.2%. Full-service carriers drove the growth rate because low cost airlines did not have a meaningful presence in Asia prior to 2004. For the past four years (2000-2004), the CAGR was higher at 4.3%. The normalized passenger growth rate for full service carriers is about 6-7% (versus the sub-par growth rate of 3.2% of the past six years), if the

external macro shock events of the Asian economic crisis (1997/98), 9/11 terrorist attacks (2001) and the SARS outbreaks (2003) were excluded. With the assumption of full-service carriers growing at an annualized rate of 6.5% for the next six years (2004-2010), this would mean that the LCCs would potentially grow at a CAGR of 20.5% and would increase the market share of an estimated 5.4% in 2004 to 11.1% by 2010, based on Morgan Stanley base case scenario (Exhibit 17).

Exhibit 17

Asia Pacific LCC Market Share

	Passengers Carried (Mil)		Market Penetration*
	Network	Low Cost	
2004	278	15	5.40%
2005	296	17	5.74%
2006E	315	21	6.67%
2007E	336	29	8.63%
2008E	358	36	10.06%
2009E	381	42	11.02%
2010E	406	45	11.08%
CAGR 2004-2010 (%)	6.5%	20.5%	

* Includes the low cost airlines in Australia

E = Estimates

Sources: Morgan Stanley

In contrast, the passenger market shares of LCCs in the US and European aviation markets were about 16% and 23%, respectively, in 2004, according to Airbus' estimates (Exhibit 7). In the four European countries where LCCs have dominant market shares the UK, Italy, Germany and France the estimated shares for LCCs are about 19% of the domestic market and 24% of the intra-European routes. The UK market has the highest market penetration by LCCs in Europe 31% for the domestic market and 35% for the intra-Europe market and this can be attributed to the highly successful strategies of Ryanair and easyJet.

Conclusion

Asia Pacific, a far-flung region that stretches from Northeast Asia to New Zealand and across to India, which accounts for 56% of the world population and favorable macro environments coupled with a large growing affluent population will fuel new demand for discretionary travel. Asian LCC with the right business model and strategies will definitely ride on this huge potential for discretionary air travel and emulate the success exhibit in North American and Europe. Although the pace of bilateral liberalization is spreading at a much slower pace than in other markets around the world, the emergence of low cost carriers in Asia Pacific is accelerating this trend.

Within Asia, China and India could provide a bright prospect for budding LCC entrepreneurs. Many aspiring entrepreneurs have place big orders for airplanes to start LCC operation there. In 2004, it is estimated that the passenger market share for low cost airlines in the Asian aviation market was about 2-3%. If Australia is included, the market share is estimated to be about 5%. The low-cost airlines could increase their share of the Asia Pacific aviation market, which includes Japan and Australia to about 11% in 2010, and could reach higher rates if external macro environment remains favorable. This is very conservative outlook compares with current rates of 23% for Europe and 16% for the US market in 2004. The combination of progressive liberalization, vast growing affluent population, improve airplane capabilities will shape the airline strategies going forward.

The next chapter will examine the type of airplane used by LCC and what the future look likes for the two dominant aircrafts manufacturers who have employed a combination of product and marketing strategies to race against each other to become the supplier of

choice for this market segment. It will also review the future aircraft deliveries to various LCC operators.

Asia Pacific Airlines Fleet Analysis

Introduction

This chapter will examine the aircraft deliveries to various LCC operators and the aircraft market trend. This will help to understand the potential beneficiaries of LCC growth in later chapter. In 2004, the Asia Pacific traditional full-service airline industry, excluding airlines in China, operated a fleet of 1,177 aircraft. The growth in aircraft numbers for Asian airlines has been in the low single digit since the Asian economic crisis in 1997. This is due in parts to Airlines accelerating the retirement of older inefficient aircraft to cut capacity in the aftermath of September 11th terrorist attacks in 2001 and SARS outbreak in 2003. Overall in the past ten years from 1994-2004, the average annual compounded growth rate (CAGR) was 2.1% for the Asia Pacific passenger plane fleet (Exhibit 18).

Exhibit 18

Asia Pacific Passenger Plane Fleet – 1994-2004

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	CAGR 94-04
Aircraft	964	1,014	1,100	1,153	1,181	1,198	1,133	1,180	1,128	1,145	1,177	2.1%
% Change		5.2%	8.5%	4.8%	2.4%	1.4%	-5.4%	4.1%	-4.4%	1.5%	2.8%	
Seat Capacity (E)	257,311	280,478	303,811	320,762	323,799	322,465	321,980	333,934	322,775	327,607	331,949	2.6%
% Change		9.0%	8.3%	5.6%	0.9%	-0.4%	-0.2%	3.7%	-3.3%	1.5%	1.3%	

Source: AAPA E=Estimate

In terms of aircraft seats capacity added over the past ten years, it is estimate the CAGR was about 2.6%, and higher than the aircraft growth rate of 2.0%, due to the strong growth in the number of wide body airplanes in the region. More interestingly, over the

past five years (1999-2004), the number of passenger aircraft dropped by 1.8% to 1,177 while the total number of estimated seats rose by 2.9% to 331,949 in 2004.

In the next four years from (2005 to 2009), the full-service carriers are to add 284 aircraft, or a CAGR of 5.5%. Based on the announced aircraft orders, LCCs will add 246 aircraft for a CAGR of 20.5% (Exhibit 19). One of the two major LCCs in Singapore, newly merged JetStar (Ex-JetStar Asia & Valuair) have yet to announce their aircraft order plans, and the aircraft order book could swell considerably if they start to order new airplane. Moreover, with more new entrants in India and China, more recently, in Korea, we believe the potential new aircraft orders from LCCs will be higher than the 20% growth rate that is based on announced orders data tracked by ACAS.

Exhibit 19: Asia Pacific Aircraft Fleet – 2004-2009E

Asia Pacific Aircraft Fleet - 2004-2009E

	2004	2005	2006E	2007E	2008E	2009E	04-08E CAGR
Network Carrier	1,177	1,197	1,294	1,363	1,423	1,481	5.5%
Low Cost Carrier	209	277	351	409	463	525	20.5%
Total	1,386	1,474	1,645	1,772	1,886	2,006	
Network Carrier	84.9%	81.2%	78.7%	76.9%	75.4%	73.8%	
Low Cost Carrier	15.1%	18.8%	21.3%	23.1%	24.5%	26.2%	

Source: AAPA, ACAS

More Good News at Air Show

At the recent Farnborough Air Show in July 2006, Lion Air, a low cost airline in Indonesia, announced an order for another 30 B737-900 aircraft for US\$2.2 billion. The airline placed an initial order for 30 aircraft back in July 2005 and this brings their total order to 60 aircrafts. Lion Air will receive their first aircraft from 2007 onwards.

Malaysia AirAsia, the region fastest growing successful low cost airlines also placed an additional order for 40 A320s. This brings their total orders for the A320 family aircraft to 100, and estimated to worth US\$6.4 billion at catalogue price. Another low cost airline, Go Air, a new LCC start up in India, also placed an order for 10 A320s. Earlier this year, Virgin Blue, the early LCC entrant in Asia, has exercised its purchase rights for another additional 9 B737-800 to expand its fleet. SpiceJet, another low cost airline in India, also announced at the show for an order for 10 B737 next generation aircraft.

Aircraft Lessors Riding on LCC Boom

As of June 2006, there are 28 LCCs operating in the Asia Pacific market (see Appendix 1 for the list of LCCs) with 279 aircraft, and the number of LCCs and aircraft orders has been rising, as more LCCs enter the market and order more aircraft. About 75% of the LCC aircraft are on operating leases, and the relatively high number of operating leased aircraft suggests a low level of upfront capital and plays a part for the relative ease of establishing new LCCs in the Asia Pacific aviation market. This compares with only 39% of the narrow-body aircraft on operating leases for Asia Pacific airlines.

The number of LCCs in Asia had risen to about 26 at the end of 2005 and this could be higher if we include China LCC. At the latest tally exercise in June 2006, the 28 LCCs exclude associates or subsidiaries of the parent company. For example, Thai AirAsia and Indonesia AirAsia are associates of AirAsia, and JetStar Asia has common parentage with JetStar in Qantas. With an operating aircraft fleet of 209, the LCCs had about 15% of the aircraft fleet in Asia Pacific at end of 2004 (Exhibit 19). However, as the LCCs operate

with smaller narrow-body aircraft, it is estimate the market share for LCCs, based on available seats, is only about 8%.

Up till the end of Farnborough Air Show 2006, the announced aircraft fleet by both full-service and low cost carriers is estimate that the LCCs will have about 26% of the aircraft fleet by 2009 (Exhibit 19). If major LCCs in Singapore such as JetStar and other regional LCC start-ups begin to order new aircraft, it is not hard to imagine that the aircraft fleet operated by the LCCs could expand to a market share in excess of 26% on the Asia Pacific aircraft fleet in 2009. At the Paris Air Show in 2005, the Indian airline carriers placed orders for 213 aircraft valued at US\$23.9 billion from Airbus, Boeing and Empresa Brasileira de Aeronautica, making the country the biggest buyer of planes in the region. Kingfisher Airlines and other low cost airlines in India made up 28% of the aircraft orders and commitments for Airbus and Boeing planes.

Shift in Low Cost Airlines Aircraft Choices

The top six LCCs in Asia Pacific, AirAsia, Virgin Blue, Air Deccan, IndiGo, Cebu Pacific and the restructure JetStar are expected to have 294 aircraft (or 69% of the LCC aircraft fleet in 2009 and beyond, up from 118 aircraft or 56% of the aircraft fleet in 2004 (Exhibit 20). Two of the top six LCCs, Cebu Pacific and Air Deccan currently use a majority of smaller DC9 and ATR42/72 aircraft, respectively, in contrast to the standard and more efficient B737 or A320 aircraft operated by the LCCs in US and European markets. However, this trend of using smaller aircraft in Asia will gradually change as the airport infrastructure are upgraded and both Cebu Pacific and Air Deccan take delivery of 14 A319/A320 aircraft and 51 A320 aircraft, respectively, by 2009.

Exhibit 20

Top LCC Fleet in Asia, 2005-2009E

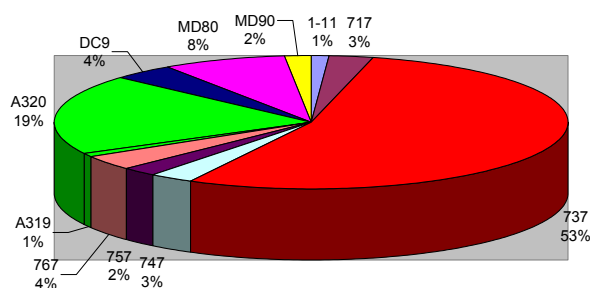
Operator	2005	2006E	2007E	2008E	2009E
AIR DECCAN	7	20	31	41	51
AIRASIA	21	32	44	56	76
THAI AIRASIA	10	10	10	10	10
INDONESIA AIRASIA	4	6	6	6	6
CEBU PACIFIC AIR	18	20	22	22	22
INDIGO	0	6	15	23	29
JETSTAR	33	38	40	40	40
VIRGIN BLUE AIRLINES	47	47	47	53	60
Total	140	179	215	251	294

Source: ACAS, 2006

In 2005, the LCCs in Asia Pacific operated with more B737 than A320 family type of aircraft (Exhibit 21). Boeing aircraft accounted for 53% of the 277 aircraft operated by the LCCs while Airbus had only about 20% share of the Asia Pacific market. The B737 aircraft dominated Asia Pacific LCCs with 149 aircraft or 53% of the market in 2005, with Virgin Blue and AirAsia being the key customers for the B737 aircraft.

Exhibit 21: Asia Pacific Fleet Composition in 2005

Asia Pacific LCC Fleet Composition in 2005

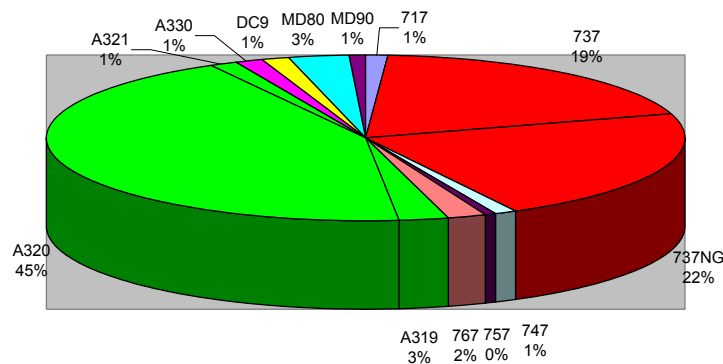


Source: ACAS, 2006

However, when the recent aircraft orders by the Asian low cost carriers are added, it is projected that Airbus will overtake Boeing to be the narrow-body aircraft of choice after 2009 (Exhibit 22) in Asia Pacific. Based on ACAS database, Airbus will have 49% of the market share in 2009, operating 250 A319/320/A321 aircraft among 525 aircraft. Boeing will probably see its market share of B737 diluted to 41%.

Exhibit 22: Asia Pacific Aircraft Fleet Composition in 2009E

Asia Pacific LCC Fleet Composition in 2009



Source: ACAS, 2006

The possible reason for Airbus success in the Asia Pacific low cost airline market is due to the aggressive use of lessors to promote the A320 aircraft to new LCC start-ups. As indicated in Exhibit 23, seven of the new Asia Pacific LCCs in 2004 leased the A320 aircraft from various leasing companies before ending up purchasing the A320 aircraft to fuel their growth expansion. Boeing on the other hand, is not going to concede defeat as yet as the orders books is beginning to fill up again in the recent Farnborough Air show. Boeing is aggressively marketing their B737 Next-Generation aircraft. Boeing believe

their product is more superior as it is at least 10 years younger than the A320 and therefore the B737NG offer the customer with more advance technologies, lower operating costs, greater range, faster cruise speed and a new interior.

Exhibit 23

Low Cost Carrier Utilized Lessors Aircraft during Launch Phase

Operator	Leased		Owned		Grand Total
	A319	A320	A319	A320	
AIR DECCAN		14			14
GOAIR		3			3
JETSTAR ASIA AIRWAYS		4			4
KINGFISHER AIRLINES	3	7	1	1	12
STAR FLYER		3			3
TIGER AIRWAYS		6			6
VALUAIR		4			4
Grand Total	3	41	1	1	46

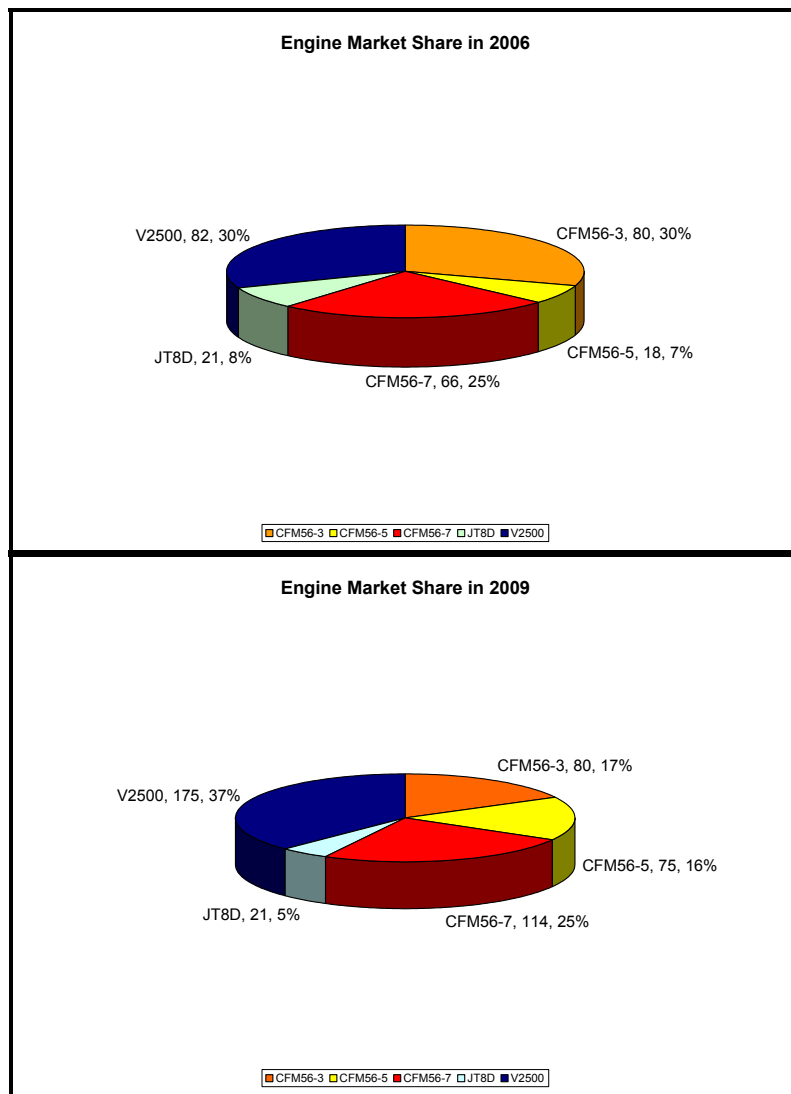
Source: ACAS, Hamilton Sundstrand Analysis

Narrow-Body Aircraft Engine Choices

Boeing B737 and B737NG are power by CFM company CFM56-3 and CFM56-7 engines respectively. CFM international is a joint venture company between Snecma, France and General Electric Co., U.S.A. While the Airbus A320 aircraft has a choice of engine configuration and is power by either the CFM56-5 or International Aero Engine (IAE) V2500 engine. IAE comprises a few shareholders, Pratt & Whitney; Rolls-Royce; Japanese Aero Engines Corp. (JAEC); and MTU Aero Engines. The partners signed an agreement in 1983 to develop and produce turbofan engines known as the V2500 family. The growth of LCC has brings cheers to these 2 engines companies. Currently IAE has 82 engines flying on the A320 family aircraft on various LCCs (exclude China), and CFM has only 18 engines in operation (Exhibit 24). In 2009, IAE will have 175 engines in

operation as compared to CFM engine population of 75 on the A320 aircraft. When the recent aircraft orders by the Asian low cost carriers are added, it is projected that CFM will have a huge lead over IAE and becomes the narrow-body aircraft engine of choice with a total population of 269 engines by 2009 (Exhibit 24). Based on ACAS database, CFM will have 58% of the market share in 2009, while IAE will have 37%.

Exhibit 24: Engine Market Share in 2006 vs. 2009



Source: ACAS, Hamilton Sundstrand Analysis

Conclusion

Low cost carriers accounts for about 8% of the available seats in the Asia Pacific aviation market and about 15% of the aircraft market share. However, LCCs are to put aircraft into service at about four times the rate of the full service network airlines over the next four years (2005-2009) and are expected to account for about 26% of the aircraft fleet by 2009. This market trend will greatly benefit the aerospace industry suppliers and aircraft lessors. Aircraft manufacturer such as Airbus and Boeing, with well position product lines will continue to grab the lion share of the aircraft orders. Downstream suppliers to the aircraft manufacturer such as manufacturers for aircraft engines and aircraft systems will benefit as well. For the narrow-body aircraft engine manufacturer, it is projected that both International Aero Engine and CFM International will benefit greatly from the LCC boom with market share of 37% and 58% respectively. As more and more LCCs enter the profitable Asia Pacific market or expand their fleet to build economy of scale, there could be great prospect for the aerospace vendors to see a much higher number of aircraft deliveries, exceeding the annualized growth rate of 20%.

Review of Asian Aviation Regulatory Framework

Introduction

Today commercial aviation market is still governed largely by outdated regulatory framework laid down in the post World War II era. Despite today's trend toward globalization and economic integration, one of the most globalize, technologically driven industries remains laden by regulations that suppress competition. This did not allow value surpluses created to be passed on to airlines, communities, and passengers. The bilateral air service agreements that continue to regulate much of international commercial aviation define how the airlines will link their two home territories. These barriers often restrict market growth, force consumer to pay a premium for air services, and create a series of vested interests.

With great foresight and leadership, United States domestic airline industry was the first to undergo dramatic changes through the enactment of the Airline Deregulation Act in 1978. This led to a large increase in the entry of new airlines, a remarkable change in existing airlines' route and fare structures, and a notable increase in the use of air travel services. Two important amendments were made which transformed the US Airline industry. First, airlines have the liberty of entry and exit on domestic routes. Second, airlines were given total autonomy to set fares. After having operated in a tightly regulated industry structure, the airline suddenly had to adapt quickly to an intensely competitive market. The Airlines' lower cost structures, more creative management, and more efficient aircraft fleets allowed these airlines to ride successfully over the storm in the early years. European enjoyed similar benefits when their airline industry marched

towards deregulation in the 1990s. However, long protected national flag airlines were not so fortunate and some even succumbed to the competitive pressure. Asian governments in the region recognize the benefits of liberalized air services. Unfortunately, the varying degrees of economic development in different countries also place various pressures on governments, limiting their ability to liberalize their air transport markets effectively.

Australia vs. Japan Liberalization Experience

Australia and New Zealand concluded a Single Aviation Market (SAM) agreement, effective as of November 1, 1996. The goal of SAM was to bring the two countries closer together within the elements of the Australia-New Zealand Closer Economic Relations Free Trade Agreement or ANZCERTA. While the SAM agreement opened up many new opportunities within the Trans-Tasman market, it did not deal with beyond markets to third countries. Those markets were still under the original 1961 Australia – New Zealand Air Services Agreement and the subsequent 1992 Memorandum of Understanding. Two different definitions of air carriers were created from the agreement: the “Domestic” and the “SAM” airline. The Domestic airline designation allowed carriers to fly domestic services in each others domestic market and the SAM designation harmonized ownership, control, technical and safety certifications from each countries regulatory agencies. The slow but progressive liberalization in Asia has been instrumental in attracting new low cost airlines into the Asia Pacific aviation market. Since the establishment of SAM in 1996, the liberalization of the Asia Pacific market has been slow but gradual, with Japan opening up the domestic market in 1996 and the premature deregulation of some ASEAN markets in 2004.

The formation of the single Australia/New Zealand aviation market led to some consolidation and resulted in the acquisition of Ansett Australia by Air New Zealand in 2000. The Air New Zealand/Ansett combination, supported by a 25% strategic equity investment in Air New Zealand by Singapore Airlines (SIA), was a serious threat to Qantas. However, due to the complicated regulations and political inertia, the SIA group was not allowed to increase its stake in the enlarged Air New Zealand group to a more significant controlling position. This probably led to the eventual demise of Ansett Australia in September 2001 and created a vacuum in the Australian market. After the collapse of Ansett Australia, it created an opportunity for Virgin Blue to progress and becomes the second dominant carrier in the domestic Australian market.

The new airline, Virgin Blue, has a lower comparative operating cost advantage over Ansett and Qantas and quickly gain market share. Prior to the entry of Virgin Blue, the Australian domestic market was operated as a duopoly by Qantas and Ansett Australia. The high operating cost structure of Ansett, high aircraft leased operating charges and expensive unionized labor costs, made it very difficult for Ansett to remain profitable when the low cost model hit the Australian marketplace with vengeance in 2000. The entry of low cost competitors such as Virgin Blue and Impulse and the aggressive fare discounting in the domestic market in early 2001 made it enormously difficult for Ansett Australia to stay afloat. Coupled with the dramatic September 11th event that caused Ansett and many other airlines to bleed their cash flow at a profusely fast rate due to the sudden downturn in international travel, the airline has no choice but to declare bankrupt.

In Japan, the deregulation in 1986 did not create any real impact until the introduction of discount carriers in the domestic market in 1997. Deregulation did not create competition within the Japanese aviation market, but it merely reallocate both domestic and

international market shares among JAL, ANA and, to some extent, Japan Air System (JAS). The three operators behave rationally and expand their capacity in a systematic fashion to attain a reasonable traffic growth and profit levels. The domestic market did not get a shakeup till late 1996, when the Ministry of Transportation approved the opening of new start up airlines in the domestic market. In late 1997, two new carriers, Skymark Airlines and Hokkaido International Airlines (also known as Air Do), began offering low fares on domestic routes.

Liberalization in the domestic Japanese aviation market has not accomplished the desired effect as compared to the Australian aviation market. The two major surviving low cost airlines, Skymark and AirDo, and the third LCC Skynet Asia, which enter the market in late 2002, have not been successful in penetrating the domestic market. Their combined market share is a measly 3.3% as of fiscal year 2003 (Appendix 4) and the main reasons are the limiting slots in the Japanese airports and the prevailing control of the incumbent network airlines at the airport gates. The merger of JAL and JAS also consolidated the incumbent airlines position in the domestic market with both ANA and JAL now controlling more than 96.7% of the domestic market.

ASEAN Air Transport Market

The Association of Southeast Asian Nations or ASEAN was established on 8 August 1967 in Bangkok by the five original Member Countries, namely, Indonesia, Malaysia, Philippines, Singapore, and Thailand. Today ASEAN has grown to a 10 nations grouping with the addition of Brunei, Cambodia, Vietnam, Myanmar and Laos (exhibit 25).

Exhibit 25

ASEAN Map



Source: www.aseansec.org

The ASEAN region has a population of about 500 million, a total area of 4.5 million square kilometers, a combined gross domestic product (GDP) of almost US\$ 700 billion, and a total trade of about US\$ 850 billion (See appendix 5 for breakdown by countries). This statistics present a huge growth potential for intra-ASEAN air transportation. The formation of an ASEAN Economic Community to promote free trade within the ASEAN market will be the end-goal of ASEAN economic integration as outlined in the ASEAN Vision 2020, a process similar to the North American Free Trade Agreement (NAFTA, US-Mexico-Canada free trade area) and the European Economic Union (or EEC in

Europe). Its goal is to create a stable, prosperous and highly competitive ASEAN economic region in year 2020.

ASEAN attaches great importance to enhancing infrastructure and communications connectivity in the realization of the ASEAN Economic Community (AEC). The AEC's 11 priority sectors in regional integration include air travel and tourism. In November 2004, the 10 ASEAN member countries signed a road map for the integration and liberalization of air transport in Southeast Asia under the ASEAN Framework Agreement for the Integration of Priority Schedules (ASEAN 2004). The deregulation of air services is part of the ASEAN Transport Action Plan to improve the region's air transport infrastructure and logistics network. Article 10 of the Framework Agreement provides for expediting the development of integrated transport logistics services within ASEAN, particularly for cargo transportation. The more relevant Article 11 provides for the facilitation of travel in ASEAN. To hasten the travel process, member countries shall harmonize the procedures for the issuance of visas to international travelers in ASEAN in late 2004, and have provided visa exemptions for intra-ASEAN travel by ASEAN nationals in 2005.

To achieve an integrated economic community within ASEAN, the following steps have been developed:

- setting clear targets and schedules for services liberalization for each sector and each round to achieve the free flow of trade in services with the end date earlier than 2020,
- accelerate services liberalization earlier than the end date by countries which are ready, through the application of the ASEAN-X formula;
- accelerate regional integration in the 11 priority sectors which ASEAN enjoys competitive advantage;

- accelerate liberalization in these priority sectors by 2010 and promote joint ventures and cooperation, including third country markets; and
- facilitate the movement of business people and tourists. Air travel is one of the 11 priority sectors that the 10 ASEAN member governments have agreed to liberalize at a faster pace in a bid to create an ASEAN Economic Community by 2020. ASEAN members recently endorsed a road map for the integration of the air travel sector, which targets full liberalization of cargo services and unlimited direct operations to ASEAN capitals by December 2008.

The ASEAN Transport Ministers fully recognize the benefits of liberalized air services and supported the view that this is the key for ASEAN to integrate with the global economy, improve competitiveness and enhance the inflow of foreign direct investment. Moreover, the Ministers will work towards developing a regional action plan for staged and progressive implementation of open-sky arrangements in ASEAN-member countries.

One of the key action points highlighted in the ASEAN Transport Action Plan for 2005-2010 is “promoting open sky arrangements by building upon the Roadmap for Integration of ASEAN (RIA) for ASEAN Competitive Air Services Policy, including exploiting the potential of full air freight services liberalization, through plurilateral or multilateral basis, to support increased intra-ASEAN travel, trade and investment (Article 14d).” The key initiatives will be for ASEAN-member countries to open up their skies for both cargo and passenger services from 2006 (see Appendix 5 for the Roadmap for Integration of Air Travel Sector).

For passenger services, the liberalization of the ASEAN aviation market will begin with opening fifth freedom or beyond right traffic for all designated points within the ASEAN sub-regions. Simply put, there will be no restriction on the number of flights for an ASEAN airline to pick and drop passengers from the designated points in the ASEAN sub-regions by 2006. Fifth freedom traffic is not ideal for LCCs but favors the network carriers. The liberalization of the ASEAN skies also allows unlimited third and fourth freedom traffic (home country to another country and vice versa) for at least two designated points in each country between the ASEAN sub-regions at the end of 2006. To illustrate, any airlines based in Singapore or in Thailand can operate the Singapore-Phuket route, and the number of flight frequencies will depend on the airport slot availability than on the restrictive bilateral rights. Point-to-point operations (or third and fourth freedoms) are ideal for LCC. A detailed definition of freedom traffic for airlines, have been attached in Appendix 7.

In 2008, the unlimited point-to-point operation will extend to the capital city in each ASEAN member country. An interesting development would be the Kuala Lumpur-Singapore route, currently one of the most profitable in Asia for both Malaysia Airlines (MAS) and Singapore Airlines (SIA). The liberalization of third and fourth freedom traffic could entice the entry of low-cost airlines into this sector and drive down the yield for this route. In 2010, further liberalization of the ASEAN skies will lead to unlimited fifth freedom traffic for the capital city in each ASEAN member country.

Many multilateral agreements have been made between member countries in preparation for air transport liberalization. Cambodia, Laos, Myanmar and Viet Nam signed an agreement on air transport in Hanoi in late 2003. Brunei Darussalam, Singapore and

Thailand have also reached an agreement on full liberalization of air transportation in late 2004, ahead of the other members of ASEAN. The agreement allows airlines based in the three countries to operate any number of passenger flights between the three countries. The competition has led to a sudden increase of inexpensive flights between Thailand and Singapore. The “2-plus X” approach, as outlined in the ASEAN Transport Action Plan, enables two or more ASEAN member countries to proceed ahead if they are prepared to do so earlier than the other member countries. The three-way pact between Singapore, Thailand and Brunei demonstrate this approach and will allow the liberalization target to be achieved four year ahead of the other member countries.

Air cargo operators have been constraint by the current approach of regulating flights in terms of aircraft capacity, frequency and routing. This does not provide the operational flexibility that they seek. In view of this, four ASEAN members, which include Thailand, Brunei, Singapore and Cambodia, signed a multilateral air cargo open-skies agreement that will allow the four countries to operate unlimited all-cargo services among the countries, to any third country. Member countries will achieve full liberalization of airfreight services by 2008.

Malaysia-Singapore skies are also heading for open sky before 2008. Malaysia and Singapore have both welcomed the imminent opening up of two-way air routes, seeing mutual benefits in such a development (CNA, 2006). The Kuala Lumpur-Singapore city pair route is one of the most protected and lucrative routes in Asia. It has one of the highest passenger yields (estimated at US\$0.20/RPK) in Asia. The existing air fare costs over US\$240 for a round trip. Two national flag carriers, MAS and SIA, dominate the Kuala Lumpur-Singapore route with 84% of the 184 weekly flights. In contrast, the

Singapore-Bangkok sector has 380 weekly flights and fares (starting as low as US\$100 for a round trip) between the two cities have decrease dramatically since the entry of low cost airlines such as Tiger Airways, Thai AirAsia and JetStar. Low cost airlines from both sides, Malaysia's AirAsia and Singapore's Tiger Airways, have both indicated interest in flying the busy Kuala Lumpur-Singapore air route and could erode the high yield for this route. To protect themselves ahead of the open skies in 2008, three Airlines, SIA, MAS and SilkAir have signed a code sharing agreement for expanded access between Singapore and four Malaysian states.

An exception to the liberalization is the Philippines. The country requires more time to comply with the air transport integration and liberalization program among ASEAN members. The Philippines has applied for the ASEAN-X protocol, which allows ASEAN member flexibility in complying with the terms of the air transport program. The airlines based in the Philippines have called on the government to delay opening its skies to foreign carriers before they become competitive.

Overall, the ASEAN countries are largely liberalizing the international bilateral agreements that would allow the regulation of the number and type of aircraft, number of seats provided and the fare pricing levels. Recent liberalization trends also cover Thailand and China, which have adopted an “open-skies” agreement, allowing unrestricted operations between the two countries, while Singapore, Thailand and Brunei are negotiating a multi-lateral “open-skies” agreement for passenger flights.

South Asia Transport Market

Liberalization in South Asia is also emerging. India appears to be making some progress on this issue, customarily a laggard behind their more dynamic counterparts elsewhere in Asia. Earlier this year, India accomplished major milestones in its aviation history when it signed liberalized aviation agreements with China, UK, and US. Reflecting the new mood of optimism, significant orders for new aircraft deliveries were placed with the two major airplane makers by new entrant airlines. Gradual capacity growth has been observed between India and key ASEAN cities due to the constraint in airport capacity and other bottlenecks. Foreign airlines still do not have free market access in India, while bilateral liberalization appears to be highly selective.

China's Progressive Market Deregulation

Deregulation of China aviation market has gathered pace since late 2003. In 2004, we saw China ease bilateral restrictions considerably with major Asian countries, including Singapore, Malaysia, Thailand, South Korea, Australia and Japan, as well as with the US and Hong Kong (See appendix 8). These liberalized air service agreements include expansion of passenger and cargo frequencies, provision for multiple carrier designation, and improved access to Chinese destinations for participating airlines. The enlarged capacity is strongly sought after by the aviation market players. This could potentially drive the fares lower and result in a decrease in yield for the airlines. However, higher traffic to and from major Chinese airport hubs will more than compensate for the lower yield.

Asia is lifting travel restrictions for its populace progressively, particularly for China which relaxes the restrictions for its citizens to travel by raising the number of exit visas issued for independent and group travel. On May 2, China's Taiwan Affairs Office of the State Council granted approval for Chinese tourists to visit Taiwan, starting with a daily quota of 1,000 persons per day (or 365,000/year) and increasing to 3,000 persons per day (or 1 million/year) in a few years. The liberalization of China's aviation market will be a significant boost to Asia Pacific airlines and a potential goldmine for the low cost airlines. As reported by Xin (2006), China will open more overseas and domestic air routes to meet traffic demands in the run-up to, and during the 2008 Olympic Games. Currently, there are 186 flights from Beijing Capital International Airport to Japan and 154 flights to South Korea each week, and the number for these two countries and other Asian nations is expected to soar by 2008.

North Asia Market – Difficult for LCCs

In Asia Pacific, Japan was among the first countries to promote low cost airlines. However, the market penetration for the three LCCs is only 3.3% after more than five years of operation. Skymark Airlines, which was established in 1996 and is currently Japan's largest discount carrier by market share reported its first annual net profit only in the year ended 31 October 2004. Hokkaido International Airlines (Air Do), based in Sapporo, is undergoing a corporate rehabilitation process and entered into a comprehensive alliance with All Nippon Airways to help the carrier restructure. The third low cost operator, Skynet Asia commenced domestic services in Japan in August 2002, but has encountered financial difficulties and is currently restructuring with support from the state-backed Industrial Revitalization Corp. In South Korea, two LCCs (Jeju Air and

Hansung Airlines) have announced plans to provide domestic flights in Korea using ATR and Bombardier aircraft, with the longer term goal of providing regional flights to China and Japan. The business models and goals of these two Korean LCCs look ambitious, given the tough competition the low cost airlines will face from Korean Air and Asiana Airlines. Low cost airlines faces immense difficulty in competing with the incumbent network airlines due to the restrictive bilateral agreements in North Asia, high airport landing fees, high labor costs (particularly pilots) and the dominance of incumbent carriers in the respective home markets.

Within the Pearl River Delta region, which include Special Administrative Region of Hong Kong and Macau, and the eight prefectures of Guangdong province, lays an alternate gateway to Hong Kong and into China, i.e. Macau. The airport in Macau could evolve to become a major threat for the North Asian network and full service airlines if the LCC model established a foothold there. Two Asian LCCs, Air Asia and Tiger Airways, have already initiated flights into Macau. Both LCCs have intention to expand their North Asian regional presence by establishing a hub in Macau. If Macau becomes a new hub for low cost airlines, the North Asian full-service airlines could face the same passenger yield pressure as experienced by other deregulated regions.

Exhibit 26

Map of Pearl River Delta Region



Source: www.wikipedia.org

On June 20, 2005, Singapore reached a deal with Hong Kong to allow unlimited passenger flights between the two cities. The deal falls short of an open skies agreement, which would allow airlines to pick up passengers in Hong Kong and fly them to other destinations. The five carriers, which include SIA, Cathay Pacific Airways, JetStar (include Valuair), China Airlines and United Airlines currently operate 238 weekly passenger flights between the two cities. The new aviation deal will be a significant boost for low cost airlines to expand flights between Singapore and Hong Kong.

Conclusion

The creation of a common Australia/New Zealand aviation market in 1996 was the first step towards creating a liberalized aviation market in Asia. InterVISTAS-ga² Consulting study found that each nation gained more than 20,600 full-time positions from the liberalization and the ensuing traffic increase. The GDP of each country grew by US\$726 million. By 2005, Australia-New Zealand traffic has increase by 56 percent as compared to the period prior to any liberalization. The relaxed market controls facilitates the growth of the total passenger traffic by more than 1.7 million a year, and the increase in passenger volume would require the airlines to operate another 27 additional flights per day.

The Japan market followed the liberalization path in 1996 but the outcome is less certain. Unless a genuinely liberalized aviation industry exists within Japan domestic market. It would be a challenge for all operators to compete in an environment where consumers, rather than politicians or bankruptcy court judges, decide the winners and losers.

The two most populous countries, China and India, are both opening up their aviation market gradually and selectively. They have tended to favor their major trading partners. As they gain more confidence in the international aviation market, and their economies continue to surge forward with strong growth, India and China is expected change their mindsets and shift towards a new aviation policy with emphasis on improved market access.

The ASEAN skies with a significant market size of 500 millions people will start to be liberalized in 2006, with full liberalization expected in 2008, ahead of the development of a common ASEAN Economic Community in 2020. Pockets of liberalization have already begun in more mature economies like Thailand, Singapore and Brunei. Early indications show a trend towards lower fare and an increase in consumer surplus. Open skies in Australia and Singapore with the US could also drive the pace of liberalization of Asian airspace. A more progressive liberalized aviation environment will have a positive impact on low cost airlines based in Asia Pacific, allowing them to expand aggressively.

Keys Sectors Riding on LCC Growth

Introduction

Which sectors will benefit from the strong growth of low cost airlines? For this section, major industries both upstream and downstream of the food chain will be analyzed to determine major beneficiaries of the LCC phenomenon. To help in the analysis of the food chain and to provide a better focus on the resultant gains, this section is separate into 2 distinct grouping, namely, Aircraft fleet and passenger (Appendix 27).

Aircraft Fleet: Upstream Food Chain

Among the key beneficiaries in the upstream of the aircraft fleet food chain are aircraft manufacturers, aircraft engine and component manufacturers, and providers of in-flight entertainment systems.

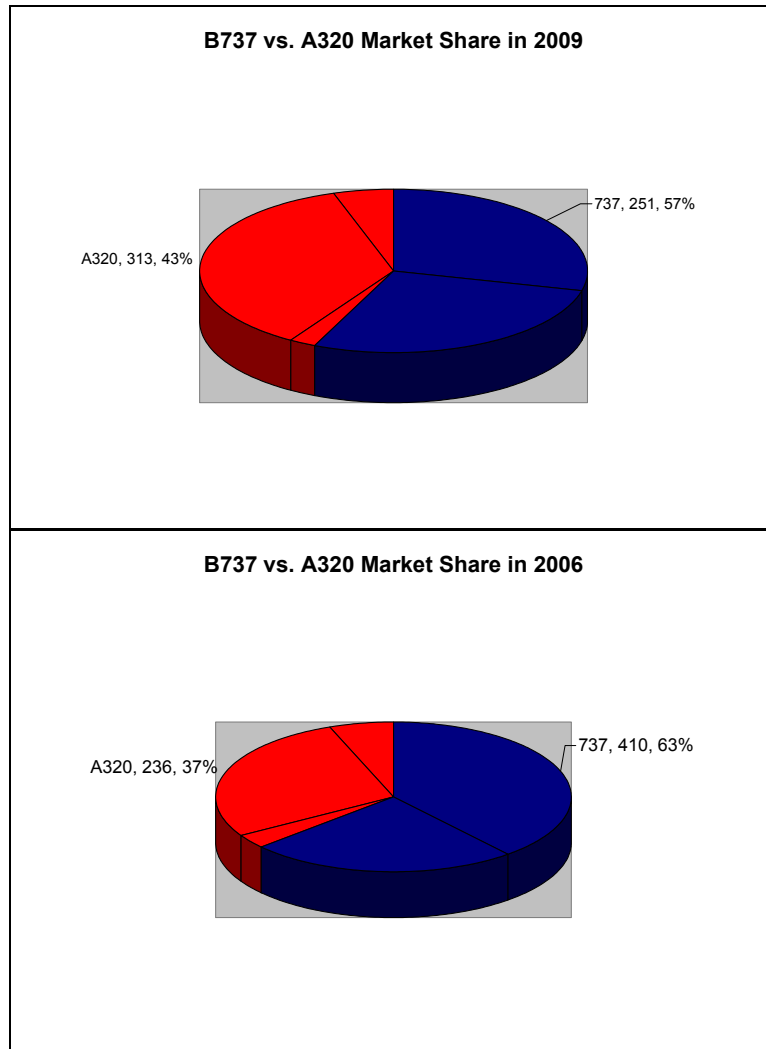
I. Aircraft Manufacturers

There are fierce competitions for the narrow body aircraft between Airbus's A320 family and Boeing's newer B737NG. Boeing has clear dominant position of this type of aircraft and has 63% market share, while Airbus has the remaining 37%, based on the number of aircraft that are in the Asia Pacific market (Exhibit 27). However, the market share will narrow to a ratio of 57% vs. 43% in 2009, with Airbus catching up real fast. Boeing's B737 aircraft has been in the market since 1971 with the first model B737-200 delivered to Southwest Airlines in the United States. Airbus introduced the A320 aircraft in 1988

but the narrow-body aircraft gained popularity among low-cost airlines only in the early part of this decade.

Exhibit 27

B737 vs. A320 Market Share in Jun 2006 -2009



Source: ACAS, 2006

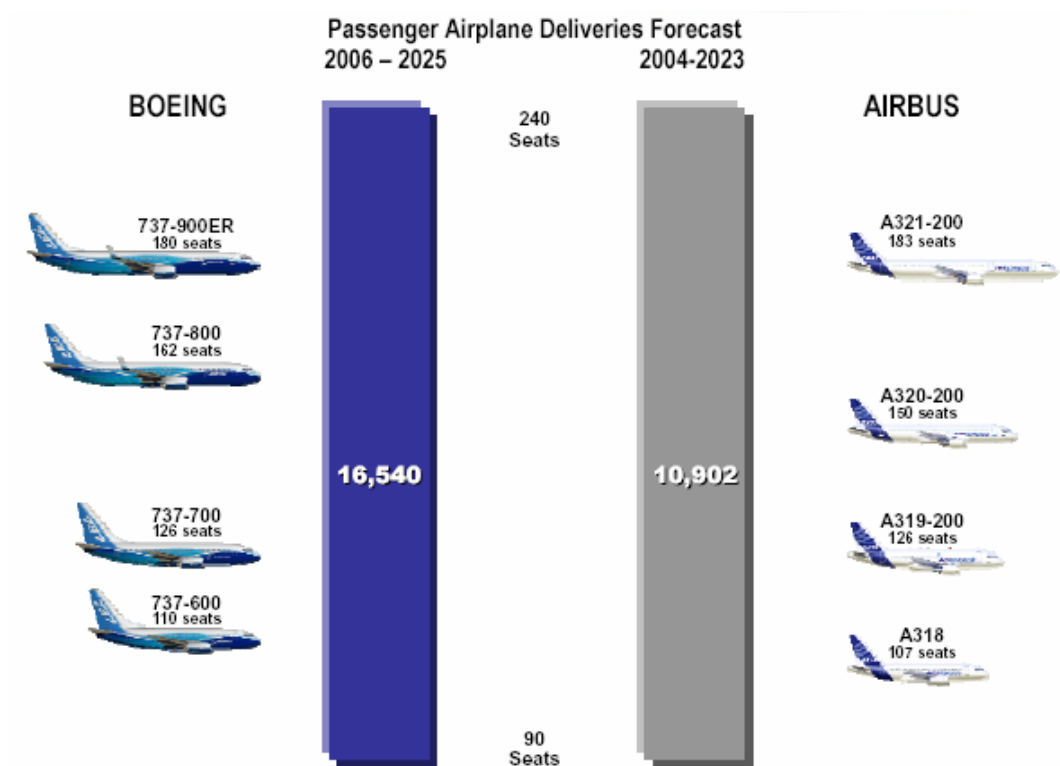
The B737 has strong and loyal customers in the US and European markets due to its long track record of serving the LCCs since 1971. The key B737 customers include Southwest Airlines, Ryanair, easyJet and Virgin Blue, while A320 key customers are the newer

airlines such as JetBlue. Recently, AirAsia and JetStar have also converted their fleet to A320. A fascinating development is that easyJet and Air Berlin are operating both B737 and A320 aircraft, but the two airlines will eventually lean towards the A320 aircraft due to the attractive aircraft pricing packages offered by Airbus.

Narrow-body aircraft will dominate new orders for the aircraft manufacturers. In the recent Boeing market outlook projection, they expect the global market will absorb about 16,000 aircraft in the next 20 years vs. Airbus conservative outlook of about 11,000 aircraft (Exhibit 28).

Exhibit 28

Boeing vs. Airbus Projection for The Next 20 Years



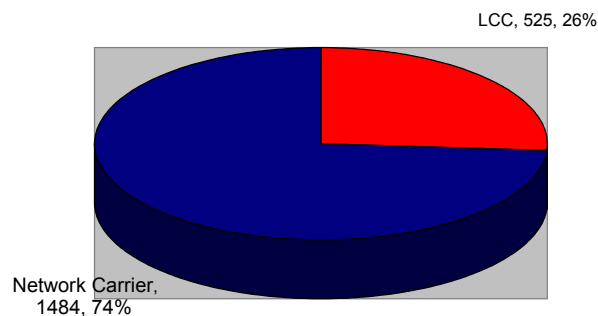
Source: Boeing

Based on orders placed by LCCs and network airlines in recent years, LCCs will significantly increase their market shares for aircraft in operation, especially in Asia Pacific. The Asia Pacific LCCs will have about 26% of the aircraft fleet in Asia Pacific by 2009 (Exhibit 29).

Exhibit 29

Projected LCC vs. Network Carriers Aircraft Fleet Market Share in 2009

Asia Pacific Aircraft Fleet Market Share in 2009E



Source: ACAS 2006

II. Aircraft Engine and Component Manufacturers

CFM56 (CFM International), V2500 (IAE), JT8D (Pratt & Whitney) and BR700 (Rolls-Royce) are the engines of choice for the current LCCs fleet. The older Pratt & Whitney JT8D engine is slowly disappearing from the market as the B737-200 is being replaced by more fuel efficient narrow body aircraft. BR700 future is bleak with Boeing deciding to discontinue production of the B717 aircraft in May 2006. V2500 are widely used for the A320 aircraft and the key company to benefit from this trend would be United Technologies, of which Pratt and Whitney is a division and in turn has shares in IAE. The

CFM56 engine is also gaining widespread acceptance with A320 aircraft and being the sole engine source on B737-300 model onwards. CFM International is a joint venture by Snecma and General Electric.

On the aircraft and engine lie many systems such as air management system, electrical power systems, hydraulic and flight control systems, engine accessories such fuel control and many more. The component manufacturer or system integrator provides these components and systems to the aircraft and engine manufacturers for integration into the final product. Original equipment manufacturers (OEM) include companies such as Hamilton Sundstrand, Honeywell, Goodrich, Rockwell Collins, and Smiths Aerospace to name a few. Hamilton Sundstrand, a United Technologies Corporation subsidiary and other OEMs will benefit greatly from the strong demand for A320 and B737NG aircraft.

III. In-Flight Entertainment

In-flight entertainment (IFE) is viewed as a potential ancillary revenue stream for advertising, pay-per-view, interactive gambling, duty free shopping and sale of food and beverage outlets. The products include overhead monitors or retractable LCDs, in-seat multi-channel video and DVD players. IFE is a standard product for full service carriers on long haul flights. However, it is a fairly new concept for LCCs, with JetBlue being the pioneer in introducing the free satellite television. This is primarily due to the carrier operating long haul flights in the US. Other LCCs like Kingfisher from India is also investing in IFE to differentiate their LCC brands in their respective geographic markets. As IFE is a relatively new concept for LCCs, it is too early to gauge if the LCCs will adopt expensive IFE system for short sector flights.

Aircraft Fleet: Downstream Food Chain

In the downstream of the aircraft fleet food chain, the key beneficiaries would be companies specializing in aircraft and components maintenance, aircraft leasing, and airports.

I. Aircraft and Component MRO

The big increase in narrow-body aircraft orders for the next five years will lead to an increase in demand for aircraft maintenance, repair and overhaul (MRO) services for narrow-body aircraft, engines and aircraft components. The major MRO companies to benefit are likely to be those located where LCCs are expanding aggressively in the region, e.g., in the ASEAN, Australian and Indian markets. ST Aerospace currently provides MRO service contracts for Valuair (S\$10-15 million), Air Asia (US\$63 million) and JetStar (US\$47 million), while Tiger Airways, an associate of SIA, utilizes the MRO services of SIA's subsidiary, SIA Engineering (SIAEC). SIAEC also provides MRO services to other LCCs such as Cebu Pacific Air in the Philippines, and Go Air in India. ST Aerospace and SIAEC, is the leading MRO around the world and provides services to both full-service and low-cost airlines.

ST Aerospace is actively pursuing the narrow-body aircraft market with the opening of a S\$12 million new hangar in Seletar Airport (Singapore), which has been able to accommodate two narrow-body aircraft from March 2005. As more LCCs fly into Hong Kong and Macau and establish operating hubs in North Asia, HAECO (Hong Kong Aircraft Engineering Company) and GAMECO (Guangzhou Aircraft Maintenance

Company) are likely to see increased demand for their MRO services. At the same time, Boeing has also committed US\$100 million to build a regional MRO facility in Nagpur, India to fulfill their pledge to Air India. Last year, Air India and its low cost subsidiary, Air India Express committed to Boeing to purchase 68 B737NG, B777 & B787 airplane, a record order of US\$11.4 billion for Indian commercial transportation.

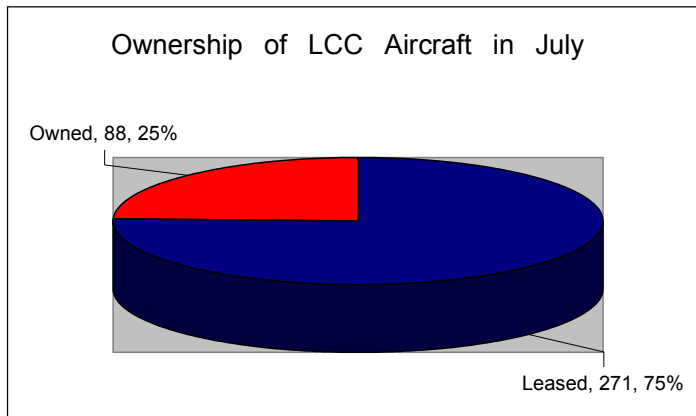
Several OEM have also set up aerospace component repair facilities in the Asia Pacific region to cater to the growing demands for such services. In Singapore, the Loyang industrial park is renowned for its aerospace focus and has many companies including OEM setting up aviation related MRO services there. Singapore is currently Asia's largest and most comprehensive aerospace maintenance, repair and overhaul (MRO) hub with 25% Asia market share.

II. Aircraft Leasing Companies

Among the leading aircraft leasing companies that have exposure in narrow-body aircraft are Boullioun Aviation Services, Singapore Aircraft Leasing Enterprise (SALE), Aviation Capital Group, Bavaria International Aircraft Leasing and Volvo Aviation. Most of the aircraft leasing companies serve both the full-service and low-cost airlines. Most of the Asia Pacific aircraft operated by the LCC were leased and about 75% were on operating leases in 2006 (Exhibit 30). More importantly, as highlighted in the Asia Pacific Fleet Analysis chapter, LCCs operate a significant number of aircraft on operating leases, particularly when operations are in initial start-up phases.

Exhibit 30

Ownership of LCC aircraft in July 2006



Source: ACAS 2006

III. Regional Airports

The regional airport will benefit from the LCC boom, with increased revenues from more aircraft landing and takeoff, as well as passenger departure taxes. Increased in passenger flow through the airport terminals will also boost sales in retail outlet. Airports are in essence a monopolistic play on the high traffic volume growth of the airline passenger industry without the burden of high and volatile oil prices. In Asia Pacific, Singapore and Malaysia airport authorities have finished building dedicated budget terminals within the main terminals. Depending on the success of Singapore and Malaysia, More airports in Asia will build such terminals in the next few years.

The Singapore Budget Terminal opened on 26 Mar 2006, built at a cost of S\$45 million and is designed to support low cost airline business model, which is different from that of the traditional full service airlines. It comprises of 2 adjacent single-storey buildings for departure and arrival respectively, covering about 25,000 sqm. It has the lowest international charge of S\$7 for airport tax and security surcharge is \$6. It is able to handle

about 2.7 million passengers per year initially with a total of 10 departure gates, 18 check in counters, and 3 arrival baggage belts (Exhibit 31).

Exhibit 31: Singapore Budget Terminal



Source: Singapore Changi Airport

Smaller secondary airports like Senai (next to Singapore’s Changi airport), Subang (close to KLIA), Don Muang (the existing international airport in Bangkok, to be replaced by Suvarnabhumi Airport) and Macau (close to Hong Kong International Airport) could be developed as low-cost airport hubs if the respective governments can be convinced of the potential in keeping the secondary airports fully utilized.

Passenger Flow Food Chain

As low cost airlines take off in Asia, there will be several potential opportunities in the marketplace with increase flow in human traffic. As mentioned earlier, airports are key beneficiaries as the increased passenger flow implies higher incomes from passenger

airport tax, as well as higher commercial revenues from renting out space for airport duty-free shops and restaurants. The other sectors that could benefit from a greater human traffic flow are hotels, car rental companies, internet travel websites and the property market.

I. On-Line Travel Agencies

Independent on-line travel agencies such as Flight Center (FCL), the leading travel retailer in Australia would benefit. On-line travel agencies provide the following benefits to various stakeholders:

- Professional approach - a shift from contracting to supplier relationship management
- Creation of value propositions for a one-stop virtual travel shop.
- Introduction of competitive tendering
- Active channeling

While independent on-line travel agencies will compete with LCCs for secondary revenues, the experience in the Australian travel market indicates that Flight Center has seen continual record profits and has expanded to more than 1,100 retail shops and corporate travel offices in eight countries, despite competition from the internal websites of Virgin Blue, JetStar and Qantas in Australia.

II. Hotel and Car Rental Companies

Low-cost airline prefer direct transaction with their customer through their own websites. This is to eliminate commissions and to gain additional commission revenue when the consumer makes reservation for hotel rooms and car through the airline website. Budget hotels, and, to a lesser degree, budget car rentals, could also benefit from a sharp increase in their respective operations. Leisure and budget-conscious travelers need affordable

accommodations and transportation, and franchise operators of budget hotels in Asia Pacific should see increased operations due to greater demand for discretionary travel.

III. Property Market

Another quarter to ride on the LCC boom is the property market around the regions. With more convenient air services to remote regions would rekindle investment in infrastructure such as road and vacation homes. This could drive up property values in the regional market. LCCs are currently focusing in Thailand (Phuket, Bangkok and Chiang Mai), Indonesia (Padang and Bali), East Malaysia (Kota Kinabalu and Kuching), Australia (Perth) and Macau. As the travel market matures for these resort destinations, property prices around these areas could appreciate if vacation homes start to spring up in these markets.

Conclusion

From the above food chain analysis, the key industries that would benefit from Asia Pacific low cost airlines growth are the aircraft manufacturers (e.g., Boeing and Airbus), aircraft engine manufacturers (e.g., International Aero Engines, Snecma and General Electric), original equipment manufacturers (e.g. Hamilton Sundstrand, Honeywell, Goodrich, Smiths, Rockwell Collins etc), in-flight entertainment service providers (e.g. Panasonic and Thales) and aircraft maintenance providers (e.g., SIAEC and ST Engineering). Airports (e.g., Singapore Changi Airport and Airports of Thailand) should also gain from the resultant increase in passenger traffic volume.

There will also be accompanying growth in non-aviation sectors. Other industries that could benefit are aircraft leasing companies, budget hotels and car rentals, on-line reservation travel agencies, and property developers. Increase air services will promote trade and tourism, and will link more people around the Asia Pacific region and drives growth and development, while improving the social welfare of the population.

Hamilton Sundstrand Aftermarket Services

Introduction

This chapter aims to identify the market opportunities that Hamilton Sundstrand can target for with the low cost carrier emerging in the Asia Pacific airline industry. Therefore a clear understanding of the external environment is crucial. The ultimate aim is to develop a match between the organisation's capabilities and the environment in which the organisation operates. However, the dynamic nature of the environment is one of the main sources of uncertainty. First, we will provide an overview of Hamilton Sundstrand Aerospace Division range of products and services. Then follow on with an analysis of the MRO industry using the modified Porter's five forces. We will also utilize the SWOT analysis to understand the company strength, weakness and what opportunities and threat lies ahead of Hamilton Sundstrand. Finally, we will recommend strategies that the company can adopt to remain competitive and continue to win market shares and be a success story in the MRO industry.

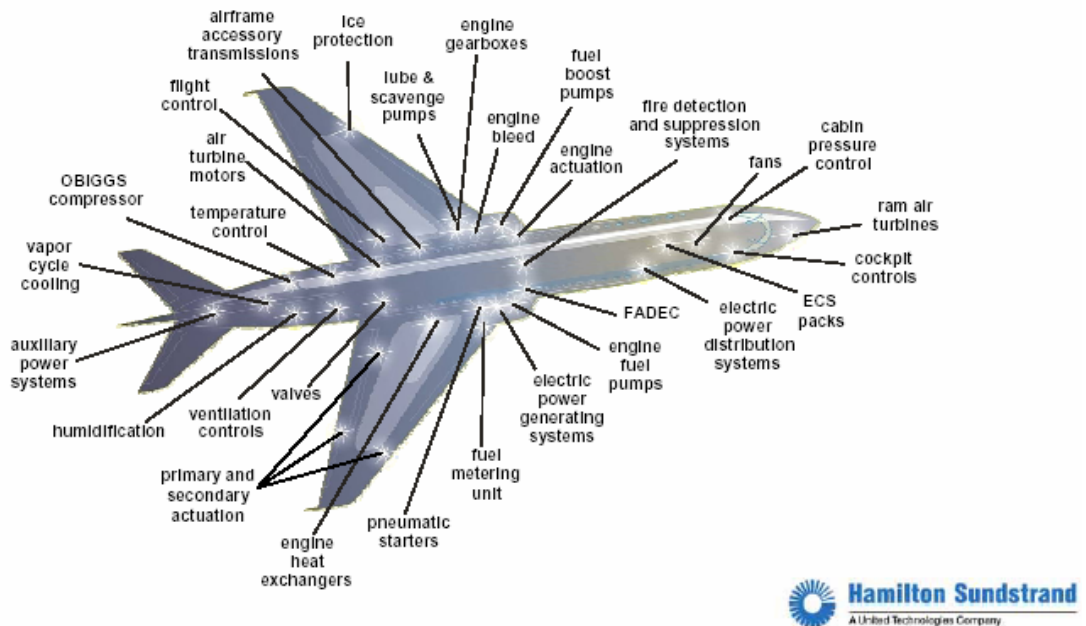
Overview of Hamilton Sundstrand

Hamilton Sundstrand's Aerospace is based in Windsor Locks, Connecticut, USA. Hamilton Sundstrand is The Aerospace Power Company, recognized worldwide as a pre-eminent value-added systems supplier to the aerospace industry. They specialize in electric, hydraulic, pneumatic and mechanical power - and the conversion of power from one form to another, its management and distribution. The following diagram illustrates

the various systems that Hamilton Sundstrand supplied to various aircraft manufacturers such as Boeing, Airbus and Embraer etc (Diagram 3).

Diagram 3: The Aerospace Power Company

Aerospace Systems Integrator



Source: Hamilton Sundstrand

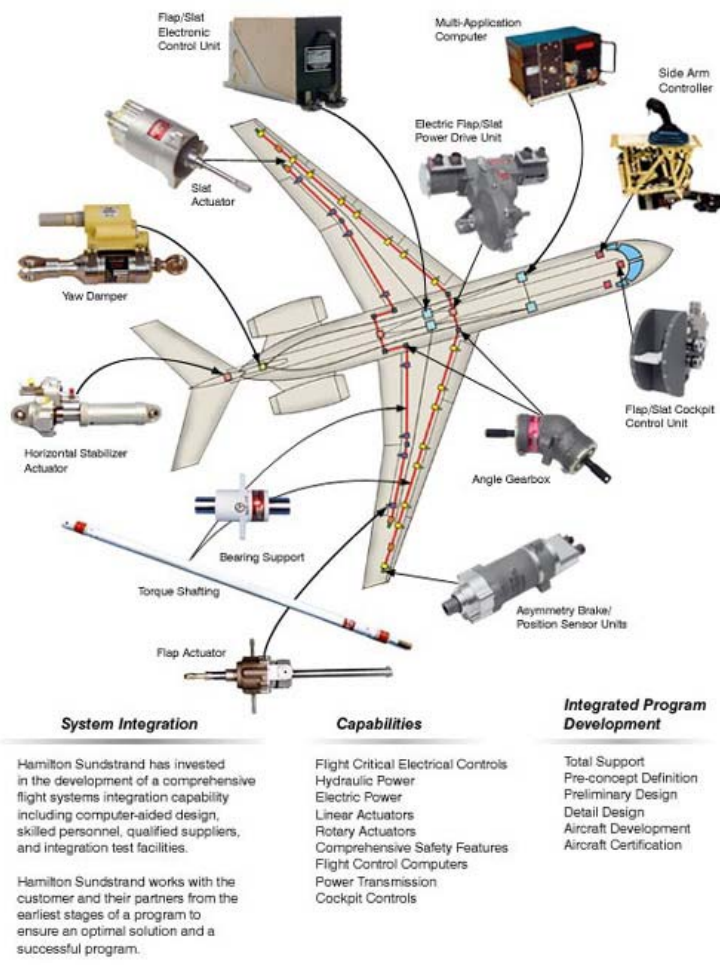
The Aerospace segment consists of business areas comprising of specialized product-and customer-aligned enterprises. These four business units are described below.

Flight & Undersea Systems

Flight Systems unit, provides integrated system solutions for aircraft applications, including propellers, flight control actuation (Diagram 4), emergency power and electromagnetic systems. Space and Undersea Systems, provides high performance

integrated system solutions at any altitude from Oceans to Orbit. These systems are used in marine, land, missile, expendable and reusable launch vehicles, and human space exploration as well as unmanned satellites and spacecraft. These systems include propellant management and storage, turbine power systems, power generation, control, management and distribution, actuation, motors and motor drives, thermal management, environmental control and life support, remote sensing and instruments, and engineering and operational support services.

Diagram 4: Flight Control Systems

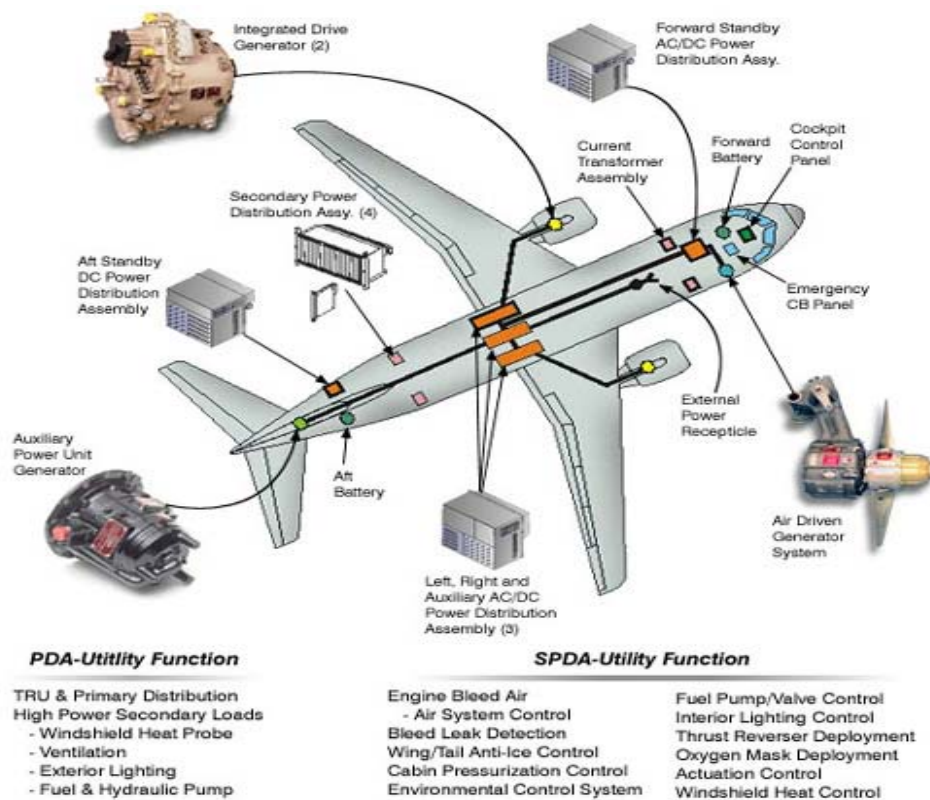


Source: Hamilton Sundstrand

Electric Systems

Electric Systems, provides electric power generation, distribution and management systems on aircraft. Products include integrated drive generators, constant speed drives, auxiliary generators and electric power conversion equipment, controllers and power management devices. Integrated electric system architecture typically includes primary Power Distribution Assemblies (PDAs) and Secondary Power Distribution Assemblies (SPDAs). Components such as Generator Control Units, Transformer Rectifier Units, contactors, circuit breakers, primary power distribution relays and circuit protection are integrated as modular assemblies within the PDAs (Diagram 5).

Diagram 5: An Integrated Electric System

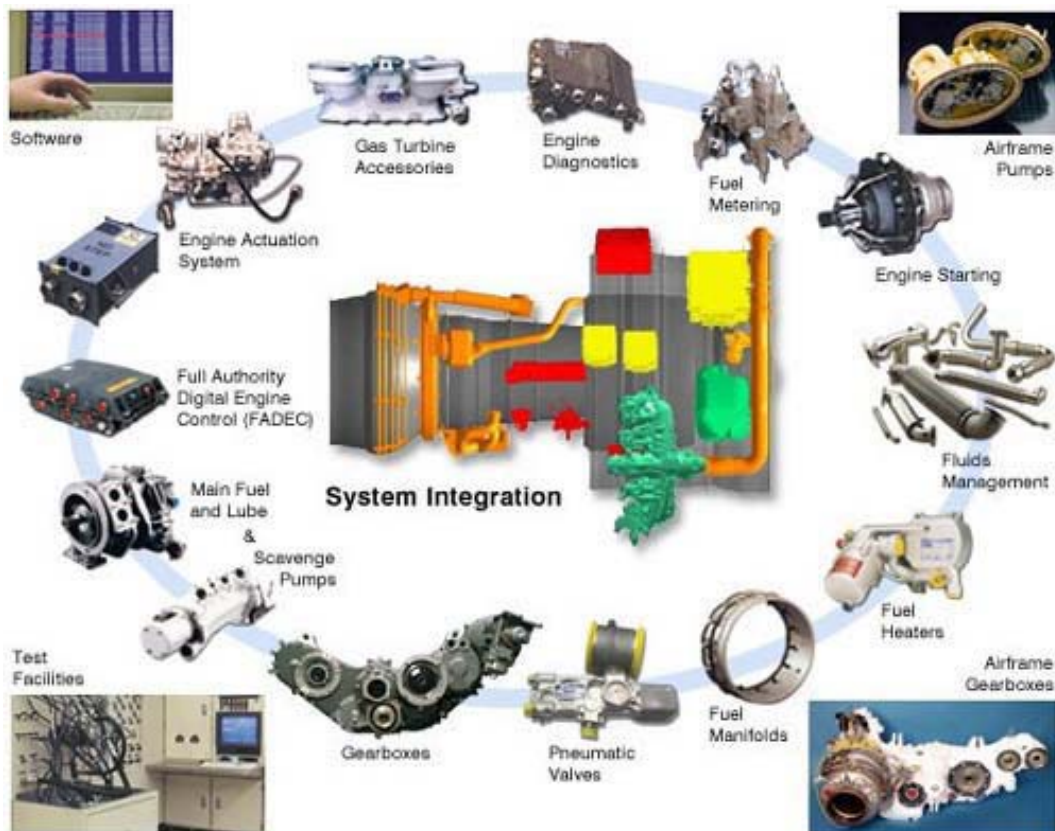


Source: Hamilton Sundstrand

Engine Systems

Engine Systems, provides engine controls, starters, gearboxes, fuel pumps, lubrication systems and scavenge pumps to various aircraft engine manufacturer such as Pratt Whitney, Rolls Royce, General Electric, International Aero Engine (Diagram 6). Hamilton Sundstrand unique capability to design and integrate subsystems results in significant engine systems benefits. These benefits include reduced cost and optimized system performance, weight and packaging.

Diagram 6: Engine System Products



Source: Hamilton Sundstrand

Air Management & Power Systems

Air Management, provides air management systems and fans. Air Management Systems include air conditioning systems, heat exchangers, pneumatic valves, cabin pressure controls, wing and cowl anti-ice equipment, high pressure and low pressure ducting, sensors, controllers and cockpit humidification. Power Systems, designs and manufactures a variety of products for commercial and military aircraft. Products include airborne auxiliary power units, electric fans, gas turbine engines for small propulsion systems and vapor cycle cooling systems.

Customer Service

The broad scope of components and systems across various commercial aircraft and engine platforms as describe above enable HS to take advantage of any upswing in aircraft orders as well as present a challenge to provide effective after market support. This task is given to the customer service organization, which is responsible for ensuring customer satisfaction as well as running MRO operations to expand HS after market sales and services. We will focus in the next section on the MRO industry to understand what opportunities that HS can reap from the LCC growth.

Porter Five Forces of Analysis on MRO Industry

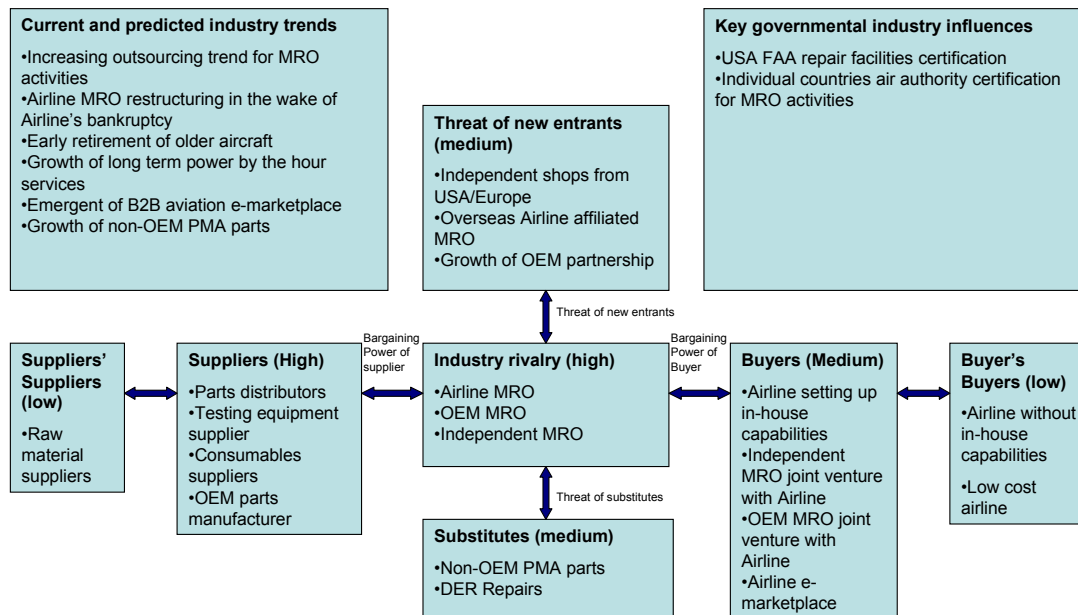
In the assessment of the attractiveness of MRO Market in Asia Pacific, we will utilize a modified Porter's five forces of analysis (Lewis et al., 1999) to understand the key industry trend as illustrated in exhibit 32. Lewis et al. (1999) found that adjustments need to be made on Porter five forces analytical framework in order to extract maximum value

out of it. Michael Porter identified five forces that determine the intrinsic long-run profit attractiveness of a market or a market segment. The five factors are:

1. Competitive rivalry within the industry
2. Threat of substitutes
3. Threat of new entrant
4. Buyer power
5. Supplier power

The five forces analysis depicts the industry at the current time. However, it is also important to understand just what the key industry developments that have shape the industry current position, in order to figure out whether if the trend will continue.

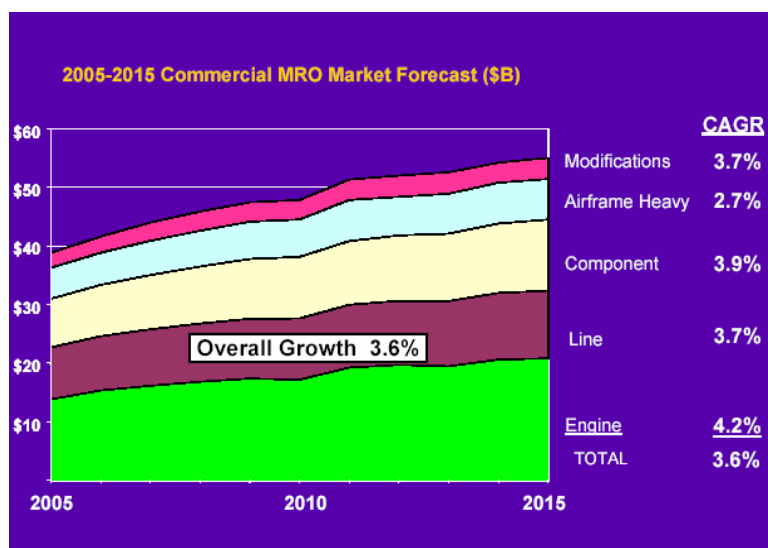
Exhibit 32: Modified Porter Five Forces Analysis of MRO Industry



In today's increasing competitive aviation environment as a result of air service liberalization and continued steady rise in oil prices over the past three years due to fear of possible supply disruptions, airlines including LCCs are very focus on reducing their overall cost. Airlines will spend around US\$38.8 billion on MRO activities this year, according to a survey by consultants BACK Aviation Solutions and Strand Associates Inc

(SAI) for McGraw-Hill earlier in the year (ARSA, 2006). Heavy maintenance visits and major modifications or retrofits will account for US\$12.2 billion; engine overhauls US\$10.6 billion, line maintenance US\$8.8 billion and the component market US\$7.2 billion. AeroStrategy estimates that commercial jet aircraft with more than 35 seats will generate MRO demand worth more than \$38 billion this year. This is spread across five primary market segments: off-wing engine overhaul; airframe heavy checks (C and D checks); component overhaul and repair; line maintenance (including A, B and overnight checks); and major airframe modifications, including cargo conversions, avionics upgrades and IFE modifications. Jane's estimates, which cover different parameters from the SAI survey, suggest just over US\$16 billion for maintenance on aircraft with more than 100 seats. Overall, the MRO business is estimated by various experts to be worth \$36-\$41 billion (Moorman, 2006). As shown in exhibit 33, AeroStrategy calculates that MRO demand will reach \$55 billion in 2015, implying an annual growth rate of 3.6 per cent.

Exhibit 33: 2005-2015 MRO Market Forecast (\$bn)



Source: AeroStrategy

Competitors in the MRO aftermarket include full service nose-to-tail MRO provider from the airlines' maintenance subsidiaries, Original Equipment Manufacturer (OEM) own repair facilities and third parties independent MRO or component repair facilities. Outsourcing of MRO work, which was an initiative of the low cost carriers to benefit from economies of scales, is to the extent of around 51% at present. This is one among many trends shaping the sustainability of the MRO market. For the foreseeable future, network and low cost airlines will both demand lower cost but high quality MRO services, as well as faster turnaround time.

Aviation MRO Industry Trend

Outsourcing Trend for MRO Services

Maintenance is traditionally one of the main barriers to entry for any new carrier. Setting up an in-house maintenance department requires a high level of capital investment in facilities and components that a low cost new carrier simply can't afford if it is to be competitive. Start-ups and low cost carriers pursuing a high growth strategy are typically short on capital and driven by variable costs. Low cost Airlines only alternative is to outsource as much of the maintenance function as practical. Outsourcing to an organization with the in-depth MRO knowledge minimizes LCCs' need for capital investment and allows them to benefit from economies of scale realized by a large, high volume MRO service provider. In a recent article published in Aviation Week, Lott (2006) reported that US low cost carriers have outsourced 51% of their maintenance spending, while traditional network airlines have increase their maintenance outsourcing to 41%

from 25% in 2000. This trend towards outsourcing will create considerable opportunities in the MRO Market.

Airline Affiliated MRO Turn into A Profit Center

The current uncertainties and financial turmoil within the airline industry provided a catalyst for radical changes in airline maintenance, repair and overhaul operations. Traditional network carriers seek to turn cost centers to profit centers, reduce variable costs and transfer inventory costs to original equipment manufacturers (OEMs). Conventionally, the legacy network carrier maintenance model operated with about 75% in-house maintenance capabilities and overhauls virtually everything from airframe to oven. This requires a large infrastructure and resulted in a high burden cost. Despite the shift towards more reliance on third parties MRO service providers, the burden remains. To reduce this burden, Airline MRO shop is actively seeking third party works to augment the base load from the airline that own them. At the same time, they are refocusing on specialty repairs instead overhauling everything and relying on continuous improvement program to become leaner and more competitive.

Early Retirement of Older Aircraft

Since September 11th event in US, older aircraft have been retired from fleets more quickly than originally planned. This prompted airlines to turn increasingly to OEM suppliers for their long term business, as the cost of retooling for new aircraft types becomes prohibitively expensive and the OEMs themselves seek more long term support contracts. Some of the network airlines have even seek to dispose of their engineering services division to reduce current operational expenditure or turn cost centers to profit

centers. This has meant more business for independent and OEM MRO suppliers, but at lower margins. For example, Southwest and GE Engine Services signed an eight-year, \$1.5 billion OnPoint Solutions service agreement covering the carrier's nearly 600 CFM56-7Bs. In June 2005, it is reported by Moorman (2006) that JetBlue signed a 10-year contract with MTU Aero Engines, a member of the IAE consortium, to provide exclusive maintenance services for the airline's IAE V2500 engines. The contract covers as many as 360 engines on the airline's fleet of A320s. Both Southwest and JetBlue expect the deals to help in overall maintenance cost reduction.

Growth of Package MRO Service Program

Independent MRO service providers have also begun to respond to the market forces, by marketing new, more flexible MRO packages for the airlines. Airlines that lack a pre-existing maintenance infrastructure or are reluctant to expand in-house maintenance resources are turning to independent MRO service provider to solve both the operational and financial challenges of maintenance. In Europe, LCC such as easyJet has utilized independent MRO provider, FLS Aerospace to be the prime maintenance organization. In Asia Pacific, as mentioned in earlier chapter on Food Chain Analysis, ST Aerospace currently provides MRO service contracts for LCC such as Air Asia and JetStar, while Cebu Pacific, Tiger Airways and Go Air contracted their MRO services to SIA Engineering Company. Many LCCs have outsourced aircraft maintenance to free up airline management to concentrate exclusively on earning revenue. However, this growth in OEM and independent MRO support services will inevitably cause tensions in the market as OEMs & Independent MRO find themselves competing for third party business against the maintenance divisions of their own customers. Rather than compete, OEMs

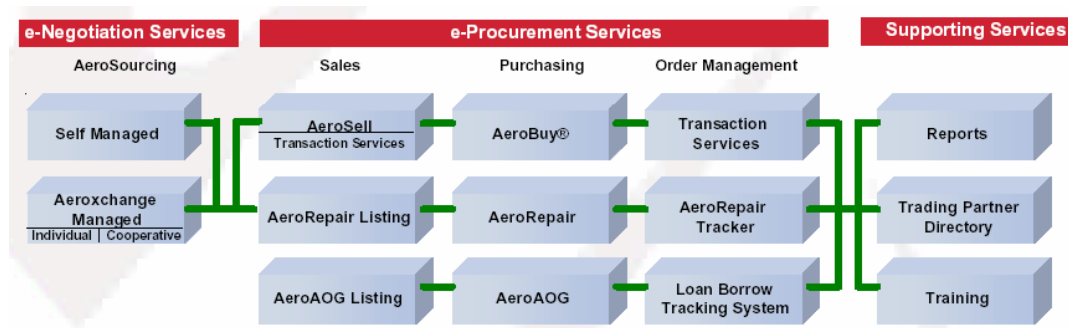
and their customer airlines could also be drawn closer together; KLM has set up a partnership with General Electric that could save the airline up to US\$35 million in lower inventory costs alone and in July this year, Revima APU, a Hamilton Sundstrand joint venture has also signed an exclusive agreement with Lufthansa Technik for the maintenance of Auxiliary Power Units (APUs). Under this agreement, Revima APU will perform repair services on all APUs installed on Lufthansa Technik's customers' MD11 airplanes. This created long term strategic partnership and win-win solution for both parties and their customers.

Evolving B2B Aviation e-Marketplace

In recent years, IT providers have become far more aggressive at getting business by unveiling flexible solutions to help plan, manage and track maintenance as well as to keep up with the latest regulatory changes. IT has become the necessary link between airlines and their designated MRO organizations, whether in-house or outsourced. Not only are airlines interested in MROs with IT systems that can track day-to-day maintenance, but carriers also want to make sure that MROs' IT systems are capable of integrating with theirs. Taking the lead, 13 airlines created a neutral aviation e-marketplace called the Aeroxchange, to maximize efficiency across the complex aviation supply chain by exploiting the power of the internet. Aeroxchange improve visibility to all source of supply and resulted in better pricing for the airlines (Exhibit 34). Additional saving are possible through the elimination of cumbersome integration of supplier and buyer IT systems and online procurement. The potential benefits of more efficient buying and selling of parts, information and services are clear. What is uncertain though is how

quickly the largest international airlines are going to adopt new purchasing strategies to take advantage of the Internet.

Exhibit 34 Aerochange Suite of e-Services



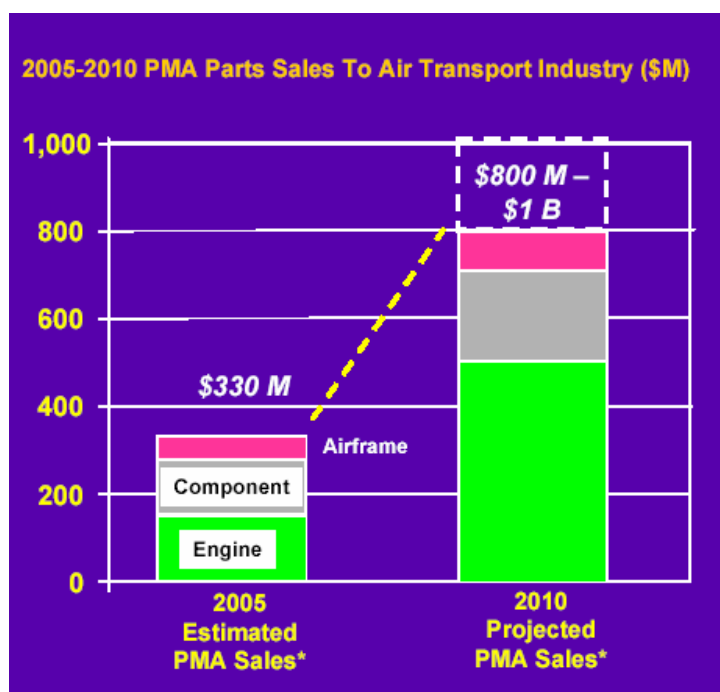
Source: Aerochange

Growth of Non-OEM PMA Parts

Another approach the airlines have taken to reduce maintenance cost and limit OEM pricing power is the sourcing of Parts Manufacturer Approval (PMA) parts and Designated Engineering Representatives (DER)-approved repairs. PMA is a combined design and production approval for modification and replacement parts. It allows a manufacturer to produce and sell these parts for installation on type certificated products. PMA parts are generally categorized as replacement aircraft parts made by someone other than the original equipment manufacturer. OEMs are usually the original type and production certificate holders for aircraft, engines, accessories, and individual parts. DER-approved repairs are repairs that go through a rigorous approval process overseen by the FAA, a process that results in a repair that is equal or better than the OEM part, at a price significantly lower than the original. The FAA is the regulatory body for all aircraft parts. Typically, PMA parts are between 25 to 30 percent cheaper than OEM

parts. AeroStrategy estimated that PMA sales to the airline market generated about \$330 million in 2005. By 2010, AeroStrategy expects that figure to be between \$800 million and \$1 billion, driven mainly by huge gains in the engine PMA arena (ARSA, 2006). OEMs will still control the vast majority of parts demand by 2010 even under optimistic projections (Exhibit 35). However, PMA penetration for some OEMs will be much higher than the market average, especially for high replacement mechanical parts.

Exhibit 35: Total Available PMA Parts Markets



Source: AeroStrategy

Key Governmental Industry Influences

In Asia Pacific, investment in MRO facilities is welcome by most countries' government policies. With China's entry to the World Trade Organization (WTO), the aircraft MRO is

the main service sector that will be opened widest to foreign companies. Foreign firms are allowed to establish companies in China, either in the form of joint venture or independent companies, to operate MRO business for Chinese or international air carriers. Singapore is also promoting itself as the aviation hub and many OEMs are attracted to start operation in Singapore due to its favorable business environment, high pool of skilled professional and good infrastructure.

MRO activities are regulated by major civil aviation authorities such as Federal Aviation Administration (FAA), European Aviation Safety Agency (EASA), and the local civil aviation authority where the facility is situated. In order to start operation, the MRO organization has to be certified by the local civil aviation authority and major civil authorities such as FAA or EASA as a minimum. Rarely does the FAA/EASA revoke any MRO organization license but the license is only renewable after an audit of the facility operation on a frequency as determine by the relevant civil aviation authority. The norm is at least once a year.

Threat of New Entrants

The barrier of entry and the profit of the industry determine the key of whether a potential entrant will come into an industry. If the barrier is high or the profit after the entrance is small, then the possibility of the potential entrant's entry is low, and the challenges for the existing market players within the industry is insignificant. The aviation MRO is an industry of high entry barrier and lucrative profit and very few private individual entrepreneurs would consider starting a MRO venture unless they have technical know-

how and huge capital support. The potential entrants of Asia Pacific MRO service include third party foreign MRO companies and the MRO facilities set up by OEM. Both of them having the technical knowledge, capital and management, and they will have a big impact on Airline owned MRO facilities in the Asia Pacific region. OEM has proprietary technical information of their products and has the practice of limiting the access only to airlines or the aircraft manufacturer only. This has restricted the number of companies that can enter into the MRO market.

As reported by Jackman (2001), most major OEMs are pursuing the partnership strategy. This strategy is driven by the airlines that are demanding better equipment reliability, more predictable costs and service programs geared towards more operational support than simply overhaul and maintenance. Airlines want to do business with smaller number of vendors and are ever more on the lookout for one-stop shopping. To deliver this type of support package requires a broad capabilities and worldwide locations that are complicated for any single company to possess and still be flexible enough to develop customized support solutions for different airlines. This type of service often is deliverable only through partnerships and joint ventures. Multi-company networks involving companies from a variety of market segments can develop a complete support packages for their customers that include engineering services, technical data and manuals, inventory management and logistics, and major modifications and retrofits, as well as airframe and component repair services. In pursuit of this trend, Airbus is taking steps to create a worldwide MRO network to strengthen its direct ties with third party providers. The Airbus MRO network has 13 members worldwide and has Hong Kong Aircraft Engineering Company (HAECO), SIA Engineering Company and ST Aerospace in Asia Pacific (Airbus Press Center, 2006). Major engines OEMs such as GE, Rolls-

Royce and Pratt & Whitney also have joint venture overhaul facilities around the world to support their engines and those of their competitors. Honeywell and Hamilton Sundstrand, both major suppliers of aircraft systems and components is also aggressive aftermarket player. Hamilton Sundstrand has 2 repair facilities in Asia Pacific that are joint ventures with the airlines to support their products and those of their competitors.

Bargaining Power of Buyers

Airlines are facing fierce competition and falling yields as mentioned in the introduction of Low Cost Carrier Business Models section, and are embracing MRO service programs that have the features of predictable maintenance costs and cater towards operational support. They want to deal with fewer vendors and are increasingly seeking for one-stop MRO service providers. The growing sophistication and reliability of present aircraft plays a pivotal role here. Latest planes design entail less maintenance, which set hurdles for a carrier to achieve the critical mass of maintenance work needed to justify the capital outlay of doing it in-house. But at the same time, the more and more sophisticated hardware found on newer aircraft requires increasingly complex and expensive test equipment, couple with the greater system reliability of new components means there are fewer test requirements. This make it even harder to justify the operating cost of a new test rig, and training technician to operate it, if it's going to be used less often than older test rigs. Outsourcing becomes a viable alternative and there is increasing trend of outsourcing as mentioned in the Aviation MRO Industry Trend section.

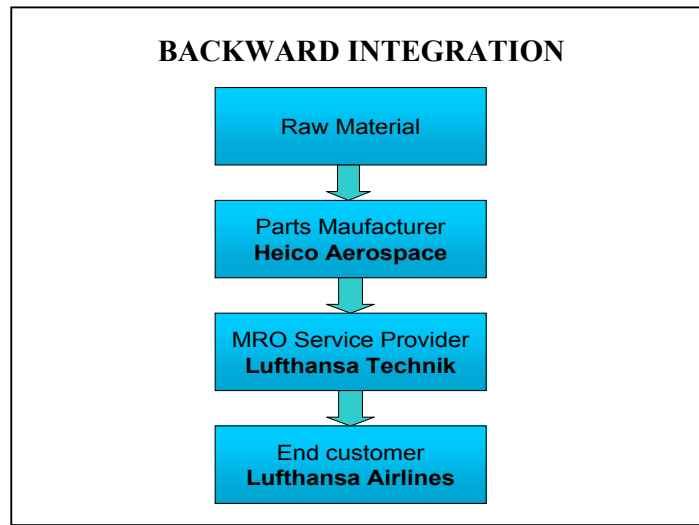
Repair and overhaul (MRO) market is dominated by the accelerating development of comprehensive and complicated global aftermarket service networks comprising of

airlines, original equipment manufacturers (OEMs) and third-party independent repair facilities. In Asia Pacific, the OEM is dominating the market through either their joint ventures with the airlines or partnership with third party service providers in the region. Foreign MRO outside the Asia Pacific region such as Lufthansa Technik (LHT), the MRO arm of Lufthansa German Airlines and other airline affiliated MRO operations, such as SR Technics, United Services and Delta, are at least in part banking on their operational experience to attract customers in Asia. Together with in-region airline affiliated MRO such as HAECO and SIA Engineering Company, and third party MRO such as ST Aerospace, the increasing competition has create a bargaining power for the airline operators.

Bargaining Power of Suppliers

Traditionally, OEM exerts considerable power in the MRO supply chains. This can be observed from the ability of the OEM to continuously escalate their catalogue part prices. When third parties MRO procured parts to repair OEM aircraft components, they are always subjected to the full catalogue lead time and this lead to great inefficiency in the supply chains. However, regulations start to change in 1996, with FAA changing the format of its airworthiness bilateral with foreign civil aviation authorities to one that was more flexible and addressed Parts Manufacturer Approval (PMA) parts specifically (Broderick, 2005). Then, in 1997, Lufthansa Technik helped put PMA on the radar screen in Europe by investing in Heico subsidiary Heico Aerospace. Heico is a key PMA parts manufacturer and supplier, and Lufthansa Technik (LHT) is the MRO arm of Lufthansa Airlines (Exhibit 36).

Exhibit 36 Lufthansa Airline Integration Strategy



LHT has more than 20 subsidiaries, affiliates and joint ventures doing everything from heavy maintenance to manufacturing PMA parts. The vertical integration strategies (Exhibit 36) adopted by Lufthansa Airline have a significant impact on the OEM pricing power. Additionally, this backward integration permit Lufthansa Airline to improve supply chain coordination, capture upstream profit margin, gain access to downstream manufacturing channels that otherwise would be inaccessible and gain in core competencies. However, this competitive advantage cannot be easily duplicated by Low cost carriers.

Threat of Substitutes

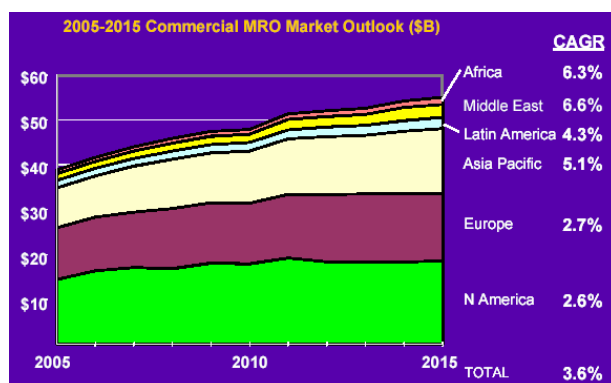
As detailed in the section on growth of non-OEM PMA parts, even a doubling of PMA sales will still limit PMA encroachment to about 5-6% by 2010 with MRO parts demand estimated to be around US\$1 billion (Exhibit 35). OEMs will still control the vast majority of parts demand by 2010 even under optimistic projections. There are several

developments in Asia Pacific low cost carrier (LCC) fleet that are working against PMA penetration that will mirror the trend in Europe (Broderick 2005). Leasing is more common among LCC. In the chapter on Asia Pacific Airlines Fleet Analysis, the section on aircraft lessors riding on LCC boom found that about 75% of the LCC aircraft are on operating lease. Coupled with lessors' general negative attitude toward PMA parts usage, this would mean that there will be fewer PMA sales to LCCs. As Broderick (2005) reported, PMAs are accepted at the governmental level, but not necessarily at the procurement level. The biggest hurdle lies at the cultural level, which is in the attitudes of potential customers.

Asia Pacific MRO Industry Rivalry

Worldwide MRO business is estimated by various experts to be worth \$36-\$41 billion (Moorman, 2006). As shown in exhibit 37, AeroStrategy calculates that MRO demand will reach \$55 billion in 2015, implying an annual growth rate of 3.6 per cent. However, AeroStrategy estimated that Asia Pacific will have a robust growth of 5.1% as compared to North America 2.6% and Europe 2.7% slower growth projection (Exhibit 37).

Exhibit 37



Source: AeroStrategy

As Lewis et al (1999) suggested, a fast growing industry will have a relatively lower industry rivalry because there is room for most or all organizations to prosper. However, the slower growth rate in North America & Europe will push more experienced foreign MROs to seek the greener pasture in Asia Pacific. As noted in earlier section, LHT has a comprehensive global MRO network and is more likely to set their eyes on Asia to continue their market expansion for MRO services and PMA parts. Currently, the Asia Pacific LCCs MRO market has been shared between SIA Engineering Company and ST Aerospace. With more foreign MROs competing with the regional MRO organizations for the same slice of the market. The decreased concentration of market players will further increase the industry rivalry within the Asia Pacific region, a point raised by Lewis et al (2006).

Lewis et al (1999) suggested that industry rivalry will also increase if the switching cost is low, which will be easy for buyers to switch from one competitor's product to another. This would be more applicable to the LCCs whose maintenance is mainly outsourced as discussed in earlier section on Outsourcing Trend for MRO Services. LCCs continuous drive towards a lower cost base will weaken their loyalty to any MRO service provider. Therefore it is important for MRO to increase the exit barrier in their service package or entice the LCCs to commit to a long term service agreements.

Having reviewed the MRO industry dynamics using the modified Porter's five forces, we will continue with a SWOT analysis to review Hamilton Sundstrand resources to meet the competition in the next section.

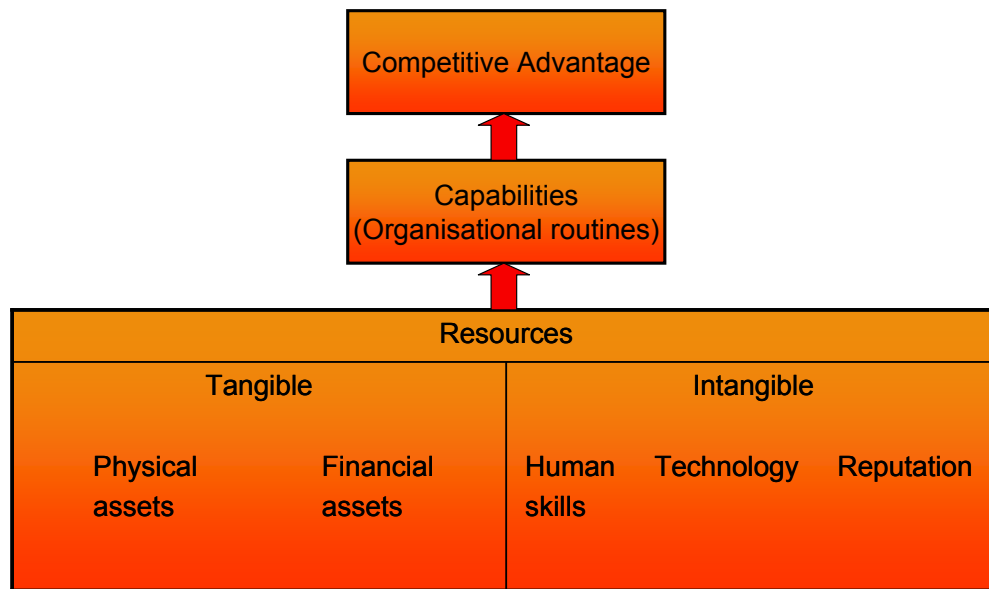
SWOT Analysis on Hamilton Sundstrand

In this section, we will shift the focus from the firm's industry environment as examine above using the modified Porter's five forces framework to the characteristics of the firm itself. The following section will scrutinize Hamilton Sundstrand's potential for establishing competitive advantage by assessing Hamilton Sundstrand resources and capabilities, which the organization owns or has access to. The case for making the resources and capabilities of the firm the foundation for its long-term strategy rests upon two premises. The first concerns the role of resources in defining the identity of the firm. That is determining what the firm can do and deciding in which industries and through what types of competitive strategy the firm can best exploit these capabilities. The second reason for focusing on resources as the foundation for a firm's strategy is that profits are ultimately a return to the resources owned and controlled by the firm (Grant, 1998). The Resource-Based View (RBV) highlights the need for a fit between the external market context in which a firm operates and its internal capabilities. Let's start by examining Hamilton Sundstrand strength and weakness.

Strength

To examine how the company can create competitive advantage, the framework proposed by Grant (2002) as shown in exhibit 38 will be used to evaluate how groups of resources work together to create the capabilities that led to the firm competitive advantage.

Exhibit 38: The Two Levels of Resource Analysis

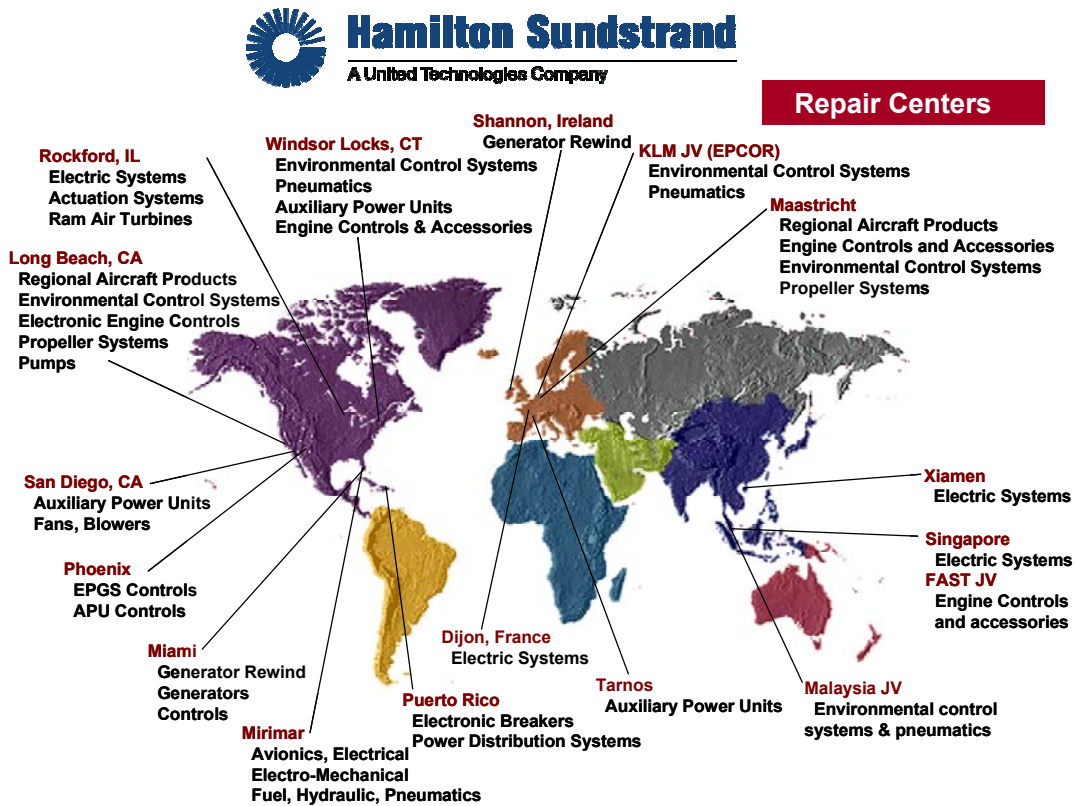


Source: Grant, 2002

Tangible Physical Assets

HS maintains a global presence to meet the needs of commercial airline customers worldwide. Their customer support managers provide customers a single point of contact for all their support needs. HS has benefited from its worldwide aviation aftermarket network (Exhibit 39). In Asia Pacific it has four MRO facilities (appendix 10) to support its aviation product and other OEM product. The proximity to the customers differentiated HS from its competitors and permits a quick turnaround of customers' assets. In Singapore, it also tied up with logistic provider United Parcel Services to manage the parts distribution to Asia Pacific customers. This ensures a timely delivery of components to support customer critical operational requirements. HS leverage on its global presence with local focus and support to gain a competitive advantage.

Exhibit 39: Hamilton Sundstrand Worldwide MRO Facilities



Source: Hamilton Sundstrand

HS also seek operational excellence through their manufacturing operations global presence (Exhibit 40). HS aims to perform in the most efficient and cost-effective way possible in all areas throughout their entire end-to-end value chain, from suppliers to internal activities to their customers.

Exhibit 40: Hamilton Sundstrand Worldwide Manufacturing

Facilities

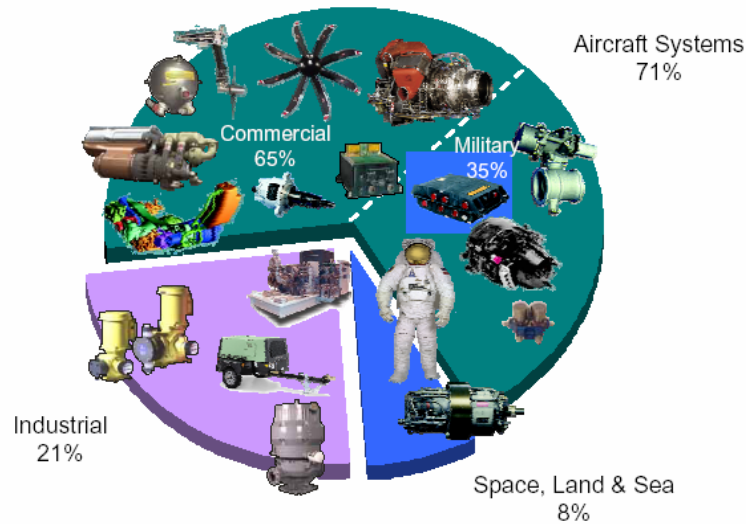


Source: Hamilton Sundstrand

Tangible Financial Assets

Hamilton Sundstrand (HS) has recorded impressive financial performance in recent years, which reflects in its top line and profitability. As of 2005, HS employs 16,239 people worldwide and records US\$4.4 billion revenue with an operating profit of US\$675 million on US\$8.9 billion of assets (UTC 2005 annual report). HS achieves this with well established disciplines built on lean manufacturing principles including an integrated supply chain. HS revenue rose 11.8% and operating profit increased \$92 million (16%) as compared with 2004 due to the impact of acquisition. UTC financial strength has allowed HS to pursue organic growth through acquisition. The commercial aircraft Systems is drawing in US\$2 billion revenue with commercial aftermarket constitutes about US\$850 million of total revenue in 2005 and has grown 6%, a result reflecting higher aerospace aftermarket volumes (Exhibit 41).

Exhibit 41: Breakdown of Total Revenue by Segment



Source: Hamilton Sundstrand Company Data

Intangible Assets: Human Resource

As mentioned in the earlier Hamilton Sundstrand Overview, Hamilton Sundstrand is one of the world largest system integrator and supplier. Their engineering innovation is a result of rigorous research and engineering program management and investment in their people. United Technologies (UTC) employees, of which Hamilton Sundstrand is a division, have earned 18,500 college and university degrees under the company's recognized and applauded Employee Scholar Program. UTC pays all tuition and costs, provide paid time away from work, and award UTC common stock on degree attainment. This allowed the company to retain talent and always have the best educated people within the company.

Intangible Assets: Technology

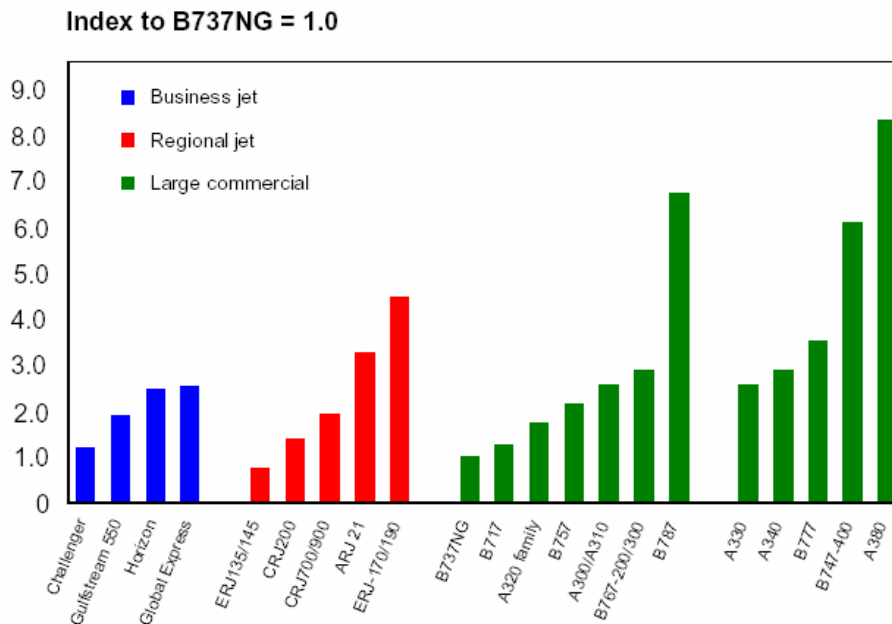
HS vision is to become the lowest cost, highest quality manufacturer of proprietary, highly engineered products and systems. HS strength lies in its innovative engineering capabilities. Since HS predecessor companies were founded, the company has generated more than 3,000 U.S. patents. A380 airliner and, most recently, the Boeing B787 will increase the patents the company holds. Based on the B787 inventions identified so far, HS could end up filing more than 100 additional patent applications just for the B787 program alone. Base on HS capabilities to integrate complex aircraft systems, Boeing has tapped HS to supply seven major systems for the Boeing B787. The value of these wins over the life of the program will exceed \$6 billion. HS and its international team of business enterprises are also leading suppliers for the Airbus A380 now in development. It will provide systems that break conventional norms for power, size and efficiency, including the aircraft Air Generation System, Cabin Pressure and Control System, Emergency Power System and Trimmable Horizontal Stabilizer Actuator.

Intangible Assets: Reputation

HS engineering expertise and capabilities in integrating their whole supply chain to bring added value to their customers have been recognized by major customers. Boeing named HS Supplier of the Year in 1999 for outstanding performance in providing the integrated electrical power system for the 717. AVIC I Commercial Aircraft Co. (ACAC) Limited of Shanghai China, has awarded HS the ARJ21 Supplier of the Year Award in 2004. ACAC is the aircraft manufacturer for the regional jet ARJ21. The US Defense Supply Center has recognized HS as a Platinum Supplier, its top award for suppliers. The center is the Department of Defense's lead center for procurement of aviation-related spare parts and HS's largest single military aftermarket customer. Additionally, the growing engineering

expertise in aircrafts system integration has allow HS to get into more and more contents on major aircraft programs as shown in Exhibit 42.

Exhibit 42: Hamilton Sundstrand Aircraft Content Index



Source: Hamilton Sundstrand

Customer service is another area where the company has excels in. Customer Service is a major source of revenue (42% of total revenue as shown in exhibit 41) for the company and is HS main point of contact with airline customers. The Customer Service organization is structured along regional lines to allow it to better focus its efforts on customers in a specific area of the world. It is a far-flung enterprise with about 1,500 employees serving about 900 customers worldwide. It has three regional organizations covering the Americas; Europe, the Middle East and Africa; and the Asia Pacific region. The organization has developed innovative support packages that provide value to customers by taking on some of their tasks. The CARE (Comprehensive Accessory

Repair and Exchange) aftermarket service performs both asset and repair management for customers. HS also has structured several onsite support agreements at major airlines that provide technical support and inventory management.

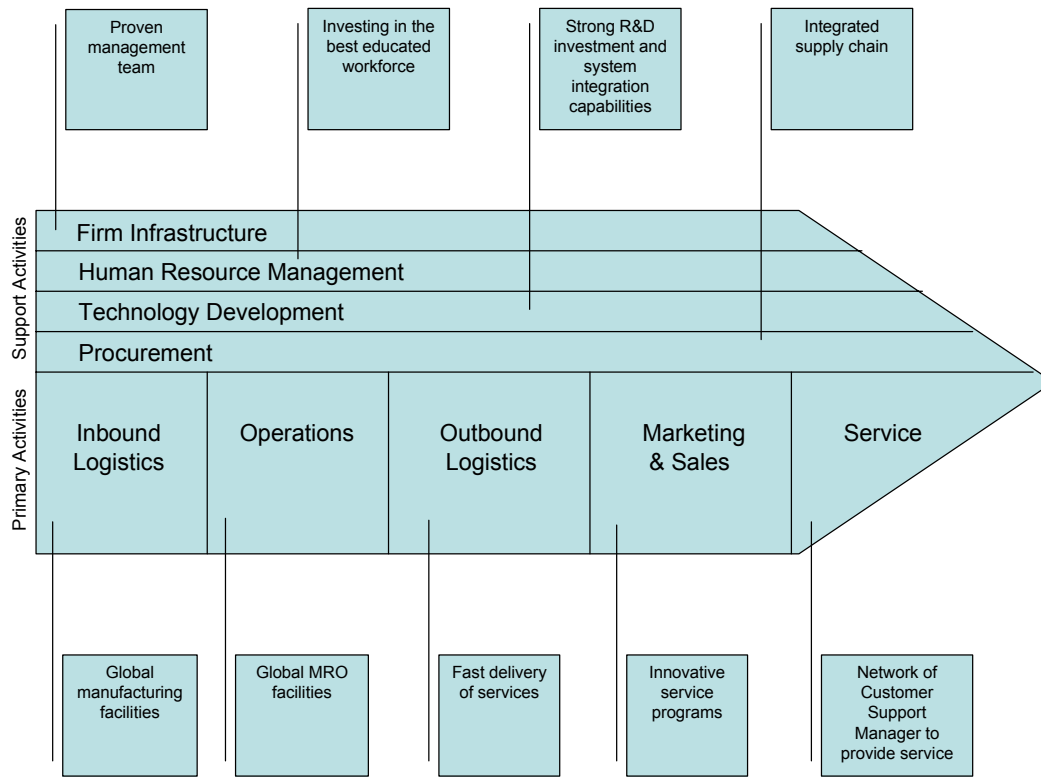
Organizational Capabilities or Core Competence

A core competence is a potential foundation for any new or revised strategy. The term core competency refers to a company's expertise or skills in key areas that directly produces superior performance. As the analysis of HS resources shows, HS aims to become the highest quality, lowest cost, most customer focused provider of highly engineered products and integrated systems for aerospace customers. To achieve this goal, HS employ three business strategies.

1. Build on HS success in engineering and servicing integrated systems by offering value-added solutions to customers, flawlessly execute existing program and improve competitive position and global presence.
2. Establish operational excellence in all areas by reducing costs, improve efficiency and quality. Focus on continuous improvement and deliver exceptional financial performance
3. Continue to develop an empowered, energized workforce by valuing employee, emphasize career development, improved skills and communicate honestly and often

The execution of these business strategies can be established from the analysis of HS using the Porter's value chain as illustrate in Exhibit 43

Exhibit 43: Hamilton Sundstrand Value Chain



Inbound Logistics

HS global manufacturing presence allows it to capitalize on manufacturing core products in the lowest cost plant within HS. Additionally, in-house manufacturing capabilities facilitates new product development as the interaction of design and manufacturing engineers ensure the parts are easier to manufacture. The ease of manufacturing will reduce cycle time and reduce cost of producing the parts and result in lower cost parts.

Operations

HS run a solid MRO operation and this is demonstrated by their exceptional operational performance. HS integrated supply chain management address increasing customer

demands for quality, delivery, and speed. Supply chains can exist in both manufacturing and service organizations, and they are principally concerned with the flow of products and information between supply chain member organizations. This includes activities such as procurement of materials, transformation of materials into finished product, and distribution of that product to end customers. Today's information-driven, integrated supply chains are enabling HS to reduce inventory and costs, add product value, extend resources, accelerate time to market, and retain customers.

“Outbound Logistics”

The average turnaround time for component repair is within the industry best of 15 days. The global manufacturing operations and MRO presence allows it to be close to the customers and permits a quick turnaround of customers' assets. The facilities proximity offer great inventory saving to the airlines. The longer it takes to return a serviceable component to the airline after repair would mean provisioning a higher level of inventory for airline operation. A typical industry inventory provisioning calculation found that a 30 days vs. a 15 days turnaround time would generate saving of 47%. A 45 days vs. a 15 days turnaround time would save the airline a hefty 91% on inventory.

Marketing & Sales

HS has a strong marketing team and has been recognized within the aviation industry to be innovative in their approach to design MRO packages to meet the customer demands. Exhibit 44 highlight an award given by Aviation week's to Hamilton Sundstrand for their innovative MRO packages.

Exhibit 44: MRO Innovation Award for Hamilton Sundstrand



“A model for meeting the tough requirements that airline customers face now and in the future.”

Kenneth Gazzola

Publisher, Aviation Week

Service

HS maintains a global presence to meet the needs of commercial airline customers worldwide through their network of customer support managers. Customer support managers provide customers a single point of contact for all their support needs and avoid duplicate calls from various parts of the HS organization. This allows HS to increase its focus on managing accounts for the top airlines worldwide.

Human Resource Management & Development

HS recognized that their best competitive advantage is their employees. HS can always develop new technology, but any technological edge is fleeting in today's world where HS competitors can develop or adapt similar technologies. What distinguish HS from their competitors are the skills, attitudes and commitment of the employees. Therefore HS

invest continually in their employee education so that a culture of continuous learning is embedded in HS employee to enable them to adapt quickly to new ways of doing business. Employees are given the necessary information and tools to understand and meet HS customers' needs and desires, so that they can develop and provide value-added solutions for HS customers.

Technology Development

The people, the products and the processes of various businesses are helping HS venture into new dimensions of systems integration. These businesses are combining expertise, building new skill sets and integrating system packages to a degree traditionally performed by the aircraft manufacturers themselves. By doing this, HS revolutionize the level of value that they bring to their customers such as the aircraft and engine manufacturer. Base on HS capabilities to integrate complex aircraft systems, Boeing has tapped HS to supply seven major systems for the Boeing B787. HS and its international team of business enterprises are also leading suppliers for the Airbus A380 now in development.

Firm Infrastructure

HS have a proven management team which has significant aerospace industry experiences. The present President Dave Hess joined Hamilton Sundstrand in 1979 and has held various senior executive positions at Hamilton Sundstrand since 1995. Various business units' leaderships have an average tenure in the company of at least 25 years either within the company or within the parent company, United Technologies Corporation.

Purchasing

Today, the typical HS plant sources MRO supplies from as many as 500 traditional distributors. This has the potential to generate excess or duplicate inventories throughout the supply chain and thousands of purchase orders and invoices. It also increases the likelihood of ill-managed storerooms, and the chance of stock oversight. Additionally, a substantial portion of a plant's MRO supplies are often "non-stock" purchases, resulting in high cost and time-consuming efforts by plant personnel to source the item and validate that it meets proper specification. Such procurement inefficiencies cause plant productivity and working capital to suffer. HS Supply Chain Management is a proven business strategy that has gained wide acceptance in recent years due to increasing customer demands for quality, delivery, and speed. Increased speeds of communicating coupled with cost reduction and more interdependent supplier, provider, and customer relationships have accelerated the integration of supply chains on a company wide basis.

Weakness

Hamilton Sundstrand is not without its challenges. The global presence in both manufacturing and MRO facilities may result in over capacity in sudden industry downturn. Duplication of capabilities could also result in dis-economy of scale for production and create inefficiency. A lean customer service organization that have such a dispersed work force and diverse cultural background around the world would presents challenges on the communications front.

To improve HS ability to better compete in the global marketplace, HS need to initiate actions to review and eliminate excess capacity, consolidate core work to the lower cost HS plants, and outsource non-core products and services from other companies able to supply them at the lowest cost with the quality HS require. HS should also focus on continuous improvement programs to maintain its operation excellence. HS have a good future but only if it transforms its operations to be more efficient, more cost-effective and faster in responding to the customers' needs. Airline industry is going through major changes with LCC competition and high oil prices, and HS has to be flexible to quickly respond to those changes so that HS can continue to provide value to the customers.

Opportunity

Emerging Asian markets

Emerging Asian markets including the Indian and Chinese aviation markets are amongst the fastest growing markets in the world for new aircrafts. Strong economic growth, favorable and diverse demographics along with the proliferation of low cost carrier in the Asian regions makes them highly attractive markets for HS as these factors drive growth in revenue passenger miles (RPM). In fact, the Chinese and the Indian markets have been identified as one the most promising air travel market in the chapter on Market Potential for Asian LCC, which will lead to higher sales for new aircrafts and MRO services.

Growth of Low Cost Carriers

In the chapters on the Asia Pacific Airlines Fleet Analysis, the network airlines is projected to grow at 5.5% with the LCC projecting to grow four times faster at 20.5%.

With the LCC shifting to narrow-body aircraft type such as the B737 and A320, this would benefit HS on both commercial aircraft production as well as aftermarket service and spares revenue levels. Additionally, the A320 market share is estimated to grow from today's 20% to 49% in 2009. This would spell higher revenue growth for HS as it has almost twice the system content on the A320 vs. the B737 as shown in exhibit 42. Further increases in passenger revenue per miles and continued positive global economic conditions are expected to result in increased commercial aerospace volume in 2006.

Threat

Airline Poor Financial Health

The commercial airline industry continues to experience poor financial performance, which was exacerbated in 2005 by escalating fuel prices. As such, airlines and aircraft manufacturers will continue to pursue lower-cost packages from their suppliers such as HS. For the foreseeable future, airlines will demand lower-cost but high-quality MRO services as well as faster turnaround time. A change in corporate culture and maintenance processes should be a mandatory first step for any MRO organization that wants to remain competitive in an ever-evolving business.

Intense Competition

As mentioned in the earlier review of the MRO industry, the slower growth rate in mature market such as North America & Europe will drive more experienced foreign MROs to seek greener pasture in Asia Pacific. With more foreign MROs competing with the

regional MRO organizations for the same slice of the market. The decreased concentration of MRO market players will further increase the industry rivalry within the Asia Pacific region. HS regional MRO facilities will face intense competition from these foreign MRO providers. Some of the firms such as Lufthansa Technik and SR Technics become a threat by their sheer size and their ability to provide a host of other services.

Conclusions and Recommendations

Conclusions from the findings

From the analysis of the modified Porter's five forces framework, we have observed the MRO Industry is extremely competitive. The "service" is almost a commodity and there are very strong competitors in the arena. Given the harsh business conditions that the low cost carriers are facing, they are price takers. The lower yield face by all airlines as shown in exhibit 1 and persistence high oil prices means the only way to increase the profits is slashing down their cost. The MRO expenses (averaging 13% of overall airline cost) compose a high percentage of the airline costs as shown in Exhibit 3B, therefore achieving lower maintenance costs is a competitive advantage for the airline sector.

The analysis also throws some light on what LCC wants in their MRO service provider. Safety is key consideration as they need to satisfy the regulatory requirement before they are given the air operation certificate by the civil aviation authority. MRO service provider whose IT systems provide flexible solutions to help plan, manage and track maintenance as well as to keep up with the latest regulatory changes is welcome by LCC. Not only are airlines interested in MROs with IT systems that can track day-to-day

maintenance, but airlines also want to make sure that MROs' IT systems are capable of integrating with theirs. LCC is very focus on reducing their cost but not at the expense of aircraft reliability. LCC simplified routes structure, primarily point-to-point transit instead of transfers at hubs to allow highest utilization of planes imply that MRO service that guarantee aircraft availability by maintaining the aircraft systems to the highest quality and reliability is seek by the LCC. Another facet of LCCs continuous drive towards a lower cost base is their weaken loyalty to any MRO service provider. Therefore it is important for MRO to increase the exit barrier in their service package or entice the LCCs to commit to a long term service agreements.

What are the key success factors for Hamilton Sundstrand to compete in this environment? From the framework proposed by Grant (2002) as shown in exhibit 38, HS engineering expertise and capabilities in integrating their whole supply chain to bring added value to their customers has put them in a strong position and a source of their competitive advantage. Additionally, the growing engineering expertise in aircrafts system integration has allow HS to get into more and more contents on major aircraft programs as shown in Exhibit 42. The A320 market share is estimated to grow from today's 20% to 49% in 2009. The significant content HS has on the narrow body aircraft such as the A320 will allow it to continue to grow their after market business volume. The key is to lock in these customers for the long term to raise the market entry barrier for other potential competitors. With their global presence and closer proximity to the customers and technical know-how, this will be critical differentiating factors that HS has over the competition.

Recommendations for Hamilton Sundstrand

From strategic assessment of the company resources, it has provided answers to two key questions. What opportunities exist for economizing on the use of finance, inventories and fixed assets? What are the possibilities for employing existing assets more profitably? This will be answer in following section.

Exploit the Internet

As we progress into the future, the ways in which we conduct our daily tasks will continue to grow and improve, all thanks to science and technology. The improvements of tomorrow will be miles ahead of those made yesterday. One area where we can see this constant betterment is on the Internet. The capabilities of the Internet have expanded immensely, making e-commerce an increasingly valuable tool. In the world of MRO, e-commerce coupled with integrated supply has the ability to redefine the MRO supply chain. Today, the typical HS plant sources MRO supplies from as many as 500 traditional distributors. This has the potential to generate excess or duplicate inventories throughout the supply chain and thousands of purchase orders and invoices. It also increases the likelihood of ill-managed storerooms, and the chance of stock oversight. Additionally, a substantial portion of a plant's MRO supplies are often "non-stock" purchases, resulting in high cost and time-consuming efforts by plant personnel to source the item and validate that it meets proper specification. Such procurement inefficiencies cause plant productivity and working capital to suffer. When combined, integrated supply and e-commerce have the capabilities to reverse these weaknesses. HS should enhance this area to better manage its asset and provide visibility to the both suppliers and customers that

uses HS repair services and purchase parts to support their airline operations. This should not limit to just manufacturing activities but the whole supply chain.

Continuous Improvement

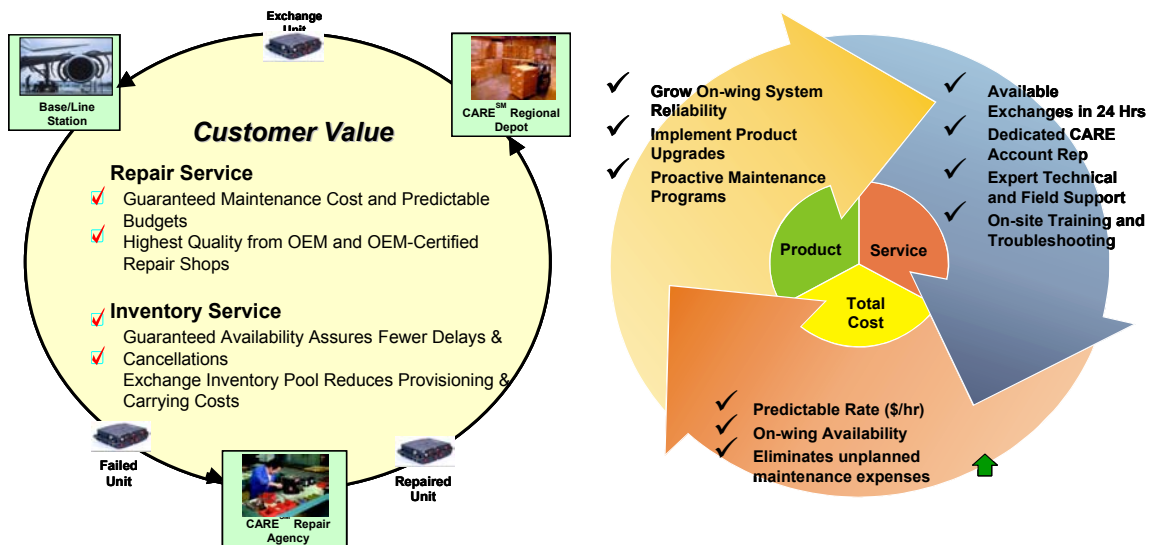
To improve HS ability to better compete in the global marketplace, HS need to initiate actions to review and eliminate excess manufacturing capacity, consolidate core work to the lower cost HS plants, and outsource non-core products and services from other companies able to supply them at the lowest cost with the quality HS require. Since substitute competition can come from many directions such as alternative resources, technological innovations, new business models etc. It is difficult to counter such threat. The key is to persuade potential competitors that substitution is unlikely to be profitable. According to Grant (2002), this can be achieved through committing the company to continuous improvement. Therefore, HS should focus on continuous improvement programs to maintain its operation excellence. HS have a good future but only if it transforms its operations to be more efficient, more cost-effective and faster in responding to the customers' needs.

Long Term Programs

Every industry needs to reinvent from the customer backwards as Kirkpatrick and Hamel (2004) argued. HS need to bring more innovation to the demand chain as they brought to the supply chain. How do LCC learn about this product or service? How do LCC pay for it? Acquire it? Use it? Experience it? And how do LCC build a relationship over time with the vendor? To lock in customer for the long term need an overall marketing strategy to bring exceptional value to the customer. This can be achieves through the many innovative programs that HS is currently marketing. CARE, which stands for

Comprehensive Accessory Repair & Exchange Program is one such program. HS should expand this program to cover the type of aircraft and engine that LCC deployed in their operation. The channel of distribution would also have to change. HS should tie in with other MRO or OEM to provide a nose to tail solution. Under such a program, the airline pay a fixed hourly maintenance rate based on the flying hours. This allows the airline to move from managing individual transaction cost to a more predictable overall maintenance cost based on flying hours. This program encompasses both repair and asset management as shown in exhibit 45. CARE will provide a 24-hour support to manage all operational demands of customer aircraft operation. Whenever a part failed on the aircraft, a unit is immediately dispatched to meet the requirement. The failed component will be routed to CARE vendors for repair before returning to CARE warehouse to standby for the next request.

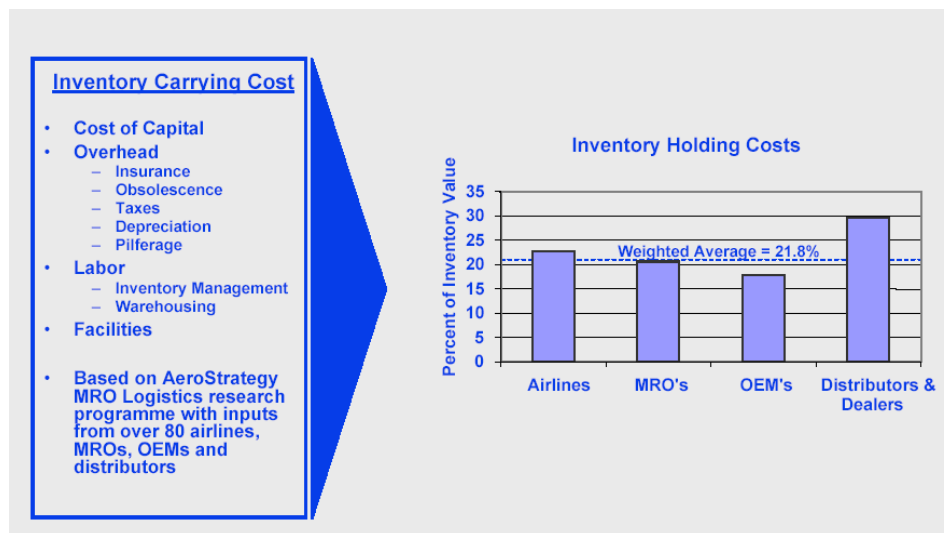
Exhibit 45: CARE Program Process and Benefits



Source: Hamilton Sundstrand

Upon joining the program, the airline does not have to own expensive inventory and has the option to sell back the inventory to HS. This eliminates the inventory cost for the airline, which can average around 21% based on an AeroStrategy's study as shown in exhibit 46.

Exhibit 46: Average Inventory Holding Costs

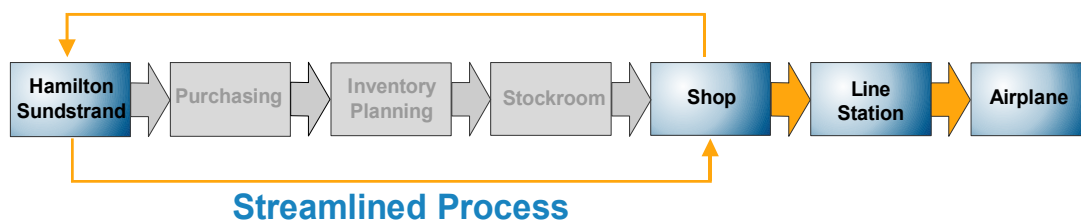


Source: AeroStrategy

To ensure high quality repair, the repair services are carried by the OEM, who has the engineering resources to ensure the component highest reliability. Normally, OEM benefits when parts break down since they sell the replacements. Under the CARE program, they benefit when the parts don't break down since they are responsible for keeping the equipment running. LCC pursuing a high growth strategy will benefit greatly from such a program as earlier industry analysis shows that maintenance is traditionally one of the main barriers to entry for any low cost carrier. Setting up an in-house maintenance department requires a high level of capital investment in facilities and components that a low cost new carrier simply can't afford if it is to be competitive.

Another program called On-Site Program provides onsite inventory to customers' point of use. This simplified the process of moving parts to the Airline Component Shops (Exhibit 47). It integrates the supply chain between HS and the customer and eliminates the middleman or broker cost.

Exhibit 47: On-site Program Simplified Processes



Source: Hamilton Sundstrand

The program includes buyback of customer current inventory and guarantee part availability at 95% Service Level. It eliminates inventory carrying costs & obsolescence risk. Overall, the program offer potential customer the possibilities of reduced total costs, reduced time waiting for parts, and reduced inventory.

Sales and Marketing

A lean customer service organization that have such a dispersed work force and diverse cultural background around the world would presents challenges on the communications front. Communications is the key to success. HS must continue to improve communications at all levels of the company. Rapid dissemination of information would allow HS organization to take advantage of any new opportunities that arise. HS maintains a global presence to meet the needs of commercial airline customers worldwide through their network of customer support managers. Customer support managers provide

customers a single point of contact for all their support needs and avoid duplicate calls from various parts of the HS organization. This allows HS to increase its focus on managing accounts for the top airlines worldwide and increase its sensitivity to the market. HS need to continue to provide their employees with the information and tools to understand and meet their customers' needs and desires, today and in the future.

Pursuing a Differentiation Strategy

Hamilton Sundstrand should pursue a differentiation strategy for its unique selling proposition of OEM quality at a guarantee cost. The tangible differentiation is concerned with observable characteristic of the service such as proximity of MRO operation to customer base of operation, and local focus with one interface between HS and the customer via the customer support manager. HS technical know-how to repair its product line and engineering expertise to continuously improve the reliability of the parts at no cost to customer is another tangible differentiation. Since customer pay a fixed rate per flying hour on the CARE program, the OEM now has more motivations to improve the product reliability as its revenue becomes fixed. Any product reliability issues will ultimately impact the service provider bottom line. Differentiation is also concerned with the provision of uniqueness. As Grant (2002) mentioned, a firm's opportunities for creating uniqueness in its offering to customers are not located within a particular function or activity but can arise in virtually everything it does. Michael Porter identifies a number of drivers of uniqueness over which the firm exercises control. These are:

- Product features and product performance (HS technical expertise and OEM services).
- Complementary services (HS fast delivery and product improvement)
- Intensity of marketing activities (e.g. thru HS customer support focus approach)

- Technologies embodied in design and manufacture which only the OEM or HS has prior information.
- The quality of the purchase input.
- Procedures influencing the conduct of each activities (e.g. quality control, onsite support etc)
- Skill and experience of employees.
- Location (proximity to customer operation)
- The degree of vertical integration (HS integrated supply chain).

Themes for Further Studies

This market study is limited to the study of low cost carrier, the impact of this business model to the Asia Pacific airline industry and the MRO industry. Additionally, we examine OEM such as Hamilton Sundstrand and determine how it can take advantage of the LCC explosive growth in the changing competitive landscape. In future studies, there is potential to explore further from the perspective of the incumbent network airlines how they would respond to the LCC challenge. Another area of study is for Hamilton Sundstrand to determine what MRO services would incumbent expect from the OEM. Would they follow the Lufthansa German Airlines strategy of backward integration or goes down another strategic path? Finally, the other area that could be studied is how Hamilton Sundstrand can change its organization structure in order to be better organized for continued success of its after market support to meet the changing needs of its customers.

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Appendices

Appendix 1

Asia Pacific LCC Aircraft Fleet Plan: 2004 - 2009

Operator	2005	2006E	2007E	2008E	2009E
ADAM AIR	16	18	18	18	18
AERO ASIA	3	1	1	1	1
AIR DECCAN	7	20	31	41	51
AIR INDIA EXPRESS	3	7	7	7	7
AIRASIA	21	32	44	56	76
AIRBLUE	3	5	5	5	5
ALLIANCE AIR	11	10	10	10	10
CEBU PACIFIC AIR	18	20	22	22	22
CITILINK	4	2	2	2	2
FREEDOM AIR	4	7	7	7	7
GOAIR	2	3	3	3	3
AIR DO	4	5	5	5	5
INDIGO	0	6	15	23	29
INDONESIA AIRASIA	4	6	6	6	6
JAL EXPRESS	12	12	12	12	12
JETSTAR	24	30	32	32	32
JETSTAR ASIA	9	8	8	8	8
KINGFISHER AIRLINES	7	18	24	32	41
LION AIRLINES	23	24	30	40	50
NOK AIR	3	4	4	4	4
ONE-TWO-GO	15	12	12	12	12
PACIFIC BLUE AIRLINES	3	3	3	3	3
PB AIR	1	1	1	1	1
SHAHEEN AIR INTERNATIONAL	3	4	4	4	4
SKYMARK AIRLINES	7	9	9	9	9
SKYNET ASIA AIRWAYS	6	6	6	6	6
SPICEJET	5	9	15	15	15
STAR FLYER	0	3	4	4	4
THAI AIRASIA	8	10	10	10	10
TIGER AIRWAYS	4	9	12	12	12
VIRGIN BLUE AIRLINES	47	47	47	53	60
Total	277	351	409	463	525

Source: ACAS, 2006

Appendix 2

Asia Pacific LCC fleet – July 2006

Operator	Airbus			Boeing						Embraer	BAE	ATR		Total		
	A319	A320	A321	717	737	747	757	767	DC9	MD80	MD90	ERJ145	1-11		ATR-42	ATR-72
ADAM AIR						19										19
AERO ASIA					1								4			5
AIR DECCAN		14												13	4	31
AIR INDIA EXPRESS						7										7
AIRASIA		7				19										26
AIRBLUE		3	2													5
CEBU PACIFIC AIR	6	2					1		11							20
CITILINK					2											2
FREEDOM AIR		7														7
GOAIR		3														3
AIR DO						2			3							5
INDONESIA AIRASIA						6										6
JETSTAR AIRWAYS		24		6												30
JETSTAR ASIA AIRWAYS		8														8
KINGFISHER AIRLINES	4	8														12
LION AIRLINES					12					12	5					29
NOK AIR					4											4
ONE-TWO-GO						7	1			4						12
PACIFIC BLUE AIRLINES					3											3
PB AIR								1				2				3
SKYMARK AIRLINES					3			6								9
SKYNET ASIA AIRWAYS					6											6
SPICEJET					6											6
STAR FLYER		3														3
THAI AIRASIA						10										10
TIGER AIRWAYS		6														6
VIRGIN BLUE AIRLINES						47										47
Total	10	85	2	6	147	7	2	10	11	16	5	2	4	13	4	324
% Composition	3.1	26.2	0.6	1.9	45.4	2.2	0.6	3.1	3.4	4.9	1.5	0.6	1.2	4.0	1.2	

Source: ACAS, 2006

Appendix 3

Asia Pacific LCC fleet – up to 2015

Operator	Airbus					Boeing										Embraer	BAE	ATR		Total
	A320	A330	A340	A350	A380	717	737	737NG	747	757	767	787	DC9	MD80	MD90	ERJ145	1-11	ATR-42	ATR-72	
ADAM AIR	12						18													30
AERO ASIA							1													1
AIR DECCAN	76																4	13	31	124
AIR INDIA EXPRESS								7												7
AIRASIA	100						19													119
AIRBLUE	7	2																		9
ALLIANCE AIR							10													10
CEBU PACIFIC AIR	14								1					7						22
CITILINK							2													2
FREEDOM AIR	7																			7
GOAIR	13																			13
AIR DO							2				3									5
INDIGO	100																			100
INDONESIA AIRASIA							6													6
JAL EXPRESS							7								5					12
JETSTAR	24	2				6						12								44
JETSTAR ASIA	8																			8
KINGFISHER AIRLINES	51	5	5	5	5															71
LION AIRLINES							12	60						8	4					84
NOK AIR							4													4
ONE-TWO-GO									7	1				4						12
PACIFIC BLUE AIRLINES								3												3
PB AIR											1						2			3
SHAHEEN AIR INTERNATIONAL							4													4
SKYMARK AIRLINES								3			6									9
SKYNET ASIA AIRWAYS							6													6
SPICEJET								25												25
STAR FLYER	4																			4
THAI AIRASIA								10												10
TIGER AIRWAYS																				12
VIRGIN BLUE AIRLINES	12							60												60
Total	428	9	5	5	5	6	101	158	7	2	10	12	7	17	4	2	4	13	31	826
% Composition	51.8	1.1	0.6	0.6	0.6	0.7	12.2	19.1	0.8	0.2	1.2	1.5	0.8	2.1	0.5	0.2	0.5	1.6	3.8	

Source: ACAS, 2006

Appendix 4

Outline of Major Carriers in Japan

Title of carrier	Items										Accounts in fiscal 2003 Upper: Operation balance Lower: Current balance (Unit: million yen)
	Carrier outline (As of January 2004) Unit: 1=million yen						Transport results in fiscal 2003 Unit: 2=1,000 persons				
	Establishment	License date	Capital (Unit: 1)	Airlines	Fleet	Personnel	Domestic Passengers (Unit: 2)	Domestic Mkt Share %	International Passengers (Unit: 2)	Total (Unit: 2)	
JAL Japan Airlines	1951	Domestic:	188,600	Domestic:	163	16,075	23,780	25.5%	10,820	34,600	-77,300
		Oct. 20, 1952		29							-81,200
		International:		187							
JAA Japan Asia Airways	1975	International:	4,300	International:	76	720	-	-	920	920	-2,700
		Aug. 29, 1975		5							-2,800
		Irregular:									
JAZ JAL ways	1990	Feb. 22, 1991	3,000	International:	48	1,224	-	-	1,350	1,350	800
		International:									600
		Jul. 30, 1999									
JTA Japan Trans Ocean Air	1967	Domestic:	4,500	Domestic:	43	706	2,670	2.9%	-	2,670	2,200
		Jul. 17, 1973		17							2,000
JEX JAL Express	1997	Domestic:	5,800	Domestic:	17	250	810	0.9%	-	810	-400
		Mar. 20, 1998		4							-400
JAS Japan Air System	1971	Domestic:	23,500	Domestic:	84	5,022	17,360	18.6%	10	17,370	2,300
		Feb. 14, 1962		64							400
		International:		9							
JAC Japan Air Commuter	1983	Domestic:	300	Domestic:	23	474	1,340	1.4%	-	1,340	1,000
		Nov. 2, 1983		30							800
ANA All Nippon Airways	1952	Domestic:	86,200	Domestic:	142	13,119	40,090	43.0%	3,200	43,290	24,000
		Oct. 15, 1953		84							25,100
		International:		57							
NCA Nippon Cargo Air Lines	1978	International:	21,600	International:	11	794	-	-	-	-	3,400
		Aug. 13, 1983		33							2,400
ANK Air Nippon	1974	Domestic:	5,400	Domestic:	107	1,581	4,180	4.5%	100	4,280	1,900
		Aug. 3, 1974		70							2,600
		International:		4							
AJX Air Japan	1990	Irregular:	50	International:	20	214	-	-	510	510	200
		Feb. 8, 1991		4							200
		International:									
SKY Skymark Airlines	1996	Domestic:	6,600	Domestic:	5	726	1,550	1.7%	40	1,590	-300
		Jul. 28, 1998		3							-600
		International:									
ADO Hokkaido International Airlines	1996	Domestic:	2,300	Domestic:	3	367	790	0.8%	-	790	1,700
		Oct. 26, 1998		2							1,500
SNA Skynet Asia Airways	1997	Domestic:	2,500	Domestic:	4	511	710	0.8%	-	710	-1,200
		May 21, 2002		2							-1,300

Source: Ministry of Land, Infrastructure, and Transport

- Remark:
1. Skymark Airlines' accounts are figures of the October period in 2003 (November 2002-October 2003).
 2. Aircraft includes joint-operation airplanes
 3. Airlines include code-sharing flights.
 4. Skynet Asia Airways has launched since August 2002.

Appendix 5

ASEAN Member Countries Basic Information

ASEAN Basic Data

Member Countries	Total Area	Population	GDP
Brunei Darussalam	5,770 sq.km	0.3 million	US\$ 7.07 billion
Cambodia	181,040 sq.km	11.5 million	US\$ 2.00 billion
Indonesia	1,919,440 sq.km	200 million	US\$ 232.00 billion
Laos	236,800 sq.km	4.9 million	US\$ 1.90 billion
Malaysia	329,750 sq.km	22.18 million	US\$ 95.50 billion
Myanmar	678,500 sq.km	46.4 million	US\$ 14.31 billion
Philippines	300,000 sq.km	68.6 million	US\$ 83.30 billion
Singapore	632.6 sq.km	3.87 million	US\$ 92.10 billion
Thailand	514,000 sq.km	61.81 million	US\$ 186.00 billion
Viet Nam	329,560 sq.km	78 million	US\$ 23.30 billion
Total	4,495,493 sq.km	497.56 million	US\$ 737.48 billion

Source: An Overview of ASEAN, 1999

Appendix 6

ASEAN Framework Agreement for the Integration of Priority

Sectors

Roadmap for Integration of Air Travel Sector

I. OBJECTIVE

The objective of this initiative is to advance the full liberalisation of air transport services in ASEAN, to achieve the ASEAN Leaders' vision of Open Sky in the ASEAN region. This Roadmap will build upon the Roadmap for ASEAN Competitive Air Services Policy adopted by the Ninth ATM Meeting in Yangon, Myanmar in October 2003. The Roadmap will complement the overall policy goals of the Action Plan for ASEAN Air Transport Integration and Liberalisation to be adopted at the Tenth ATM in Phnom Penh, Cambodia in November 2004.

II. MEASURES

This Roadmap provides concrete actions that ASEAN Member Countries shall pursue to achieve greater and significant air transport liberalisation in ASEAN, through a staged and progressive implementation. This roadmap includes issues specific to a) Liberalisation of air freight services; and b) Liberalisation of scheduled passenger services.

In the implementation, two or more ASEAN Member Countries who are ready can negotiate, conclude and sign implementing agreements/arrangements in line with the ASEAN-X Formula, on a plurilateral, multilateral or sub-regional basis. The other Member Countries could join in the implementation when they are ready. ASEAN Member Countries can also conclude more liberal bilateral arrangements for air services liberalisation. ASEAN Member Countries shall be provided flexibility with regard to the implementation of the proposed timeline for the specific measures.

III. COVERAGE

The liberalisation measures will cover the movement/carriage of both passengers and cargo or freight by air transport.

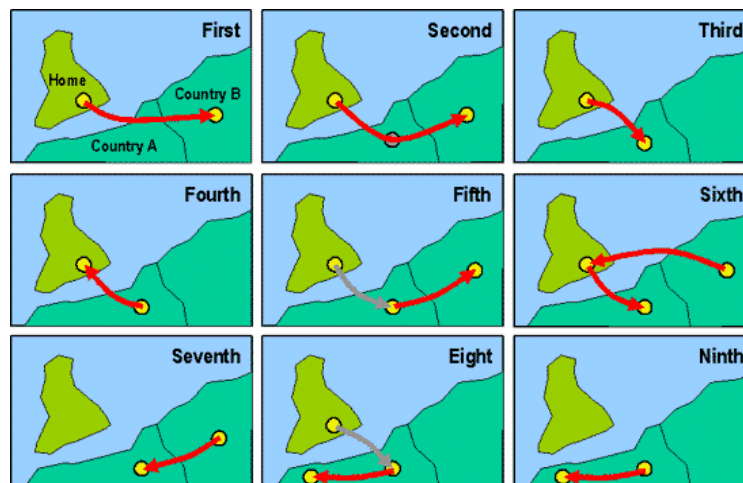
NO.	MEASURES	IMPLEMENTING BODY	TIMEL
SPECIFIC ISSUES			
I	Liberalisation of Air Freight Services		
1	Liberalisation of air freight services with no limitation of third and fourth freedom traffic December 2006	Senior Transport Officials Meeting rights and with increased tonnage and (STOM) through Air Transport Working Group (ATWG)	
	additional designated points to those stated in the ASEAN MOU on Air Freight Services (2002)		
2	Full liberalisation of ASEAN air freight services		December 2008
II	Liberalisation of Scheduled Passenger Services		
3	Liberalisation of scheduled passenger services with no limitations on third and fourth December 2005	STOM through ATWG	freedom traffic rights for all designated
	points within the ASEAN sub-regions		
4	Liberalisation of scheduled passenger services with no limitations on third and fourth December 2006		freedom traffic rights for at least
	two designated points in each country between the		
5	Liberalisation of scheduled passenger services with no limitations on fifth freedom December 2006		traffic rights for all designated
	points within the ASEAN sub-regions		
6	Liberalisation of scheduled passenger services with no limitations on fifth freedom December 2008		traffic rights for at least two
	designated points in each country between the ASEAN		
7	ASEAN-wide liberalisation of scheduled passenger services, with no limitations on December 2008		third and fourth freedom traffic
	rights for the capital city in each ASEAN Member Country		
8	ASEAN-wide liberalisation of scheduled passenger services, with no limitations on fifth December 2010		freedom traffic rights for the
	capital city in each ASEAN Member Country		
III	Enhancing Capacity Building Programmes		
9	Enhancing capacity building programmes to facilitate transition towards full air services liberalisation	STOM through ATWG	2005-
2010			

Note: Air travel shall be deemed to refer to air transport
Travel Sector

Source: Appendix I Roadmap for Integration of Air

Appendix 7

Air Freedom Rights



Traditionally, an airline needs the approval of the governments of the various countries involved before it can fly in or out of a country, or even across another country without landing. Prior to World War II, this did not present too many difficulties since the range of commercial planes was limited and air transport networks were in their infancy and nationally oriented. In 1944, an International Convention was held in Chicago to establish the framework for all future bilateral and multilateral agreements for the use of international air spaces. Five freedom rights were designed, but a multilateral agreement went only as far as the first two freedoms (right to overfly and right to make a technical stop). Freedoms are not automatically granted to an airline as a right, they are privileges that have to be negotiated. All other freedoms have to be negotiated by bilateral agreements, such as the 1946 agreement between the United States and the UK, which permitted limited "fifth freedom" rights. The 1944 Convention has been extended since then, and there are currently nine different freedoms (see above picture):

- **First Freedom.** The right to fly from a home country over another country (A) en-route to another (B) without landing. Also called the transit freedom.
- **Second Freedom.** The right for a flight from a home country to land in another country (A) for purposes other than carrying passengers, such as refueling, maintenance or emergencies. The final destination is country B.
- **Third Freedom.** The right to carry passengers from a home country to another country (A) for purpose of commercial services.
- **Fourth Freedom.** The right to fly from another country (A) to a home country for purpose of commercial services.

Third and Fourth Freedoms are the basis for direct commercial services, providing the rights to load and unload passengers, mail and freight in another country.

- **Fifth Freedom.** This freedom enables airlines to carry passengers from a home country to another intermediate country (A), and then fly on to third country (B) with the right to pick passengers in the intermediate country. Also referred to as "beyond right". This freedom divided into two categories: Intermediate Fifth Freedom Type is the right to carry from the third country to second country. Beyond Fifth Freedom Type is the right to carries from second country to the third country.
- **Sixth Freedom.** Not formally part of the original 1944 convention, it refers to the right to carry passengers between two countries (A and B) through an airport in the home country. With the hubbing function of most air transport networks, this freedom has become more common, notably in Europe (London, Amsterdam).
- **Seventh Freedom.** Covers the right to operate a passenger services between two countries (A and B) outside the home country.
- **Eighth Freedom.** Also referred to as "cabotage" privileges. It involves the right to move passengers on a route from a home country to a destination country (A) that uses more than one stop along which passengers may be loaded and unloaded.
- **Ninth Freedom.** Also referred to as "full cabotage" or "open-skies" privileges. It involves the right of a home country to move passengers within another country (A).

Source: <http://people.hofstra.edu/geotrans/eng/ch3en/conc3en/airfreedom.html>

Appendix 8

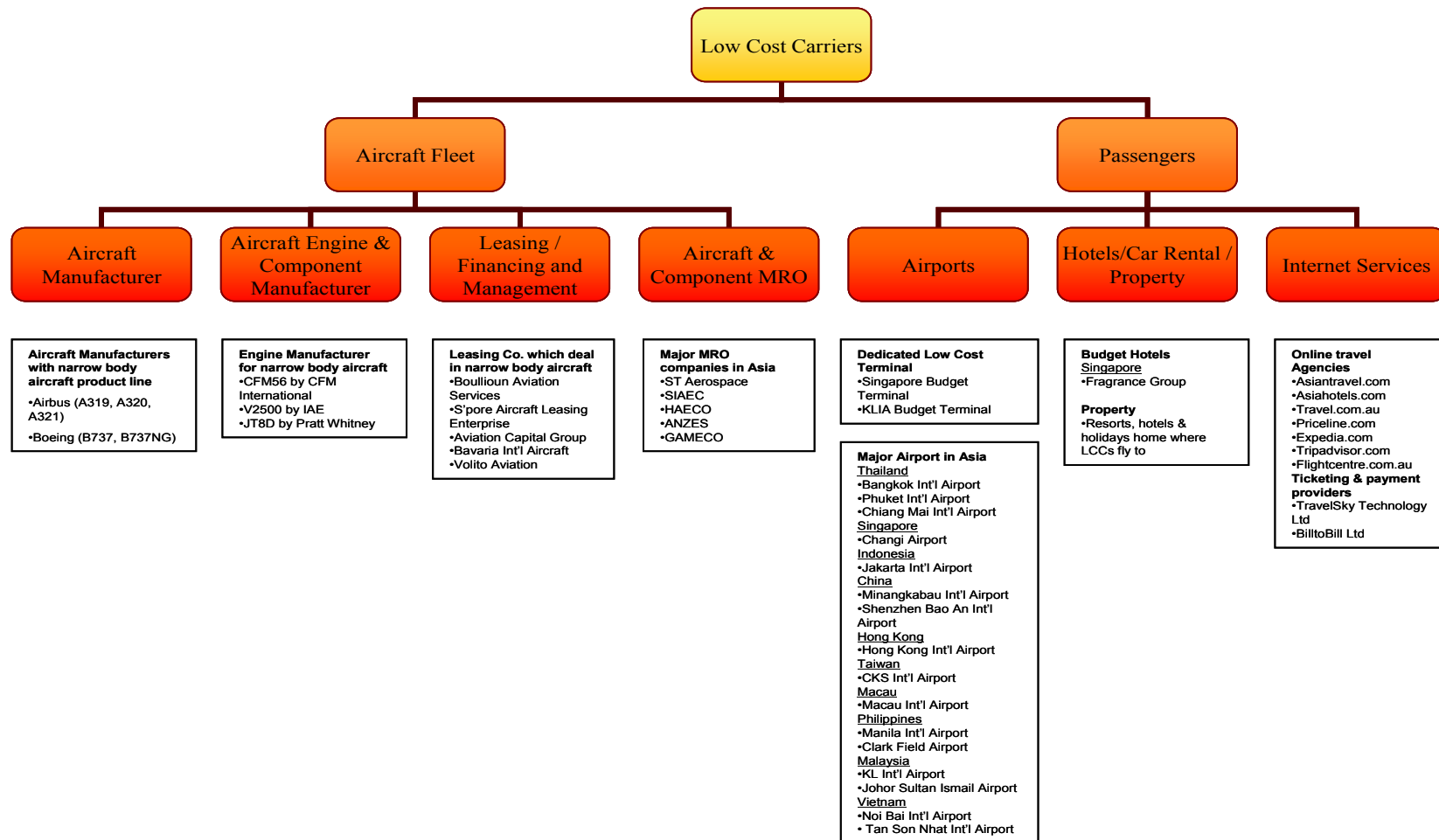
Details of China Aviation Market Liberalization

Country	Date	Details
Australia	9-Jul-03	Liberalized air services agreement, removing all designation restrictions, allowing expanded codeshare rights, removing restrictions on services between regional centers in Australia and China, and doubling capacity for services to Sydney, Melbourne, Brisbane and Perth.
Japan	1-Aug-03	Liberalized agreement, increasing weekly frequencies between the two countries by 35 each and adding three gateway airports in each country.
Thailand	1-Jan-04	Open Skies.
UK	4-Feb-04	British airlines are allowed to increase their weekly flights from 10 to 15 in 2004 and to 25 in 2005 and 31 in 2006.
S. Korea	19-Mar-04	Liberalized bilateral air services agreement, providing multiple carrier designation on three routes between the countries and additional capacity.
US	24-Jul-04	Liberalized bilateral air services agreement, increasing total capacity by 3.6x to 249 from 54 by 2008 (128 for passenger flights and 121 for cargo flights, up from 17 and 37, respectively), removing all designation restrictions, allowing for the establishment of cargo hub in China provided that a carrier reaches the threshold of 72 flights per week, and lifting all limits on code-sharing agreements.
Hong Kong	8-Sep-04	Liberalized bilateral air services agreement, increasing number of round trip passenger flights by 30% to 800 a week and the number of round-trip all-cargo flights by 100% to 42.

Source: Center for Asia Pacific Aviation

Appendix 9

Food Chain Analysis of Low Cost Carriers



Appendix 10

Hamilton Sundstrand Asia Pacific MRO Facilities



Hamilton Sundstrand Pacific Aerospace (Singapore)
•Repair Services for 400 Hz Electric Power Generating Systems



Fuel Accessory Service Technologies (Singapore)
•Repair Services for Jet Engine Fuel Accessories



Hamilton Sundstrand Qinling Aerospace (Xiamen)
•Repair services for 400 Hz Electric Power Generating Systems



Hamilton Sundstrand Customer Support Centre (Malaysia)
•Repair Services for Air Management Systems