

STRATEGIC CLASSIFICATION AND EXAMINATION OF THE DEVELOPMENT OF CURRENT AIRLINE ALLIANCE ACTIVITIES

**Zhi. H. Wang and Michael Evans
Southern Cross University
New South Wales, Australia**

ABSTRACT

Previous research argues that despite the fact that strategic alliances have become an important feature of the world airline industry, little rigorous analysis has been done on the effects of these alliances. This is partially because there is a lack of precise definitions to specify different types of airline alliances in the literature. This research identifies several categories of airline alliances through a strategic classification of the current alliance activities involving the major airlines for the period 1989 to 1999. The classification enables this research to examine how strategic alliance activities are evolving, particularly to compare how airlines in North America, the European Union and the Asia Pacific region have committed to different alliances. Findings show that there is a significant difference between the number and scope of alliances adopted in the three aviation markets. These findings facilitate research to further analyse the impact of market liberalization on various formations of strategic airline alliances.

BACKGROUND

In the 20th century, companies have experienced changes in a diverse environment, including the shake-up of the social structure, economic progress and technological advances (Limerick & Cunnington, 1993). The social structural evolution resulted in dismantled hierarchical cultures within industries. The economic changes resulted in a change of lifestyle patterns and increased consumption (Goeldner, 1992). The technological changes have lifted the industrial society into an information society (Limerick & Cunnington). The progress of information technology has allowed communication, research and development, rapid fund transfer and business coordination through the global network. These social, economic

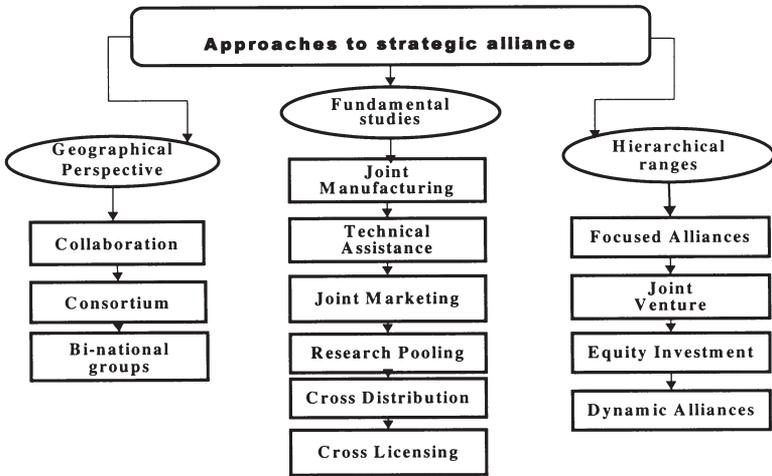
Zhi H. Wang is teaching in the School of Commerce and Management at Southern Cross University in Australia, having just submitted her Ph.D. thesis for the examinations. She has published in the areas of strategic alliances, liberalization, economics and tourism.

Michael Evans is an Associate Professor in Accounting and Finance in the Graduate College of Management at Southern Cross University in Australia. He has published in the areas of initial public offerings of shares, commercialisation, privatisation and deregulation.

and technological changes are paving a way for organizational globalization. Facing this changing environment, most industries have adopted various management strategies. Strategic alliances have been employed as one of these management strategies.

Enterprises pursue alliances for the purposes of being able to cultivate multinational markets, save time in learning curves, share resources and manage risks, gain global brand reputations, and develop economies of scale and scope. In line with an increasing number of enterprises entering strategic alliances, various approaches to strategic alliances have also appeared in the current literature. These approaches can be viewed from generally three perspectives: geographical scope (see Byttebier & Verroken, 1995; Dussauge & Garrette, 1995), fundamental alliances (see Pucik, 1998; Kanter, 1989), and hierarchical ranges (see Faulkner, 1995; Pucik; Robinson & Clarke-Hill, 1994). The concepts of these perspectives are shown in Figure 1, and discussed briefly below.

Figure 1. Major perspectives of study strategic alliances in the current literature



The geographical perspective studies strategic alliances in terms of collaboration, consortia, and bi-national groups (Byttebier & Verroken, 1995; Dussauge & Garrette, 1995). The fundamental studies, for instance those by Pucik (1998) and Kanter (1989), review strategic alliances in terms of joint ventures, technology change, licensing, cross-distribution, and coproduction. In turn, hierarchical ranges, in terms of Faulkner (1995), Pucik (1998), and Robinson and Clarke-Hill (1994,) emphasize the levels

of cooperation in an alliance such as simple coordination or complex alliances in nature and features. The simpler forms of alliances can be seen as more focused alliances such as research and development or sharing resources. The more complex forms refer to more integrative alliances, which may involve equity investments and various higher levels of coordination, joint manufacturing, cross distribution of products, and cross-licensing.

Despite the two economic depressions due to the Gulf War during 1990, and the Asian financial crisis in 1997, the airline industry has experienced several growth periods (Wang, Pendse & Prosser, 1998). Meanwhile it has been seen that it is not just the number of alliances that has increased in the last decade; there are also various types of alliances emerging (Wang & Evans, 2001). The term airline alliance has been used to describe an accord, partnership, cooperative agreement, joint operation, marketing alliance or code sharing agreement (IC, 1997). The strategic alliances forged in air transport markets also include intercontinental alliances (Oum & Taylor, 1995). Intercontinental alliances are the largest and fastest growing type of international alliance. An across border alliance crosses geographical areas like Asia Pacific, Europe and North America continents through activities like code sharing. Their aim is to expand operations abroad.

In 1992, the US started to pursue the potential of bilateral open skies agreements. The most significant progress in airline alliances was on January 11, 1993, when the US Department of Transportation approved the Northwest/KLM commercial cooperation and integration agreement under a grant of antitrust immunity. KLM and Northwest were since then free to join together in creating a unified global airline system. The Northwest/KLM's commercial cooperation and integration agreement, under a grant of antitrust immunity showed an entirely new level of cooperation between the two carriers in air services.

From 1993, both joint activities and marketing alliances made progress. Some carriers created frequent flier programs (FFPs), and joined together to handle ground service through joint services and marketing, sharing capacity and joint operation of FFPs. In 1994, airline alliances moved towards a stage of multilateral air transport alliance, such as single-skies agreement, air transport liberalization (open skies), multilateral aviation rights, and cooperative agreements. From 1995, airline alliances stepped further towards regional aviation blocs, blocking space agreements, and open skies agreements. However, the US had to take its air service agreement negotiations as hard-ball bilateral liberalization, recognized by the US Department of Transportation, due to the market situation and hence different attitudes towards open skies between Asian, European and North American carriers (Airline Business, 1998).

Critically, the five major alliance sectors emerged in the airline industry in 1996, after the spate of alliance-building activities started from 1994. The Star Alliance was formally established in 1997, and followed by oneworld in 1998, in the mean time more airlines entered these two global alliances or other global groupings (Oum, Park & Zhang, 2000). While more dynamic airline alliances are emerging, there are more memorandums of understanding signed between countries, which enabled operating the Fifth and Seventh Freedom Rights¹ of Air, and some even included agreements of domestic flights (cabotage).

What follows is a consideration of the influential features of alliances adopted in the air transport markets, and how airlines are involved in different forms of alliances. Answers to these questions enable researcher to further examine the effects of airline alliances on airline performance. In attempting to address these general questions, several problems are identified.

Research Problems

There are increasing numbers of airlines entering alliances and increasing levels of involvement in the alliances. However, the effects of strategic alliances on firm performance and on industry organization have received relatively less attention from academics (Oum, Park & Zhang, 2000). The general alliance research in previous studies mostly discusses functions and motivations of strategic alliances (e.g., Varadarajan & Cunningham, 1995; Vyas, Shelburn & Rogers, 1995). Some of the studies just describe how to choose partners (e.g., Brouthers, Brouthers & Wilkinson, 1995). In the airline industry, some of the studies examined airline routes or network systems. The several studies that have examined airline alliances are mainly focused on code share or airline alliances in general. Very few studies have examined the effects of joint activities and marketing alliances. More critically, most of the studies have not controlled for industry specific effects and specific alliance effects (Park, 1997; Park & Cho, 1997). Airlines exercise different tactics on different routes thus different levels of cooperation may have different degrees of effects.

In aiming to examine effects of alliance alliances, this research confronts another problem which is a lack of clear definitions of the alliances in the current literature, possibly resulting from the complex features and the changing tactics of airline alliances (Wang & Evans, 2001). For example, the equity alliance (Jennings, 1990) between Singapore, Delta and Swissair formed in 1990 was an agreement for the coordination of international fares and flight schedules, the loaning of flight attendants and opening the possibility of joint buying opportunities. This alliance encompassed the same characteristics of today's global grouping of Star

Alliance or oneworld. It was reported as an equity alliance (Jennings), but, in fact, has no equity swaps. On the other hand, the alliance between British Airways and United, similar to Singapore/Delta/Swissair alliance included schedule coordination and code sharing of international flights, and was called a marketing alliance (Jennings).

The route-specific agreement between the airlines of Garuda of Indonesia and Japan Airline is also called a strong marketing alliance by Garuda. However, Japan Airline officials have trouble remembering the agreement exists (Jennings, 1990). This alliance is actually a route-specific agreement. Similarly, in 1990 Alitalia and Iberia signed an agreement to provide each other reciprocal access to their Southeast Asian and Central American networks. The nature of the agreement shows that this deal is a bilateral agreement on route specific services, but it is called a natural collaboration in their business reports (see Whitaker, 1990).

Similar to the US open skies, the Andean countries' alliances are also called open skies. In mid-May 1991, all of a sudden, more skies over the Andes were opened (Booth, 1991). In 1993, the presidents of the five Andean countries—Bolivia, Colombia, Ecuador, Peru and Venezuela—signed an agreement, to set up an open skies regime. In 1994, Malaysia, Indonesia and Thailand forged a regional bloc called the Northern Growth Triangle (Hooper, 1997). This regional alliance has later stemmed out the idea of open clubs, approached by some researchers and airline business experts. It thus can be questioned whether all these liberal forms of alliances should be considered in the studies of effects of the integrative alliances in the airline industry.

Code share also varies in terms of concepts and agreements. There are different agreements within code share alliances such as parallel and complementary alliances (Park, 1997). Code share, according to the International Civil Aviation Organization (ICAO, 1997) are block space arrangements, which occur when a number of passenger seats and/or specified cargo space are purchased by an air carrier for the carriage of its traffic on an aircraft of a second air carrier. The code share between Air Canada and All Nippon Airways is an agreement on only the limited flights between the routes of Osaka-Vancouver and Tokyo-Toronto (Airline Alliance Survey, 1999). However, the code share between Air Canada and United entails the comprehensive code share agreements on several hundred flights, including joint marketing, one-stop check-in and lounge access. Thus, it can be questioned whether partners involved in simple code sharing benefit in the same way as partners entering comprehensive code sharing. Thus, to what extent does the term code share apply?

The problems discussed above show airline alliance activities are complex in features and forms. There is, however, no clear definition or specific terminology of these alliances. This problem confuses research and observation in airline alliance studies, and may have partly contributed to the limited studies in the current literature that have examined the effects of airline strategic alliances. The five emerging Global Alliances, started in 1996, have already accounted for 57.1% of the world total revenue passenger kilometers, and share more than 59.0% of the world total operation revenue of the airline industry by 1999 (Airline Business, 1999). Thus, it is important to study airline alliances, and hence the effects of the different types of airline alliances.

Importantly, the stages of market liberalization between North America (NA), the European Union (EU) and the Asia Pacific (AP) region AP may have affected the progress of the airlines entering strategic alliances. It has been argued that the US has been moving towards open skies while most of the markets in the AP region are still regulated with only a few AP airlines invited to enter the open skies (Eleck, Findlay, Hooper & Warren, 1999; Hooper & Findlay, 1998; PC 1998).

The problems indicated above are the background of this research's central issues:

Research Issue 1: What are the features and patterns of the development of airline alliances in the air transport markets?

Research Issue 2: Is a significant difference among airlines' formation of alliances in North American, the European Union and the Asia Pacific region?

STRATEGIC CLASSIFICATION OF AIRLINE ALLIANCES

This part of the study examines the concepts of different types of airline alliances while attempting to create a framework for strategic classification of the airline alliances. As airline alliances vary in features and areas of cooperation, the classification is important, enabling research further examining the development of airline alliances and their consequences.

Route Specific Services

During the period of 1989 to 1999, international airlines launched numerous route specific services negotiated under bilateral Air Service Rights (ASRs). It therefore is important to know how the new route-specific agreements, coexisting with other types of alliances, contribute to

airline performance. Thus, the bilateral route specific services are classified as *Type One Alliances*, suggesting a simple and basic form of airline alliance agreements.

Since the 1944 Chicago Convention, all commercial aspects of international air transport have been governed by bilateral air service agreements (ASAs). Each international airline faces a complex web of ASAs signed by its home state (Oum & Yu, 1997). ASRs are a product of a complex global network of ASAs that guarantee the scheduled and non-scheduled (charter) airlines certain traffic freedoms (PC, 1998). Currently ASAs are based on the principle of reciprocity, an equal and fair exchange of rights between countries.

The route specific services examined by this research refer to the agreements based on bilateral traffic rights between countries. Although the agreements vary in form, they generally specify services and routes to be operated between the two countries' designated airlines and the capacity to be provided by each airline (Oum & Yu, 1997; Rimmer, 1997). The agreements offer carriers access to entry and hence enable carriers to operate flight services across country borders within the limits the rights permit. The bilateral services may also include services beyond these limits. For example, Air Canada launched a weekly Toronto-Berlin/Schonefeld route, using fifth freedom rights from Paris.

Code Sharing

Code sharing has become a popular form of airline alliance. Code share is classified as *Type Two Alliances* in this research. Code share, compared with the route specific services, is a step forward in the progress of alliance development in terms of the alliance features. Code share provides cooperation between carriers other than just providing access for city-pairs or non-stop flights. Under code share, the agreements often involve one airline buying blocks of seats on the other airline's flights and reselling them (GAO, 1995). Under a code sharing agreement, one partner (the code sharing partner) assigns its airline designator a code to the flight of its partner (the operating carrier) (ICAO, 1997).

A block of seats agreement can be negotiated with the number of seats available to the code-sharing partner determined upfront. The most complex alliances operate sophisticated computerized seat management systems that allow both partners to manage the capacity effectively on a seat-by-seat basis on a particular route, on a range of flights within a region, or on a global basis coordinating activities over many countries (BTCE, 1996).

An example of code share is the Canadian and Qantas alliance. Canadian and Qantas have a code sharing agreement on the Vancouver-Honolulu-Sydney route where Canadian serves the Vancouver-Honolulu section and Qantas serves Honolulu-Sydney section of the route (OAG, 1999). Code share alliances enable a participating carrier to enter thin markets that it would not otherwise serve profitably on its own. For example, Qantas formed a code sharing alliance with Air Vanuatu on the Australia/Vanuatu route, as load factors would not be viable if it introduced its own aircraft onto the route (BTCE, 1996)

Parallel and complementary alliances in nature are also code share alliances. Parallel operation of flight service refers to the coordination in competing routes or the same route (Park & Zhang, 1998). For example, between Vancouver, Canada and Sydney, Australia a code share service is offered under either Canada or Qantas. This service is actually operated by Canada between Vancouver and Honolulu and by Qantas between Honolulu and Sydney (ICAO, 1997).

Complementary code sharing is an alliance on different routes rather than parallel routes. According to Park and Zhang (1998), a complementary alliance is the case where two firms link their existing networks and build a new complementary alliance network in order to feed traffic to each other. According to the Industry Commission (IC, 1997), complementary code sharing is when two airlines code share on different, but connecting routes, usually to feed traffic between two sectors.

Typically code sharing is accompanied by a suite of other coordinated services designed to provide passengers with smooth connections between flights operated by the partner carriers (ICAO, 1997). On-line service belongs to the category of code share. On-line service refers to enabling passengers to fly by one airline on behalf of another airline based on a formal alliance arrangement between the two airlines. Interline service refers to customers flying or using transport services of more than one airline (ICAO). On-line service agreements are generally aimed at facilitating international passenger movements, as without an alliance agreement, passengers have to fly on an airline other than the one identified on the ticket (ICAO). On-line services also allow partners to provide more alternatives in destination choices through their expanded networks, which offer more convenient itineraries to passengers (Park, 1997).

Joint Activities

If a code share agreement is multiple cooperation in nature, it can be regarded as a *Type Three Alliance*. In Type Three Alliances, the cooperation is no longer limited to just exchanging designation code or buying a block of seats but involving multiple cooperation of ground services. The current

literature shows that various airline alliances are mixed together under equity or joint operations. This research aims to separate alliances having only code share or block space sales from those with multiple areas of joint activities including the coordination of ground handling, joint use of ground facilities, coordination of flight schedules, joint maintenance, purchase of aircraft and fuel and staff training. Creating connection services is also a potential joint activity. Connection services normally involve the coordination of baggage checks and honouring of tickets between airlines, but the identity of each carrier is maintained (ICAO, 1997).

Marketing Alliances

Marketing alliances include the global groupings. The five emerging global, marketing alliances appeared in the global air transport market from late 1996 to 1999. These five alliances are the Star, Qualiflyer (or Excellence), oneworld, Northwest/KLM (or Global Wings) and Air France/Delta (Airline Business, 1999). These groups of global alliances are defined in Table 1.

Table 1. The emerging global alliance groupings

AIR FRANCE/DELTA	GLOBAL WINGS	ONEWORLD	STAR ALLIANCE	QUALIFLYER
Delta Airlines	Northwest	American Airlines	United Airlines	Swissair
Air France	KLM	British Airways	Lufthansa	Sabena
Aeromexico	Continental	Qantas	Airline Canada	Thy Turkish
Austrain	Alitalia	Cathay Pacific	Thai International	Tap Air
Korean Air	Malaysia	Canadian	SAS	AOM
		Iberia	Varig	Lauda Air
		Finnair	Air New Zealand	Crossair
		Lanshile	Ansett Australia	Air Europe
			All Nippon	
			Singapore	

Note: From Airline Alliance Survey. Airline Business Special Issue July 1999, pp. 39-65.

Star Alliance brought together eight carriers in 1997, and was joined by Ansett Australian and Air New Zealand in 1999. The Singapore and Lufthansa alliance was formed on November 24, 1997 and, by the end of 1999, Singapore also became a member of the Star Alliance. All Nippon Airways joined the group in October 1999 (Airline Business, 1998; 1999).

By 1999 the Star Alliance network covered more than 760 destinations and 112 countries. The alliance allows access to over 250 Star Alliance lounges around the world, reciprocal FFPs participation and recognition, through check-in, streamlined airport operations, cargo cooperation, joint purchasing, advertising and promotions (Airline Business, 1999).

The formation of oneworld in 1998 was presented as a brand name for a global network. Finnair and Iberia joined the group in September 1999, and Lan Chile became a member of the group in 2000. A third major global group, Global Wings, has coalesced around KLM and Northwest who formed an alliance in 1989, later joined by Continental Airlines, and Malaysian Airlines, who both signed the Joint Venture Agreements in 1999. In November 1998, Alitalia and KLM announced the Master Cooperation Agreement, and since November 1999 Alitalia became a member of the group (Airline Business, 1999).

European Quality Alliance (Qualiflyer), which started in 1994, includes Swissair, Austrian, and SAS. In 1995, however, SAS faced three alternatives: alliances with Lufthansa, KLM or British Airways. In 1997, SAS joined Star Alliance and Austrian joined the Air France/Delta group. According to Airline Business (1999) this group currently also has seven other European Airlines as members. The last sector, according to Oum, Park and Zhang (2000) refers to the Air France and Delta group (see also Airline Business, 1999).

Marketing alliances are aimed at marketing passenger services and creating customer satisfaction through various cooperative operations. These types of alliance often involve high integration and coordination of flights, scheduling, advertising and FFPs (GAO, 1995). For example, FFPs enable passenger to accrue frequent flier miles on their home carrier's plans even if they fly on a partner's flight and also permit them to use FFPs rewards on each other's flights (Oum, Park & Zhang, 2000). The alliances are easier for travellers to accumulate mileage because the alliance network serves more cities than does a single carrier (IC, 1997; Oum, Park & Zhang). These types of alliance have the key characteristics of cooperation in the marketing field.

Some international airlines have entered regional groupings prior to global marketing alliances. These regional blocs have agreements covering the same areas of cooperation and hence can be regarded as marketing alliances.

Sharing the Computer Reservation System (CRS) is also part of the activities of marketing alliances. Alliance partners can obtain competitive advantages over non-aligned competitors on the CRS display. Travel agents use the CRS of major international airlines and these airlines have entered into alliances. A code shared non-stop flight is listed twice in the CRS

because each partner places their individual code of the same flight on the system (Park, 1997). The same service using different airline designation codes and flight numbers may appear a great number of times, due to code sharing services (ICAO, 1997). Thus, the alliances for sharing the CRS enable airlines to obtain marketing advantages.

Generally, marketing alliances aim to offer better service quality, more advantages through the larger networks, more destinations available, flexible tickets, and bonus points. Marketing alliances, also through global grouping, share the CRS, offer FFPs, and coordinate other passenger services.

Open Skies

In 1992, the US adopted an open skies regime and came to pursue a more liberal form of alliances in world air transport markets. The Northwest/KLM alliance started in 1989 (Airline Alliance Survey, 1999; 2000) is an example of open skies in that partners have long-haul code sharing and a comprehensive marketing agreement, on the North Atlantic, in the US, Europe, Africa and the Middle East. They also have joint FFPs. They cooperate on ground handling, sales, catering information technology, cargo and maintenance, and joint purchasing (Alliance Survey in Airline Business, 1999). These can show some characteristics of the broad commercial alliances under the open skies.

In 1993, the US Department of Transportation granted anti-trust immunity to the alliance between Northwest and KLM, which allows the airlines from both countries unrestricted entry and capacity rights between and beyond both countries (PC, 1998). This permitted the airlines to conduct extensive code sharing and to jointly market capacity and determine fares without fear of legal challenge from the competing airlines (IC, 1997). This shows another characteristic of open skies—broad commercial alliances.

American Airlines and Canadian also signed a broad commercial agreement under the US open skies regime. This alliance also provides Canadian with a range of services including accounting, data processing and communications, operations planning, pricing and yield management, international services, passenger services training and US originated reservations (Airline Alliance Survey, 1999). American Airlines also invested \$190 million in Canadian for 25 percent of Canadian's voting shares and 8.99 percent of its convertible preferred shares (Park, 1997). This shows another feature of broad commercial alliances under open skies.

According to the open skies policy outlined in Appendix A the broad commercial alliances show the removal of restrictions on the ability of airlines to operate services between two countries. Normally, the memorandum of understanding includes code share agreements on international and domestic flights, reciprocal FFPs, lounge access, through check-in, integration of boarding procedures, computer reservation system linkage, joint marketing and sales programs.

The regional blocs or open club in the AP region and the open skies in the five Andean countries also show the characteristics of broad commercial alliances. The five Andean countries' open skies include partners of Bolivia, Colombia, Ecuador, Peru and Venezuela who signed an agreement in 1993. However, the alliance between Cathay Pacific/South African Airways formed in 1998 belongs to marketing alliances, as the memorandum of understanding leads only to a code share agreement, FFPs, and ground handling. Compared with other types of alliance, broad commercial alliances under open skies in general are more liberal in areas of cooperation and dynamic in features.

Summary of the Classification and Research Questions

In the above analysis, the current airline alliances are identified as the five major categories: bilateral route specific services; code share; joint activities; marketing alliances; and broad commercial alliances (open skies). This classification system is based on systematic observation of airline alliance activities and supported by the concepts of the theoretical studies by the information papers and academic research. A framework of the strategic classification is provided in Appendix B.

This theoretical examination enables the researcher to further explore how each type of alliance activities increases in the airline industry, and particularly in the three aviation markets: NA, the EU, and the AP region. It also investigates how each airline has adopted different alliances. Towards these objectives, this research develops research questions and hypothesis as follows:

Question 1: How many strategic alliances have been formed by the airlines in general from 1989 to 1999?

Question 2: How have the five types of alliances increased from 1989 to 1999?

Question 3: How are the airlines involved in the different types of alliances from 1989 and 1999

Question 4: How are the airlines in the three regions of North America, the European Union and the Asian Pacific region involved in the five types of alliances from 1989 and 1999?

Hypothesis 1: There is a significant difference in the number and forms of strategic airline alliances between the three regional aviation markets.

METHODS

Methods employed for this research are descriptive statistics and analysis of variance. The research hypothesis involves analysis of variance, and, hence, ANOVA technique is employed. This enables the comparisons of the means of numbers and types of airline alliances between the three groups, and seeks whether there is a significant difference between the groups based on likelihood ratios (F ratio) obtained. An ANOVA essentially answers the simple question of whether there are differences between the groups. This is a *path analysis* (Tabachnick & Fidell, 1996). The path analysis enables further examination of the critical factors involved in formation of an airline alliance in future studies.

The samples used for the study are described in Table 2. The 27 major airlines sampled are the members of the ICAO. These airlines are also the major international carriers or mostly the flag carriers of the NA, the EU and the AP region. Importantly, they are where the critical issues were raised by previous studies, and hence the focus of this research.

Table 2. Airlines included in the research sample

NORTH AMERICA AIRLINES	DESIGN CODE	EUROPEAN AIRLINES	DESIGN CODE	ASIAN AIRLINES	DESIGN CODE
Air Canada	AC	Air France	AF	Air India	AI
American	AA	Alitalia	AZ	Air NZ	NZ
Continental	CO	British Airways	BA	All Nippon	NH
Delta Airlines	DL	KLM	KL	Cathay Pacific	CX
Northwest	NW	Lufthansa	LH	Air China	CA
SAS	SK	Swissair	SR	Japan Airlines	JL
United	UA	Virgin Atlantic	VIR	Korean	KE
Canadian	CDN			Malaysia Airlines	MH
USAir	AL			Qantas Airways	QF
				Singapore	SQ
				Thai Airways	TG

Focusing on these airlines, the airline alliance data were collected from *Airline Business*, including 5,518 monthly issues of electronic journals from 1989 to 1999. These issues have been accessed on the Internet at the web site page <http://ezproxy.scu.edu.au>. Information of global alliances was gathered from Special Report of Airline Business, July 1999, and July 2000, including the Airline Alliance Survey, the Global Grouping, and Mergers Revised.

Five type of alliance identified by the theoretical study can be seen in ordinal ranges (see Table 3). These ranges enable the analysis to separate a simple alliance from higher levels of cooperation between partners in examining the effects of the different types of alliances. Another set of variables used are the three phases, which specify the earlier stage of airline alliance (Phase 1 from 1989 to 1992), the developing stage (Phase 2 from 1992 to 1995) and the developed stage (Phase 3 from 1995 to 1997). These measures enable the comparison of the development of alliances to be made between different historical stages. Further, the three regional aviation markets are the focus of the hypothesis. All these variables are shown in Table 3.

Table 3. Measures and variables employed for this research

VARIABLES	SPECIFICATIONS	
Types of Alliances	Type 1 Type 2 Type 3 Type 4 Type 5	Bilateral Code share Joint activities Market alliances Open skies
Year indices	1, ...,11	1989-99
Three phases	Phase 1 Phase 2 Phase 3	1989-92 1992-95 1995-97
Regional aviation markets	i, ...,g i≠g	NA, EU, AP

Normality of the variable is required in estimations done by methods of maximum likelihood and generalised least squares (Bacon, 1997). The criteria value for testing the normality is from a z-distribution, based on a significant level desired (Tabachnick & Litschert, 1994). The data normal distribution was examined by SPSS Data Exploration, through which skewness and kurtosis statistics were obtained, and then calculated. The z score obtained by skewness statistics was further divided by the standard error. The z score of kurtosis followed the calculation procedures of $z \text{ score} = \sqrt{\text{kurtosis statistic} / \text{std.error}}$. These z scores were then checked against the critical ratio desired ($z \text{ score} = \pm 3.5$). A value exceeding ± 2.6 is

used as a critical ratio for rejecting the assumption about normality of the distribution for this research. The results in Table 4 show that all the data were normal distribution, except open skies, which however, meet the critical ratio of skewness.

Table 4. Normality test results for the alliance data

	KOLMOGOROV- SMIRNOV		SKEWNESS	KURTOSIS
Variables	Statistic	Df	Statistic (Critical ratio)	Statistic (Critical ratio)
Bilateral	0.16	286	1.10	0.56
Code share	0.20	286	1.60	2.60
Joint activity	0.17	286	1.40	1.90
Marketing	0.24	286	1.09	1.90
Open skies	0.38	286	2.50	6.70*
Total alliance	0.14	286	1.30	1.60

*departs from normal distribution

Following the normality test, the analysis is conducted. The next section reports results of the descriptive studies and hypothesis test.

RESULTS

The following results are from the study of the first question concerning the number of strategic alliances formed by the airlines in general from 1989 to 1999, as outlined in the theoretical section of theoretical study (see Table 5).

Results in Table 5 show there were 1,211 alliances in the major air transport markets between 1989 and 1999. British Airways, American Airlines, and United Airlines had the largest numbers of alliances between 1989 and 1999, followed by Air Canada, Qantas, Scandinavian Airlines Air France, Lufthansa and Japan Airlines.

The development of the five types of airline alliance is examined. The following results are from the examination of how the five types of alliances have increased from 1989 to 1999. Figure 2 shows that bilateral services were the fastest developing route services. There were a total number of 171 new services launched by 1995. However, the growth rates went down while the international airlines increased agreements under the US open skies regime and other kinds of cooperation during 1996 and 1999. Code sharing alliances developed at the most rapid speed after 1992. In 1999 there were a total number of 363 agreements signed by the 27

Table 5. Summary of the alliance activities of the airlines, 1989-99

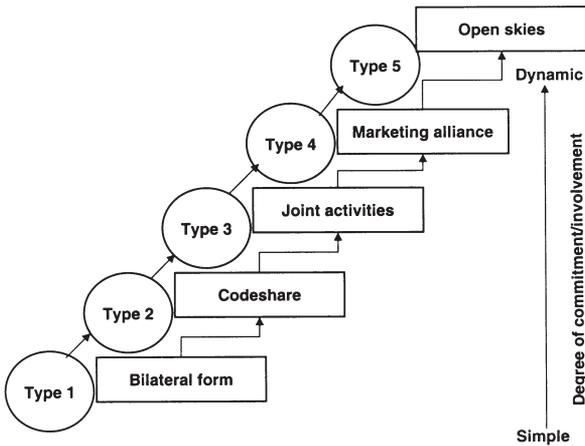
AIRLINE	RANK	TOTAL ALLIANCES	AIRLINE	RANK	TOTAL ALLIANCES
BA	1	89	NZ	15	45
AA	2	81	DL	16	41
UA	3	77	SQ	17	34
QF	5	77	TG	17	33
AC	4	76	MH	18	36
SK	6	69	AZ	19	33
AF	7	62	CA	20	22
LH	8	55	NH	21	25
JAL	9	51	KE	22	22
SR	10	49	AL	23	20
KL	11	46	CDN	24	17
CO	12	45	AI	25	14
CX	13	38	VIR	26	9
NW	14	45	Total		1211

Note: Airlines are ranked based on total number of alliances formed from 1989 to 1999.

major international airlines. It hence shows that code share was the most popular form of alliance between 1989 and 1999.

Joint activities (total number 302) and marketing alliances (total 269) had a parallel growth pattern since 1996. Marketing alliances became the third most common alliance among the five types of alliance activities, and

Figure 2. Scales of the five types of alliances



increased from 9 in 1992 to 269 by 1999. It was not until 1994 that the numbers of broader commercial alliances started to increase. However, the growth was very rapid increasing from 2 in 1992 to 57 in 1999.

Following the study of the development of the five types of airline alliance, the examination evaluated how each airline was involved in the different types of alliances.

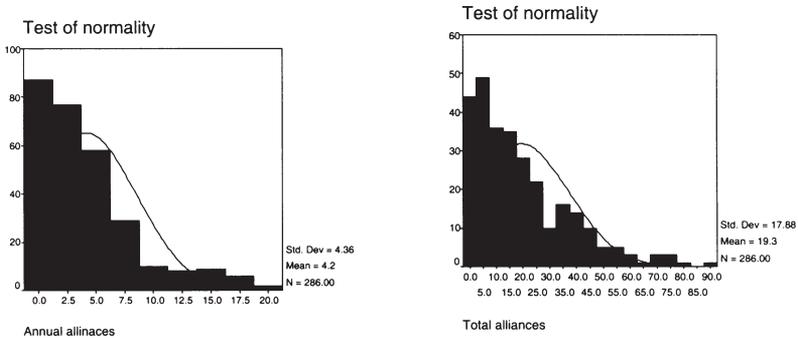
Table 6. Summary of the type of alliance involvement of the airlines, 1989-99

Rank	Airline	Airline Code	Bilateral	Code Share	Joint Activities	Marketing (Global)	Open Skies	Total
1	BA	8	8	22	29	28	2	89
2	AA	7	9	33	15	20	4	81
3	UA	25	21	20	10	20	6	77
4	QF	20	20	23	20	14	0	77
5	AC	1	18	13	19	24	2	76
6	SK	21	4	15	22	27	1	69
7	AF	2	4	27	11	17	3	62
8	LH	17	3	15	20	16	1	55
9	JAL	14	12	17	18	4	0	51
10	SR	23	2	26	7	11	3	49
11	KL	15	11	13	9	9	4	46
12	CO	11	8	12	8	12	5	45
13	NW	19	20	8	2	9	6	45
14	NZ	4	9	13	14	8	1	45
15	DL	12	6	19	7	6	3	41
16	CX	9	5	5	20	8	0	38
17	MH	18	3	16	13	2	2	36
18	AZ	5	6	13	2	6	6	33
19	SQ	22	8	3	15	4	3	33
20	TG	24	1	4	20	7	0	32
21	NH	6	13	7	4	1	0	25
22	CA	10	9	6	7	1	0	23
23	KE	16	3	16	2	1	0	22
24	AL	26	15	3	0	1	1	20
25	CDN	28	0	6	1	8	2	17
26	AI	3	2	3	7	2	0	14
27	VIR	13	0	5	0	3	1	9
Total			220	363	302	269	57	1211

Results in Table 6 show that during the 11 years, different international airlines had different concentrations in forming different types of strategic alliance at different periods of time. British Airways was found to have the largest number of marketing alliances and joint programs. American Airlines had the largest number of code share agreements. United, KLM, Northwest and Alitalia had the largest number of open skies agreements. USAir was first in the number of bilateral agreements.

The examination of the differences among the three regions focused on how each market has been involved in alliance activities. Results from the exploration of the bilateral alliances are shown in Figure 3. The airlines of the AP region developed the largest number of the bilateral services from 1990 to 1994. NA airlines, however, were faster with the development of bilateral services after 1993. They reached a total number of 97 alliances by 1999. EU airlines had the smallest number of the new bilateral services until 1998, when they increased by 76, and became the second largest market in terms of these activities. The airlines of the AP region increased the new bilateral services by a larger number between 1990 and 1991. They were then steady until 1999.

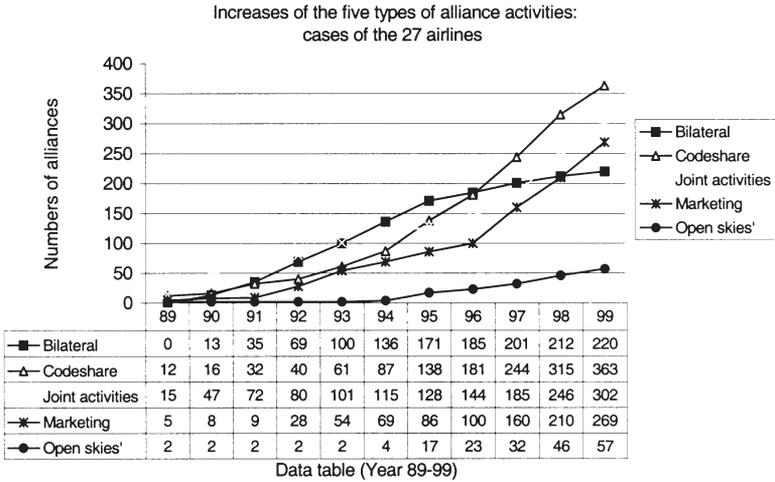
Figure 3. Normal plots-the alliance data



Results for code share activities are shown in Figure 4. The three markets increased code share activities modestly before 1994. EU airlines had rapid growth after 1994, with a total number of 85 code share agreements signed by 1997, followed by NA airlines with 74 agreements. By 1997, the airlines of the AP region had a smaller number of code share agreements.

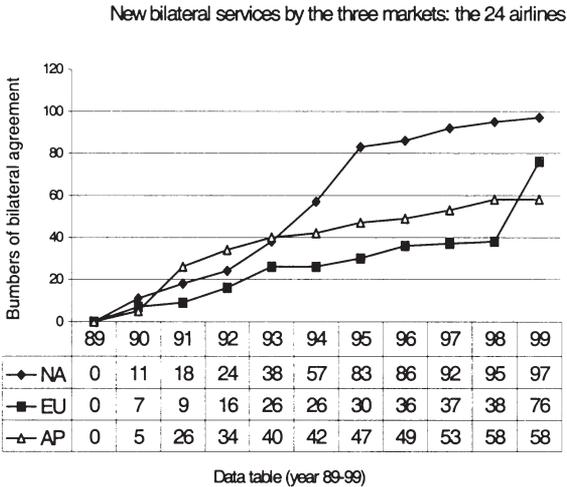
Results for joint activities are shown in Figure 5. The AP region airlines were leading in the number of the joint activities from 1989 to 1999, with a total of 109 agreements. This was followed by EU airlines. The number of

Figure 4. Summary of the increases of the five types of alliance activities of the 27 airlines 1989-1999



Note: a) This figure uses accumulated data of alliances of each year
 b) Assessment based on monthly issues and special issues of Airline Business 1989-1999

Figure 5. Summary of the new bilateral services by the three markets



Note: a) 0= data were not available for 1989
 b) This figure uses nested data of new bilateral services
 b) Assessment based on monthly issues and special issues of Airline Business 1989-1999

joint activities by EU airlines increased rapidly from 1996 to 1997, with 100 agreements signed in 1999. The airlines of NA, on the other hand, had fewer joint program agreements, with only 62 formed with other international airlines between 1989 and 1999.

Results from the investigation of the development of marketing alliances are shown in Figure 6. Before 1991, there were few marketing alliances, and the activities developed slowly in the markets. However, EU airlines had a leap in 1992, and increased the number of alliances from 2 to 12. NA airlines also had rapid progress during that time, and developed from 8 alliances in 1992 to 28 by 1996.

In fact, both NA and EU airlines had increases between 1996 and 1999, with the total numbers of marketing alliances increased from 59 to 117, when many airlines joined the Star Alliance and oneworld. On the other hand, AP region airlines had the smallest number of marketing alliances between 1989 and 1999, with a total of 32. However, in 1997 they increased the number of marketing alliances from 9 to 20, and by 1999 eight of the airlines became members of global alliances.

Results from the exploration of the open skies activities are shown in Figure 7. From 1994 to 1997, the US signed open skies agreements with 12 NA and EU countries. There were no AP region countries that had entered the US open skies at that stage. However, in 1994, Malaysia, Indonesia and Thailand entered a regional bloc, and signed a joint Memorandum of Understanding. By 1997, a few AP region countries were invited to enter the US open skies. The trends in Figure 7 show that the US open skies activities developed rapidly in NA and EU from 1994.

Figure 6. Summary of the code share

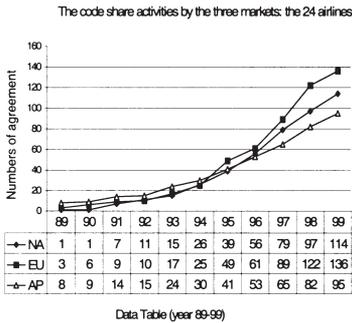
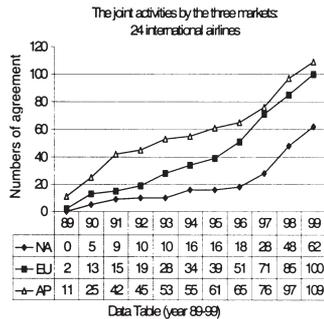


Figure 7. Summary of the joint activities



Note: a) These figures use accumulated data of the activities
 b) Assessment based on monthly issues and special issues of Airline Business 1989-1999

In addition to the US open skies and Asia regional blocs, there were also several bilateral open skies agreements signed by the airlines of South America. Prior to 1991, a bilateral open skies agreement was signed between Colombia and Venezuela. In mid-May 1991, all of a sudden, more skies over the Andes were open. The presidents of the five Andean countries, Bolivia, Colombia, Ecuador, Peru and Venezuela signed an agreement, to set up an open skies regime by 1993. The agreement was to create a single aviation market. They also launched deregulation within the region in December 1991. The Scandinavia region also opened up, which enabled Norway and Sweden greater competition between their carriers in the context of negotiations with the European Community on full participation in the single air transport market.

As the research presumes that there are differences between the number and types of alliances of the carriers, this presumption is expressed as:

$$\sum (al)_i \neq \sum (al)_k \dots\dots\dots (3.1) \quad i=1,2,3, i \neq k$$

$$\sum_{j=1}^5 (al)_{ij} \neq \sum_{j=1}^5 (al)_{kj}$$

where $\Sigma (al)$ stands for the sum total of alliances, subscript i and k is a market, respectively, subscript j is an alliance specific dummy variable, and $\sum_{j=1}^5$ is the sum total of one type for the five types of alliances.

The analysis is directed at testing the hypothesis which supposes there is a significant difference in the number and forms of strategic airline alliances between the three regional aviation markets. The results in Table 7 shows there was a significant difference in numbers of strategic airline alliances between the three aviation markets ($F = 5.05, df = 2, p < 0.007$). The means showed that NA airlines on average engaged in more alliances (mean = 5.2) than EU airlines (mean = 4.5), and AP region airlines (mean = 3.3). The results also show that there was a significant difference between the three markets in numbers of joint activities ($F = 6.2, df = 2, p < 0.002$), marketing alliances ($F = 17.4, df = 2, p < 0.000$), open skies agreements ($F = 28.5, df = 2, p < 0.000$) and route specific services ($F = 12.5, df = 2, p < 0.000$). However, there was no significant difference in the number of code sharing activities between the airlines of NA, the EU and the AP region. AP region airlines, in fact, forged more numbers of joint activities than the airlines of the other two markets, as the means shown. The test results corroborated the descriptive study to support the hypothesis.

Table 7. Difference in alliances between the three markets, 1989-1999

Variables	F	Df	Mean			Sig.
			NA	EU	AP region	
Annual new alliances	5.05	2	5.2	4.5	3.3	0.007
Route specific (bilateral)	12.5	2	7.8	3.4	5.4	0.000
Code share	2.5	2	5.5	6.1	4.2	0.086
Joint activities	6.2	2	3.5	4.8	6.1	0.002
Marketing	17.4	2	4.5	5.6	1.7	0.000
Open skies	28.5	2	1.1	0.8	0.06	0.000

CONCLUSIONS

The research commenced with an attempt to address the central research issues:

Research Issue 1: What are the features and patterns of the development of airline alliances in the air transport markets?

Research Issue 2: Is there a significant difference among airlines' formation of alliances in North American, the European Union and the Asia Pacific region?

Four questions were studied towards addressing the research issues. Findings show that after the economic recession worldwide, different features of alliance agreements were not just signed by NA and EU airlines but also took shape in the AP region. Route specific alliances were once a major form of alliance to enable airlines to access other countries. It was however regularly replaced by dynamic forms of strategic alliance. Airlines of the US and the EU increased strategic alliances following deregulation and liberalization. South American countries, Colombia and Venezuela, signed the first bilateral open skies agreement in the region. Five Andean countries set up an open skies regime in 1991, effected in 1993, to create a single aviation market in South America.

Airline alliances underwent a significant change in 1992, when the US started to pursue the potential of bilateral open skies agreements. The most significant progress in airline alliances was on January 11, 1993, when the US Department of Transportation approved the Northwest/KLM commercial cooperation and integration agreement under a grant of antitrust immunity. KLM and Northwest were then free to join together in creating a unified global airline system.

In 1993, some larger carriers initiated FFPs, and joined together to handle ground services through cooperation and marketing alliances, sharing capacity and joint operation of FFPs. In 1994, airline alliances moved towards a stage of multilateral air transport alliance, such as single-

skies agreements, air transport liberalization (open skies), multilateral aviation rights, and cooperative agreements. From 1995, airline alliances moved further towards the creation of regional aviation blocs, blocking space agreements, and open skies agreements. Critically, five major alliance sectors emerged in the airline industry in 1996, since the spate of alliance-building activities started from 1994. The Star Alliance was formally established in 1997, followed by oneworld in 1998, and more airlines entered these two global alliances or other global groupings.

This research also tested the hypothesis of whether there are any significant differences among the three regional aviation markets of NA, the EU and the AP region. Results show that there is a significant difference between them regarding the number of alliances entered and the features of alliances entered. The significant differences are shown in the numbers of joint activities, marketing alliances, open skies and route specific services. The results obtained through the multiple examinations agreed with each other to show that the research hypothesis is supported.

This research shows that the airline industry has developed different features of alliances in various areas of cooperation. The airline alliances are similar to, but also different from, the collaboration and consortia of other industries. The similarities are the nature of collaboration involving horizontal bi-national groups and consortia engaged by multiple partners of different countries, such as the Star Alliance and oneworld. The differences are the complex features, as well as, areas of cooperation. These areas of cooperation are linked to the characteristics of the airline industry and hence the motivations of the industry. Findings of this research provide information for studying the formation of strategic airline alliances.

Findings of this research have implications for the development of concepts and features of airline alliances, and, hence, contribute to the strategic airline alliance literature. The strategic classification system contributes to studying the typology of strategic airline alliance, as little research has been done to specifically identify or classify current airline alliances according to their overall nature and features. The five types of airline alliances range from simple alignments to integrative forms and these concepts are important for measuring the nature and features of airline alliances and for examining the development of airline alliances.

The Airline Alliance Survey (1999) has listed the current registered airlines' alliances as a total of 856 between 1987 to 2000. This research recognizes a total of 1,211 alliances by accumulating each year's new alliances of the 27 international airlines from 1989 to 1999. This data is accessed through the researchers' examination of 5,518 issues of *Airline Business*. It needs to be reindicated that this number of alliances includes bilateral route specific services. It has been acknowledge that more than

one third of international airline alliances were terminated between 1995 and 1998 (Li, 1999; Oum, 2000). This may further explain the difference with the numbers obtained by this research and the Airline Alliance Survey (1999). The data information provided by this research is important for examining how the numbers and features of strategic airline alliances are increasing with the liberalization process, regulatory policy, and economic factors.

Previous studies argued AP region airlines have been seen as generally entering into few alliances with each other or with other airlines (Eleck et. al., 1999; Graham, 1997, Hooper, 1997; Li, 1998; PC, 1998; Oum, 1998). These arguments generally show a concern of the aviation sector in the AP region in forming strategic alliances. This leads to a question of the impact of market liberalization on formation of strategic airline alliances. As this research has identified types and numbers of strategic airline alliances, it enables further analysis of the impact of the liberalization on formation of airline alliances, to contribute to air transport market liberalization debates. The future prospect of airline strategic alliances is seen as increasing and stable and the survival rates of airline alliances have been improving very rapidly during the last decade, and this trend is likely to continue in the future (Oum, Park & Zhang, 2000). This study further contributes to analysis of the effects of strategic airline alliances in the future.

ENDNOTE

1. The Fifth Freedom Right of Air is the right of an airline from country A to carry revenue between country B and other countries, C., D., etc. The Seventh Freedom Right of Air is the right of an airline formed in one country to carry revenue traffic between two points within another country.

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APPENDIX A
US OPEN SKIES POLICY

1. Open entry on all routes between the bilateral partners;
2. Unrestricted rights for partner airlines to operate between any international gateways in the United States and participating countries, including to intermediate and beyond points;
3. Unrestricted capacity, frequency and aircraft on all routes;
4. Flexibility for airlines in setting fares within certain guidelines;
5. Liberal charter and cargo arrangements;
6. The ability of carriers to convert earnings into hard currency and return those earnings to their homelands without restriction;
7. Open code-sharing opportunities;
8. Rights for carriers to perform their own ground handling in the partner country;
9. The ability of carriers to enter freely into commercial transactions related to their flight operations; and
10. A commitment for non-discriminatory operation of, and access to, computer reservation systems

Source: Airline Business, 1992; Subcommittee on Aviation 1997.

APPENDIX B
FRAMEWORKS FOR THE STRATEGIC CLASSIFICATION OF
THE AIRLINE ALLIANCES

TYPES	DEFINITIONS
TYPE 1 (Route Specific Services)	Route specific alliance refers to the prime Bilateral Air Service Agreement signed between two countries, to enable flights between cities of the two countries, or boost capacity or frequencies of flight service between cities of the two countries (or may grant beyond rights, to use intermediate stops or beyond services). The bilateral agreement of six weekly Singapore-New York services signed between Singapore and USA enables three flights agreement operated via Brussels and three via Frankfurt is an example. A trading-beyond-right between Korea and India enables Korean Airlines to fly from India to Europe and Egypt, in return for the right to Air India to fly from Seoul to the United States is another example.
TYPE 2 (Code Share)	Code share refers to block space agreements, or code share on a number of city-pair markets. These agreements often involve one airline buying blocks of seats on the other's flights and reselling them: Qantas and Air Nuigini operate a route-specific alliance, which involves code sharing on flights between Cairns and Port Moresby and Mount Hagen. An agreement between United Airlines and Ansett enables passengers to travel to Sydney on a United Airlines flight and connect with Ansett flights to eight Australian cities. Code share also involves one airline's designator code shown on flights operated by its partner airline. Code sharing agreements allow each airline involved to provide services with its partner's flights even though it does not operate the aircraft itself. For example, Canadian Airlines and Qantas had a code-sharing agreement on the Vancouver- Honolulu- Sydney route where Canadian served the Vancouver-Honolulu section and Qantas served the Honolulu-Sydney section of the route.

Type 3 (Joint Activities)	Joint activities generally refer to joint venture, collaboration or cooperation including joint purchasing of aircraft and fuel. The joint operation is within the areas of cooperation in joint use of ground facilities, coordination in ground handling, coordination of flight schedules.
Type 4 (Marketing Alliances)	A marketing alliance involves cooperative agreements on ticketing service, share of CRS, FFPs and joint advertising, including milestones such as Star Alliance. To this extent, a marketing alliance may cover some of the joint activities, as the marketing alliance can also involve joint use of ground facilities, coordination in ground handling, coordination of flight schedules and on-line and interline co-operations under the agreement of global alliances. Marketing alliances include oneworld, Star, Qualifier, Air France/Delta Global Wings (Northwest/KLM), and other similar regional based alliances.
TYPE 5 (Open Skies)	Open skies refers to the alliances initiated by the US between some American, European Union and a few Asian Pacific countries. The alliances, formed under the US bilateral open skies policy, are basically commercial alliances in nature, being more integrative in levels and areas of cooperation, compared with the other types of alliances. The memorandum of understanding normally covers code share agreements on international and domestic flights, reciprocal FFPs, lounge access, though check-in, integration of boarding procedures, computer reservation system linkage, joint marketing and sales programs. Open skies may involve a single aviation market, free access to the markets, full traffic rights, and may also grant anti-trust immunity. However, few countries so far have been granted these rights (Also see the open skies policy in Appendix A).

Sources: Airline Business, 1989-1999; General Accounting Office, 1995; IC, 1997, 1998; ICAO, 1997; Park, 1997; Oum, Park, & Zhang, 2000