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## Abstract

Over the past decade (2000-2009), the domestic and international transportation services showed contradictory trends to the civil aviation industries over the period from 2000 to 2009. There was a significant increase on international air transport for both passenger and cargo. The number of passenger increased 35 percent, the cargo increased 24 percent, and the numbers of flights increased 53 percent over the period. Meanwhile, the numbers of domestic air transport declined significantly since the number of passengers decreased almost 65 percent, the numbers of flights also decreased 63 percent, however the numbers of cargo services remained constant ever since 2000.

National Airborne Service Corps were also having a substaintial increase in the total number of missions and the cumulative flown hours for the past eight years. The total number of flown hours was still less than 1,000 hours in 2002; however, when it came to 2005, the number has increased rapidly to about 9,400 hours. The trend then remained steady for the last four years. Last year, 2009, due to the 88 typhoon disaster, the missions of disaster relief were increased in the period. The yearly total flight hours almost reached 10 thousand hours.

According to the occurrence rates for the airplanes in civil aviationr transportation category over the last 10 years (2000-2009), the average rate of hull loss occurrences on commercial jet was 0.6 per million flight hours, or 1.82 per million departures. In addition to that, the hull loss occurrence rate on turboprop airplane was 1.09 per million flight hours or 1.02 per million departures. Based on the 10-year moving average of hull loss occurrence rates on civil aviation transportation category, from 1993 to 2009, suggests that by 2006 the 10-year average of hull loss occurrence rates on commercial jet had declined, though with a minor rise in 2007, from 2008 to 2009 it returned to declination trend; whereas the number on turboprop airplanes had declined steadily over the years.

When focusing at the accident rates for each phase of flight, which was defined by International Civil Aviation Organization (ICAO), there were total 34 aviation occurrences happening at different phases over the last decade. Among all these accidents, 15 of them took place at landing phase, as the most prevalent, followed by cruise phase, which accounted for 8 occurrences.

In accordance to the occurrence category used by ICAO, among all 34 civil transportation category airplane occurrences over the past ten years, the runway excursions overall were the most frequent and a total of nine occurrences were reported. The second most frequent occurrences were abnormal runway contact, accounting for five. When further analyzed those transport category occurrences with ASC occurrence scales, the most frequent Class I occurrence were the SCE-NP (system/component failure or

malfunction/ non-power plant) and ICE. Although the highest numbers of occurrences came from the category of RE (runway excursions), eight out of nine cases were Class V which was a smaller scale of occurrences.

The National Transportation Safety Board (NTSB) often established the probable cause and contributing factor of an occurrence using three broad categoris: personnel, environment, and aircraft related. By using the similar approach, for the civil transportation category airplane occurrence occurred over the past ten years in Taiwan, personnel was cited as a cuase/factor in 89.7% (62.1% related to pilots, 27.6% related to maintenance/ATC personnel) of those occurrences as the largest percentage, environment was cited in 34.5%, and the aircraft related in 17.1%.

From 2000 to 2009, the rate of general aviation occurrence was 8.96 per 100,000 flight hours, fatal occurrence rate was 3.58 per 100,000 flight hours and hull loss occurrence rate was 5.38 per 100,000 flight hours. The general aviation was safer between 2002 and 2007 as neither fatal accidents nor Hull Loss of aircrafts were occurred, however there was two hull loss occurrence in recent two years.

There were 8 occurrences involving public aircraft during the period of 2000 to 2009. Of these occurrences, 3 were fatal occurrences and 5 were hull loss occurrences which included the cost of repair exceeding the cost of the aircraft.

According to the formal records of ultra-light vehicles occurrence, there were 8 occurrences from 2004 to 2009, including 4 fatal occurrences which resulted in 7 fatalities. Of all 8 occurrences were hull losses.

After finishing 52 occurrences investigation, the Avation Safety Council has made 465 aviation safety recommendations during the period from April, 1999 to June, 2010. At the time of this publication, only 1 out of 236 action plans/proposals corresponding to safety recommendations was still labled as “under supervision” and the rest 235 action plans/proposals were all labled as “accepted”. It meat only 0.4% of plans/proposals was at “under supervision” and the accepted action plans/proposals was as high as 99.6%.

# Introduction

Civil aviation has become an integral part of the economy; and at the same time, demand for air transport has been closely linked with economic development as well. This paper begins with the topic of social economy, which includes the critical changes in socio-economic indicator systems in Taiwan over the last decade. Then following by the review of operation status of civil aircrafts, public aircrafts and ultra-light vehicle, it will allow readers to oserve the civil aviation operations change in view of the Taiwan social economy.

The second part of the report includes the statistics/analysis of aviation occurrences and safety recommendations. In order to give readers the general understanding of aviation occurrences statisitcs, the article will first introduce the basics and defnition of statistical data, categorization of occurrence aircrafts, ASC's investigation procedure and classification of occurrences. Then the report will focus on the statistics of aviation occurrences, including the overview of Occurrences happened over the last decade, and different types of aircraft Occurrences: the civil aviation transport category occurrences, general aviation occurrences, helicopter occurrences, public aircraft occurrences, and ultra-light vehicle occurrences. Data related to the civil aviation transport category will be further analyzed in accordance with the taxonomy used by International Civil Aviation Organization. The end of this section will include safety recommendations made by the Aviation Safety Council and the status of its follow-up.

Several terminologies are used throughout this report that relate specifically to the civil aviation or International Civil Aviation Organizations, for definitions of those terms please refer to the attached appendix - Definitions of Terms.

# Aviation and the Social Economy

## The Economic Profile in 2009[1]

In 2009, the economic growth rate was -1.91%, with a 0.73% decrease in the previous year. The gross national product grew to $12 trillion and 930.4 billion NT and the gross domestic product grew to $12 trillion and $512.7 billion NT, representing a 0.64% and 1.46% decreased, respectively, over the previous year. The national dividend also grew to $477 thousands and 188 NT dollars, with a decrease of 1.20% when compared to the previous year. The rate of labor force participation was 57.9% which was similar to 58.28% in 2008. Accordingly, the overall economy was decreasing. The population of Taiwan increased 0.36%, reaching the total number of 23.12 million people; and the number of families in Taiwan increased to 7.81 million families in 2009, an increase of 1.95% over the previous year.

## Economic Changes and Tendencies from 2000 to 2009

The common indicators of socio-economic of Taiwan from 2000 to 2009 were shown on the attached Appendix 1.

The socio-economic indicators, gross national product(GNP), gross domestic product(GDP), and national dividend of the last decade were shown in Figure 1 and Figure 2. In addition year 2001[2], the year 2008 also showed negative growth. In year 2009, it showed slightly improvement, but not recovered as usuall. The economic growth rate fluctuated 3.6%-6.2% from year 2002 to year 2007. In year 2009, it reached its lowest level(-1.91%) which was similar to year 2001 (-1.65%) within 10 years. The 10-years economic growth rate (Figure 3) and other socio-economic indicators demonstrated similar patterns of change. As for the labor force participation rate[3] (Figure 4), it reached the lowest 57.23% in 2001, then the rate was increased again year over year to 58.28% in 2008, in year 2009 it slightly dropped to 57.9%.

[1] Data was referred to the Directorate General of Budget, Accounting and Statistics, Executive Yuan, R.O.C.

[2] In 2001, there was the first whole year of negative economic growth since 1947.

[3] Labor Force Participation Rate is the rate between the labor force and the overall size of their cohort, national population of the people with ages over 15. Labor force is the number of persons with ages over 15 and who are employed or are unemployed but looking for a job.

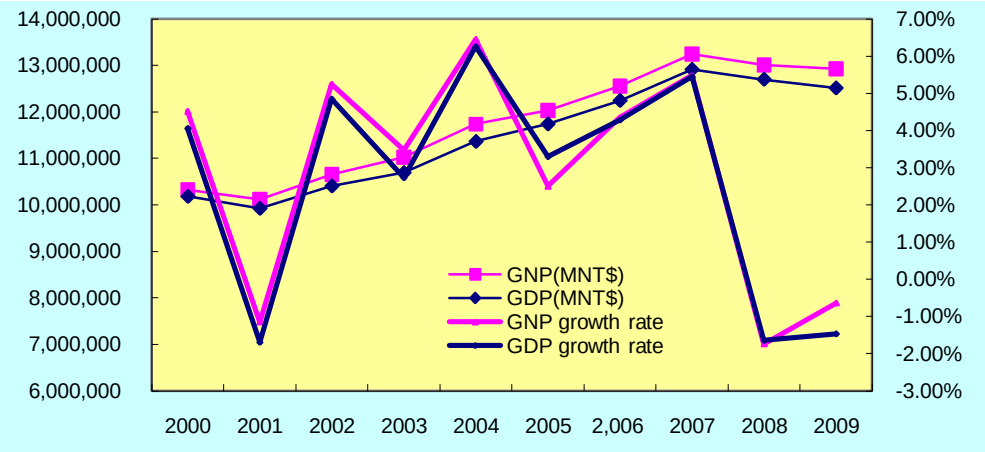


Figure1： GNP and GDP in Taiwan, 2000-2009

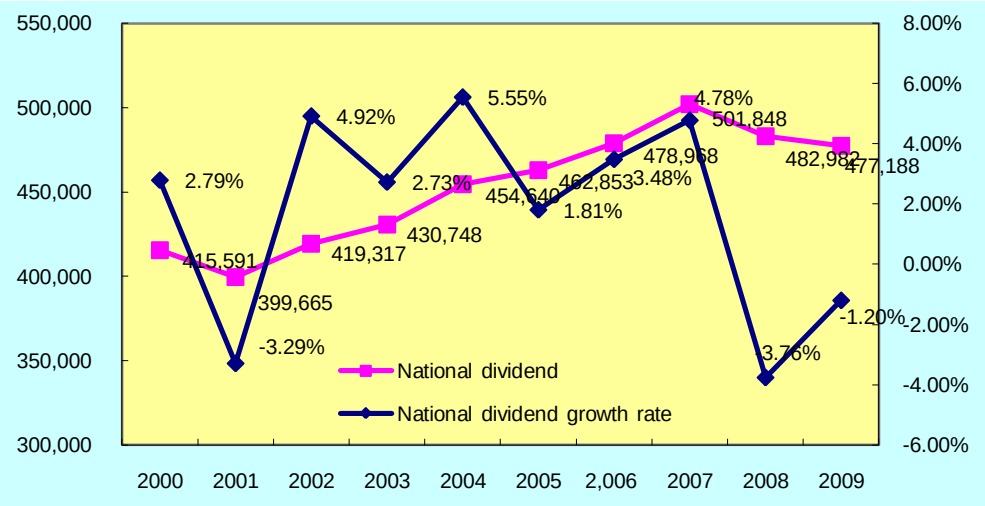


Figure2： The Average Annual National Dividend and its Growth Rate, 2000-2009

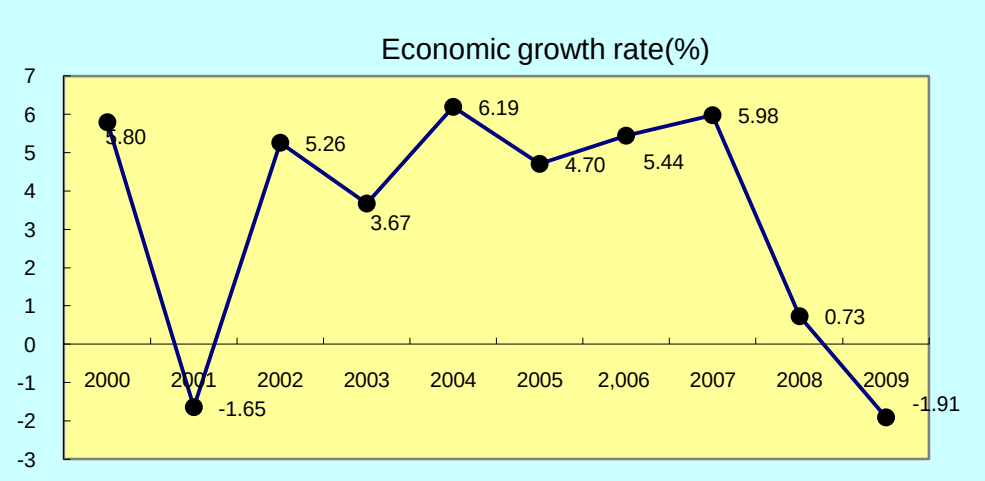


Figure3： The Economic Growth Rate of Taiwan, 2000-2009

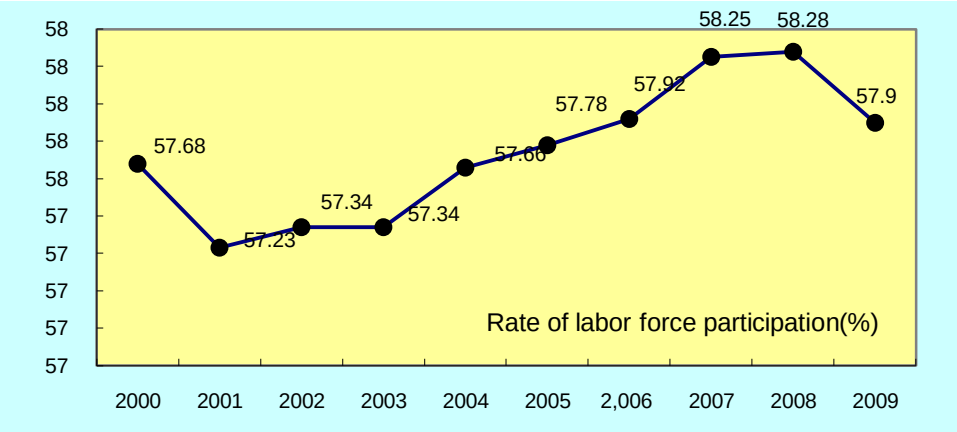


Figure4： The Change of Labor Force Participation Rate, 2000-2009

Over the past decade, the Taiwanese population (Figure 5) and number of families (Figure 6) were both growing at a steady rate. The growth rate of families was three to five times more than that of population. Although the growth rate in population remained positive, it had dropped from 0.83% in 2000 to 0.36 percent in 2009, which indicated the growth rate in population has gone from decreasing to a steady rate of recent years. For the family growth rate, it had declined from 2.28% in 2000 to 1.40% in 2006, and then slightly increased to 1.95% in 2009.

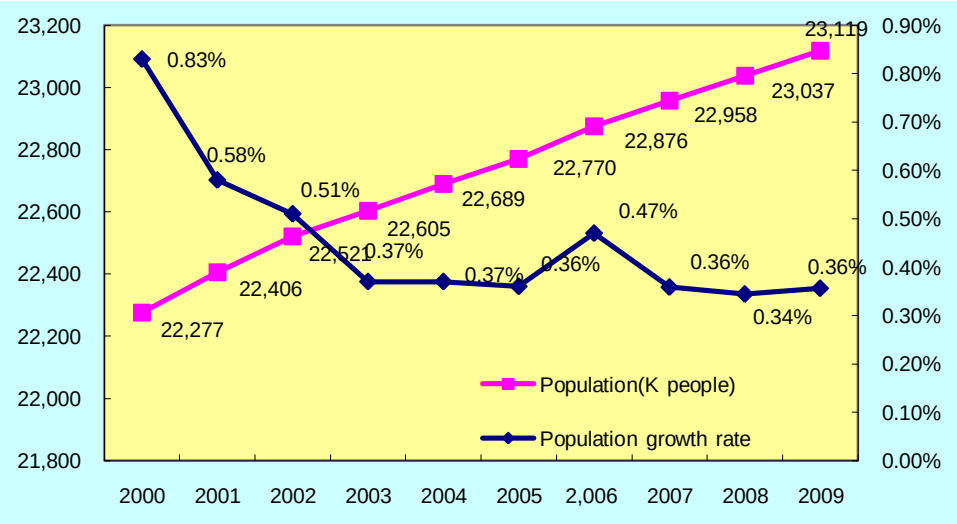


Figure5： The Population and Population Growth Rate, 2000-2009

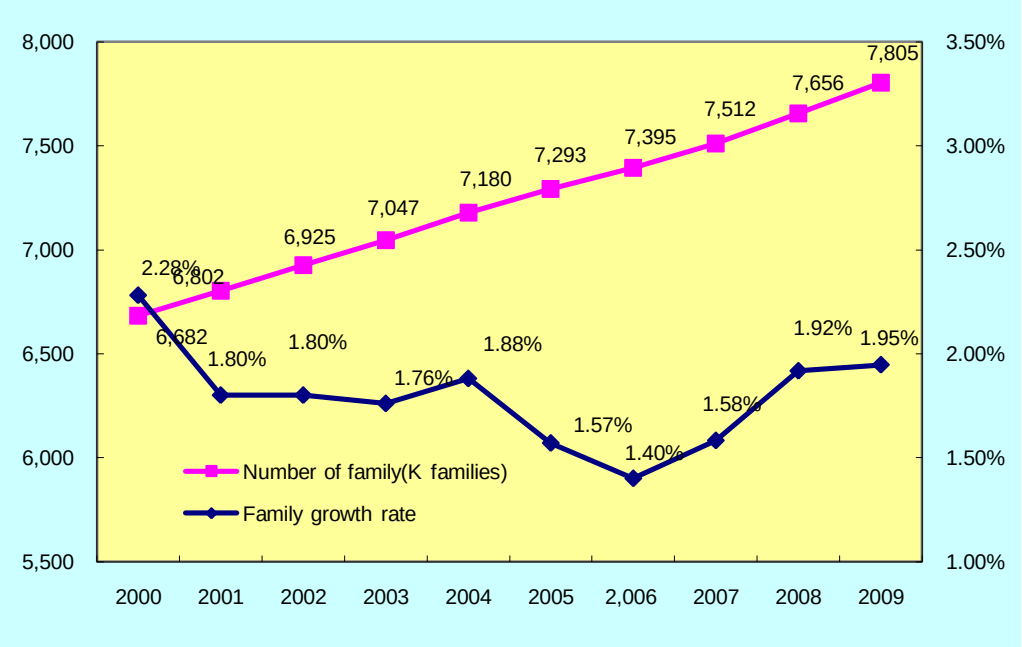


Figure6： Total Numbers of Families and the Families Growth Rate, 2000-2009

# The Operation of Civil Aircraft and Public Aircraft in Taiwan[4]

## The Overview of Civil Aviation Operation, 2000-2009

There were twelve air carriers[5] in Taiwan in 2009, and seven of them served in civil aviation transportation category. Five [6] out of seven transportation category carriers operated on both international and domestic routes. The rest two[7] operated in domestic routes only. The number of air carriers in the general aviation industry still remained as six[8]. Total number of aircraft operated in transport category and general aviation was 192, a decrease of 1 when compared to the previous year.

In 2009 the transportation category air carrier in Taiwan carried a total of 22,340,000 passengers, a 1.1 percent higher than that in 2008. Of all the passengers, 79.6 percent were international passengers, 3.4 percent increase over the previous year and 20.4 percent were domestic passengers with a 7.0 percent drop when compared to the year before. The total weights the air cargo carried in 2009 decreased to 1,427,000 tons, a 10 percent less when compared to 2008. Among them, the international air cargo accounted for 96.9 percent of the total weight in 2009 and that was reduced by 10.4 percent from 2008. The domestic air cargo accounted for 3.1 percent of the total weight, and that was increased by 2.3 percent from 2008 to 2009. There were a total of 189,208 flights in the whole year, including 45.6 percent domestic flights, a 8.2 percent less compared to the year before. International flights accounted for 54.4 percent of the total number of flights, 0.4 percent loss over the previous year. It was demonstrated from previous data that in 2009, the passenger carried shown little growth, but the flight numbers of international airlines appeared to have a small drop. The international air cargo continued the third year drop. On the other hand, the domestic flights had a decline by a wide margin. 2009 was the fifth year continued drop in domestic flights. The drop that the passenger traffic had was again serious than the air cargo transport. In 2009, the general aviation had a total of 4,589 flight hours, which was decreased by 1.7 percent from 2008 to 2009. The index of overall operations of local air carriers over the past ten years was showed in Appendix 2.

## Transportation Category

As shown in Figure 7, the number of air carriers operating in civil air transportation category decreased to seven in 2009 from eight in 2008. In

[4] The listed statistical data mainly came from “CAA Annual Report”.

[5] The number still included Far Estern Air Transport; however the company stoped operations on May 17, 2008.

[6] China Airlines, EVA Airways, TransAsia Airways, Uni Airways and Mandarin Airlines

[7] Daily Air and Sunrise Airlines

[8] Daily Air Corporation, Aerospace Industrial Development Corporation (AIDC), Emerald Pacific Airlines (EPA), ROC Aviation Company, Sunrise Airlines and Great Wing Airline.

terms of the number of registered aircraft, there was a decreasing trend in recent years as shown in Figure 8. The number of registered aircrafts increased to 204 in 2005 from 173 in 2000, mainly due to the expansion of those air carriers involving in international route services, China Airlines and EVA Airways. These air carriers expanded their fleet's scale by a wide margin[9]. However, in 2006, the number of registered aircrafts started to decrease.

For the numbers of passengers (Figure 9), the international air carriers and domestic air carriers showed two totally different trends. On international routes, apart from the negative growth in 2003, numbers of passengers were 13,216,000 in 2000 and increased gradually over the years, and to be 18,470,000 in 2007. In recent two years, it showed a little stop increasing; however a 34.5 percent increased over the past 10 year was achieved. Differently from the international routes, domestic routes had positive growth only in 2004. Other than that, numbers fell from 13,118,000 in 2000 to 4,565,000 in 2009, a decrease of 65.2 percent over the decade.

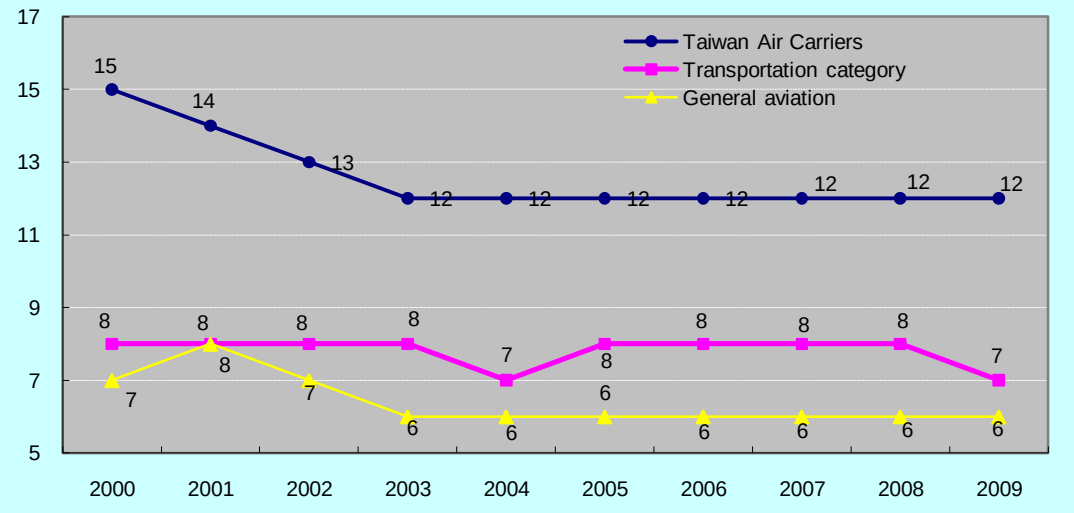


Figure7： Taiwan air carriers, transportation category and general aviation, 2000-2009

[9] China Airlines had 25 aircrafts in 1996 and the number of aircraft was increased to 66 by 2006. In the meanwhile, EVA Airways had 18 aircrafts, and also increased its number of aircrafts to 43.

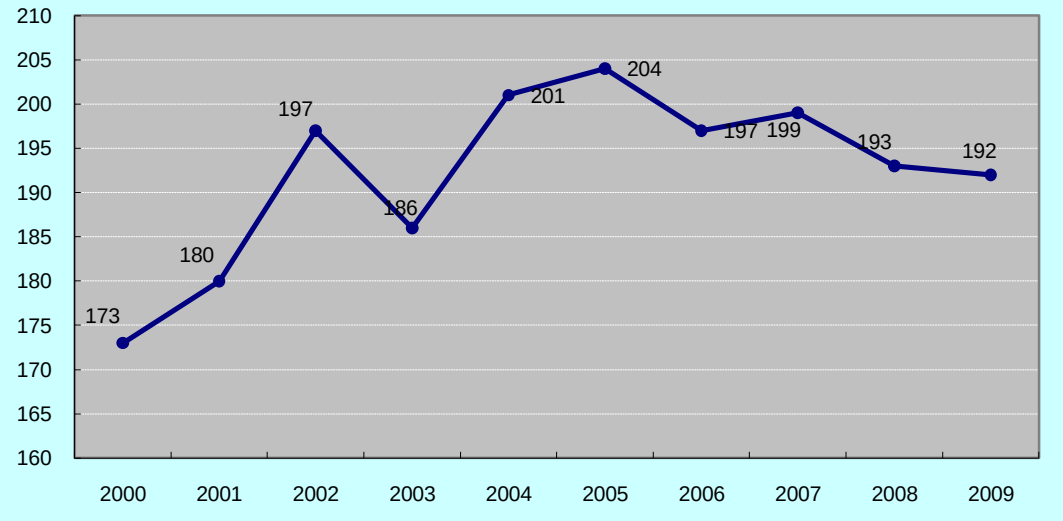


Figure8： Taiwan registered civil aircrarft, 2000-2009

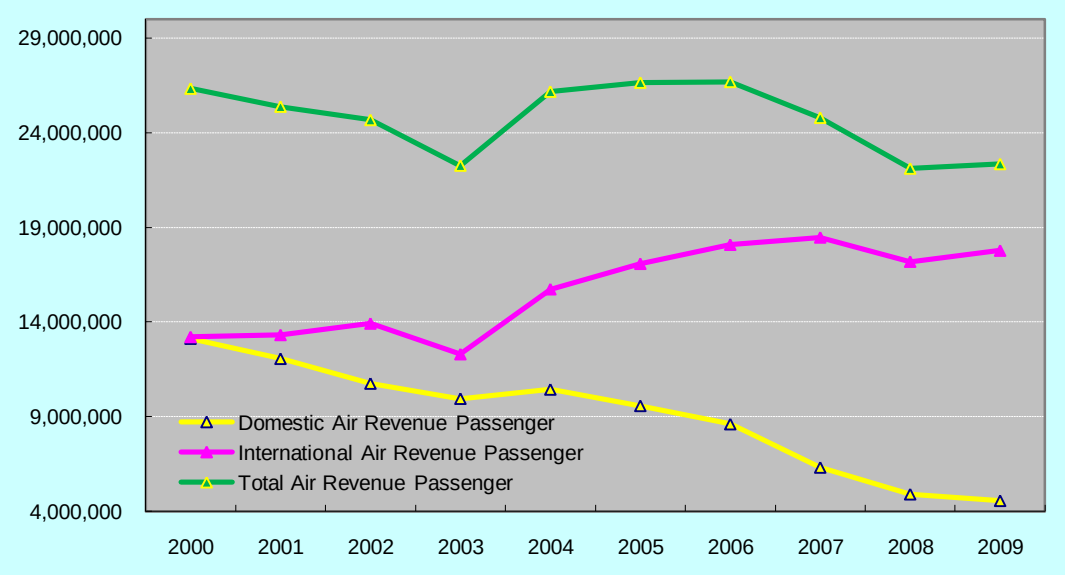


Figure9： Taiwan air carriers revenue passengers by transportation category, 2000-2009

In terms of the air cargo as shown in Figure 10, the international air cargo were much more than domestic one. In the past ten years, the international air cargo took up almost 96 percent of the total annual. Despite the negative growth in 2001, the numbers of international air freight increased year over year to 1.73 million tons in 2005 from 1.11 million tons in 2000. In 2006, the number remained the same, but a decreasing trend in last three years. Accordingly, the number of air cargo had almost 24.2% growth over the decade, but the growth trend has slowed down in these recent three years. As for the domestic air cargo, the numbers increased from 54 thousand tons in 2000 to 57 thousand tons in 2002, but remained steady with only small variation from thereafter till 2009.

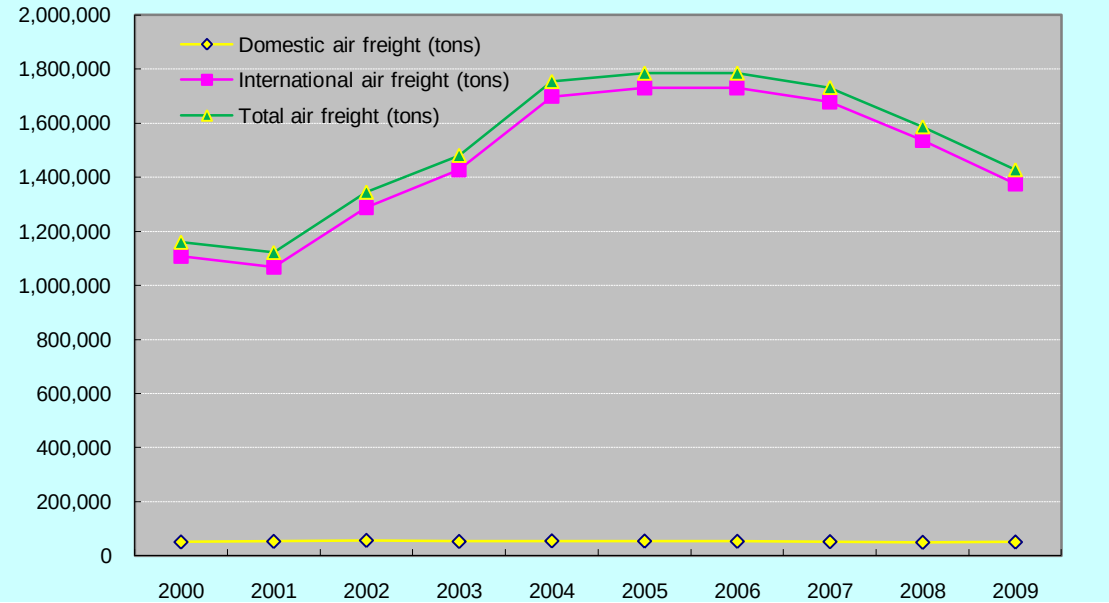


Figure10： Taiwan air freight by transportation category air carrier, 2000-2009

In terms of the number of flights, the numbers of domestic flights were 3.2 times more than the numbers of the international flights in 2000 (figure 11). While through the expansion of international airlines and the cut of domestic flight over the last decade, the numbers of international flights in 2009 were 1.3 times more than the numbers of domestic flights. The domestic flights dropped to 82,000 flights in 2009 from 222,000 flights in 2000, a reduction of nearly 63 percent. Differently from the domestic routes, international airlines were increased from 70,000 flights in 2000 to 107,000 flights in 2009 with a growth of 53 percent.

Overall speaking, the domestic and international transportation services showed contradictory trends to the civil aviation industries over the period from 2000 to 2009. There was a significant increase on international air transport for both passenger and cargo. The number of passenger increased 35 percent, the cargo increased 24 percent, and the numbers of flights increased 53 percent over the period. Meanwhile, the numbers of domestic air transport declined significantly since the number of passengers decreased almost 65 percent, the numbers of flights also decreased 63 percent, however the numbers of cargo services remained constant ever since 2000.

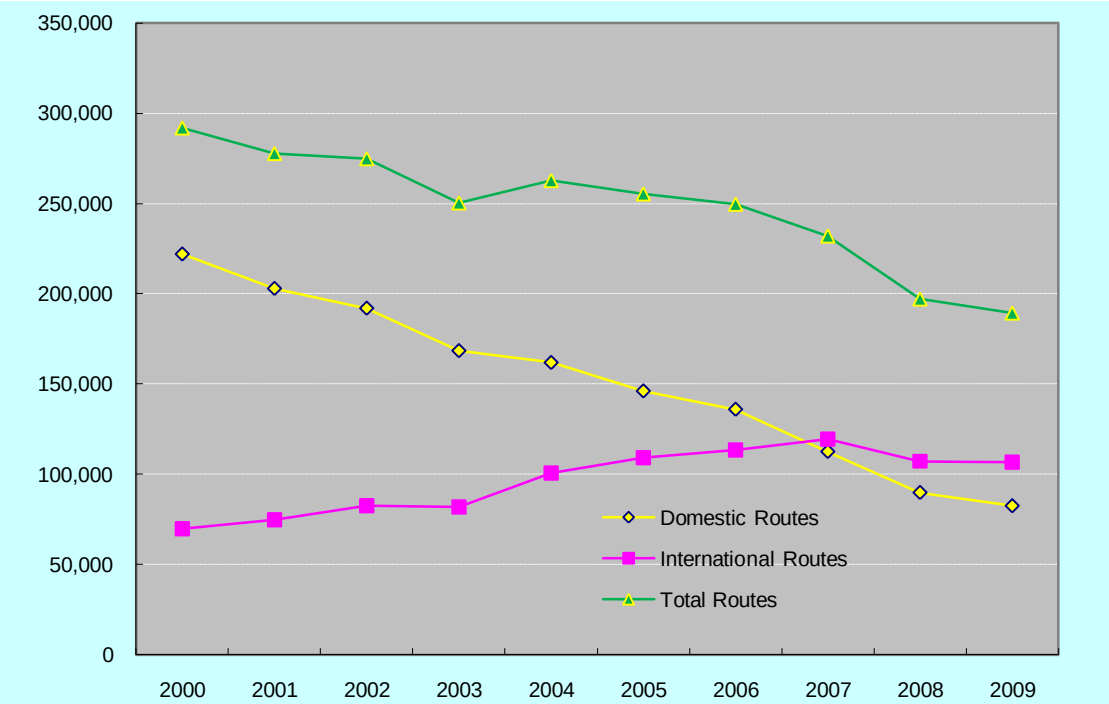


Figure11： Taiwan flight departures by transportation category, 2000-2009

General Aviation

As shown in Figure 7, air carriers running the general aviation were varied from 6 to 8 in the country over the past ten years. The total flight hours were raised from 5,666 hours in 2000 to achieve its peak at 9,773 hours in 2002; then gradually decrease to 3,919 hours in 2005. In recent years, a small increase was observed again giving the total flight hours to be 4,589 hours in 2009.

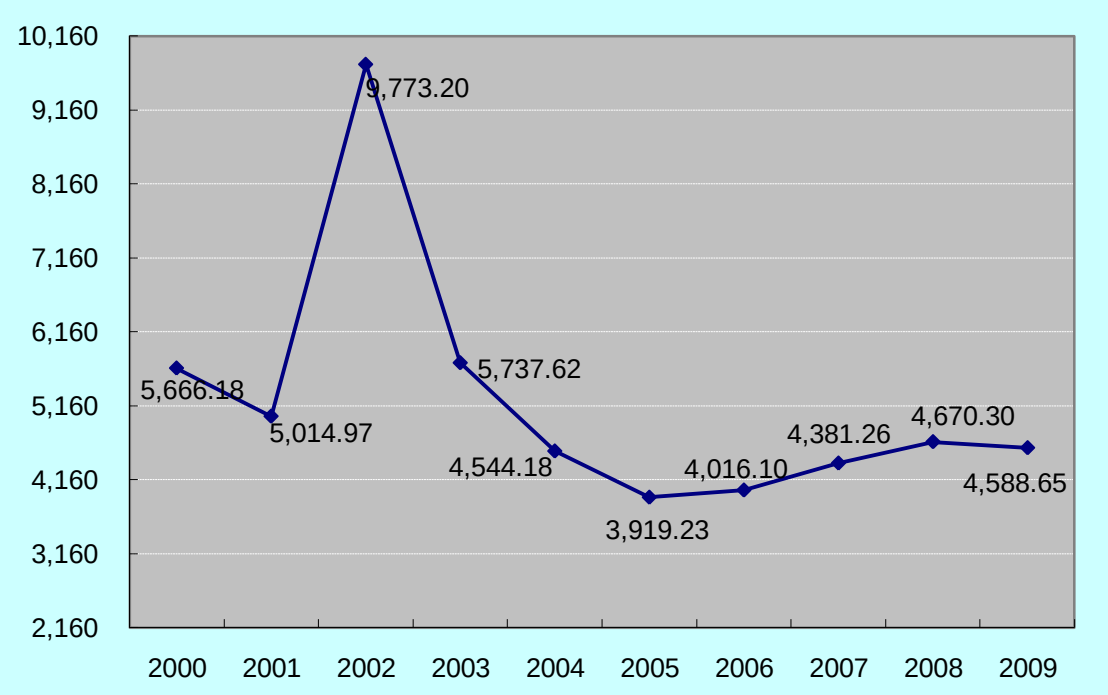


Figure12： Taiwan air carriers flight hours by general aviation, 2000-2009

## Public Aircraft

Due to different requirement of assignments, the public aircraft that the government used in the old days were under different units: the Aviation Team of Civil Aeronautics Administration of Ministry of Transportation and Communications, the Airborne Squadron of National Police Agency, the Preparatory Office of the Airborne Fire Fighting Squadron of National Fire Agency and the Air Patrol Squadron of the Coast Guard Administration, Executive Yuan. Although there was only a small number of aircrafts for each units, they all required basic relevant professional personnel to maintain proper operation of the aircrafts. Moreover, the special mission requirements of public aircraft made its flight safety management and oversight system different from the civil aircrafts.

In order to enforce the safety of public aircrafts, to make full use of resources and to unify management, the government merged the above units into the Preparatory Office of National Airborne Service Corps Ministry of the Interior on March 10th, 2004. This newly formed organization was aiming to be the center of command for the five major tasks: Search and Rescue, Disaster Relief, Emergency Medical Services, Reconnaissance and Patrol, and Transportation. Furthermore, on June, 2005, the Organization Act of Airborne Services Corps of MOI was passed, and National Airborne Service Corps (NASC) of the Ministry of the Interior was finally officially established. After the merging, there were 33 helicopters and 2 fixed-wing aircrafts under the NASC command. In addition, the Civil Aeronautics Administration still owned 1 light aircraft in the order to assist the airport navigation facilities flight test. After the announcement of Aviation Occurrence Investigation Act on June, 2004, investigations of public aviation aircrafts were then officially the responsibility of Aviation Safety Council, Executive Yuan.

In the past, the flight records of the public aircrafts were dispersed among several government units, making it difficult to gather. According to the data of NASC, as shown in Figure 3, the total numbers of flights were plotted against the total flight hours in recent years and curve graphs was produced. From the graph, one can see that within these 8 years, there was an obvious increase for both NASC flight numbers and flight hours. The total flight hours of 2002 was less than 1000 hours, but rapidly increased from then on, to a total of 9,400 flight hours in 2005 and remained stable in continuous 3 years. In 2009, the total flight hours was about 10 thousand hours.

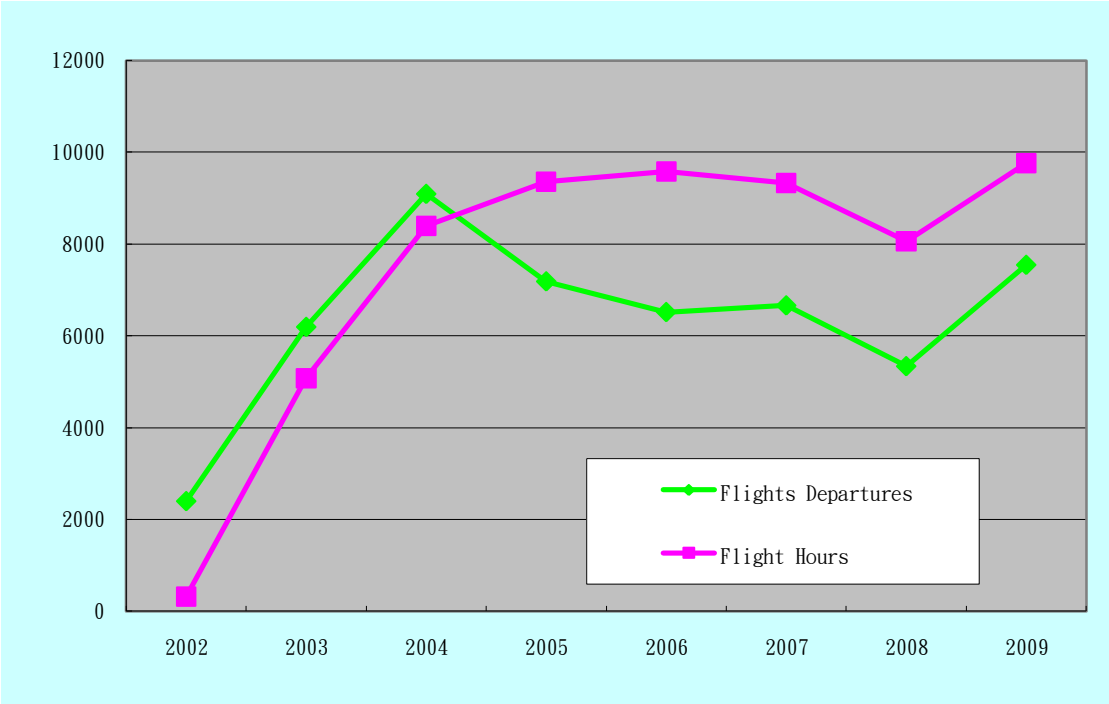


Figure13： Total flight numbers and total flight hours of National Airborne Service Corps, 2002-2009

## Activities of Ultra-Light Vehicle

Since the introduction of ultra-light vehicle to Taiwan in 1985, the ultra-light vehicle had once been flourished in 1989, reaching its maximum quantity of more than six hundreds aircraft and with more than seventy ultra-light airfields in Taiwan. Nevertheless, ultra-light aircraft occurrences were frequently reported from 1989 to 2002. Due to the lack of mandatory legal regulation for ultra-light vehicles, where most of the activities were functioned according to administrative orders, the oversight of ultra-light vehicle operations was difficult and inefficient back then. In order to improve the situation, the Ministry of Transportation and Communications added related provisions to civil aviation acts in 2003, and then concluded “Ultra-light Vehicle Regulation” in the following year, formally putting ultra-light vehicle into CAA’s supervision. Furthermore, according to the data from CAA, there are 17 available airspaces nowadays, and five of them were approved to be legal airspaces. Only 4 airfields were approved to have ultra-light vehicle activities carried on. Ten ultra-light vehicle activity associations were approved by the Ministry of the Interior based on Citizen’s Organization Law. Four out of these ten associations were approved by CAA to have leagle activities. There was no formal statistics of ultra-light vehicle number in Taiwan in 2009. In accordance with the Aviation Investigation Act, investigations of occurrences involving ultra-light vehicle are still in the scope of Aviation Safety Council inquiry.

# Statistics and Analysis of Taiwan Aviation Occurrence data, 2000-2009

## Introduction to Aviation Occurrence Data

### Data Source

The contents presented in this chapter are a statistical compilation of the Taiwan air carriers' operation and aviation occurrences. Major data sources include the statistics of operation/flight safety from CAA, the Aviation Safety Council (ASC) aviation occurrences investigation reports, and the data from the National Airborne Service Corps. The government official documents and press accounts provide additional information of the few aviation occurrence statistics on the early days.

### Definition and Categories

The statistics are organized based on the characteristics and the operations of the aircraft. In the review of aircraft accident data released by the US National Transport Safety Board, civil aircraft fall into several categories, including Part 121, Part 135, Commuters, On Demand Operations, and General Aviation, following the Federal Aviation Regulations (FARs). Briefly stated, Part121 applies to major airlines and cargo carriers that fly large transport category aircraft while Part 135 applies to commercial air carriers commonly referred to as commuter airlines and air taxis.

The statistics released by the International Civil Aviation Organization (ICAO) covers a wide range of aircraft, including those of various Maximum Take-Off Weight, number of engine installed, types of thrust, scheduled and non-scheduled, and General Aviation. The focus, however, is on the fatal accidents of scheduled and non-scheduled flights of transport category aircraft, as well as that of aircraft of Maximum Take-Off Weight in excess of 27,000 kg (60,000 lb.).

The Boeing Company (USA) has presented a statistical summary of commercial jet airplane accidents worldwide between 1959 and 2008. The statistics is confined to worldwide commercial jet airplanes that were heavier than 60,000 pounds maximum gross weight, excluding those manufactured in the Commonwealth of Independent States (CIS) or the Union of Soviet Socialist Republics (USSR). In Britain, airplanes above 5,700 kg (12,500 lb.) are the major focus of the statistics of the fatal accident rate per 1,000,000 flight hours.

In 2001, a special issue, "the Review of Civil Aviation Safety in Taiwan" was published on Civil Aviation Journal Quarterly by the Civil Aeronautics Administration. In this special review, the definition of jets for statistics was referred to a Maximum Take-Off Weight of more than 15,000 kg, which was the same as the International Air Transport Association (IATA). Since then, it has been applied in annual reports and statistics of civil aircraft flight hours and departures released the Civil Aeronautics Administration, Taiwan.

Judging from the above information, global aviation accident data mainly

focus on the large aircraft (Maximum Take-Off Weight in excess of 15,000 kg or 27,000 kg). For local aviation accident data statistics, all sizes of aircraft are accounted and categorized. Taking advantage of sharing the same pool of flight operation data from CAA, this statistics of this report adapts the definition of aircraft category used by CAA. Further refer to ASC's occurrence category for investigation. The aviation occurrence data presented in this report are confined to all Taiwan domestic aircraft (except military airplanes), including:

- Aircraft of transportation category
  Commercial Jet airplanes (models listed in Table 1)
  Turboprop airplances (models listed in Table 2)
- General Aviation (models listed in Table 3)
- Public aircraft (models listed in Table 4)
- Ultra-light vehicles

A glossary of aviation and technical terms used in this document can be found in the appendix. The major references are from the Civil Aviation Act of the Republic of China, Aviation Occurrences Investigation Act (AOIA), Regulations Governing the Investigation of Aviation Occurrence of Civil and Public Aircraft, the Aviation Occurrence Investigation Standard Operation Procedure, and ICAO publications.

Table 1： Aviation occurrence statistics related commercial jet airplanes

| BOEING | BOEING | AIRBUS | FOKKER | EMBRAER |
|---|---|---|---|---|
| 737 | MD-80 | A300-600 | F-100 | 190 |
| 747 | MD-90 | A310 | | |
| 757 | MD-11 | A320/319/321 | | |
| 767 | | A330 | | |
| 777 | | A340 | | |

Table 2： Aviation occurrence statistics related commercial turboprop airplanes

| ATR | FOKKER | DORNIER | DE HAVILLAND | SAAB |
|---|---|---|---|---|
| ATR72 | F-50 | Do-228 | DH8 | 340 |

Table 3： Aviation occurrence statistics related general aviation aircraft included

| BELL | AEROSPATIALE | KAWASAKI | HILLER | Others |
|---|---|---|---|---|
| Bell 206 | AS-365 | BK117 | UH-12E | BN-2B |
| Bell 412 | | | | ASTRA SPX |
| Bell 430 | | | | |

Table 4： Aviation occurrence statistics related public aircraft

| BELL | AEROSPATIALE | BOEING | SIKORSKY | BEECH |
|---|---|---|---|---|
| UH-1H(205) | AS-365 | B234 | S76B | BE200 |
| | | | | BE350 |

## Aviation Occurrences Investigation Standard Operation Procedure

The Aviation Safety Council (ASC) is a government investigation agency on aviation occurrences (aviation accidents and serious incidents) occurred in the territory of the Republic of China (hereinafter referred to as ROC), including those of civil aircraft, public aircraft, and ultra-light vehicle. Upon receipt of the notification and invitation of an aviation occurrence occurred outside the territory of the ROC, which involves an aircraft registered in the ROC, the ASC

shall appoint an accredited representative and immediately contact the investigation authority of the State of occurrence to participate in the investigation for factual data collection. In this report the occurrence data included not only occurrence investigated by ASC but also the occurrence of ROC's registered aircraft which occurred outside the territory of ROC.

The ASC shall release the Preliminary Report within 30 days of the occurrence based on the data and limited information obtained during the early stages. The Report shall be sent to ICAO, related parties and posted on the ASC website. Within several months of the occurrence, the ASC may release the Factual Data Report that contains all relevant factual data collected during the on-scene phase of the investigation. A Factual Data Report should present only the facts and should not express "subjective opinions" and "analytical judgment." After the Factual Data Report is published, the investigation enters the analysis stage. ASC investigators with help of advisors shall conduct the analyses to identify the probable causes and contributing factors of the occurrence, as well as the risk factors and other factors that might affect flight safety based on the verified factual data, and propose the safety recommendations.

In order to determine the probable causes of an occurrence, all factual data, various conditions and circumstances should be carefully examined. The Safety Council presents the findings derived from the factual information gathered during the investigation and the analysis of the occurrence. The findings are presented in three categories: findings related to probable causes, findings related to risk, and other findings. The findings related to the probable causes identify elements that have been shown to have operated in the occurrence, or almost certainly to have operated in the occurrence. These findings are associated with unsafe acts, unsafe conditions, or safety deficiencies that are associated with safety significant events that played a major role in the circumstances leading to the occurrence. The findings related to risk identify elements of risk that have the potential to degrade aviation safety. Further, other findings identify elements that have the potential to enhance aviation safety, resolve an issue of controversy, or clarify an issue of unresolved ambiguity.

It usually takes considerable amount of time to complete the Final Report. In some cases, the Report was not released until two years after the occurrence. Based on the ICAO format the Final Report should consist of four chapters: Chapter 1 Factual Information, Chapter 2 Analysis, Chapter 3 Conclusion, and Chapter 4 Safety Recommendations. The Final Draft Report will be sent to the relevant organizations for feedback. All opinions applicable should be integrated in the Final Draft Report, which should be submitted for Council approval. The Final Draft Report will automatically become the official Final Report after the Council approves it. The Final Report shall then be published and sent to authorities and organizations.

## ASC Definition and Classification of Occurrences

Aviation occurrence in the Aviation Occurrences Investigation Act (AOIA) is defined as an occurrence associated with the operation of an aircraft which

takes place between the time any person boards the aircraft with the intention of flight until such time as all such persons have disembarked, in which: (1) A person sustains death or serious injuries; (2) The aircraft sustains substantial damage or missing; or (3) Death or serious injuries of a person or substantial damage of the aircraft nearly occurred.

In terms of the investigation scale, ASC classified the occurrence into one of the following six classes:

Class I. An occurrence of an airplane not by the general aviation nature, resulted in fatality or injury and the airplane was substantially damaged.

Class II. An occurrence of an airplane not by the general aviation nature, resulted in fatality or injury but aircraft not substantially damaged.

Class III. An occurrence of an airplane not by the general aviation nature, not resulted in fatality or injury but resulted in substantial damage to the aircraft.

Class IV. Any occurrence of a helicopter, or an airplane by general aviation or public aircraft resulted in fatality or injury or in substantial damage to the aircraft.

Class V. Serious incidents of all types of aircraft except ultra-light vehicle.

Class VI. An occurrence of an ultra-light vehicle.

The class decides the structure of the ASC on-scene investigation team, the format of a report and the verification procedure of the report.

To establish comparable data sets to those of aviation statistics collected worldwide, Classes I to III are categorized in the the same group, where the occurrences lead to fatality, injury and/or substantial damage of the aircraft. Such aviation occurrences are defined as “accident” by ICAO and aviation accident in CAA regulations. These aviation occurrences are sub-divided into fatal occurrence and hull loss occurrence in the aviation occurrence statistics.

## Fatal/ hull loss aviation occurrences in Taiwan, 2009

The general public is mostly concerned about whether an aviation incident results in any fatalities or aircraft hull loss. Statistics of occurrences resulting in fatalities or hull loss of aircrafts in Taiwan in 2009 were shown in Table 5. This data was compiled from various types of aircrafts, including air carriers aircraft, public aircrafts, and ultra-light vehicle. Statistics data of airplanes of transportation category, by definition are all the air carriers fly large transport airplane, there were neither fatal occurrence nor hull loss occurrence. There was one general aviation helicopter occurrence which caused two frailties and aircraft hull loss. Of the occurrences involving public aircrafts, there was one occurrence in 2009 and it resulted in three fatalities and aircraft hull loss. The ultra-light vehicle also involved one occurrence with two fatalities and aircraft hull loss. As shown in the Table 5, totally 5 aviation occurrences occurred in 2009 that resulted in 7 fatalities and 3 hull loss. For transportation category aircraft, none of the occurrence resulted in crew/passenger fatal or injured or aircraft hull loss, as shown in the Table 6.

Table 5： Aviation fatal/ hull loss occurrence Statistics in Taiwan, 2009.

| | Number of Occurrence | | | Fatalities | |
|---|---|---|---|---|---|
| | All | Fatal | Hull Loss | Total Fatalities | Aboard |
| **Civil Aviation Transportation Category** | | | | | |
| *Commercial Jet airplane* | 0 | 0 | 0 | 0 | 0 |
| *Turboprop airplane* | 1 | 0 | 0 | 0 | 0 |
| **Sum** | **1** | **0** | **0** | **0** | **0** |
| | | | | | |
| **General Aviation Aircraft** | **1** | **1** | **1** | **2** | **2** |
| **Government Aircraft** | **1** | **1** | **1** | **3** | **3** |
| **Ultra-light Aircraft** | **1** | **1** | **1** | **2** | **2** |
| **Occurrences of Foreign-Registered Aircrafts Occurred in Taiwan** | **1** | **0** | **0** | **0** | **0** |
| **Total Sum** | **5** | **3** | **3** | **7** | **7** |

Table 6：Fatalities or injuries caused by transportation category aircrafts in Taiwan, 2009

| Injuries Level | Flight Crew | Cabin Crew | Passengers | Other | Total |
|---|---|---|---|---|---|
| Fatal | 0 | 0 | 0 | 0 | 0 |
| Serious | 0 | 0 | 0 | 0 | 0 |
| Minor | 0 | 0 | 0 | 0 | 0 |
| Total | 0 | 0 | 0 | 0 | 0 |

## Taiwan aviation occurrence of the last decade

From 2000 through 2009, the total number of aviation occurrences in Taiwan was 62, including those Taiwan air carriers' aircraft occurred outside the country. In general, transportation category aircraft occurrences accounted for the most (34). The remaining 27 occurrences were general aviation, public aircrafts, ultra-light vehicle or foreign-registered aircrafts. Of those 62 occurrences, 327 fatalities were resulted, majorly due to the occurrences involving two transportation category aircraft. Of the Taiwan carriers' transportation category occurrences, 2 were fatal, resulting in 227 fatalities and of the occurrence involving foreign registered aircraft, 1 resulted in 83 fatalities. The details were shown in Table 7.

Table 7： Aviation Occurrence Statistics in Taiwan, 2000-2009

| | Number of Occurrence | | | Fatalities | |
|---|---|---|---|---|---|
| | Total | Fatal | Hull Losses | Total Fatalities | Aboard |
| **Civil Aviation Transport Category** | | | | | |
| *Commercial Jet airplane* | 27 | 1 | 3 | 225 | 225 |
| *Turboprop airplane* | 7 | 1 | 1 | 2 | 2 |
| **Sum** | **34** | **2** | **4** | **227** | **227** |
| | | | | | |
| **General Aviation Aircraft** | **5** | **2** | **3** | **4** | **4** |
| **Public Aircraft** | **9** | **3** | **5** | **6** | **6** |
| **Ultra-light vehicle** | **8** | **4** | **8** | **7** | **7** |
| **Occurrences related to Sabotage, hijacking or terrorism** | **0** | **0** | **0** | **0** | **0** |
| **Foreign-Registered Aircraft Occurrence in Taiwan/ Occurrences Investigated by ASC** | **6** | **1** | **1** | **83** | **83** |
| **Total** | **62** | **12** | **21** | **327** | **327** |

Note：When an occurrence involved two aircraft, for example: midair collision, airprox, or ground collision; although it was one occurrence investigation, would be counted twice when compiled the statistic data.

## The aviation safety performance in Taiwan

### By the number of passenger fatalities rate

Cumulative data of fatal occurrences, fatalities and injuries of passenger involving transportation category aircraft in Taiwan have been listed and summed over the last decade, as shown in Table 8. Numbers of passenger aboard were also included in this table. Of 247 million passengers on board over the past ten years, 206 passengers were reported fatal. The majority of fatalities were due to one catastrophic occurrence, CI611 occurrence in 2002. This resulted in the fatality rate 0.83[10] fatalities per million passengers involving transportation category aircraft occurrences. It's about the same as last year. The fatality rate could also be shown as 0.0369[11] fatalities per 100 million passenger-km, or in flight mileage as 1 fatality per 27.1 million km.

Table 8： Aviation safety performance of transportation category aircraft in Taiwan

| Year | Fatalities | Serious Injured | Total Aboard (Millions) | 100 million Passenger-km | Death/Million Passenger Aboard | Death/100 million passenger-km |
|---|---|---|---|---|---|---|
| 2000 | 0 | 0 | 26.33 | 516.39 | 0 | 0 |
| 2001 | 0 | 0 | 25.38 | 486.04 | 0 | 0 |
| 2002 | 206 | 0 | 24.67 | 510.58 | 8.35 | 0.4035 |
| 2003 | 0 | 0 | 22.26 | 466.11 | 0 | 0 |
| 2004 | 0 | 0 | 26.17 | 572.68 | 0 | 0 |
| 2005 | 0 | 0 | 26.65 | 607.94 | 0 | 0 |
| 2006 | 0 | 4 | 26.69 | 630.43 | 0 | 0 |
| 2007 | 0 | 0 | 24.79 | 632.87 | 0 | 0 |
| 2008 | 0 | 6 | 22.10 | 585.06 | 0 | 0 |
| 2009 | 0 | 0 | 22.30 | 569.20 | 0 | 0 |
| Total | 206 | 10 | 247.34 | 5577.3 | 0.83 | 0.0369 |

Note: Fatalities not including flight crew and cabin crew.

### Fatal occurrence rate with 5-year moving average

The fatality rate can provide a good indication of the frequency at which major occurrence are occurring. This is also what the general public mostly concerned about. For transportation category aircraft, a 5-year moving average was used to track fatal occurrence rates over the last ten years and in terms of fatal occurrences per million departures. As shown in the Figure 14, commercial jet airplane had an average rate of 2 to 3 fatal occurrences per million departures before 2004. In addition, for the turboprop airplane, the

[10] The global fatalities rate from aviation accidents for 2008 was 0.13 (per million passengers) announced by IATA.

[11] The global fatalities rate from aviation accidents for 2008 was 0.0137 (measured in passenger fatalities per 100 million passenger-km) announced by ICAO.

overall rate was decreasing since 2000 except a slightly increase in 2002. Both type of airplanes reached their lowest fatal occurrence rate (0 .0) in 2007.

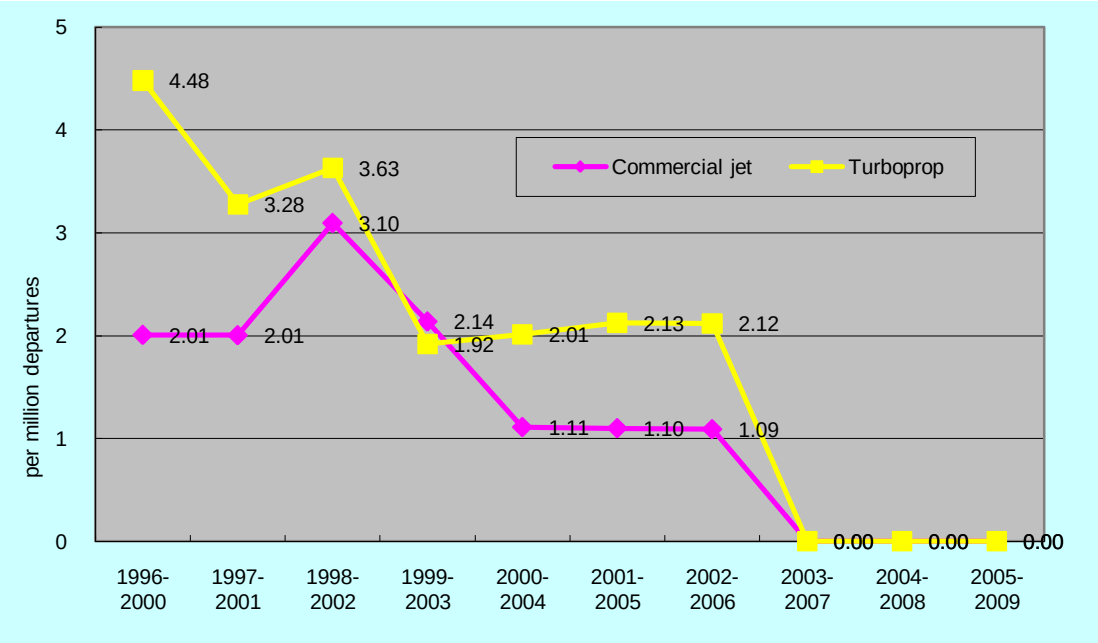


Figure14： 5-year moving average of fatal occurrence rate by million departures, Taiwan transportation category airplane, 2000-2009

## Hull loss occurrence rate with 5-year moving average

From 2000 through 2009, 5-year moving averages of hull loss occurrence rate in Taiwan were shown in Figure 15. The trend in Figure 15 was similar to the pattern seen in Figure 14, except for the most obvious difference where the commercial jet airplanes had a higher hull loss occurrence rate than fatal occurrence rates. This difference suggested that there were some cases where commercial jet airplanes hull loss occurrence resulted in hull loss, but without fatalities. In 2009, the turboprop airplanes continued the third-year zero-occurrence record with 5-year moving averages. The 5-year moving average of hull loss occurrence rate of commercial jet airplane was 1.34 which was almost the same as previous year.

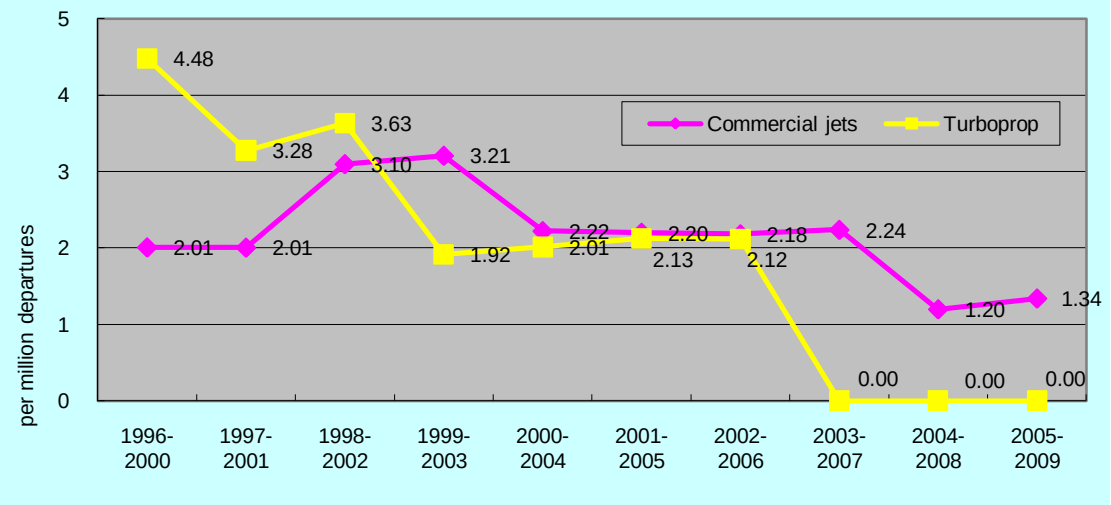


Figure15： 5-year moving averages of hull loss occurrence rates by million departures,

Taiwan transportation category airplane, 2000-2009

## Hull loss occurrence rate with 10-year moving average

The 10-year moving averages rates of transportation category airplanes were illustrated in Figure 16. In recent 10 year, the hull loss occurrence rate of commercial jet airplane was 0.60 per million flight hours or 1.82 per million departures. From 2002 to 2009, the hull loss occurrence rate of commercial jet airplane was going down with little rising in year 2007. In figure 17, the hull loss occurrence rate of turboprop airplane was 1.09 per million flight hours or 1.02 per million departures. The hull loss occurrence rates for turboprop airplanes were obviously decreasing from 2002 to 2009.

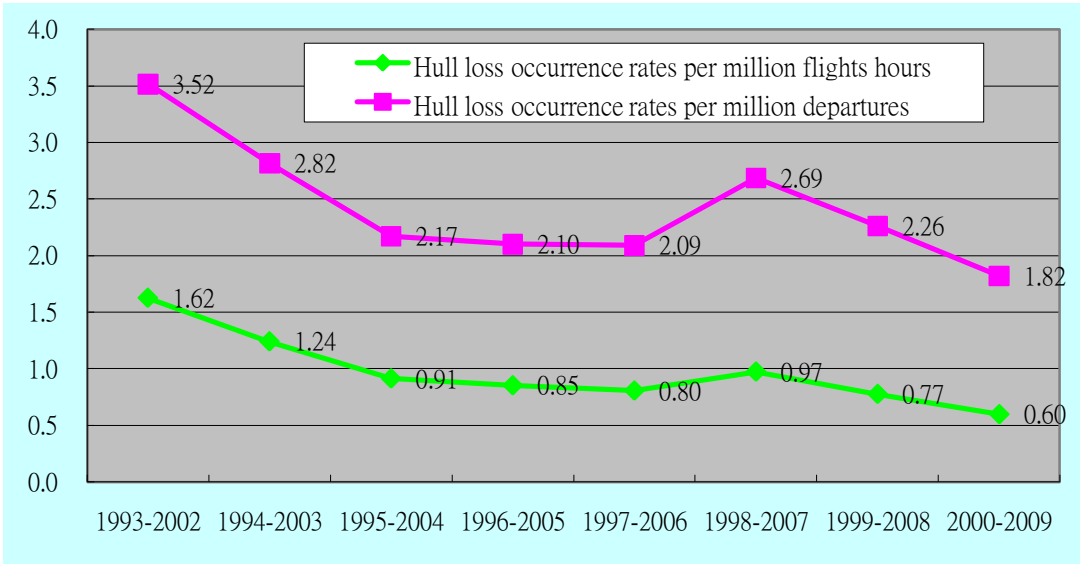


Figure16：10-year moving averages of hull loss occurrence rates for Taiwan commercial jet airplanes

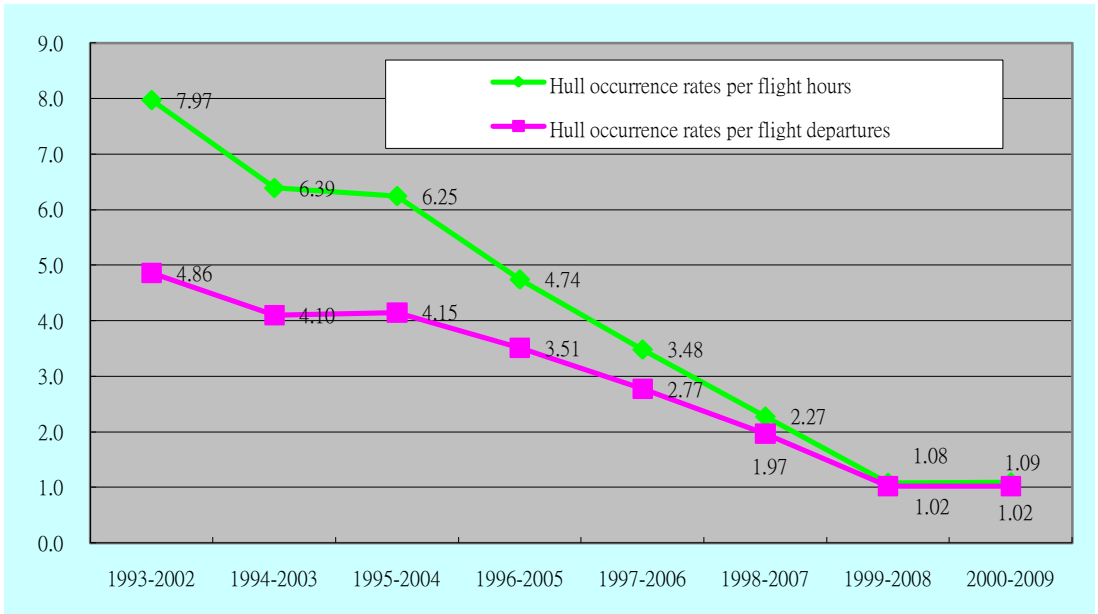


Figure17：10-year moving averages of hull loss occurrence rates for Taiwan turboprop airplanes

## Aviation accident rate（by ICAO definition）

Referring to the “accident” definition of ICAO, the number of aviation accidents involving transportation category airplane in Taiwan was 16 over 10 years. The average accident rate was 2.69 per million flight hours, which was similar to last year 2.79; or it was 6.1 per million departures which was still similar to last year. The yearly number and rate distribution of accidents was shown in Figure 18.

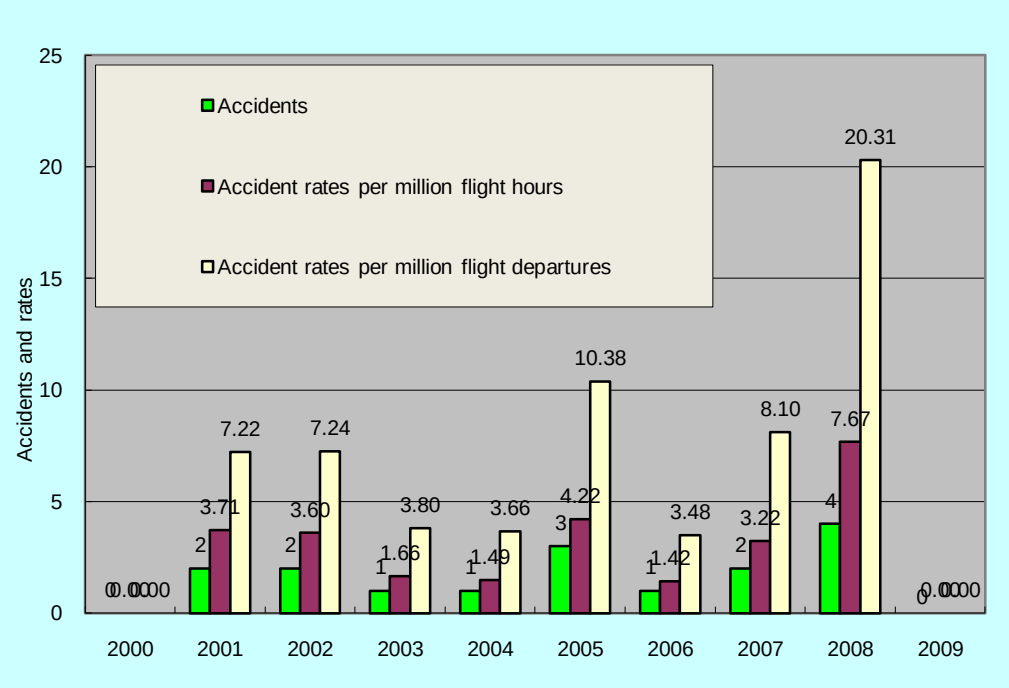


Figure18：The number and rate for transportation category airplane accidents (ICAO definition), 2000-2009

Of the total 16 accidents, 13 of them were related to commercial jet airplanes. Of these 13 commercial jet accidents, 3 were resulting in hull loss or fatalities, a total of 225 fatalities. There were 3 accidents involved turboprop airplanes. Of these 3 accidents, one accident resulted in 2 fatalities. Together, there were 4 transportation category airplanes accidents resulting in hull loss or fatalities. The details were shown in Table 9.

Table 9： Number of transportation category airplanes accidents (by ICAO definition), 2000-2009

| | Total number of accidents | Numbers of hull loss or fatal accidents | Fatalities |
|---|---|---|---|
| Commercial jet airplanes | 13 | 3 | 225 |
| Turboprop airplanes | 3 | 1 | 2 |
| Total | 16 | 4 | 227 |

From the severity level of injury and aircraft damage, a total of 16 accidents were distributed to different level of severity as shown in Figure 19. Most of the occurrences during that period were serious-injuries-w/o-aircraft substantial-damage and substantial-damage-only accidents, each had 6 cases respectively. Numbers for fatal/serious injury w/o aircraft substantial damage

accidents were 2, and hull loss w/o injuries accidents were the 2 as well.

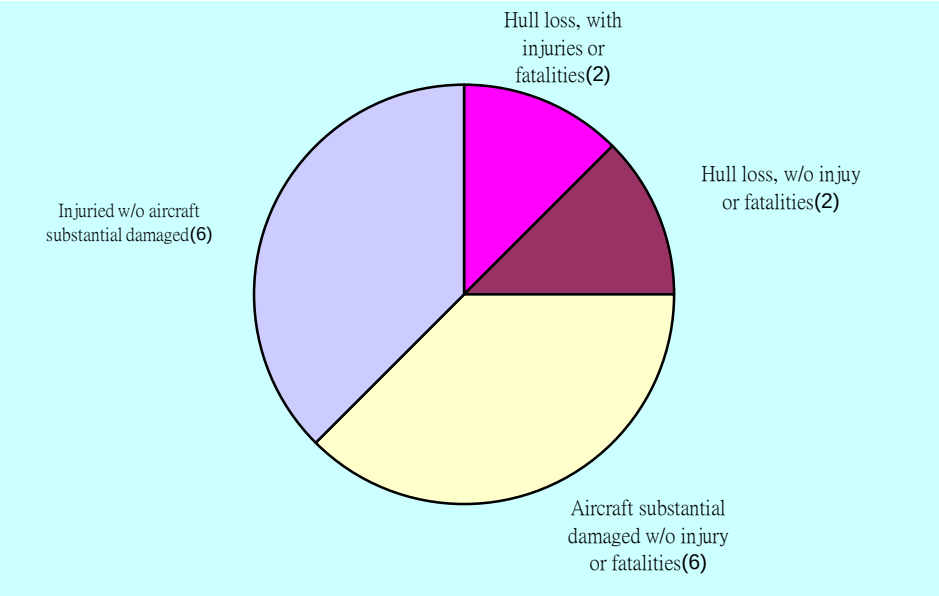


Figure19：Transportation category accidents by severity classification, 2000-2009

**Aviation occurrence rate（by ASC classification）**

The accident defined by ICAO has a wide range which would not differentiate the nature of accidents from statistics perspective. Accidents as defined by ICAO might be classified into same category with significant different level of severity. Differently the ASC classified occurrences into six classes as mentioned previously, where Class-I, II, III, and V were related to occurrences involving transport category airplanes. Occurrences rates of transportation category commercial jet at each class were shown in Table 10, take Class-I as an example, it included those occurrences of highest level of damage and injury, and in 2009 the 10-year average accident rate for Class-I was 0.20 per million flight hours. This rate was improved while comparing to the rate 0.39 in 2008.

Table 10： Commercial jet airplane occurrence rate at each class by ASC classification, 2000- 2009

| year | number of occurrences | | | | flight Hours | occurrence rate per million flight hours | | | |
|---|---|---|---|---|---|---|---|---|---|
| | class-I | class-II | class-III | class-V | hrs | class-I | class-II | class-III | class-V |
| 2000 | 0 | 0 | 0 | 4 | 481,168 | 0.00 | 0.00 | 0.00 | 8.31 |
| 2001 | 0 | 0 | 1 | 1 | 475,313 | 0.00 | 0.00 | 2.10 | 2.10 |
| 2002 | 1 | 0 | 0 | 2 | 488,564 | 2.05 | 0.00 | 0.00 | 4.09 |
| 2003 | 0 | 0 | 1 | 1 | 515,190 | 0.00 | 0.00 | 1.94 | 1.94 |
| 2004 | 0 | 0 | 1 | 1 | 580,524 | 0.00 | 0.00 | 1.72 | 1.72 |
| 2005 | 0 | 2 | 0 | 1 | 590,792 | 0.00 | 3.39 | 0.00 | 1.69 |
| 2006 | 0 | 1 | 0 | 1 | 597,757 | 0.00 | 1.67 | 0.00 | 1.67 |
| 2007 | 0 | 0 | 2 | 1 | 525,157 | 0.00 | 0.00 | 3.81 | 1.90 |
| 2008 | 0 | 3 | 1 | 2 | 414,579 | 0.00 | 7.24 | 2.41 | 4.82 |
| 2009 | 0 | 0 | 0 | 0 | 369,210 | 0.00 | 0.00 | 0.00 | 0.00 |
| Total | 1 | 6 | 6 | 14 | 5,038,254 | 0.20 | 1.19 | 1.19 | 2.78 |

According to the Table 11, the occurrence rates of transportation category turboprop airplane at each class, the occurrences in Class-I had an average of 1.09 per million flight hours over the decade. This rate was obviously higher than the Class-I occurrence rate of commercial jet, 0.20 per million flight hours. If using the million departure as the basis, turboprop in Class-I accidents had 0.91 per million departures and commercial jet had 0.61 per million departures. These two rates would not significant difference when used the number of departures as the base. The details were shown in Appendix 6 and Appendix 7.

Table 11： Turboprop airplane occurrence rate at each class by ASC classification, 2000-2009

| year | number of occurrences | | | | flight Hours | accident rate per million flight hours | | | |
|---|---|---|---|---|---|---|---|---|---|
| | class-I | class-II | class-III | class-V | | class-I | class-II | class-III | class-V |
| 2000 | 0 | 0 | 0 | 0 | 80,682 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2001 | 0 | 0 | 1 | 1 | 63,857 | 0.00 | 0.00 | 15.66 | 15.66 |
| 2002 | 1 | 0 | 0 | 1 | 67,401 | 14.84 | 0.00 | 0.00 | 14.84 |
| 2003 | 0 | 0 | 0 | 1 | 86,700 | 0.00 | 0.00 | 0.00 | 11.53 |
| 2004 | 0 | 0 | 0 | 0 | 89,575 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2005 | 0 | 0 | 1 | 0 | 120,821 | 0.00 | 0.00 | 8.28 | 0.00 |
| 2006 | 0 | 0 | 0 | 0 | 107,510 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2007 | 0 | 0 | 0 | 0 | 96,504 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2008 | 0 | 0 | 0 | 0 | 106,752 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2009 | 0 | 0 | 0 | 1 | 98,755 | 0.00 | 0.00 | 0.00 | 10.13 |
| Total | 1 | 0 | 2 | 4 | 918,557 | 1.09 | 0.00 | 2.18 | 4.35 |

When looked at the occurrences of whole transportation category in Taiwan, a 5-year moving average of occurrence rate was shown in Figure 20, where the occurrence rate was based on per million flight hours. Prior to 1998, documented statistics were limited, only aviation accident would be recorded, serious incidents were not officially recorded. Until the promulgation of "Regulations for Aircraft Accident and Serious Incident Investigation" on July 2000, the authority for ASC to conduct investigation on serious incidents was finally proclaimed in writing. Therefore, when looked at the 5-year moving average from the perspective of classification, the average occurrence rate in Class-V was more reliable since the interval of 1999-2003. The trend in the occurrence rate of Class-I was shown as the red line in Figure 20. The moving average for Class-I occurrences was decreased year over year since 2002, and achieved the zero-accident record per million hours flown by 2007. The numbers of Class-II occurrences had always been low until an increasing trend since 2005. In 2005, there were two occurrences of clear air turbulence resulting in injuries and in 2006 there was a mid-air collision; together causing the upward trend. The trend continued to 2008 because of two occurrences related to turbulance. The trend for occurrences in Class-III increased gradually over the years, and did not seem to go down significantly in the recent five years. For occurrences in Class-V, the occurrence rate was at highest in 2003, resulted in 4.2 per million flight hours, but the rate gradually decreased to 1.81 per million flight hours in 2007 and remained to 2009. As shown in Figure 21, if looked at the occurrence rate based on per million departures, each class of occurrences then still had similar trend as those observed from the rates per million flight hours.

As indicated from the above statistic changes in aviation transport category occurrence for each class, numbers of Class-I accidents, which required large-scale investigations, decreased over the years; whereas, the number of Class-III incidents, which required smaller-scale investigation, increased gradually. Such phenomenon can be interpreted as: despite the happening of aviation occurrences, the severity level of those occurrences was less in recent years. Then in 2007, numbers of Class-III occurrences also decreased. The number of Class-II accidents was increased, however they were excluded the "Statistical Summary of Commercial Jet Airplane Accidents Worldwide Operations" by Boeing when calculating the fatality rate and hull-loss rate. Class-V incidents had the smallest scale of investigation. This kind of occurrences did not result in fatality/injuries nor cause any substantial damages to the aircraft. From the point of view of public interest, Class-V occurrences would not have much direct impact on passengers' safety. Nonetheless, by investigation such kind of occurrences could effectively improve the safety of aviation because of the available evidence. The rate was also a downward trend for Class-V occurrences since 2004.

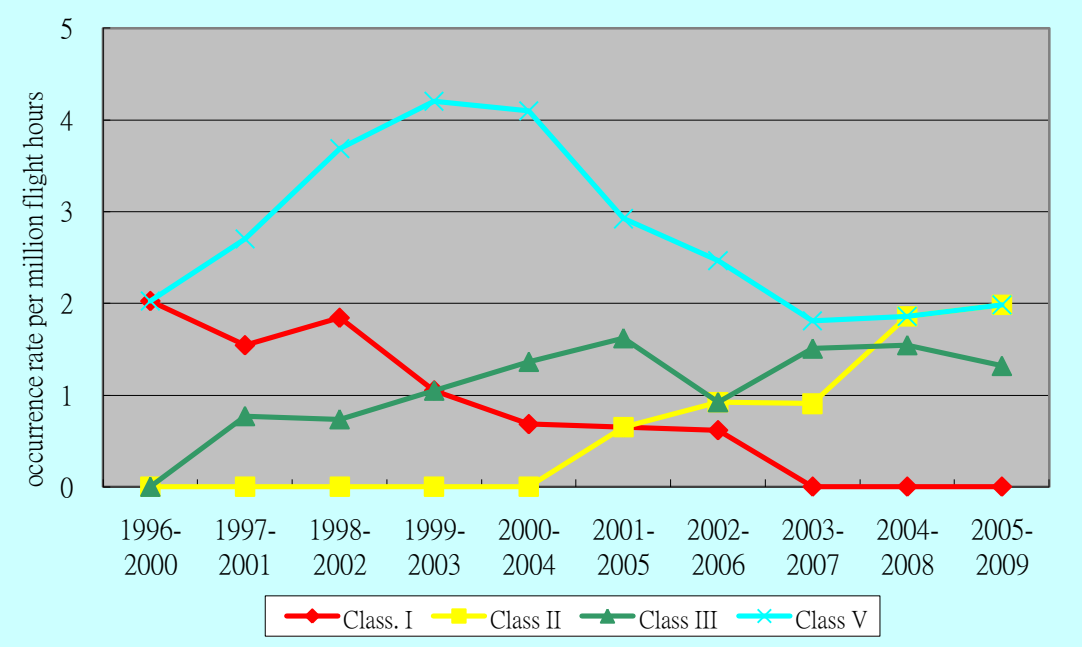


Figure20：5-year moving average occurrence rate of transportation category airplane per million flight hours by ASC's classification

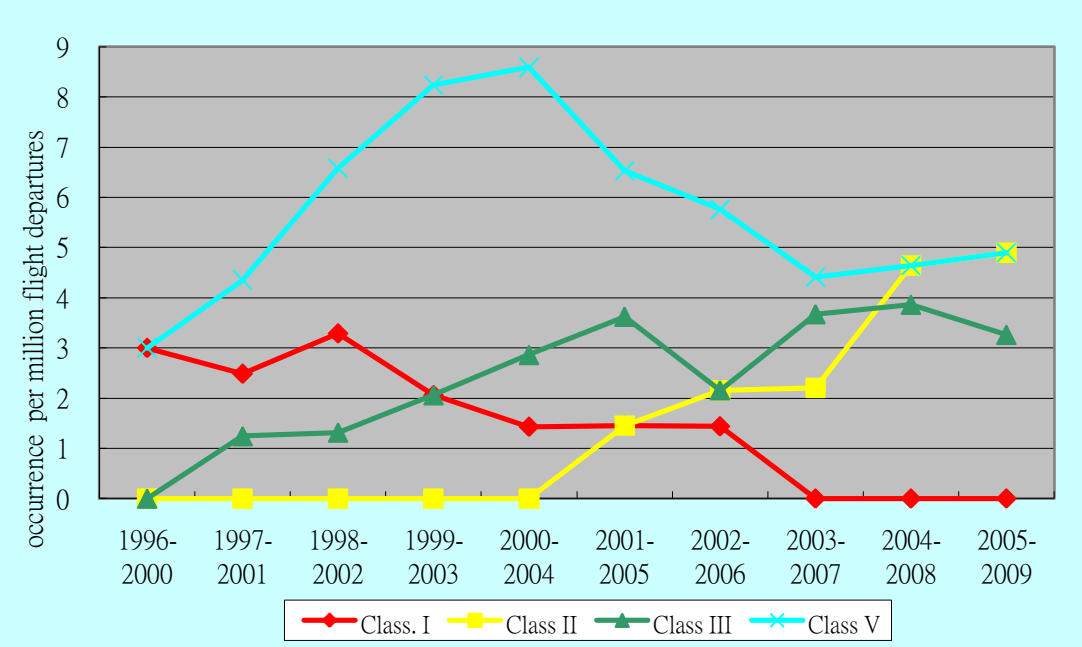


Figure21：5-year moving average occurrence rate of transportation category airplane per million departures by ASC's classification

In accordance to the classification of the occurrences made by the ASC, there were total 34 cases of transport category occurrences over the last ten years. The percentages of occurrences for each class were shown in Figure 22, where Class-V, indicating the smallest scale of investigation, was cited in 51 percent. Then the Class-I occurrences, involving the largest scale investigations, accounted for 16 percent of the total 31 occurrences.

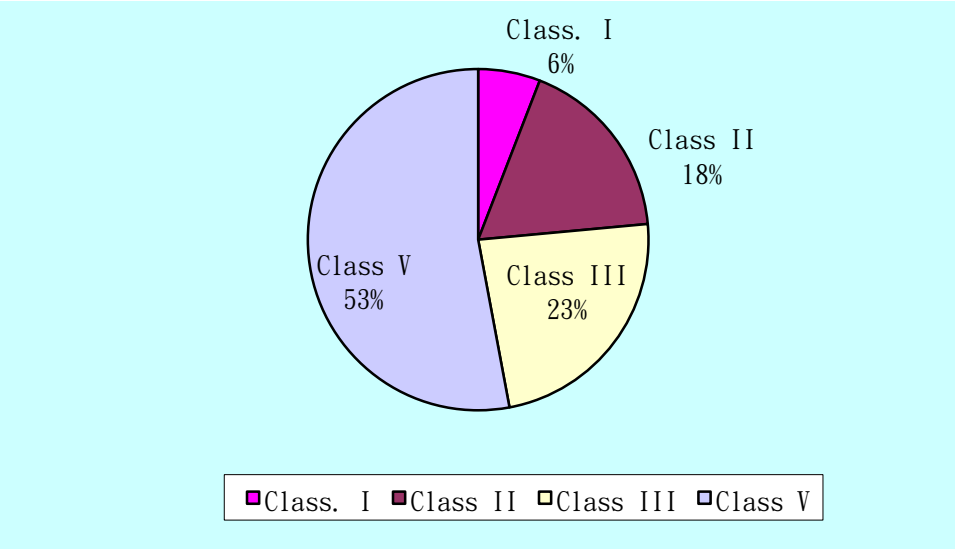


Figure22：Occurrences distribution of transportation category airplane 2000-2009 (Total 34 cases) by ASC Classification

## Statistic Analysis of Transport Category Occurrences

### Phase of Flight：

When focusing at the occurrence numbers for each phase of flight, which was defined by International Civil Aviation Organization (ICAO), there were total 34 transport category occurrences happening at different phases over the last decade as shown on Figure 23. Among all these accidents, 15 of them were taken place at landing phase, as the most prevalent cited first occurrences, including one Class I, four Class III, and ten Class V accidents. Cruising was the second most phases cited, accounting for 6 occurrences.

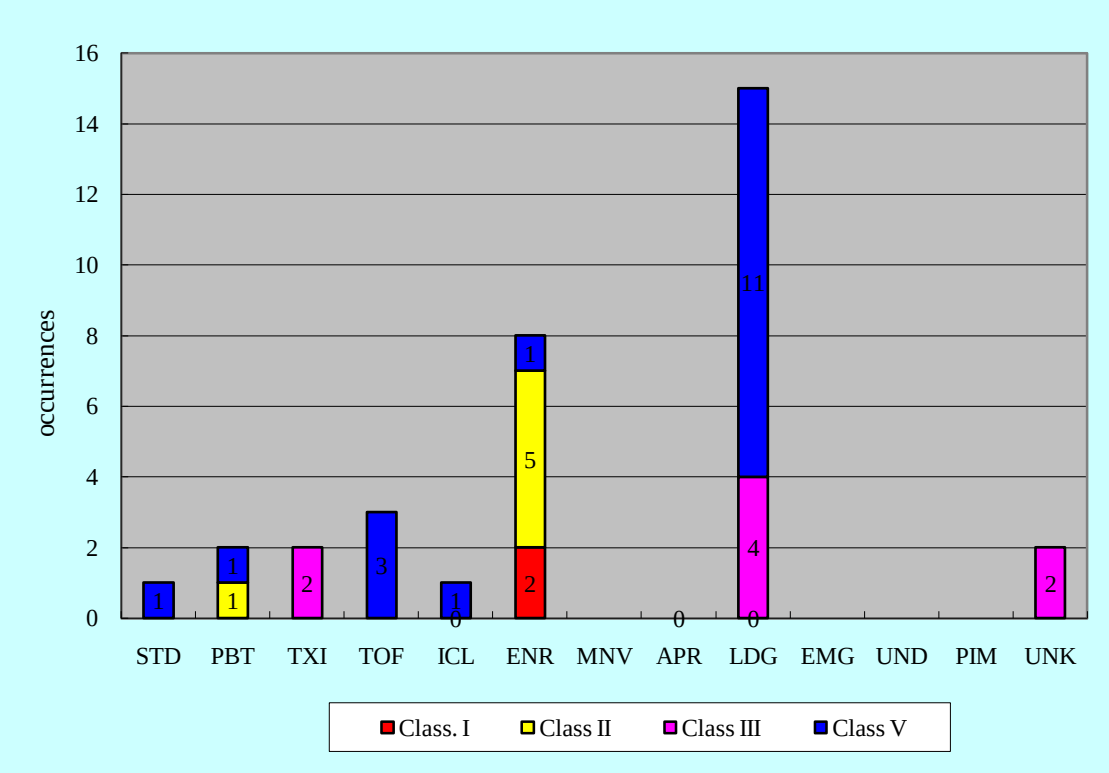


Figure23：Occurrences distribution of transportation category airplane 2000-2009 (Total 34 cases) by flight phase

### Occurrence category by ICAO definition：

There were total 34 trasnport category airplane occurrences happening over the last ten years as shown in Figure 24. The runway excursions overall were the most frequent and a total of nine occurrences were reported. The second most frequent occurrences were abnormal runway contact, accounting for five. When further analyzed those transport category occurrences with ASC occurrence classification, the most frequent Class I occurrence were the SCE-NP (system/component failure or malfunction/ non-power plant) and ICE. Although the highest numbers of occurrences came from the category of RE (runway excursions), eight out of nine cases were Class V, a smaller scale of occurrences.

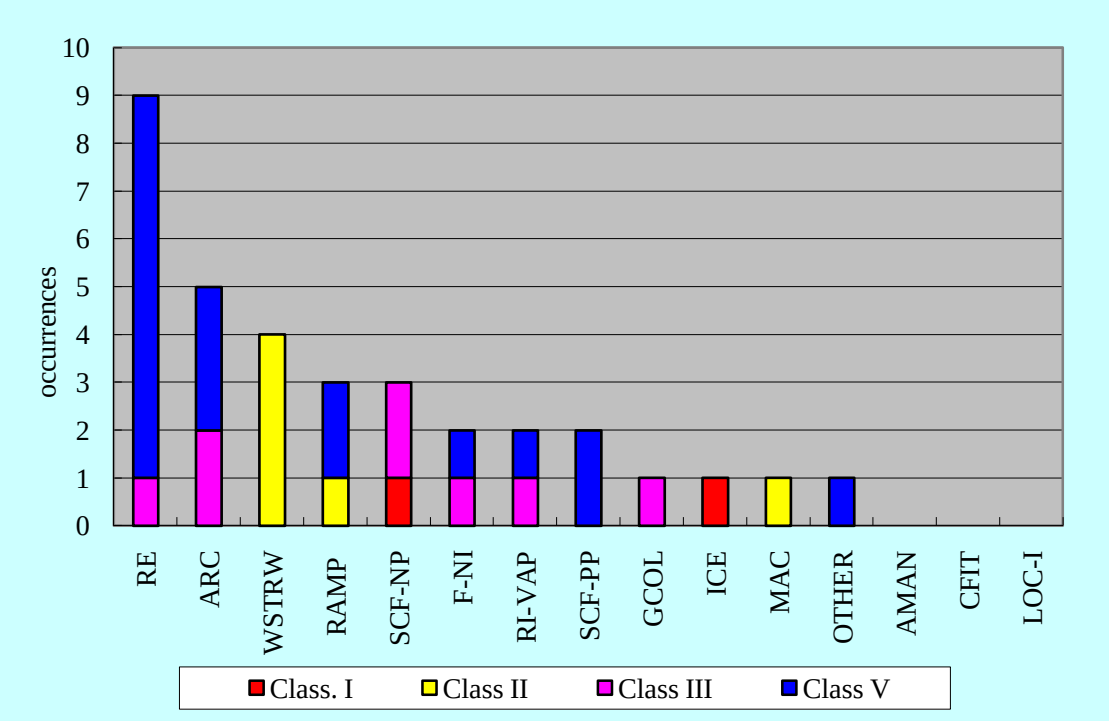


Figure24：Occurrences distribution of transportation category airplane 2000-2009 (Total 34 cases) by ICAO occurrence category

**Causes/Factors of Occurrences：**

The National Transportation Safety Board (NTSB) often established more than one cause or factor to an aviation accident using three broad categories: personnel, environment, and aircraft. Personnel classification included pilot and other personnel such as: maintenance personnel, air traffic controller, and management personnel. Environmental categories included those causes related to weather, airport facilities, air traffic facilities, time of the accident (day or at night), light conditions, and terrain conditions. Then in the category of aircraft related cause or factors, failures of aircraft system and equipment, engines, and structure or performance of the aircraft were all belonged to this category. Broad causes and/or factors for airplane of transport category occurrences over the last ten years were shown in Figure 25. In total, there were 34 occurrences, and 29 investigations of them were closed. Within each occurrence, there was at least one cause that explained why the event had happened, and some might have two or even more causes and factors. For most of the 10-year period, personnel were cited as a cause or factor/factors in 89.7 percents, followed by 34.5 percents of environment-related causes/factors and by 17.2 percent of aircraft-related causes/factors as indicated in the figure. Within the broad categories, the pilot was responsible in 62.1 percent of occurrences where personnel was the cause or factor, and other personnel were responsible for the rest 27.6 percent.

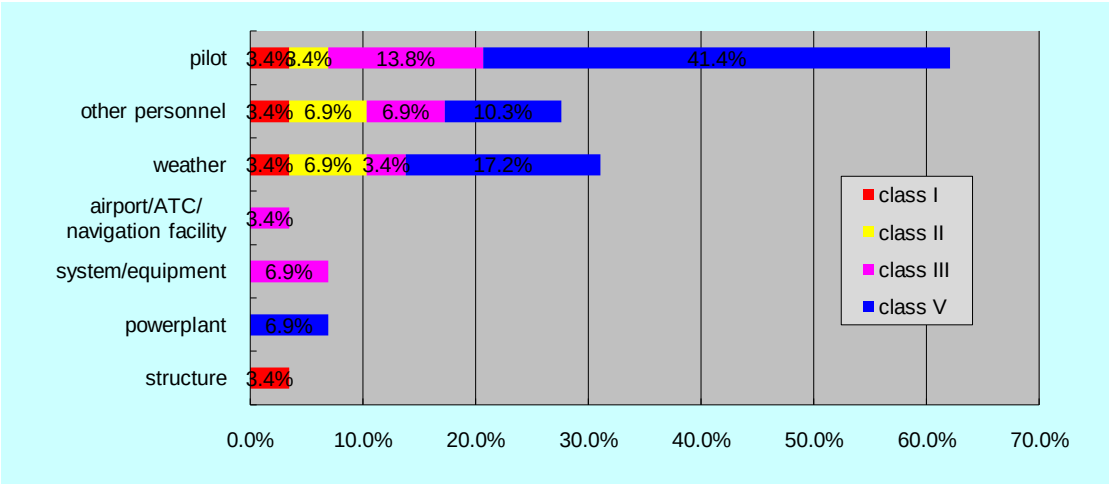


Figure25： Broad causes/factors for airplane of transport category, 2000-2009.

## Occurrences Involving General Aviation and Helicopter

In the general aviation(GA) industry, the majority of operation is carried out by helicopters with the exception of few turboprop airplanes. Few corporations however provide transportation service and GA service with helicopters. The following aviation occurrence statistics were all related to occurrence which involed general aviation service aircraft (fixed wing airplane and rotor aircraft) and helicopters( for transport category). As indicated in Table 12, five occurrences that occurred over the past ten years, 2 of them were fatal occurrences, resulting in 3 hull losses and 4 fatalities. This then led to an average of 8.96 occurrences in every 100 thousands hours, 5.38 hull loss occurrences and 3.58 fatal occurrences for every 100 thousands hours.

Table 12： Occurrence rate of aircraft for general aviation and helicopter for transport category, 2000-2009

| Year | Number of occurrences | | | Aboard Fatalities | Total Flight Hours | Accident Per 10 Thousands Hours | | |
|---|---|---|---|---|---|---|---|---|
| | All | Fatal | Hull Losses | | | Accident Rate | Fatalities Rate | Aircraft Hull Loss Rate |
| 2000 | 1 | 0 | 0 | 0 | 6,132 | 16.31 | 0.00 | 0.00 |
| 2001 | 1 | 1 | 1 | 2 | 5,162 | 19.37 | 19.37 | 19.37 |
| 2002 | 1 | 0 | 0 | 0 | 10,087 | 9.91 | 0.00 | 0.00 |
| 2003 | 0 | 0 | 0 | 0 | 5,998 | 0.00 | 0.00 | 0.00 |
| 2004 | 0 | 0 | 0 | 0 | 4,851 | 0.00 | 0.00 | 0.00 |
| 2005 | 0 | 0 | 0 | 0 | 4,319 | 0.00 | 0.00 | 0.00 |
| 2006 | 0 | 0 | 0 | 0 | 4,404 | 0.00 | 0.00 | 0.00 |
| 2007 | 0 | 0 | 0 | 0 | 4,961 | 0.00 | 0.00 | 0.00 |
| 2008 | 1 | 0 | 1 | 0 | 5,032 | 19.87 | 0.00 | 19.87 |
| 2009 | 1 | 1 | 1 | 2 | 4,859 | 20.58 | 20.58 | 20.58 |
| 總計 | 5 | 2 | 3 | 4 | 55,805 | 8.96 | 3.58 | 5.38 |

## Occurrences Involving Public Aircraft

From 2000 to 2009, there were a total of 9 public aircraft occurrences, which resulted in 3 fatal occurrences and 5 hull loss occurrences. The statistis chart was shown as Figure 26.

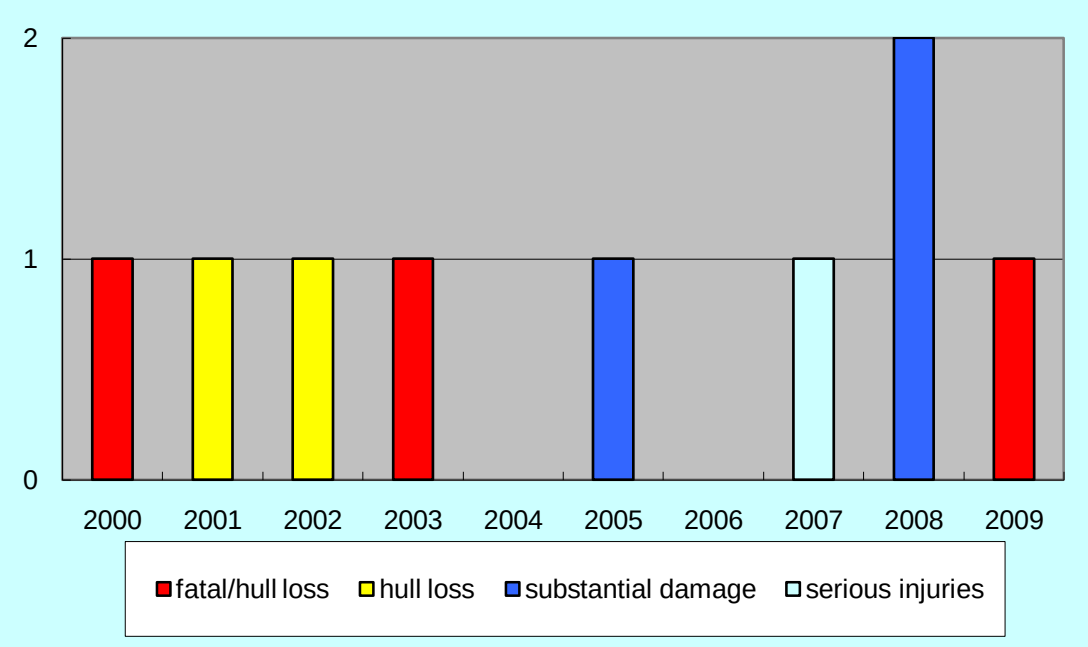


Figure26： Occurrences statistics of public aircrafts, 2000-2009

## Ultra-light Vehicle Occurrences

The ultra-light vehicles were not under supervision of Civil Aviation Act of the Republic of China until 2004. Later in the same year of 2004, in June, the investigation of any occurrences of ultra-light vehicle has formaly been part of the investigation scope of Aviation Safety Council, the Executive Yuan. Therefore, before then, there were only limited documented accident data on ultra-light vehicle and the official record on ultra-light vehicle accidents only showed the data from 2004 to 2009. As indicated in Table 13, a total of seven accidents were occurred during these four years, and three of them were fatal accidents resulting in 5 deaths. All seven occurrences were resulted in hull hoss.

Table 13： Ultra-light vehicle occurrences, 2004- 2009

| Year | Number of occurrences | Fatal occurrences | Hull losses occurrences | Fatalities |
|---|---|---|---|---|
| 2004 | 1 | 1 | 1 | 1 |
| 2005 | 2 | 1 | 2 | 2 |
| 2006 | 1 | 0 | 0 | 1 |
| 2007 | 3 | 1 | 2 | 3 |
| 2008 | 0 | 0 | 0 | 0 |
| 2009 | 1 | 1 | 1 | 2 |
| Total | 8 | 4 | 8 | 7 |

# Status of Tracking Safety Recommendations and associated action plans

## Safety Recommendations Statistics

The purpose of the safety investigation for aviation occurrences is to prevent similar occurrences from happening again. When probable causes and contribution factors of occurrences were found through systematic investigation, the council would provide appropriate recommendations to each associated units. Based on the operation of aircraft, the safety recommendations were categorized into transport category, general aviation and others (public aircraft and ultra-light vehicle). The recommendations recipients would also be categorized into three groups including Taiwan government agency, aviation industry and foreign organizations.

From April 1999 to June 2010, there were 52 aviation occurrences investigation completed. In total, the council has made 465 aviation safety recommendations. Within these recommendations, a maximum of 50.8% were presented to associated organizations of Taiwan government agencies, approximately 33.5% were presented to aviation industries, and approximately 15.7% were presented to foreign associated organizations (as shown in Figure 27).

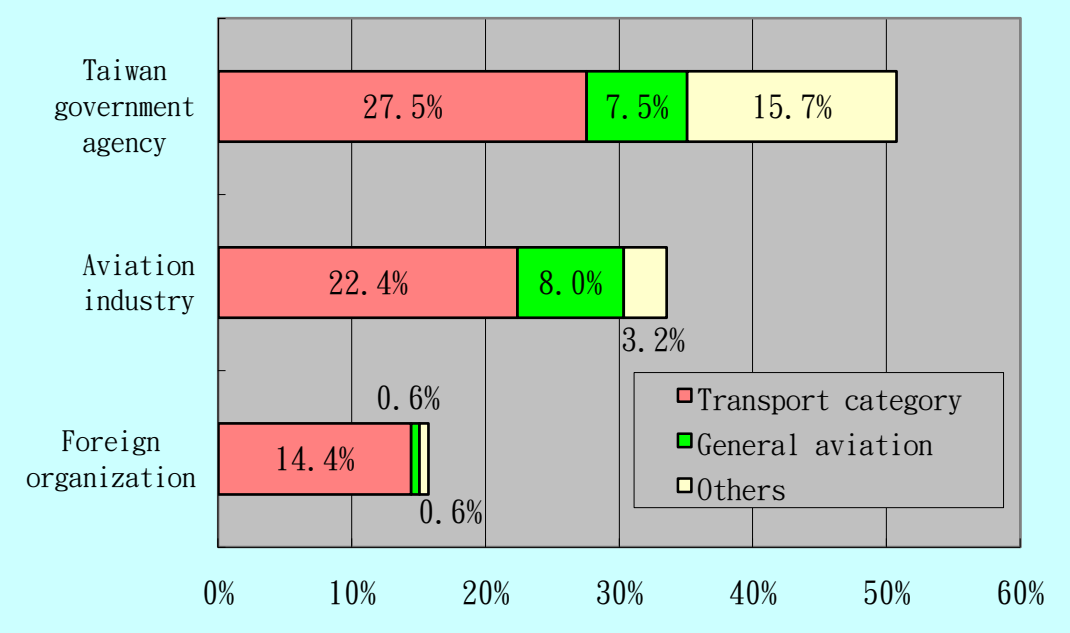


Figure27： Statistics of Aviation Safety Recommendations, 1999-2009

## Tracking of Action Plans/ Proposals for Aviation Safety Recommendations

In order to positively solve the investigation discovered aviation safety issues, if the safety recommendation recipient was part of Taiwan government, the recipient should then establish corresponding action plans and/or proposals. These action plans/ proposals will be supervised by Research, Development and Evaluation Commision (RDEC), Executive Yuan, and tracked by ASC. Usually ASC performs the evaluation of each action plan for RDEC.

After evaluating each action plan/ proposal, ASC will then categorize these plans into three statuses- “accepted”, “under supervision”, and “under evaluation”. ASC then submits the evaluation status to RDEC. When the specific action plan was carried out, the plan will be labeled as “accepted” and ASC will also recommend the RDEC to close the item. If the action plans required longer time, usually over years, to complete, the item will be supervised by RDEC continuiously and then label as “under supervision”. Such items have regular follow-ups in every six months until the cases end. For the rest of the plans/ proposals, during the process of examination or organizing by other associated units, these plans will be labeled as “under evaluation”.

## The Statistics of Action Plans Status

From April 1999 to June 2010, there were total 236 action plans being presented by related Taiwan government agencies according to the aviation safety recommendations. Currently, only one of them is in the state of “under supervision”. Of all the plans, 235 plans were identified as “accepted”. The statistics was shown in Figure 28, where the percentage of accepted plans was as high as 99.6%, with only 0.4% in the state of “under supervision”.

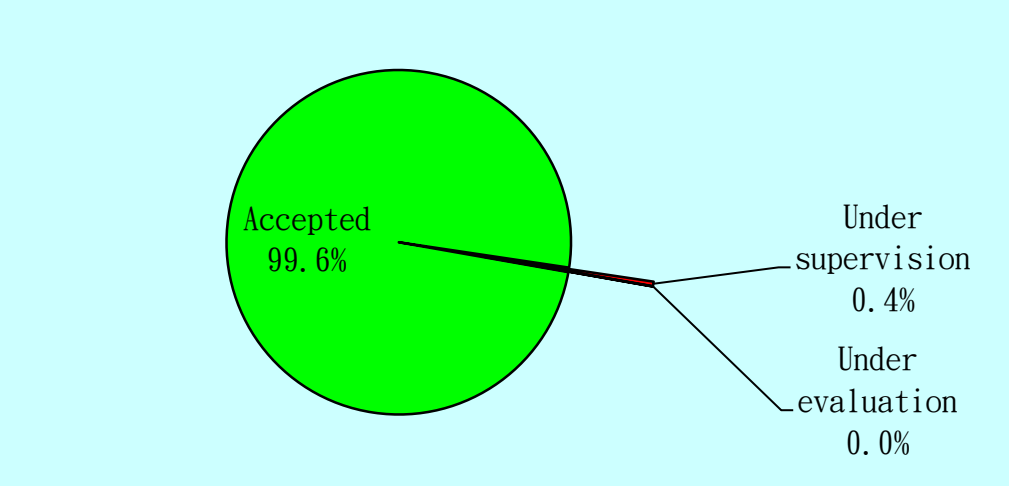


Figure28： Statistics of action plans status

# Appendix：Definitions of Terms

## Definitions of Civil Aviation Legal Terms

Civil Air Transport Enterprise：An enterprise engaged in the carriage of passengers, baggages, cargo and mail with civil aircraft to earn profits. (Here in this document the aircraft operated by Civil Air Transport Enterprise is used to called “transport category aircraft” or “transportation category aircraft”)

General Aviation Enterprise：Industries that use aircrafts to earn profits by offering sightseeing in the sky, prospecting, photographing and measuring, fire protection rescues first aid, towing, spraying, and all other authorized purposes except carrying and trnaslorting passengers, merchandises, and mails/parcel. (Here in this document the aircraft operated by General Aviation Enterprise is used to called “General Aviation aircraft” or “GA Aircraft”)

Ultra-light vehicle：“Ultra-light vehicle” means a powered aircraft which is used for manned operation in the air, has a maximum takeoff weight of five hundred and ten kilograms or less, and has a takeoff speed of less than sixty-five kilometers per hour at maximum takeoff weight or a power-off stall speed which does not exceed sixty-four kilometers per hour.

Accident：An aircraft accident means an occurrence associated with the operation of an aircraft which takes place between the time any person boards the aircraft with the intention of flight until such time as all such persons have disembarked, in which such person is fatally or seriously injured or in which the aircraft is substantially damaged or missing.

Serious Incident：A serious incident means an occurrence associated with the operation of an aircraft which takes place between the time any person boards the aircraft with the intention of flight until such time as all such persons have disembarked, which may cause aviation accidents.

Incident：Any events associated with the operation of an aircraft which takes place between the time any person boards the aircraft with the intention of flight until such time as all such persons have disembarked, and are not belong to aircraft accident or serious incident mentioned above.

**Definition of Terms in Aviation Occurrence Investigation Act and ASC internal Standard Operation Procedures：**

Aviation occurrence: An occurrence associated with the operation of an aircraft which takes place between the time any person boards the aircraft with the intention of flight until such time as all such persons have disembarked, in which:
(1) A person sustains death or serious injuries;
(2) The aircraft sustains substantial damage or missing; or
(3) Death or serious injuries of a person or substantial damage of the aircraft nearly occurred.

Investigation Report：A report prepared by the Investigator-in-Charge (IIC) compiling

submissions from all technical sub-groups in accordance with the format administered by the International Civil Aviation Organization (ICAO), containing factual information, analysis, conclusions, and aviation safety recommendations reviewed and approved under this Act.

Aviation Occurrence Investigation：A process consisting of aviation occurrence identification, gathering, compiling, and analysis of factual data, probable causes identification, submission of safety recommendations, and investigation report preparation

Civil aircraft：An aircraft that is used for the purposes of civil air transportation services or general aviation services has completed the process of registration and airworthiness inspection in the civil aeronautics administration authorities.

Public Aircraft：An aircraft owned or used by a government agency to carry out official duties, excluding the military aircraft administered by the Ministry of Defense.

**Terms in Aviation Occurrence Investigation Standard Operation Procedures for Civil Aircraft and Public Aircraft：**

Fatality or Injury：A person is killed or injured as a result of any of the following：

（I）Person being in the aircraft;

（II）Person directly contacts with any part of the aircraft, including the parts that have been detached from it, or

（III）person directly exposed to jet blast,

With exception when the injuries are from natural causes, self-inflicted or inflicted by other persons, or when the injuries are to stowaways hiding outside the areas normally available to the passengers and crew.

Injury：Any of which in the following：

（I）requires hospitalization for more than 48 hours, commencing within 7 days from the date the injury was received;

（II）results in a fracture of any bone (except simple fractures of figners, toes, or nose);

（III）causes severe hemorrhage, nerve, muscle, or tendon damage;

（IV）involves any internal organ;

（V）involves second- or third-degree burns, or any burns affecting more than 5% of the body surface;

（VI）proved to be exposed to radiation, or contaminated with radioactive material.

Substantial Damgaged：Damage or Failure which adversely affects the structural strength, performance, or flight characteristics of the aircraft, and which would normally require major repair or replacement of the affected component. Engine failure or damage limited to an engine if only one engine fails or is damaged, bent fairings or cowling, dented skin, small puncture holes in the skin or fabric, ground damage to rotor or propeller blades, and damage to landing gear, wheels, tires, flaps, engine accessories, brakes, or wingtips are not considered “substantial damage”

for the purpose of this part.

Missing：When the official search, so designated by the ASC, is terminated and the wreckage has not been located, or has been located but found to be inaccessible or impossible to retrieve the evidence essential to the investigation.

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Accredited Representative, AR：A person who is designated by the foreign country to which the aircraft involved in an occurrence is registered, the country that owns the aircraft, the country where the designer and/or manufacturer of the aircraft is located, the country whose nationalities are casualties of the occurrence, or the country that in any case is involved in the occurrence to participate in the investigation led by ROC.

**Definitions of Terms for Aviation Occurrence Investigation Standard Operation Procedures used by the Aviation Safety Council：**

Preliminary Report：The report written within 30 days of the occurrence, based on the data and limited information obtained during the early stages.

Factual Data Report：The report is the basis for follow-up analysis and composition of investigation reports. Factual data report is the factual information consented by the entire investigation team. The investigating director composed the report according to the information from each groups, and also integrating proposals by specialized conveners and the members of other investigation teams.

Preliminary Draft Report：It is the initial draft composed by the investigating director and it is the earlier stage of the final draft report. The content includes factual information, an analysis, and non-categorized conclusions. The purpose of this report is to organize the ideas and suggestions from the associated units for the final draft report.

Final Draft Report：After the investigation, the investigating director combines and organizes all the information proposed by each specialized teams. The content of this report includes several key subjects, such as factual information, an analysis, finalized conclusions, and a list of aviation safety recommendations.

Final Report：After the final draft report is approved by the council, it will become an official final report.

Interim Flight Safety Bulletin：For anything found during the process of investigation that affects the aviation safeties, which should be reported to the associated organizations and industries as soon as possible.

Finding：The conclusion acquired from the factual information and analysis of the investigation of aviation accidents.

Safety Recommendation： Recommendations which are based on findings of the investigation, may address deficiencies that do not pertain directly to what is ultimately determined to be the cause of the accident.

Findings related to Probable Causes：The findings related to probable causes identify

elements that have been shown to have operated in the accident, or almost certainly operated in the accident. These findings are associated with unsafe acts, unsafe conditions, or safety deficiencies associated with safety significant events that played a major role in the circumstances leading to the accident.

Findings related to Risk：The findings identify elements of risk that have the potential to degrade aviation safety. Some of the findings in this class identify unsafe acts, unsafe conditions, and safety deficiencies, including organizational and systemic risks that made this accident more likely; however, they cannot be clearly shown to have operated in the accident alone. Further, some of the findings in this class identify risks that are unrelated to this accident, but nonetheless were safety deficiencies that may warrant future safety actions

Other Findings：Other findings identify elements that have the potential to enhance aviation safety, resolve an issue of controversy, or clarify an issue of unresolved ambiguity. Some of these findings are of general interests that are often included in the ICAO format accident reports for informational, safety awareness, education, and improvement purposes.

**Definitions of Terms Used by the International Civil Aviation Organizations：**

Accident: An occurrence associated with the operation of an aircraft which takes place between the time any person boards the aircraft with the intention of flight until such time as all such persons have disembarked, in which:

a) a person is fatally or seriously injured as a result of

- being in the aircraft, or- direct contact with any part of the aircraft, including parts which have become detached from the aircraft, or

- direct exposure to jet blast,

**except** when the injuries are from natural causes, self inflicted or inflicted by other persons, or when the injuries are to stowaways hiding outside the areas normally available to the passengers and crew: or

b) the aircraft sustains damage or structural failure which:

- adversely affects the structural strength, performance or flight characteristics of the aircraft, and

- would normally require major repair or replacement of the affected component,

**except** for engine failure or damage. when the damage is limited to the engine, its cowlings or accessories: or for damage limited to propellers, wing tips, antennas, tires, brakes, fairings, small dents or puncture holes in the aircraft skin: or

c) the aircraft is missing or is completely inaccessible.

Note 1.-- For **statistical** uniformity only, an injury resulting in death within thirty days of the date of the accident is classified as a fatal injury by ICAO.

Note 2.-- An aircraft is considered to be missing when the official search has been terminated and the wreckage has not been located.

Causes: Actions, omissions, events, conditions, or a combination thereof, which led to the accident or incident.

**Aviation Accidents Database of the International Civil Aviation Organization Has Categorized Each Aviation Process Into the Following：**

- STANDING (STD): Prior to pushback or taxi, or after arrival, at the gate, ramp, or parking area, while the aircraft is stationary.
- PUSHBACK/TOWING (PBT): Aircraft is moving in the gate, ramp, or parking area, assisted by a tow vehicle [tug].
- TAXI (TXI)：The aircraft is moving on the aerodrome surface under its own power prior to takeoff or after landing.
- TAKEOFF (TOF)：From the application of takeoff power, through rotation and to an altitude of 35 feet above runway elevation.
- INITIAL CLIMB (ICL)：From the end of the Takeoff sub-phase to the first prescribed power reduction, or until reaching 1000 feet above runway elevation or the VFR pattern, whichever comes first
- EN ROUTE (ENR)：Instrument Flight Rules (IFR): From completion of Initial Climb through cruise altitude and completion of controlled descent to the Initial Approach Fix (IAF).
- Visual Flight Rules (VFR): From completion of Initial Climb through cruise and controlled descent to the VFR pattern altitude or 1000 feet above runway elevation, whichever comes first.
- MANEUVERING (MNV) ：Low altitude/aerobatic flight operations
- APPROACH (APR) Instrument Flight Rules (IFR): From the Initial Approach Fix (IAF) to the beginning of the landing flare. Visual Flight Rules (VFR): From the point of VFR pattern entry, or 1000 feet above the runway elevation, to the beginning of the landing flare.
- LANDING (LDG) ：From the beginning of the landing flare until aircraft exits the landing runway, comes to a stop on the runway, or when power is applied for takeoff in the case of a touch-and-go landing
- EMERGENCY DESCENT (EMG)：A controlled descent during any airborne phase in response to a perceived emergency situation.
- UNCONTROLLED DESCENT (UND) ：A descent during any airborne phase in which the aircraft does not sustain controlled flight.
- POST-IMPACT (PIM) ：Any of that portion of the Flight which occurs after impact with a person, object, obstacle or terrain.
- UNKNOWN (UNK)：Phase of flight is not discernable from the information available.

**Aviation Accidents Database of the International Civil Aviation Organization Has Categorized Each Accident Into the Following:**

- Abnormal Runway Contact (ARC)
- Abrupt Maneuver (AMAN)
- Aerodrome (ADRM)
- ATM/CANS
- Cabin Safety Events (CABIN)
- Controlled Flight Into or Toward Terrain (CFIT)
- Evacuation (EVAC)
- Fire/Smoke (Non-Impact) (F-NI)
- Fuel Related (FUEL)
- Ground Handling (RAMP)
- Ground Collision (GCOL)
- Icing (ICE)
- Loss of Control-Ground (LOC-G)
- Loss of Control-Inflight (LOC-I)
- Low Altitude Operations (LALT)
- Airprox/TCAS Alert/Loss of Separation/Near Midair Collisions/Midair Collisions (MAC)
- Other (OTHR)
- Runway Excursion (RE)
- Runway Incursion/ Animal (RI-A)
- Runway Incursion/ Vehicle, Aircraft or Person (RI-VAP)
- Security Related (SEC)
- System/Component Failure or Malfunction (Non-Powerplant) (SCF-NP)
- System/Component Failure or Malfunction (Powerplant) (SCF-PP)
- Turbulence Encounter (TURB)
- Undershoot/Overshoot (USOS)
- Unknown/Undetermined (UNK)
- Windshear/Thunderstorm (WSTRW)

**Definition of Other Terms：**

Economic Growth Rate：The percent rate of increase in *real* gross domestic product. This value, also known as the amount of the goods and services produced by an economy, is obtained by calculating the increase of gross domestic product based on a fixed weight of the base period. Economic growth rate is an important indicator for determining the overall change in economic trend. In order to net out the effect of inflation on the price of the goods and services produced, the "*real*" term here is calculated by specifing a single base-period, setting of prices and then valuing the output in all period in those prices, currently using the price from year 2001.

Gross National Product, GNP：The value of all goods and services produced in a country by the nationals, plus income earned by its citizens abroad. At countries that are open to foreign investment, there are many investments or branches in the country or a region owned by foreigners. Although their production results belong to the national domestic product, its distribution is not attributable to the income earned by nationals.

Gross Domestic Product, GDP：The total value of all final goods and services produced in the country (or a particular region); regardless of the nationalities of owners, all productions are attributed to part of gros domestic product.

Labor Force Participation Rate：Participation rate is the rate between the labor force and the overall size of their cohort, national population of the people with ages over 15. Labor force is the number of persons with ages over 15 and who are employed or are unemployed but looking for a job.

Fatal Aviation Accident：Accidents where one or more passengers die during the flight from causes of the following: a) a deliberate act by another passenger on the flight; b) a directly hit by any parts of the aircraft, including the sub-part of the aircraft body; c) a directly exposure to turbulent which was caused by the aircraft. These events exclude deaths due to natural factors, self behavior, others invasion, or hidings of stowaways at non-passengers/crews area on the aircraft in order to travel without paying or without being detected.

Hull Loss：An aircraft damaged to the extent that is not economically feasibletorepair it. This would include aircraft that are Hull Loss or aircraft that are missing, including the wreckage of unknown position or wreckage that are seriously damaged and unreachable.

## APPENDIX：

**Appendix1: Key Socio-Economic Indicator in Taiwan, 2000-2009**

| Year | Unit | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2,006 | 2007 | 2008 | 2009 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Economic Growth Rate | % | 5.80 | -1.65 | 5.26 | 3.67 | 6.19 | 4.70 | 5.44 | 5.98 | 0.73 | -1.91 |
| Gross National Product | Million Dollars | 10,326,952 | 10,122,411 | 10,654,141 | 11,025,130 | 11,737,391 | 12,031,145 | 12,555,170 | 13,243,277 | 13,013,147 | 12,930,401 |
| Gross National Product Growth Rate | % | 4.52% | -1.15% | 5.25% | 3.48% | 6.46% | 2.50% | 4.36% | 5.48% | -1.74% | -0.64% |
| Gross Domestic Product | Million Dollars | 10,187,394 | 9,930,387 | 10,411,639 | 10,696,257 | 11,365,292 | 11,740,279 | 12,243,471 | 12,910,511 | 12,698,501 | 12,512,678 |
| Gross Domestic Product Growth Rate | % | 4.06% | -1.69% | 4.85% | 2.73% | 6.25% | 3.30% | 4.29% | 5.45% | -1.64% | -1.46% |
| Average National Income | Dollar | 415,591 | 399,665 | 419,317 | 430,748 | 454,640 | 462,853 | 478,968 | 501,848 | 482,982 | 477,188 |
| Average National Income Growth Rate | % | 2.79% | -3.29% | 4.92% | 2.73% | 5.55% | 1.81% | 3.48% | 4.78% | -3.76% | -1.20% |
| Participation Rate of Labor Force | % | 57.68 | 57.23 | 57.34 | 57.34 | 57.66 | 57.78 | 57.92 | 58.25 | 58.28 | 57.9 |
| Population | Thousand People | 22,277 | 22,406 | 22,521 | 22,605 | 22,689 | 22,770 | 22,876 | 22,958 | 23,037 | 23,119 |
| Population Growth Rate | % | 0.83% | 0.58% | 0.51% | 0.37% | 0.37% | 0.36% | 0.47% | 0.36% | 0.34% | 0.36% |
| Number of Households | Thousand Household | 6,682 | 6,802 | 6,925 | 7,047 | 7,180 | 7,293 | 7,395 | 7,512 | 7,656 | 7,805 |
| Number of Households Growth Rate | % | 2.28% | 1.80% | 1.80% | 1.76% | 1.88% | 1.57% | 1.40% | 1.58% | 1.92% | 1.95% |

## Appendix2: The Operations of Airline Companies in Taiwan, 2000-2009

| Year | | | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| The Nationality of Airlines | | Number of Companies | 15 | 14 | 13 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| | | Operations of Civil Aviation Transporting Industry | 8 | 8 | 8 | 8 | 7 | 8 | 8 | 8 | 8 | 7 |
| | | General Aviation Industry Operators | 7 | 8 | 7 | 6 | 6 | 6 | 6 | 6 | 6 | 6 |
| | | Number of Registered Aircrafts | 173 | 180 | 197 | 186 | 201 | 204 | 197 | 199 | 193 | 192 |
| Aircraft of Civil Air Transport Enterprise | Domestic Passenger Flight | Passengers aboard | 13118367 | 12055845 | 10748282 | 9949410 | 10435597 | 9571448 | 8606339 | 6320000 | 4908889 | 4564516 |
| | | Passenger- Kilometers | 3937966 | 3649813 | 3335551 | 3083657 | 3281672 | 3020943 | 2748635 | 1973000 | 1473750 | 1268615 |
| | International Passenger Flight | Passengers aboard | 13216420 | 13323033 | 13926689 | 12308978 | 15738207 | 17081082 | 18085793 | 18470000 | 17192364 | 17775123 |
| | | Passenger- Kilometers | 47700559 | 44953835 | 47722077 | 43527445 | 53986238 | 57772630 | 60294197 | 61314000 | 57032361 | 55649773 |
| | Total Number of Passenger Flight | Passengers aboard | 26334787 | 25378878 | 24674971 | 22258388 | 26173804 | 26652530 | 26692132 | 24790000 | 22101253 | 22339639 |
| | | Passenger- Kilometers | 51638525 | 48603649 | 51057628 | 46611102 | 57267909 | 60793574 | 63042833 | 63287000 | 58506111 | 56918388 |
| | Domestic Cargo Flight | Tonnage | 51250 | 53368 | 57104 | 53159 | 55267 | 54555 | 53621 | 52383 | 49911 | 51076 |
| | | Passenger- Kilometers | 7208 | 7249 | 8690 | 8077 | 7422 | 7023 | 6975 | 6450 | 6314 | 5626 |
| | International Cargo Flight | Tonnage | 1108164 | 1068247 | 1287590 | 1427700 | 1698853 | 1730241 | 1731481 | 1679542 | 1536589 | 1376553 |
| | | Passenger- Kilometers | 7714808 | 7319456 | 8733977 | 9489420 | 11274247 | 11391722 | 11489345 | 11139070 | 9488982 | 8598983 |
| | Total Sum of Cargo Flights | Tonnage | 1159414 | 1121615 | 1344694 | 1480859 | 1754120 | 1784796 | 1785102 | 1731925 | 1586500 | 1427629 |
| | | Passenger- Kilometers | 7722016 | 7326705 | 8742667 | 9497497 | 11281670 | 11398744 | 11496320 | 11145520 | 9495296 | 8604609 |
| | Flight Routes | Domestic Routes | 222024 | 202923 | 191978 | 168440 | 161863 | 146114 | 135943 | 112528 | 89813 | 82447 |
| | | International Routes | 69724 | 74672 | 82719 | 81779 | 100745 | 109094 | 113546 | 119369 | 107210 | 106761 |
| | | Total | 291748 | 277595 | 274697 | 250219 | 262608 | 255208 | 249489 | 231897 | 197023 | 189208 |
| Helicopter for Civil Air Transport Enterprise | | Flight Hours | 465.4 | 146.72 | 313.55 | 260.82 | 306.58 | 399.57 | 387.88 | 580.22 | 361.22 | 270.35 |
| | | Number of Flights | 214 | 15 | 448 | 548 | 738 | 1140 | 1012 | 461 | 460 | 630 |
| | | Passengers Aboard | 1327 | 133 | 3563 | 2641 | 4153 | 6137 | 5007 | 4606 | 2088 | 2709 |
| Helicopter for General Aviation | | Flight Hours | 5666.18 | 5014.97 | 9773.20 | 5737.62 | 4544.18 | 3919.23 | 4016.10 | 4381.26 | 4670.30 | 4588.65 |

## Appendix3: The Operation Statistics of Public Aircraft, 2002-2009

| Year | Government units | Types of Operation | Total flights | Total Flight Hours | Aircraft Type，Number of Aircraft | |
|---|---|---|---|---|---|---|
| 2002 | General Aviation Squadron, the Aerial Police Brigade of National Police Agency, the Aerial Fire Brigade Provisional Office of National Fire Agency | Search and Rescue, Disaster Relief, Emergency Medical Services, Reconnaissance and Patrol, and Transportation(Training) | 2396 | 322：05 | AS-365 10<br>BE-200 1<br>BE-350 1 | S-76B 2<br>B-234 3<br>UH-1H 8 |
| 2003 | | | 6194 | 5079：15 | AS-365 10<br>BE-200 1<br>BE-350 1 | S-76B 2<br>B-234 3<br>UH-1H 20 |
| 2004 | National Airborne Service Corps (NASC) of the Ministry of the Interior | Search and Rescue, Disaster Relief, Emergency Medical Services, Reconnaissance and Patrol, and Transportation(Training) | 9094 | 8399：02 | AS-365 10<br>BE-200 1<br>BE-350 1 | S-76B 2<br>B-234 3<br>UH-1H 20 |
| 2005 | | | 7187 | 9358：09 | AS-365 10<br>BE-200 1<br>BE-350 1 | S-76B 2<br>B-234 3<br>UH-1H 20 |
| 2006 | | | 6518 | 9577：54 | AS-365 10<br>BE-200 1<br>BE-350 1 | S-76B 2<br>B-234 3<br>UH-1H 20 |
| 2007 | | | 6663 | 9324:06 | AS-365 10<br>BE-200 1<br>BE-350 1 | S-76B 2<br>B-234 3<br>UH-1H 20 |
| 2008 | | | 5338 | 8061:02 | AS-365 10<br>BE-200 1<br>BE-350 1 | S-76B 2<br>B-234 3<br>UH-1H 20 |
| 2009 | | | 7547 | 9756:15 | AS-365 10<br>BE-200 1<br>BE-350 1 | S-76B 2<br>B-234 2<br>UH-1H 15 |

Note：

I. The National Airborne Service Corps（NASC）preparatory office is established on Mar 10, 2004 by merging 4 government agencies including the Air Patrol Corps of the Coast Guard Administration, the Aviation Corps of Civil Aeronautics Administration of Ministry of Transportation and Communications, the Aviation Police Corps of National Police Agency and the Aviation Fire Corps of National Fire Agency. The National Airborne Service Corps officially established on Nov 9, 2005 by the order of Executive Yuan.

II. This statistical table does not include the number of flights and flying hours on helicopter rental by the Air Patrol Corps of Coast Guard Administration, Executive Yuan.

III. Number of aircraft in 2009 only counted serviceable aircraft.

**Appendix4: Aviation Occurrences and Rates (by Flight Hours) for Civil Aiviation Transport Category Airplane, 2000-2009**

| | Fatal Aviation Occurrences of Jet Transport Aircraft | | | | | | | Fatal Aviation Occurrences of Turboprop Aircraft | | | | | | | Fatal Occurrences for All Aircrafts in National Civil Air Transport Enterprise | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Year | Fatal Occurrence | Hull Loss Occurrences | Fatal/Hull Loss Occurrences | Flight Hours | Fatal Rate Per Million Flight Hours | Hull Loss Rate Per Million Flight Hours | Fatal/Hull Loss Rate Per Million Flight Hours | Fatal Occurrences | Hull Loss Occurrences | Fatal/ Hull Loss Occurrences | Flight Hours | Fatal Rate Per Million Flight Hours | Hull Loss Rate Per Million Flight Hours | Fatal/Hull Loss Rate Per Million Flight Hours | Total Fatal Occurrences | Total Hull Loss Occurrences | Fatal/Hull Loss Occurrences | Flight Hours | Fatal Rate Per Million Flight Hours | Hull Loss Rate Per Million Flight Hours | Fatal/Hull Loss Rate Per Million Flight Hours |
| 2000 | 0 | 0 | 0 | 481,168 | 0.00 | 0.00 | 0.00 | 0 | 0 | 0 | 80,682 | 0.00 | 0.00 | 0.00 | 0 | 0 | 0 | 561,850 | 0.00 | 0.00 | 0.00 |
| 2001 | 0 | 0 | 0 | 475,313 | 0.00 | 0.00 | 0.00 | 0 | 0 | 0 | 63,857 | 0.00 | 0.00 | 0.00 | 0 | 0 | 0 | 539,170 | 0.00 | 0.00 | 0.00 |
| 2002 | 1 | 1 | 1 | 488,564 | 2.05 | 2.05 | 2.05 | 1 | 1 | 1 | 67,401 | 14.84 | 14.84 | 14.84 | 2 | 2 | 2 | 555,965 | 3.60 | 3.60 | 3.60 |
| 2003 | 0 | 1 | 0 | 515,190 | 0.00 | 1.94 | 0.00 | 0 | 0 | 0 | 86,700 | 0.00 | 0.00 | 0.00 | 0 | 1 | 0 | 601,890 | 0.00 | 1.66 | 0.00 |
| 2004 | 0 | 0 | 0 | 580,524 | 0.00 | 0.00 | 0.00 | 0 | 0 | 0 | 89,575 | 0.00 | 0.00 | 0.00 | 0 | 0 | 0 | 670,099 | 0.00 | 0.00 | 0.00 |
| 2005 | 0 | 0 | 0 | 590,792 | 0.00 | 0.00 | 0.00 | 0 | 0 | 0 | 120,821 | 0.00 | 0.00 | 0.00 | 0 | 0 | 0 | 711,613 | 0.00 | 0.00 | 0.00 |
| 2006 | 0 | 0 | 0 | 597,757 | 0.00 | 0.00 | 0.00 | 0 | 0 | 0 | 107,510 | 0.00 | 0.00 | 0.00 | 0 | 0 | 0 | 705,267 | 0.00 | 0.00 | 0.00 |
| 2007 | 0 | 1 | 0 | 525,157 | 0.00 | 1.90 | 0.00 | 0 | 0 | 0 | 96,504 | 0.00 | 0.00 | 0.00 | 0 | 1 | 0 | 621,661 | 0.00 | 1.61 | 0.00 |
| 2008 | 0 | 0 | 0 | 414,579 | 0.00 | 0.00 | 0.00 | 0 | 0 | 0 | 106,752 | 0.00 | 0.00 | 0.00 | 0 | 0 | 0 | 521,331 | 0.00 | 0.00 | 0.00 |
| 2009 | 0 | 0 | 0 | 369,210 | 0.00 | 0.00 | 0.00 | 0 | 0 | 0 | 98,755 | 0.00 | 0.00 | 0.00 | 0 | 0 | 0 | 467,965 | 0.00 | 0.00 | 0.00 |
| total | 1 | 3 | 1 | 4,669,044 | 0.21 | 0.64 | 0.21 | 1 | 1 | 1 | 918,557 | 1.09 | 1.09 | 1.09 | 2 | 4 | 2 | 5,956,811 | 0.34 | 0.67 | 0.34 |

**Appendix5: Aviation Occurrences/ Rates (by Departures) for Civil Aiviation Transport Category Airplane, 2000-2009**

| | Fatal Aviation Occurrences of Commercial Jet | | | | | | | Fatal Aviation Occurrences of Turboprop Aircraft | | | | | | | Fatal Occurrences for All Aircrafts in National Civil Air Transport Enterprise | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Year | Fatal Occurrences | Hull Loss Occurrences | Fatal/Hull Loss Occurrences | Number of Departures | Fatal Rate Per Million Departures | Hull Loss Rate Per Million Departures | Fatal/Hull Loss Rate Per Million Departures | Fatal Occurrences | Hull Loss Occurrences | Fatal/Hull Loss Occurrences | Number of Departures | Hull Loss Rate Per Million Departures | Fatal/Hull Loss Rate Per Million Departures | Total Fatal Occurrences | Total Hull Loss Occurrences | Fatal/Hull Loss Occurrences | Fatal/Hull Loss Occurrences | Number of Departures | Fatal Rate Per Million Departures | Hull Loss Rate Per Million Departure | Fatal/ Hull Loss Rate Per Million Departures |
| 2000 | 0 | 0 | 0 | 195,136 | 0.00 | 0.00 | 0.00 | 0 | 0 | 0 | 111,906 | 0.00 | 0.00 | 0.00 | 0 | 0 | 0 | 307,042 | 0.00 | 0.00 | 0.00 |
| 2001 | 0 | 0 | 0 | 180,019 | 0.00 | 0.00 | 0.00 | 0 | 0 | 0 | 97,151 | 0.00 | 0.00 | 0.00 | 0 | 0 | 0 | 277,170 | 0.00 | 0.00 | 0.00 |
| 2002 | 1 | 1 | 1 | 176,466 | 5.67 | 5.67 | 5.67 | 1 | 1 | 1 | 99,701 | 10.03 | 10.03 | 10.03 | 2 | 2 | 2 | 276,167 | 7.24 | 7.24 | 7.24 |
| 2003 | 0 | 1 | 0 | 168,335 | 0.00 | 5.94 | 0.00 | 0 | 0 | 0 | 94,976 | 0.00 | 0.00 | 0.00 | 0 | 1 | 0 | 263,311 | 0.00 | 3.80 | 0.00 |
| 2004 | 0 | 0 | 0 | 180,092 | 0.00 | 0.00 | 0.00 | 0 | 0 | 0 | 93,221 | 0.00 | 0.00 | 0.00 | 0 | 0 | 0 | 273,313 | 0.00 | 0.00 | 0.00 |
| 2005 | 0 | 0 | 0 | 203,874 | 0.00 | 0.00 | 0.00 | 0 | 0 | 0 | 85,144 | 0.00 | 0.00 | 0.00 | 0 | 0 | 0 | 289,018 | 0.00 | 0.00 | 0.00 |
| 2006 | 0 | 0 | 0 | 188,679 | 0.00 | 0.00 | 0.00 | 0 | 0 | 0 | 98,818 | 0.00 | 0.00 | 0.00 | 0 | 0 | 0 | 287,497 | 0.00 | 0.00 | 0.00 |
| 2007 | 0 | 1 | 0 | 152,503 | 0.00 | 6.56 | 0.00 | 0 | 0 | 0 | 94,283 | 0.00 | 0.00 | 0.00 | 0 | 1 | 0 | 246,786 | 0.00 | 4.05 | 0.00 |
| 2008 | 0 | 0 | 0 | 109,321 | 0.00 | 0.00 | 0.00 | 0 | 0 | 0 | 87,641 | 0.00 | 0.00 | 0.00 | 0 | 0 | 0 | 196,962 | 0.00 | 0.00 | 0.00 |
| 2009 | 0 | 0 | 0 | 91,891 | 0.00 | 0.00 | 0.00 | 0 | 0 | 0 | 113,157 | 0.00 | 0.00 | 0.00 | 0 | 0 | 0 | 205,048 | 0.00 | 0.00 | 0.00 |
| total | 1 | 3 | 1 | 1,646,316 | 0.61 | 1.82 | 0.61 | 1 | 1 | 1 | 975,998 | 1.02 | 1.02 | 1.02 | 2 | 4 | 2 | 2,622,314 | 0.76 | 1.53 | 0.76 |

**Appendix6: Aviation Occurrences/Rates of Transport Category Commercial Jet Aircraft, 2000-2009**

| Year | Aviation Occurrences | | | | Number of Departures | Rate of Aviation Occurrences Per Million Departures | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Class I | Class II | Class III | Class V | | Class I | Class II | Class III | Class V |
| 2000 | 0 | 0 | 0 | 4 | 195,136 | 0.00 | 0.00 | 0.00 | 20.50 |
| 2001 | 0 | 0 | 1 | 1 | 180,019 | 0.00 | 0.00 | 5.55 | 5.55 |
| 2002 | 1 | 0 | 0 | 2 | 176,466 | 5.67 | 0.00 | 0.00 | 11.33 |
| 2003 | 0 | 0 | 1 | 1 | 168,335 | 0.00 | 0.00 | 5.94 | 5.94 |
| 2004 | 0 | 0 | 1 | 1 | 180,092 | 0.00 | 0.00 | 5.55 | 5.55 |
| 2005 | 0 | 2 | 0 | 1 | 203,874 | 0.00 | 9.81 | 0.00 | 4.90 |
| 2006 | 0 | 1 | 0 | 1 | 188,679 | 0.00 | 5.30 | 0.00 | 5.30 |
| 2007 | 0 | 0 | 2 | 1 | 152,503 | 0.00 | 0.00 | 13.11 | 6.56 |
| 2008 | 0 | 3 | 1 | 2 | 109,321 | 0.00 | 27.44 | 9.15 | 18.29 |
| 2009 | 0 | 0 | 0 | 0 | 91,891 | 0.00 | 0.00 | 0.00 | 0.00 |
| total | 1 | 6 | 6 | 14 | 1,646,316 | 0.61 | 3.64 | 3.64 | 8.50 |

**Appendix7: Aviation Occurrences/Rates of Transport Category Tuboprop Aircraft, 2000-2009**

| Year | Aviation Occurrences | | | | Number of Departures | Rate of Aviation Occurrences Per Million Departures | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Class I | Class II | Class III | Class V | | Class I | Class II | Class III | Class V |
| 2000 | 0 | 0 | 0 | 0 | 111,906 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2001 | 0 | 0 | 1 | 1 | 97,151 | 0.00 | 0.00 | 10.29 | 10.29 |
| 2002 | 1 | 0 | 0 | 1 | 99,701 | 10.03 | 0.00 | 0.00 | 10.03 |
| 2003 | 0 | 0 | 0 | 1 | 94,976 | 0.00 | 0.00 | 0.00 | 10.53 |
| 2004 | 0 | 0 | 0 | 0 | 93,221 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2005 | 0 | 0 | 1 | 0 | 85,144 | 0.00 | 0.00 | 11.74 | 0.00 |
| 2006 | 0 | 0 | 0 | 0 | 98,818 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2007 | 0 | 0 | 0 | 0 | 94,283 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2008 | 0 | 0 | 0 | 0 | 87,641 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2009 | 0 | 0 | 0 | 1 | 113,157 | 0.00 | 0.00 | 0.00 | 8.84 |
| total | 1 | 0 | 2 | 4 | 1,093,568 | 0.91 | 0.00 | 1.83 | 3.66 |

**Appendix8: Aviation Occurrences Involving Illegal Actions in Airlines (Suicide, Damaging on Purpose, Terrorists), 2000-2009**

| Category | Date | Place | Airline Companies | Total Fatalities | |
|---|---|---|---|---|---|
| | | | | Total Number | Total Number |
| Civil Air Transport Enterprise | N/A | N/A | Uni Air | 0 | 0 |
| General Aviation Enterprise | N/A | N/A | N/A | 0 | 0 |

**Appendix9: Statistics of Aviation Safety Recommendations, 1999-2010.6**

| Accepted by / Type of Aircrafts | Associated to the Percentage | Aviation Industry | International Organization | Total | Percentage |
|---|---|---|---|---|---|
| Civil Air Transport Enterprise | 128 | 104 | 67 | 299 | 64.3% |
| General aviation Enterprise | 35 | 37 | 3 | 75 | 16.1% |
| Other | 73 | 15 | 3 | 91 | 19.6% |
| Total | 236 | 156 | 73 | 465 | 100% |
| Percentage | 50.8% | 33.5% | 15.7% | 100% | |

Note：Others including public aircrafts and ultra-light vehicle etc.