

**DEVELOPING A METHODOLOGY IN AVIATION RISK MANAGEMENT  
BASED ON SUSCEPTIBILITY**

**by**

**NG YING CHOW**

**Thesis submitted in fulfillment of the  
requirements for the degree  
of Master of Science**

**2007**

## ACKNOWLEDGEMENTS

I would like to take the chance to express my greatest gratitude to my supervisor, Dr Hamid R. Saeedipour, for his constant guidance, support and supervision which is the essential part of me to complete this research successfully. I would also like to extend my greatest appreciation to Mr. Illiyia, Dr Radzuan Razali, Dr Azlin for providing immeasurable help for me in the admin part, which enable me to carry out my research while conducting interviews and conferences for my research. Also not to forget Mr Samsul, who gave much valuable input for my thesis, to make it more unusual.

Many thanks to the people from the organizations who had involved in this thesis, who gave me a helping hand during my research. Special thank goes to Steven Tan (Transmile), Megat Farizat Mohd. Zamri ( Malaysia Airports), Shahrul bin Ahmad Shah (MIAT), May Toh (Transmile) and Miss Sharifah (MAS)who had provided me valuable assistant during this period. Sincere thanks also due to all my friends and colleagues, for their support and inspirations that has made this project a memorable one.

Last but not least, I would like to express my deepest sense of gratitude to my family and relatives who had been a tremendous source of inspiration, and always been supportive and patient during my research.

## CONTENTS

	<b>PAGE</b>
<b>ACKNOWLEDGEMENTS</b>	ii
<b>CONTENTS</b>	iii
<b>LIST OF TABLES</b>	vi
<b>LIST OF FIGURES</b>	vii
<b>LIST OF ABBREVIATION</b>	viii
<b>LIST OF APPENDICES</b>	ix
<b>LIST OF PUBLICATIONS &amp; SEMINARS</b>	x
<b>ABSTRAK (in Bahasa Melayu)</b>	xi
<b>ABSTRACT (in English)</b>	xii
<b>CHAPTER ONE : INTRODUCTION</b>	
1.0 Preface	1
1.1 The Background of Analysis	2
1.2 Airline Industry Analysis	3
1.2.1 Industry Competitors	4
1.2.2 Suppliers	5
1.2.3 The Buyer's Power	8
1.2.4 New Entrants	10
1.2.5 The Substitute	12
<b>CHAPTER TWO : LITERATURE SURVEY</b>	
2.0 The Aviation Industry	14
2.1 Aviation Deregulation	16
2.2 Management and Communication in Air Crises	18
2.3 Globalization Approach	21
2.4 Technology	23
2.5 The Business Model	24
2.6 Alliances	25
2.7 Switching Cost in Frequent Flyer Program	29
2.8 Capacity Management	31
2.9 Hedging	32
2.10 State Aid	33

### CHAPTER THREE: METHODOLOGY

3.0	Introduction	36
3.1	Data Gathering	36
3.2	Data Analysis	38
3.3	Identify Problem and Research	39
3.4	Results and Discussions	39
3.4.1	Aviation Risk Modeling	40
3.4.1.1	Determining Potential Markets (routes)	42
3.4.1.2	Determining Flight Frequency	43
3.4.1.3	Determining Cost and Expected Revenue	44
3.4.1.4	Competitiveness	47
	(a) <i>Price Competitiveness</i>	48
	(b) <i>Flight Frequency Competitiveness</i>	48
	(c) <i>Time of Flight, <math>T_f</math></i>	49
3.4.1.5	Case Study	49
3.4.2	'The MAS Way' Survivability Solution	54
3.4.2.1	'The MAS Way' Solution	54
3.4.2.1.1	Flying to Win Customers	56
3.4.2.1.2	Mastering Operational Excellence	56
3.4.2.1.3	Financing and Aligning the Business on the Profit-Loss Account	57
3.4.2.1.4	Unleashing Talents and Capabilities	58
3.4.2.1.5	Winning Coalitions	58
3.4.2.2	The Analysis	59
3.4.2.2.1	Commercial	59
3.4.2.2.2	Operation	61
3.4.2.2.3	Finance	63
3.4.2.2.4	The People	64
3.4.2.2.5	The Stakeholders	65

### CHAPTER FOUR: SUSCEPTIBILITY AND VULNERABILITY

4.0	Introduction	67
4.1	The Concept of Susceptibility	68
4.1.1	Simplified Business Model	69
4.1.1.1	Technology	70
4.1.1.2	Outsourcing	73

4.1.1.3	Loyalty Program	75
4.1.2	Elimination of Future Uncertainties	77
4.1.2.1	Hedging	77
4.1.2.2	Fleet Flexibility	80
4.1.3	Cost Efficiency	82
4.1.4	Strategic Alliances	84
4.1.4.1	Economies of Scope	84
4.1.4.2	Economies of Scale	86
4.2	The Concept of Vulnerability	88
4.2.1	Strategic Task	89
4.2.1.1	Crisis Investigation	89
4.2.1.2	Crisis Relationship Management	95
4.2.2	Operational Task	97
4.2.2.1	Capacity Management	97
4.2.2.1.1	The Demand for Capacity	98
4.2.2.1.2	The Supply for Capacity	99
4.2.2.2	Coordination with Business Partners	100
4.2.3	Exceptional Task – Government Assistance	101

## **CHAPTER FIVE: CONCLUSIONS AND FUTURE WORK**

5.0	Preview	104
5.1	The Summary	104
5.2	The Research Outcomes	106
5.3	Discussions	107
5.4	Future Work	108
5.4.1	General	108
5.4.2	Carry-on Project	110

<b>REFERENCES</b>	112
-------------------	-----

## **APPENDICES**

Appendix A: Interviewing Mr. Steven Tan (Assistant Station Manager – CEN Worldwide Sdn. Bhd. )

Appendix B: Interview with Mr. Megat Farizat (Risk Management Executive - Malaysia Airports BHD)

## LIST OF TABLES

		<b>PAGE</b>
Table 1.1	Factors that may affect the power of industry competitor in aviation industry	5
Table 1.2	Factors that may affect the power of suppliers in airline industry	8
Table 1.3	Factors that may affect the power of buyer in airline industry	10
Table 1.4	Factors that may affect the power of new entrants in airline industry	12
Table 1.5	Factors that may affect the power of substitute in airline industry	13
Table 2.1	Domestic deregulations of countries	17
Table 2.2	Members of three global alliances	26
Table 2.3	Hedging strategies	34
Table 3.1	Comparison of labor productivity for regional airlines	60
Table 3.2	Pros and cons of the changes to be made in commercial area in 'The MAS Way'	61
Table 3.3	Pros and cons of mastering operation excellence	63
Table 3.4	Pros and cons of the third thrust	64
Table 3.5	Pros and cons of the fourth thrust	65
Table 3.6	Pros and cons of the fifth thrust	66
Table 4.1	Technologies used by airlines for competitiveness and business superiority	72
Table 4.2	Hedging Categories	78

**LIST OF FIGURES**

	<b>PAGE</b>
Figure 1.1 Airline industries exposing to outside risks	2
Figure 1.2 Porter's five forces model	4
Figure 2.1 World Airline Operating Profit	15
Figure 3.1 The MAS Way	55
Figure 4.1 Outsourcing reduce the complexity of airline industry	74
Figure 4.2 Crude oil price volatility	79
Figure 4.3 Economies of scale	86
Figure 4.4 The "V" Crisis	91
Figure 4.5 The "N" Crisis	92
Figure 4.6 The "Z" Crisis	93
Figure 4.7 The "W" Crisis	94

## LIST OF ABBREVIATIONS

3D-VE	Three-dimension Visual Enterprise
AAPA	Association of Asia Pacific Airlines
APEC	Asia-Pacific Economic Cooperation
ASEAN	Association of Southeast Asian Nations
ASK	Available Seat Kilometer
ATK	Available Ton Kilometer
CRS	Computerized Reservation System
DOC	Direct Operating Cost
EU	European Union
EWRM	Enterprise Wide Risk Management
FFP	Frequent Flyer Program
FSC	Full Service Carrier
FTK	Freight Ton Kilometer
GNP	Gross National Product
IATA	International Air Transport Association
ICAO	International Civil Aviation Organization
IOC	Indirect Operating Cost
KLIA	Kuala Lumpur International Airport
KPI	Key Performance Indicator
LCC	Low Cost Carrier
MAS	Malaysia Airline System
MDP	Market Development Program
PAL	Philippines Airlines
PESTE	Political, Economic, Social, Technology and Environmental
ROI	Return on Investment
RPK	Revenue Passenger Kilometer
SARS	Severe Acute Respiratory Syndrome
SBAC	Society of British Aerospace Companies
SEA	South East Asia
SIA	Singapore Airlines
SWOT	Strength, Weakness, Opportunity and Threat
US	United States
WTO	World Trade Organization

## LIST OF APPENDICES

- A Interviewing Mr. Steven Tan (Assistant Station Manager – CEN Worldwide Sdn. Bhd. )
  
- B Interview with Mr. Megat Farizat (Risk Management Executive - Malaysia Airports BHD)

## LIST OF PUBLICATIONS & SEMINARS

1. Ng, YC & Saeedipour, HR, "Susceptibility Consideration in Risk Management of an Airline Involving Concurrent Air Crises", National Aerospace Conference 2004 (NAC04), University of Science Malaysia (USM), Pinang, Malaysia, 7-9 September 2004.
2. Ng, YC & Saeedipour, HR, "Development of Porter's Model for Aviation Risk Management of Low Cost Carrier in South East Asia", The National Postgraduate Colloquium 2004 (Napcol 2004), 8<sup>th</sup> – 9<sup>th</sup> December 2004.
3. Ng, YC & Saeedipour, HR, "Vulnerability Analysis of a Low Cost Carrier Affected by Air Crises", Malaysian Universities Transport Research Forum Conference 2004 (MUTRFC 2004), 1<sup>st</sup> – 2<sup>nd</sup> December 2004.
4. Saeedipour, HR, Ng, YC, & Chan, WL, "The State of the Aviation Industry - Asia Pacific & the Middle East", Cost Airlines/Competitive Business Strategies Conference, International Conference Organized by Aviation Industry Group / UK, Kuala Lumpur, Malaysia, 26-27 May 2004.
5. Saeedipour, HR, & Ng, YC, "The Effect of Market Forecasting Analysis on Aviation Risk Management", National Conference of Engineering & Technology, School of Engineering, University of Malaya, Kuala Lumpur, Malaysia, 26-27 May 2004.
6. Saeedipour, HR, Razali, R, Ng, YC, Chang, TY, Abdullah, F, Aminuddin, SN, "Aviation Market Analysis in South East Asia", 2<sup>nd</sup> New Root Asia Forum, International Conference Organized by ASM International / UK, Kuala Lumpur, Malaysia, 25-27 Apr 2004.
7. Saeedipour, H. R. & Ng, Y. C., 'Air Crises Effects on Air Cargo', Asian Aviation Conference, Kuala Lumpur, Malaysia, 16-17 March 2006.

## **PEMBANGUNAN KAEDAH PENGURUSAN BERISIKO DALAM PENERBANGAN BERDASARKAN KEPEKAAN**

### **ABSTRAK**

Pengurusan penghidupan adalah satu konsep yang dikembangkan daripada konsep penghidupan kapal terbang perang. Ia boleh dibahagikan kepada dua kategori, iaitu pengurusan kepekaan dan pengurusan kekuatan. Pengurusan kepekaan bertujuan untuk mengurangkan peluang syarikat penerbangan diserang oleh krisis penerbangan. Ia seharusnya dilakukan pada hari biasa dan bersifat strategik. Pengurusan kekuatan bertujuan untuk menaikkan kemungkinan hidup syarikat penerbangan setelah diserang oleh krisis. Ia fokus dalam operasi syarikat penerbangan dan memerlukan kesannya dapat dilihat dengan cepat. Ini adalah disebabkan bahawa dalam krisis penerbangan, biasanya syarikat penerbangan menghadapi masalah kewangan yang berat, maka ia memerlukan kesan keputusan dapat dirasai dengan segeranya.

Satu model risiko penerbangan juga telah dimasukkan dalam tesis ini. Model risiko ini adalah meniru perancangan jalan penerbangan untuk syarikat penerbangan yang sebenar. Model ini ditulis berdasarkan beberapa andaian dalam hidup sebenar perniagaan penerbangan untuk syarikat penerbangan. Ia bertujuan untuk menolong pengurus syarikat penerbangan untuk membuat keputusan yang lebih baik dengan menggunakan cara matematik untuk menganalisa risiko yang mereka hadapi. Model ini juga boleh mengukur daya persaingan untuk syarikat penerbangan berbanding dengan syarikat-syarikat penerbangan yang lain.

Kaedah yang dikembangkan dalam tesis ini juga telah digunakan untuk menganalisa pelan Malaysia Airlines untuk menyempulihkan perniagaannya. Setiap kekuatan and kelemahan pelan ini dari segi pengurusan penghidupan telah dianalisa and diterangkan.

## **DEVELOPING A METHODOLOGY IN AVIATION RISK MANAGEMENT BASED ON SUSCEPTIBILITY**

### **ABSTRACT**

Survivability management is a concept evolves from aircraft combat survivability concept. It can be divided into two main categories, namely susceptibility and vulnerability management. Susceptibility is meant to help airline to reduce the chances for the airline being hit by the crisis. It should be implemented during normal business day and more on the strategic side. Vulnerability management is aims to increase the chance for the airline to survive after being hit by crisis. It is focus on the operational side of the airline which the result should be seen immediately. This is because during air crisis, airline is usually under heavy financial pressure; hence immediate result is required to ensure the airline's survival.

A risk model of airline's risk is also included in this thesis. The risk model is to imitate the actual planning of route management. It was developed under some assumptions base on the real life airline business. It is aims to help the airline manager to make a better decision by using a mathematical model to analyze the risk that they are facing. This model also measure the competitiveness of the airline compare to the other airlines on the market.

Methodology developed was used to analyze the business turnaround plan that Malaysia Airline announced in February 2007, The MAS Way. The strength and weakness of this plan in terms of survivability managements were analyzed and explained.

## CHAPTER ONE INTRODUCTION

### 1.0 Preface

Risk management is one of the most important aspects in aviation industry due to the nature of the industry since it is exposed to more risks compare to other industries. This chapter will describe the overall situation of aviation industry and explain the reason why airline is relatively easy to being hit by crises.

The world airline industry currently generates about RM 1520 billion in output and employs over 4 million people directly all over the World. Indirectly, it creates further 24 million job opportunities with turnover of about RM 5.32 trillion in total, which is about 4.5% of the World gross national product (GNP) (International Air Transport Association, IATA 2005). In the age of globalization, air transport has grown to become one of the most essential transportation systems for international business traveling and tourism. However, despite the glamour perceived from the commercial power; the airline industry is suffering from irregular and low profit margin, highly susceptible to outside risks that are considered as non-business factors. It is highly dependant on marketing forecasting and economic influences compare to other transport industries (Saeedipour *et al* 2004).

Fluctuation effect on airline's profitability is caused by a series of variable tasks such as operational and technical changes, regulatory and political issues (Figure 1.1). All of these factors are currently playing an important role in aviation business but none of them are in the hand of airlines control. Two of the well-known examples are the crises of 911 and epidemic Severe Acute Respiratory Syndrome (SARS) that caused a catastrophic on the financial side of airlines for quite some time. Apparently, the airline industry is exposed to excessive risks compared to other industries alike. Encountering

aviation crises is not uncommon in the current airline industry. In short, the experience shows that handling of crises can make or break an airline at any extreme cases. Therefore, the main goal of this thesis is to formulate a guideline to help airline managers overcome the crises and risks they may face at present or in the future.

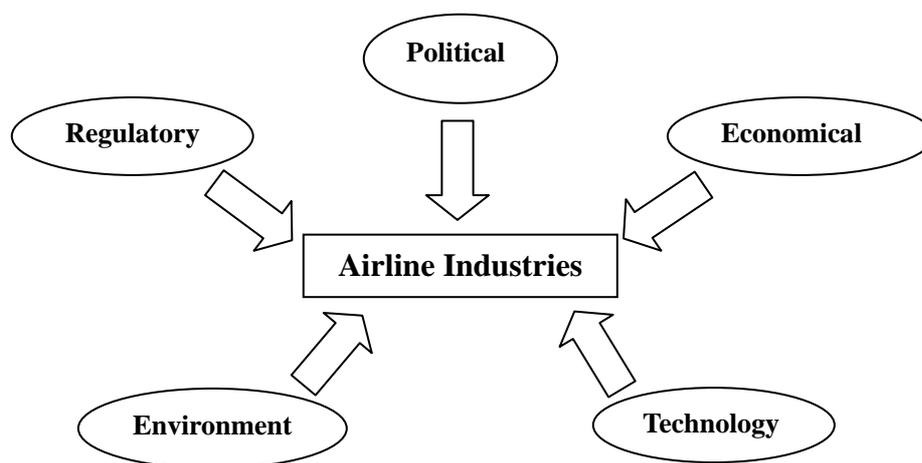


Figure 1.1: Airline industries exposing to outside risks

## 1.1 The Background of Analysis

The airline industry had always been a highly regulated industry from the beginning of its establishment. The deregulation or liberalization movement initially started in the US in 1978. In general, governments usually treat the airline industry differently compared to some other industries due to the sensitivity of the aviation business, which involve some national security and sovereignty issues. Hence, many airlines are regarded as national property and protected from a fierce competition in the business world from their counterparts in other industries alike. Airlines need to obtain various permits from the authorities such as landing rights in each country required on certain routes. Generally, such rights are given base on bilateral agreements between the two countries. The number of seats, flight frequency and names of corresponding airlines are stated clearly in the agreement. Respective airlines from both parties may provide the service required on the route according to the terms and conditions stated

in the agreement.

Liberalization and deregulation started in a large number of countries in the World in the last decade such as Germany and Italy. It is generally accepted in market that any highly regulated industry can face a low productivity and profitability. The main idea of deregulation is to release airlines from certain constraints and outdated rules that may prevent the industry from doing business. The first and most prominent effect of deregulation is to increase competition within the industry and hence to improve the efficiency of the industry as a whole because airlines need to keep competing for the customers in a relatively free market. Fierce competitions forced airline to seek out more cost saving and operation efficiency to increase profitability.

## **1.2 Airline Industry Analysis**

As mentioned before, profitability of the airline industry is traditionally lower than the other similar industries. Economic studies are showing that the industry can sustain different level of profitability. One of the main reasons behind these differences in profitability is the industry structure. In this research, Porter's Five Forces Model is being widely used to analysis the aviation industry structure to provide an overall view of the industry. This is a well-established model, in which the industry can be simulated as a model influenced by five different factors called 'forces' as shown in Figure 1.2. These forces are named as industry "competitor", "supplier", "buyer's bargaining power", "threat of new entrants" and "substitutes". A suitable dynamic interaction of these five forces shapes the basic structure to determine the profitability and attractiveness of the industry. In real World, this model is widely used for competition analysis, especially in business strategy formation. The collective strength of these forces will determine the ability of an airline to earn and the rate of return on investment (ROI) in excess of the cost of capital.

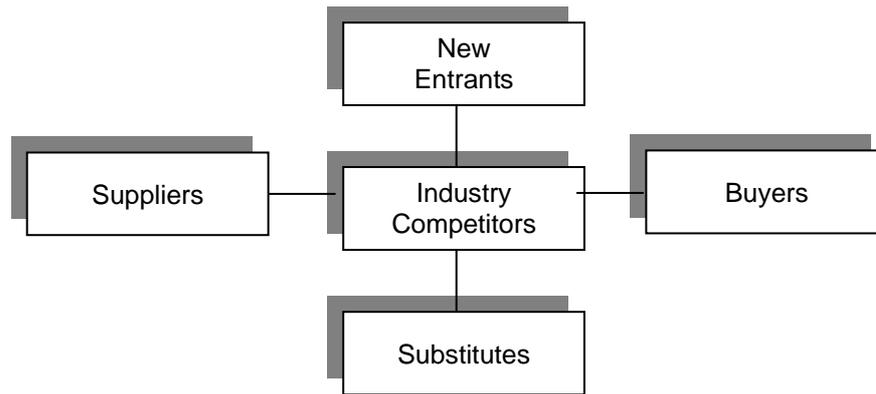


Figure 1.2: Porter's five forces model

### 1.2.1 Industry Competitors

The degree of rivalry is one of the most important factors determining profitability of the industry. The market growth and number of competitors are some of the causes that will affect the industry rivalry. Each airline analyses other airline's competitive strategy and employ their unique strategy to gain a stronger position in the market. For the airline industry where its fixed cost is usually very high and the variable cost is low, competition is fierce as airlines are trying to generate revenue to reach break-even level in order to survive.

Competition in the airline industry can be divided into competition among low cost carrier's market, among full service carrier's market and also competition between low cost carriers (LCCs) and full service carriers (FSCs) in both regional and domestic markets. The competition among low cost carriers is usually fiercer as offering the cheaper airfare is utmost important for them. One of the main reasons that passengers choose to use a LCC is "cheaper airfares". Since most of the low cost carriers do not have frequent flyer program to impose switching cost on customers, it is rather difficult for them to build up customer loyalty except constantly offering a cheaper airfare to retain their customers.

On the other hand, the competition between full service carriers is more complicated; this is because FSCs are competing in many aspects of their services, such as network coverage, flight frequency, and service quality and ticket prices. While the competition between FSCs and LCCs are mainly focused on attracting each other's market as they usually have different customer groups. Customer base of LCCs are largely made up of leisure traveler while FSCs appear to be more attractive for business traveler (Ng & Saeedipour 2004<sup>2</sup>).

Further liberalization in the aviation industry will certainly intensify the industry rivalry. In Malaysia, Market Development Program (MDP) that was used as the pricing mechanism by airlines and travel agents to stabilize airfares has been changed since 1 November 2004. The abolishment would give the power to airlines and travel agents to determine airfare based on supply and demand of the market. According to Chairman of MDP, Dato' Rashid Khan, the removal of MDP is a natural progress in a maturing industry. On international market, the ASEAN Open Sky policy is going to be fully implemented in 2015 and it will bring more challenges and competitions to the industry. Table 1.1 summarized factors that may cause changes in power of industry competitor.

Table 1.1: Factors that may affect the power of industry competitor in aviation industry

Increase	Decrease
<ul style="list-style-type: none"> <li>• Relatively high number of competitors</li> <li>• Emergence of low cost carriers</li> <li>• Deregulation</li> </ul>	<ul style="list-style-type: none"> <li>• Low profitability</li> <li>• Highly volatile profitability</li> </ul>

### 1.2.2 Suppliers

Suppliers are those who provide necessary raw material, equipment and labor for an airline to perform their daily operation. Supplier's strength can greatly affect the industry's profitability, if there is a high concentration in the supplier power, they can exert influence on airlines thus increasing their bargaining power. Major inputs for airline to provide their services to passengers are aircraft, labor, fuel and landing slots.

The fleet is the most important assets for airlines to generate revenue. However, there are only two major aircraft manufacturers in the West, Boeing and Airbus, which almost monopolizing the wide-body civil transport aircraft market worldwide. Hence, the bargain power of aircraft manufacturers against airlines remains very strong, as the concentration of aircraft supplier market is very high. Besides, high concentration on aircraft-supplier side also limits the power on the buyer-side. Although there is increasing competition between Boeing and Airbus, still, airlines have very little power in negotiation of aircraft deal with the manufacturer. A notable change happened in the US and Europe is the strengthening of market position of other aircraft manufacturers such as Embraer and Bombardier. For example, JetBlue Airways ordered 100 aircrafts from Embraer breaks the duopoly situation. However, whether such situation will happen in the South East Asia (SEA) countries as well, remains to be seen in the near future.

Another source that airlines may obtain aircraft from is through aircraft leasing companies. Aircraft leasers are those who buy aircraft in large volume (usually with a bargaining price from the manufacturer) and leasing out to single airline with various terms and conditions, such as wet lease and operating lease. Leasers utilize their large capital to ensure a strong supplier's power relative to airlines. However, the recent crises in air transportation such as 911 and SARS epidemic have forced several airlines out of business, which may lead to decrease of the aircraft prices and increase in the buyer power. A joint study conducted by Kearney and Society of British Aerospace Companies (SBAC) in 2003 revealed that the incident of September 11 created a strong buyers' market for aircraft and thereby caused a significant dropped in price of both new and used aircraft. The aircraft supplier's power in the airline industry is forecasted to be strong in the Asia Pacific region.

Airlines need to obtain landing rights within corresponding countries and landing slots from the airports that they intend to fly to. Traditionally, landing rights are negotiated between two countries and usually only designated airline will be allowed to fly on routes between two countries. Such negotiations are sometimes treated as national issues between the two countries. On the airport-side, due to natural monopoly advantages that airport has over airlines in some markets, the airport charges can be relatively high because airlines may stand a very weak position to negotiate for lower charges. However, many secondary airports are currently offering very attractive packages to airlines, especially low cost carriers, to lure them to fly to these airports and generate revenue for them. Nevertheless, this trend was not followed in the Asia Pacific region. One of the reasons of this is due to lack of secondary airports in this region (Ng & Saeedipour 2004<sup>2</sup>).

Some airline employees are considered as highly specialized and professionals, such as pilots and aircraft technicians. Due to their specializations, it is almost impossible for an airline to find replacements for pilots or maintenance workers in short time, which may cause an increase in the bargaining power of their employees over the airlines. In this regard, the labor cost is one of the biggest operating costs of most airlines. However, the recent trend suggests that this situation is changing. In the aftermath of crises such as 911, war on Iraq and fuel price hike, cutting cost is the main agenda of airline nowadays, and the labor cost is always the first to be the victim. Ironically, failing airline situation financially is the major reason that strengthens its bargaining power over its employees. Table 1.2 shows factors that may cause changes in supplier's power in airline industry.

Table 1.2: Factors that may affect the power of suppliers in airline industry

Increase	Decrease
<ul style="list-style-type: none"> <li>• Civil aircraft market was nearly monopolized by two major aircraft manufacturers</li> <li>• Large capital (leasing companies)</li> <li>• Employees are highly specialized and professionals</li> </ul>	<ul style="list-style-type: none"> <li>• Recently crises decrease aircraft prices and orders</li> <li>• Secondary airports need low cost carriers to generate traffic flow</li> </ul>

### 1.2.3 The Buyer's Power

The buyer's power is defined as the influence that customers can have on the airlines revenue affecting ticket prices and service charges. If the buyer's power is strong enough, customers can set the ticket price, and vice versa. Strong buyer power can bargain away potential airline profit and extract other benefits from airlines such as quality-improved services. Some of the favorable factors to strong buyer's power in the airline industry are relatively low customer switching cost, low product differentiation, and freely available information on Internet.

Basically, most airlines are now offering the same product, namely "a seat to the destination". In fact, the product differentiation among the airlines is extremely low. Since the seat pitch, in-flight services and comfort in similar class provided by different airlines do not vary widely. Passengers will not feel much difference when they are traveling with different airline in the same class. The most commonly used method for the airlines to build up customer loyalty and incur switching cost among the passengers is "Frequent Flyer Program" (FFP). Under frequent flyer scheme, customers can accumulate certain amount of credit points each time they fly with the specific airline, and the collected credit points can be used to redeem some rewards such as upgrade to a better class of flying or exchange for a free flight. However, frequent flyer program has limited power to retain airline's passengers and it may incur cost for the airline to maintain it instead of creating revenue. On top of that, with most of the airlines,

especially LCCs, are constantly promoting their ticket sales through internet, potential customers can easily obtain the price and flight schedule information from internet freely. It had become so easy for buyers to compare the price of tickets online and to find the best deal available. Freely available information yields a greater buyer's bargaining power compare to when the information is poor. Besides, many small travel agencies offer online services to attract more passengers, where in many cases; buyers are able to get discounted tickets from them. In such situation, airlines will have to put in more efforts to win over these passengers resulting in a great buyer's power (Ng & Saeedipour 2004<sup>2</sup>).

Nevertheless, the buyer's power may be weakened by low buyer concentration or small purchase volume. Although fierce pricing war dispute among the airlines, it is notably that buyers do not play proactive roles in the pricing war. Current price impacts in the market is aimed to keeping the airline's competitors out of the market rather than providing the low pricing power of the airlines to their customers. Besides, travel agents, who usually buy air tickets in large volume, yield greater power but they use this concept to strengthen their position in the market rather than transferring the cost benefit to costumers.

The recent development in aviation industries has shown an increase in the buyer power, such as the abolishment of Market Development Program (MDP) that has also been used to stabilize airfares in Malaysia. Despite this, the buyer power is still considered as low as the buyers do not have enough influence on the airline's ticket price setting decision-making. However, any rapid development in the industry may change such situation soon. Table 1.3 summarized factors that may cause changes in power of buyers in the market.

Table 1.3: Factors that may affect the power of buyer in airline industry

Increase	Decrease
<ul style="list-style-type: none"> <li>• Low customer switching cost</li> <li>• Low product differentiation</li> <li>• Freely available information on internet</li> <li>• Deregulation</li> </ul>	<ul style="list-style-type: none"> <li>• Frequent flyer program to incur switching cost on customers</li> <li>• Low buyer concentration</li> </ul>

#### 1.2.4 New Entrants

“New entrant” refers to any new player in the aviation market which will compete with the incumbents. A key criterion to analyze the threat of new entrant in the industry is to analyze the level of entry barriers. Entry barriers are obstacles that may discourage others from entering the market hence affect the competition of the industry. New entrants will also lower the potential profits of the industry as a whole. Most common entry barriers in airline industry are regulation restrictions, labor, access to distribution channels and high capital requirement. However, the entry barriers to the airline industry had generally been lowered recently, especially on the regulation restrictions and distribution channels.

It is relatively easy to obtain permit to set up a new airline compare to a decade ago as the liberalization of airline industry is happening, especially in Europe and the Asia Pacific region, which lower the entry barrier for the new comer. A recent boom in new players such as the LCCs in the South East Asia (SEA) countries since 2004 is a very good example of the effect of the deregulations.

Another entry barrier that can be considered as vanished is the access to traditional distribution channel in the industry such as travel agents. Most of the new start-up airlines build their own distribution channel through Internet or direct phone booking. Besides reducing cost, the concept of online ticket booking enables small airlines to interact and build their customer base and bypassing travel agents as

intermediaries. Besides, the number of Internet users in the Asia Pacific is increasing rapidly, providing the basis for online booking for the new entrants.

On the other hand, in the aftermath of recent crises such as the 911, the war and conflicts on Iraq and SARS, newly start-up airlines are relatively in a strong position with the aircraft manufacturer or leasing companies. This is because that in the time of crisis, incumbent airlines not only cancelled or delayed the new aircraft delivery; they may return their leasing aircraft earlier. This is lowering the barrier of intensive capital requirement for newly established airlines especially for LCCs as typically LCCs are starting their business with only two or three used aircrafts.

One advantage that new entrants usually have over the incumbents is the relatively low cost, especially labor cost, which will increase over time. With no burden of pension fund payment and high salary, new entrants are more competent in term of ticket pricing. Besides, usually new entrants started their business with used aircraft, which has a huge difference in the aircraft cost compared to new aircraft. However, the challenge for new entrant lies in maintaining the low cost to make profit in the long term.

It seems airlines need economy of scale and density to lower their average cost per seat. This is one of the main disadvantages that new entrants have to face over their present counterparts. In order to achieve economy of scale as fast as possible, new entrants are eager to expand their market share, so they tend to adopt a more aggressive pricing policy which may lead to ignite the price dispute across the industry and in long run will drag down the average profit of the industry. Table 1.4 shows factors that may cause changes in power of new entrants in airline industry.

Table 1.4: Factors that may affect the power of new entrants in airline industry

Increase	Decrease
<ul style="list-style-type: none"> <li>• Deregulation</li> <li>• Lower entry barrier in terms of regulatory and capital required</li> <li>• Internet</li> <li>• Recent crises such as 911 and SARS</li> </ul>	<ul style="list-style-type: none"> <li>• No economy of scale and scope</li> <li>• Relatively high unit cost</li> </ul>

### 1.2.5 The Substitute

“Substitution” represents the threat that other industries or transportation may offer a product, which can replace air transport. The threat of substitution depends on the type of flight, namely long haul or short haul, and travel purpose such as business or leisure. For short haul and leisure travel, the main substitution threat in the Asia Pacific comes from surface transport such as road and sea transport. Even though some of the airfares from LCCs are lower than bus fare, but after paying for the airport charges and insurances, customers will find that generally the total cost of air travel is still higher than that of road transport. Although surface transport is cheaper in term of money, it still costs the passenger more in terms of time and efficiency. Furthermore, road transport generally will not compete with long haul travel, especially for cross-nation traveling.

On the other side, latest technology inventions such as videoconference pose a bigger threat for business travel. In the aftermath of 911, many worries that the airline industry will be substituted by video conferencing companies as they assumed that people will be less willingly to travel since then. However, the speedy traffic recovery proved them wrong. Although the international passenger flow haven’t returned to the pre-crisis level, but it seems the recovery is on the right path. Table 1.5 summarized the factors that may change the power of substitute in airline industry.

Table 1.5: Factors that may affect the power of substitute in airline industry

<b>Increase</b>	<b>Decrease</b>
<ul style="list-style-type: none"><li>• Surface transport</li><li>• Advance technology</li><li>• Lower cost or fare</li></ul>	<ul style="list-style-type: none"><li>• Air travel is relatively fast and reliable</li></ul>

## CHAPTER TWO LITERATURE SURVEY

### 2.0 The Aviation Industry

The World aviation industry is a very unique industry. It can be said as a service industry as it doesn't produce any physical product for its customers in exchange of the money they paid to the airlines. It is also a capital intensive, high fixed costs and highly unstable demand industry (Aharoni 2002, Shaw 1999). The World airline industry shows a cyclical pattern in their financial results as a whole with a few up and down aggressively (Doganis 2001, Morrell 2001, Lenoir 1998, Chin & Tay 2001, Saeedipour *et al* 2004). Airlines are susceptible to crisis and facing inconsistent profitability because their fix cost is high while the demand is highly sensitive to other factors (Morrell 2001, Aharoni 2002). Unfortunately, these factors are usually out of airline's control such as economic growth and regulations changes and there is very little that they can do to change the situation (Ng *et al* 2004, Saeedipour *et al* 2004).

Lenoir (1998) concluded that air traffic growth fluctuates in the same direction with the GDP growth only that air traffic growth was more chaotic. In other words, economic conditions affect airline profitability and this effect was amplified in the airline industry. On the other hand, Chin and Tay (2001) used regression analysis to show that air traffic growth rates are positively associated with GDP growth rates for Asian airlines.

Chin and Tay (2001) described the fluctuation of airline profitability through airline's investment decisions. Asian airlines usually place order for new aircraft while they are making good profit, or during the upturn of the circle. However, the aircraft will only deliver to the customer after 2 – 3 years after the order was placed, which the upturn of circles was ended and/or demand was low. Hence the delivery of new aircraft

will result in over-capacity, lower load factor and depresses airline's profit. They concluded that Asian airlines should improve their forecasting techniques, capacity flexibility and responsiveness to the changing environment in order to survive and make money. Figure 2.1 shows the cycles in profit of world airlines from IATA. It is apparent to see that airline operating profits all over the world is never constant.

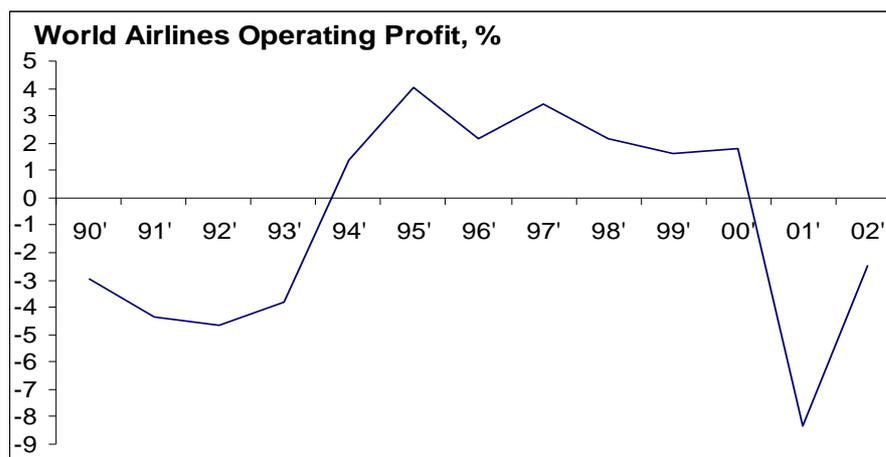


Figure 2.1: World Airline Operating Profit (Source: IATA Annual Reports, 2003)

Besides, airlines operate in a relatively more complicated business environment due to its business nature. Shaw (1999) identified five major factors affecting the airline industry, namely political, economic, social, technological and environmental factors. Shaw called it all together as PESTE (Political, Economic, Social, Technology and Environmental) analysis. He explained how these factors play their role and form a complicated business environment in airline business.

Aviation industry is a highly capital intensive industry where a large amount of capital is required for its operation to begin. Various regulations restriction on ownership of airlines prevents airlines from getting capital from various sources (Ng *et al* 2004). Such restriction are barring airline from getting capital injections that they needed for their service expansions and to gain from economies of scale.

Yergin *et al* (2000) claimed that airline industry is lagging behind other industries in term of competitive and efficiency as a whole. To be as efficient as other industries, they believe that the world airline industry is facing a series of common problems, such as regulatory adjustment and risks, the scale and ownership, the role of national identity and the investment policy, the competitive pressures, the consolidation, the national security and the network economics. They claimed that a competitive airline industry with sufficient scale and scope is vital to achieve many benefits that can be gained from increased trade and economic integration in the new millennium.

## **2.1 Aviation Deregulation**

Deregulation is the process by which government removes selected regulations on business in order to encourage the efficient operation of markets. In aviation industry, deregulated market is also called an Open Skies market. Airline industry is a relatively highly regulated industry compared to other industries. In many developing countries, especially Asia Pacific, airlines are not allowed to carry out their business activities freely compared to other industries because of the constraint of regulations (Oum & Yu 2000, Shaw 1999, Fallon 2004, Forsyth *et al* 2004, Findlay 1999, Tae & Yeong 2002, Aharoni 2002). For example, flying capacity between two countries, or seats offered by airlines, is regulated by local governments. Airlines are expected to provide probably more capacity in bilateral agreement between the two countries. However, many hold the opinion that the government should change or remove such regulation on the industry. Doganis (2001) believed that these regulations constrain airlines' market access, pricing policing and even output decision, hence affecting airline's competitiveness. It is generally accepted that deregulating the airline industry will increase efficiency of the industry as a whole by imposing competition on airlines.

At the early stage of airline industry, it was highly regulated and any changes in price or route to serve by the airline must obtain permission from the local authorities in

advance. In 1978, the US government started to deregulate its airline industry, in order to increase the efficiency. Tae (1998) provided a historical view of the bilateral agreement system and the US's initiative in deregulation of the aviation industry. After that, countries all over the world started to follow the steps of the US. Table 2.1 provides a list of countries over the world showing the date they begin their deregulation in domestic airline industry and their status now.

Table 2.1: Domestic deregulations of countries

<b>Country</b>	<b>From</b>	<b>Status Now</b>	<b>Country</b>	<b>From</b>	<b>Status Now</b>
Argentina	1994	Full	Mexico	1993	Full
Australia	1990	Full	Morocco	2000	Full
Brazil	1996	Full	New Zealand	1984	Full
Canada	1988	Full*	Norway	1993	Full
Chile	1982	Full	Peru	1990	Full
China	1987	Partial	Portugal	1993	Full
Egypt	2000	Partial	South Africa	1991	Full
France	1994	Full	Spain	1994	Full
Germany	1993	Full	Sweden	1992	Full
India	1990	Partial	Taiwan	1987	Partial
Ireland	1993	Full	Thailand	1995	Full
Italy	1993	Full	Turkey	1994	Full
Japan	2000	Full	UK	1993	Full
Kenya	1995	Full	USA	1978	Full
Malaysia	1994	Partial	Venezuela	1990	Full

\*Air transport services within northern Canada remain a closed market.

Source: Williams 2002

Instead of deregulation or open skies approach, Elek *et al* (1999) suggested another way of liberalizing aviation market, namely Open Clubs. The concept of Open Club is removal of restriction on capacity on all air routes of an air transport system among a group of economies. Members of the club will exchange unrestricted access right, while non-members will be treated differently. The advantage of Open Club includes transparency and openness to new members. They also suggest approach to the implementation of the club through an existing regional institutional arrangement.

Forsyth *et al* (2004) studied the process of liberalization or deregulation in the ASEAN countries. They indicated some problem areas for deregulation due to the vast diversity in the nature of this industry in the ASEAN. They also suggested that process of liberalization of the ASEAN airline industry as a whole to be divided into 3 stages to reduce instability and risks that may be faced by the airlines. Moreover, their report also includes a detail analysis on the benefit, cost and overall impact that may have on the industry in their research. They summarized their research result by giving some realistic conclusion that can be taken to liberalize the ASEAN airline industry. Tae and Yeong (2002) claimed that aviation market in Northeast Asian is very fragmented compared to its counterpart in the US and the European Union. They believe that the main reason that brings to some inefficient and inconvenient aviation markets is restrictive bilateral agreements between Asian countries. They suggest deregulating the Northeast Asian aviation markets in order to increase efficiency and competition. They also suggest four methods to liberalize the aviation market: a) multilateral approaches to liberalization through World Trade Organization (WTO) and Asia-Pacific Economic Cooperation (APEC); b) including air transport in China – Korea – Japan trading block; c) Open Skies Club approach; and d) bilateral liberalization.

The European Union (EU) is the first region is the word to remove the restriction on airline ownership rules. Chang and Williams (2002) studied the response of airlines towards the EU moves to remove such restriction. They believe that such fast changing industry will force governments to adjust their aviation policies. Hence it is important to analyze benefit and results that are likely to occur and how airlines should respond to such changes.

## **2.2 Management and Communication in Air Crises**

In general, the nature of airline business is to deliver their passengers from the departure to the destinations, which in case of international flight, involving sovereign of

each by-pass countries. Obtaining landing rights from each of the countries involved is hard to solve by the airline itself because it usually involves the political issues. Although liberalization is gradually happening in Asia, but such barrier has long constrain the growth of airline industry (Ng *et al* 2004).

Nowadays, facing uncertainties and tackling crises had become a norm in airline business. Zea (2003) classified risks facing by airline industry into four categories, namely: hazard, strategic, financial and operational. He claimed that strategic and financial risks accounting near three quarter of value loss during April 1991 to April 2001. However, he believed that most of the risks can be mitigated with the right tools and airlines need to move to the new level of risk management. Zea's view was echoed by Loudon (2004), who agreed that airline can benefit greatly by managing these risks in a better way. By using some analysis on Australia and New Zealand markets, he showed a theoretical analysis of financial risk exposures in the airline industry. He also claims that airlines are significantly exposed to financial risks if the time length is extended.

Augustine (2000) claimed that crisis can be distinguished in six stages, which are: a) avoiding the crisis, b) preparing to manage the crisis, c) recognizing the crisis, d) containing the crisis, e) resolving the crisis and f) profiting from the crisis. Each stage of the crisis requires different effort and strategies to deal with. He believes that the future of a company often depends on how expertly it handles the crisis. Most importantly, Augustine highly recommends those who are facing any crisis to "tell the truth and tell it fast".

By using Lufthansa in the aftermath of September 11 as case study, Hättly and Hollmeier (2003) explained the airline's step by step crisis preparation and strategies to survive and then benefits from a crisis. They believe that early preparation and

anticipation give an edge to the airline in tackling a crisis by reacts swiftly to the crisis. They also introduced 3 generic types of crisis that may occur to the airline. Time span of crisis was also taken into consideration. They explain that the type and time span of crisis would affect the strategies that should be taken for the airline to deal with the crisis. Since crises are unavoidable in the industry, how an airline handle the crisis is vital and it will make or break the airline. Chin *et al* (1999) studied the responses of Asian airlines toward the Asian financial crisis in 1997 in terms of scope of operations, capacity decisions, cost competitiveness, alliances and service decisions. They believed most airlines responded to the crisis by reducing capacity and forming strategic alliances. The immediate effect of the depreciation in currency of the Asian countries is the Asian airline's cost competitiveness had been strengthen against their European and the US counterparts. Chin *et al* (1999) also concluded that this economic crisis had actually shifted air transport policies toward greater liberalization.

Essenberg (2003) studied the recent crises in the aviation industry and summarized them in his paper. He showed how the initial capacity reduction action taken by airlines was followed by long-term changes in employment. His work has showed the typical response of an airline towards crisis and how these temporary reactions turn into a permanent policy.

Doorn (2003) concluded that an airline crisis communication strategy is influenced by two criteria: the degree to which the cause is perceived to be outside or inside the organization and the degree of aversion against the airline. Doorn believed that the key priority of any airline in any accident should be to take care of the victims and their families. Hence, communication to the public must be focused on acting quickly, honestly and caringly. He also suggested a model of crisis communication for airline.

Gillen and Lall (2003) described the international transmission of shock or negative effect does exist in airline industry, although the extent varied across regions. They identified that the trade effect, the alliance effect and the wake-up call effects are some of the transmission channels of crisis in airline industry. Besides, they also found that low cost carrier and full service carrier were affected by crisis in very different extent.

Siomkos (2000) studied the concept of passenger's perception on the airline's safety level and responses to airline disasters. He claims that most of the passengers can remember airline's crash in the last three years, and he believes that passenger's perception plays an important role for an airline to recover from a crisis. Passenger's respond differs depends on the purpose and frequency of flying, hence a different strategies should be implemented to for the airline to regain customer's faith in flying with them.

Through the case studies conducted in Southwest, Continental and Delta, Spiess (2004) found that there is a positive connection between high quality labor management relationship and productivity of the airline. He also claimed that the long-term sustainability of aviation industry is depended on the ability of airlines to realizing the advantages in favoring a socially responsible productivity enhancement approach in their restructuring process.

### **2.3 Globalization Approach**

Globalization did not only stimulate air traffic growth, it also brings some fundamental changes to the industry. While globalization help airlines to expand their market reach, it also exposed them to other risks. In most cases, airline will not be able to isolate itself from the air crisis that happens on the other end of world. Crisis that happened in the United States (US) will affect airlines from Europe and Asia as well,

transmission of shock in the industry wide across the world is not unusual in this era of globalization (Gillen & Lall 2003).

Ng *et al* (2004) described that the globalization can force airlines to make a new approach to serve and reach their customers, such as forming international alliances. Globalization makes airlines becoming more dependants to each other's while they are competing for the same market. Failure or success of one airline in one continent will affect the other airlines from other continent as well.

One paradox about the World aviation industry is that it is a great catalyst for globalization, yet it can't globalize due to the ownership regulations (Yergin *et al* 2000, Aharoni 2002). Airlines play a key role in globalization by ensuring the global communities gain access to global marketplace (Yergin *et al* 2000). They believed globalization is pressuring the authorities for an international regulatory reformation in aviation industry to increase economic and operational efficiency on industry wide basis. According to them, by far the international alliances are the only notable response of airlines toward globalization forces due to regulations restrictions. They claimed that although international alliances bring some benefits to airlines, it also creates uncertainties and impose other limitations that may be overcome by full integration.

Aharoni (2002) praised airlines that make globalization easier by offering lower air transportation costs in real term, high speed and safer traveling. He also studied the impact of globalization on the aviation industry and suggested strategies that airlines may adopt based on some scenarios that he predicted might occur in the future. He stressed that airline industry is suitable to be globalized because it is a mature industry and it needs a mass market in order to enjoy economic of scale and density. He also predicted that the global airline industry will consolidate to a global oligopoly structure

with three or four global operators plus a large number of regional carriers.

## 2.4 Technology

In the last two decades, advancement of information technology allowed airlines more rooms to differentiate themselves from the others. For example, frequent flyer program, which was first introduced by the American Airlines in 1981, was designed to increase customer loyalty to the airlines, particularly of frequent business flyer (Aharoni 2002). Development in the latest Internet technology can change the way of doing business in airline industry and increase its efficiency to a higher level yet with a lower cost. (Jiang & Liu 2003, Pappas 2000, Grenblad & Rosén 1999, Sander 2004, Shon *et al* 2003). In addition, Kelemen (2002) went further by introducing the latest technologies and linking the usefulness of these technologies to airline industry. He also gave some suggestion on areas that can be improved in airline industry.

A comparison of usage of iris recognition and other biometric identification to other technology employed by airlines was made by Dunker (2003). Dunker has made a very clear explanation on the advantages and usefulness of iris recognition as a secure biometric identification. On the other hand, Shon *et al* (2003) showed in their research that internet as virtual channel is a good enough medium to dominate the market, but the traditional channels such as travel agent still have their own niches in some specific segment. Some experts were worried that development of video conferencing may hurt air traffic growth due to possible reduction on the number of passenger. However, by studying aviation market in Norway, Denstadli (2004) proved that video conferencing technology has very limited impact on business air travel, with a substitute rate of 2.5% - 3.5%. He believes video conferencing is expected to grow more but remain supplementary to personal contact and physical attendance.

The advancement of internet technology allows airline to encourage their users to book ticket online, which cutting airline's distribution cost. Besides reducing cost, online booking provides the chance for airline to directly interact with their customers. Kadar and Kotanko (2001) claim that by leveraging the data that airlines had collected from their customers, airlines can improve customer profitability and discover new opportunities. Aharoni (2002) stated that information technology (IT) was used to increase airline revenue through a more sophisticated and computerized yield management system. He claimed that the American Airlines' advance yield management system involves optimization of overbooking, allocation of discounted fares and meeting demands for connecting flights.

## **2.5 The Business Model**

Airline industry is notorious for being a high-cost model, especially for full service carriers (FSCs). Any single global event may cause a turbulent in airline business day, such as natural disaster, terrorism act, war and oil crises, impacting airlines' yield and disrupting business plan. On top of these, some claimed that airline business model is too complicated that caused unnecessary burden to their profitability. Many are starting to call for a restructuring on the industry wide basis, starting from the cost structure to the business model, in order to create a more competitive industry.

Tretheway (2004) believed that there are infant flaws in the business model of major network carriers that needed to be fixed at once. He claimed that full service network carrier has a cost structure that is too high for everyone to pay the same fare; hence they implement price discrimination, which charge different fare on different air passengers. He believes FSCs had overestimated the value of their network and they should switch their pricing decision from short term to long term basis.