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Abstract

Over the past decade (2002-2011), the domestic and international transportation services showed contradictory trends to the civil aviation industries. There was a significant increase on international air transport for both passenger and cargo. The number of passenger increased 48.7 percent, the cargo increased 34.2 percent, and the numbers of flights increased 47 percent over the period. There were 2 times of declinations over the past decade. One was in 2003 which was resulted from the influence of SARS. The other one was in 2008. Meanwhile, the numbers of domestic air transport declined significantly since the number of passengers decreased almost 52 percent, the numbers of flights also decreased 54 percent; however the numbers of cargo services remained constant over the past decade.

National Airborne Service Corps were also having a substantial increase in the total number of missions and the cumulative flown hours for the past 9 years. The total number of flight 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. In 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. In year 2011, the yearly total flight hours were reduced to 6,286 hours.

From 2002 through 2011, there were 59 aviation occurrences in Taiwan totally, including those Taiwan air carriers' aircraft occurred outside the country. Transportation category aircraft occurrences accounted for the most (33). The remaining 26 occurrences were general aviation, public aircrafts, ultralight vehicles or foreign-registered aircrafts. Of those 59 occurrences, 242 fatalities were resulted, majorly due to the occurrences involving 2 transportation category aircrafts. Of the Taiwan carriers' transportation category occurrences, 2 were fatal, resulting in 227 fatalities. There were 6 aviation occurrences occurred in 2011, including 3 local civil aviation transportation category aircrafts, 1 public aircraft and 2 ultra-light aircrafts. There was no fatality or serious injury of civil aviation transportation and public category aircrafts. The occurrence of Ultra-light resulted in 2 hull losses 1 of them resulted in 1 fatality.

According to the occurrence rates for the airplanes in civil aviation transportation category over the last 10 years (2002-2011), the average rate of hull loss occurrences on commercial jet was 0.54 per million flight hours, or 1.75 per million departures. In addition to that, the hull loss occurrence rate on turboprop airplane was 1.35 per million flight hours or 1.21 per million departures. Based on the 10-year moving average of hull loss occurrence rates on civil aviation transportation category, from 2002 to 2011, suggested 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, the occurrence rate was constant from year 2009

to 2011; whereas the number on turboprop airplanes had declined steadily over the past decade.

When focusing at the accident rates for each phase of flight, which was defined by International Civil Aviation Organization (ICAO), there were total 33 aviation occurrences happening at different flight phases over the last decade. Among all these accidents, 12 of them took place at landing phase, as the most prevalent, followed by cruise phase, which accounted for 8 occurrences.

In accordance with the occurrence category used by ICAO, among all 343 civil transportation category airplane occurrences over the past ten years, the runway excursions overall were the most frequent and a total of 9 occurrences were reported. The second most frequent occurrences were the SCE-NP (system/component failure or malfunction/ non-power plant), accounting for 5.

The National Transportation Safety Board (NTSB) established the probable cause and contributing factor of an occurrence using three broad categories: 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 cause/factor in 69.7% (51.5% related to pilots, 18.2% related to maintenance/ATC personnel), of those occurrences as the largest percentage, environment was cited in 33.3%, and the aircraft related in 27.3%.

From 2002 to 2011, the rate of general aviation occurrence was 5.53 per 100,000 flight hours, fatal occurrence rate was 1.84 per 100,000 flight hours and hull loss occurrence rate was 3.69 per 100,000 flight hours. The general aviation was safer between 2002 and 2007 as neither fatal accident nor Hull Loss of aircrafts occurred, however there were 2 hull loss occurrences in year 2008 and 2009. There was no occurrence in year 2011.

There were 8 occurrences involving public aircraft during the period of 2002 to 2011. Of these occurrences, 2 were fatal occurrences and 4 were hull loss occurrences which included the cost of repair exceeding the cost of the aircraft. There was a serious incident involving personnel injury in 2011.

According to the formal records of ultra-light vehicles occurrence, there were 11 occurrences from 2004 to 2011, including 5 fatal occurrences which resulted in 8 fatalities. Of all 11 occurrences were hull losses.

After finishing 75 occurrences investigation, the Aviation Safety Council had made 604 aviation safety recommendations during the period from April, 1999 to December, 2011. At the time of this publication, the numbers of action plans proposed by government were 369 which account for 95.6%, while the numbers of plans/proposals still under supervision were 6 which account for 1.6%. The percentage of those plans/proposals still under reviewing or waiting for reply was 2.8%.

Introduction

Civil aviation has become an integral part of the economy; and at the same time, and the demands 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 socioeconomic indicator systems in Taiwan over the last decade. Then following by the review of operation status of civil aircrafts, public aircrafts and ultra-light vehicles, it will allow readers to observe 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 statistics, the article will first introduce the basics and definition 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 Organization, for definitions of those terms, please refer to the attachment - Definitions of Terms.

Civil Aviation and the Social Economy

The Economic Profile in 2011¹

In 2011, the economic growth rate was 4.03% which was lower than the growth rate of previous year (10.72%). The gross national product grew to \$14 trillion and 133.0 billion NT dollars and the gross domestic product grew to \$13 trillion and \$745.0 billion NT dollars, representing a 0.64% and 0.96% increases, respectively, over the previous year. The national income per capita was \$518 thousands and 315 NT dollars, with a decrease of 0.57% when compared to the previous year. The rate of labor force participation was 58.17% which was higher than year 2010 in 58.07%. Accordingly, the overall economy was increasing. The population of Taiwan increased 0.27%, reaching the total number of 23.22 million people; and the number of families in Taiwan increased to 8.05 million families in 2011, an increase of 1.51% over the previous year.

Economic Changes and Tendencies from 2002 to 2011

The common indicators of socioeconomic of Taiwan from 2002 to 2011 were shown on the attached Appendix 1.

The socioeconomic indicators, gross national product (GNP) and gross domestic product (GDP) (Figure 1), showed positive growth rate from year 2002 to year 2007 and negative growth rate in year 2008 and year 2009. A positive growth rates were shown after year 2010. The growth rate of national income per capita (Figure 2) showed similar trend except a negative growth rate in year 2011. As for the trend variations, the economical growth rate fluctuated between 3.6% and 6.2% from year 2002 to year 2007. In year 2008 the growth rate was only 0.73. The only negative growth rate was shown in year 2009 (-1.81%) The growth rate of year 2010 (10.72%) was the highest over the past decade. As a whole, the total economical growth rate in year 2008 and 2009 showed negative trends. An obvious bounce back was shown in year 2010 and the economical growth rate showed moderate trend in year 2011. As for the labor force participation rate² (Figure 4), the rate was increased from 57.34% in year 2002 to 58.28% in year 2008, in year 2009, the rate slightly dropped to 57.9%, in year 2011, it slightly increased to 58.17%.

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

² 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.

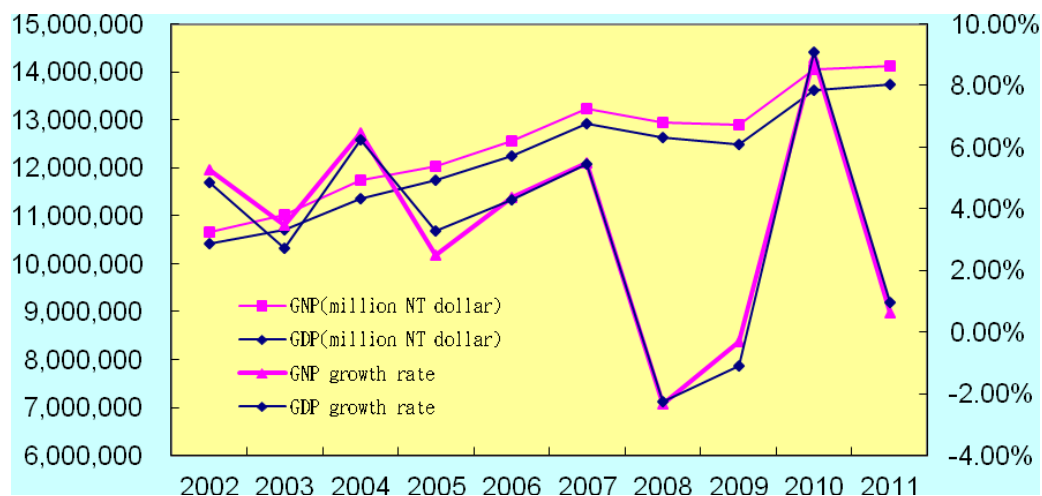


Figure1 : GNP and GDP in Taiwan, 2002-2011

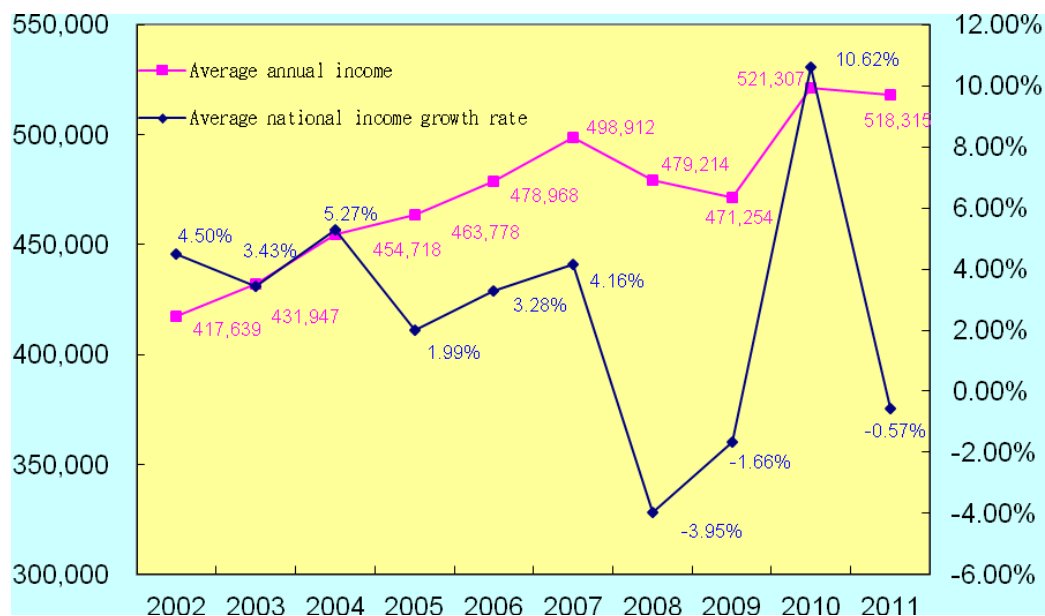


Figure2 : The Average Annual National Dividend and its Growth Rate, 2002-2011

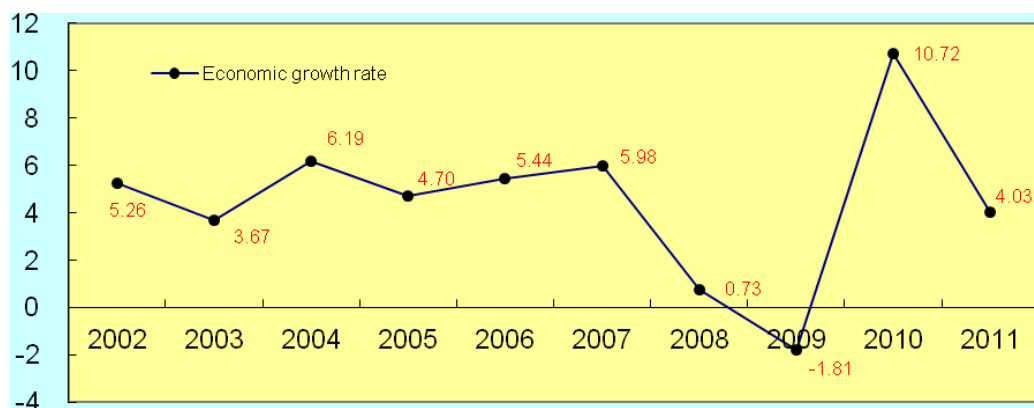


Figure3 : The Economic Growth Rate of Taiwan, 2002-2011

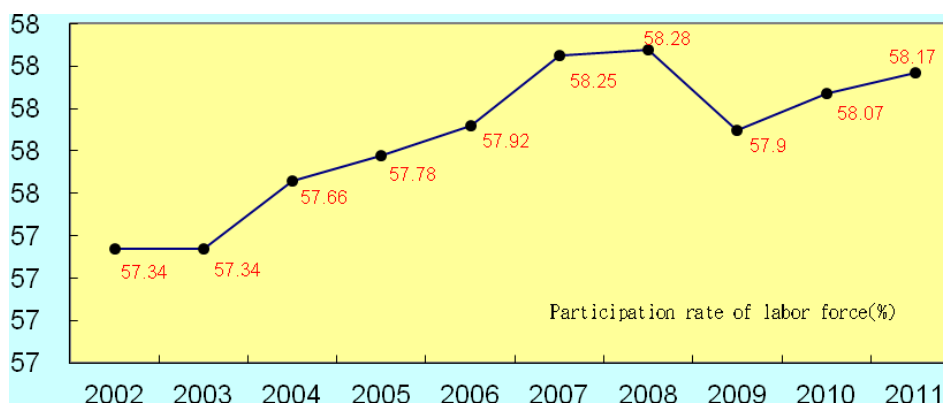


Figure4 : The Change of Labor Force Participation Rate, 2002-2011

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 nine times more than that of population. The growth rate in population had dropped from 0.51% in 2002 to 0.19% in 2010. The growth rate was slightly increased to 0.27% in year 2011. For the family growth rate, it varied between 1.4% and 1.95%.

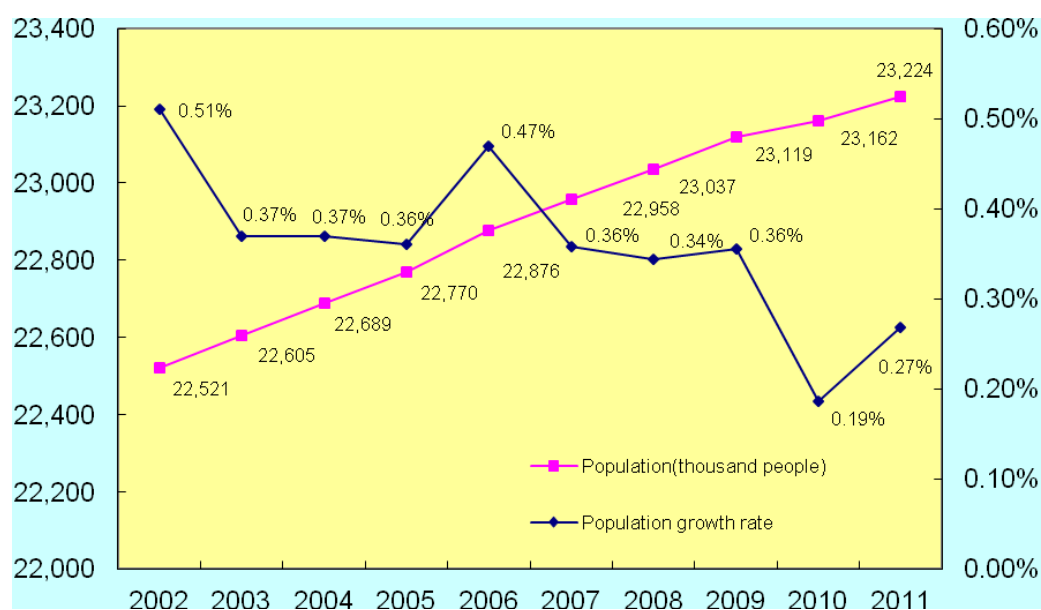


Figure5 : The Population and Population Growth Rate, 2002-2011

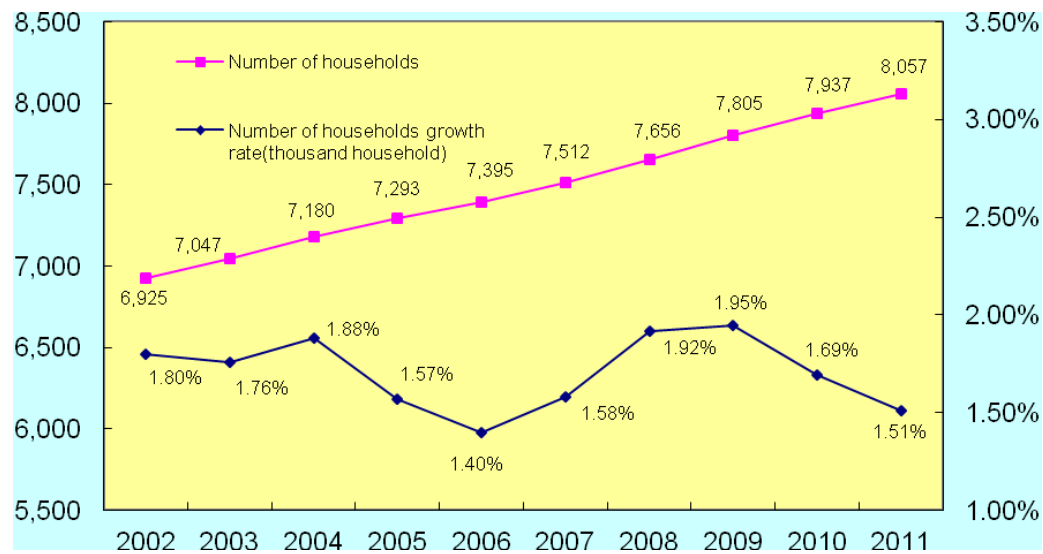


Figure6 : Total Numbers of Families and the Families Growth Rate, 2002-2011

The Operation of Civil Aircraft and Public Aircraft in Taiwan³

The Overview of Civil Aviation Operation, 2002-2011

There were 13 air carriers in Taiwan in 2011, and 8 of them served in civil aviation transportation category. Five⁴ out of 8 transportation category carriers operated on both international and domestic routes. Two⁵ operated in domestic routes only. The number of air carriers in the general aviation industry was 7⁶. In Aug. 19, 2010, the CAA issued flight operational certificate to the Win Air Business Jet for charter operation. Total number of aircraft operated in transport category and general aviation was 199 in 2011.

In year 2011 the transportation category air carrier in Taiwan carried a total of 25,900,000 passengers, a 1.9 percent higher than that in 2010. Among those, 80.0 percent were international passengers, 0.5 percent increase over the previous year, 20.0 percent were domestic passengers with a 7.6 percent increase when compared to the year before. The total weights the air cargo carried in 2011 reduced to 1,780,000 tons, a 7.3 percent lower when compared to 2010. Among them, the international air cargo accounted for 97.1 percent of the total weight in 2011, decreased by 7.5 percent from 2010. The domestic air cargo accounted for 2.9 percent of the total weight, increased 0.9 percent from 2010 to 2011. There were a total of 209,692 flights in the whole year, including 41.8 percent domestic flights, a 5.6 percent increase compared to the year before. International flights accounted for 58.2 percent of the total number of flights, 1.7 percent increase over the previous year. It was demonstrated from previous data that in 2011, the passenger carried showed slight growth rate. The domestic flights were also increased in year 2011. In 2011, the general aviation had a total of 4,724 flight hours, which was increased by 6.7 percent from 2010 to 2011. 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 was 8 in 2002. After some variations of aviation market, the number of carriers remained 8 in year 2011. Among those, the Far Eastern Airlines ceased its operation in year 2008 and reopened in year 2010. As for the number of registered aircrafts, a fluctuating variation was shown in the early stage as shown in Figure 8. A decreasing trend was shown in year 2005.

³ The listed statistical data mainly came from "CAA Annual Report".

⁴ China Airlines, EVA Airways, TransAsia Airways, Uni Airways and Mandarin Airlines

⁵ Daily Air and Sunrise Airlines

⁶ Daily Air Corporation, Aerospace Industrial Development Corporation (AIDC), Emerald Pacific Airlines (EPA), ROC Aviation Company, Sunrise Airlines, Great Wing Airline and Win Air Business Jet.

The number of registered aircrafts was 182 in year 2010 but increased to 199 in year 2011. The reason was the purchase of new aircraft of each Airline.

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 13,927,000 in 2002 and increased gradually over the years, and reached the highest 20,708,000 in 2011. It showed a 48.7 percent increased over the past 10 year. Differently from the international routes, domestic routes had positive growth only in 2004 and 2011. Other than that, numbers fell from 10,748,000 in 2002 to 4,825,000 in 2010. In year 2011, the numbers of passengers were 5,192,000, a decrease of 51.7 percent over the decade.

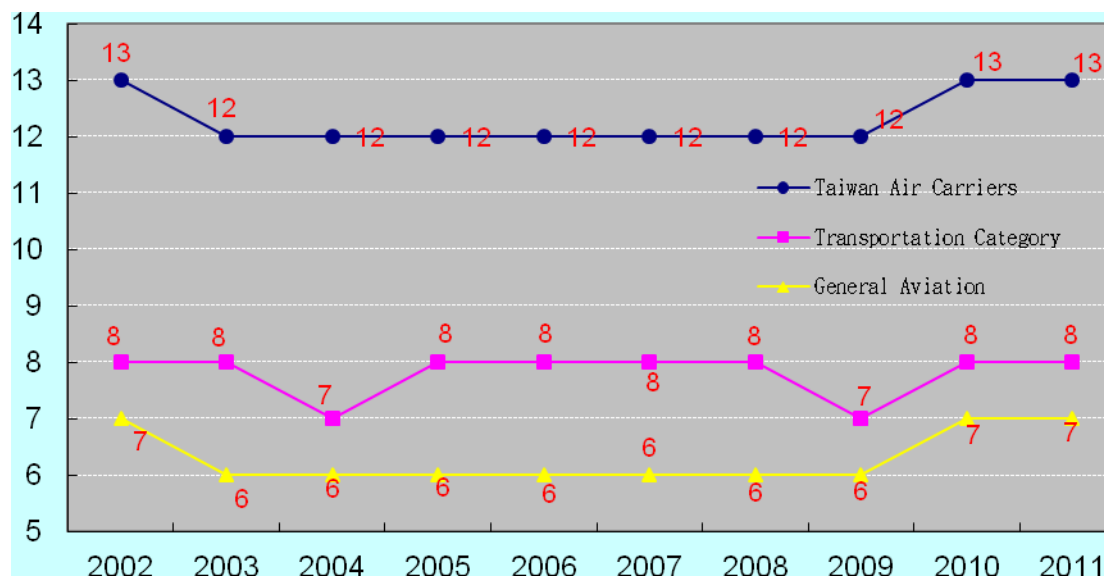


Figure7 : Taiwan air carriers, transportation and general aviation category, 2002-2011

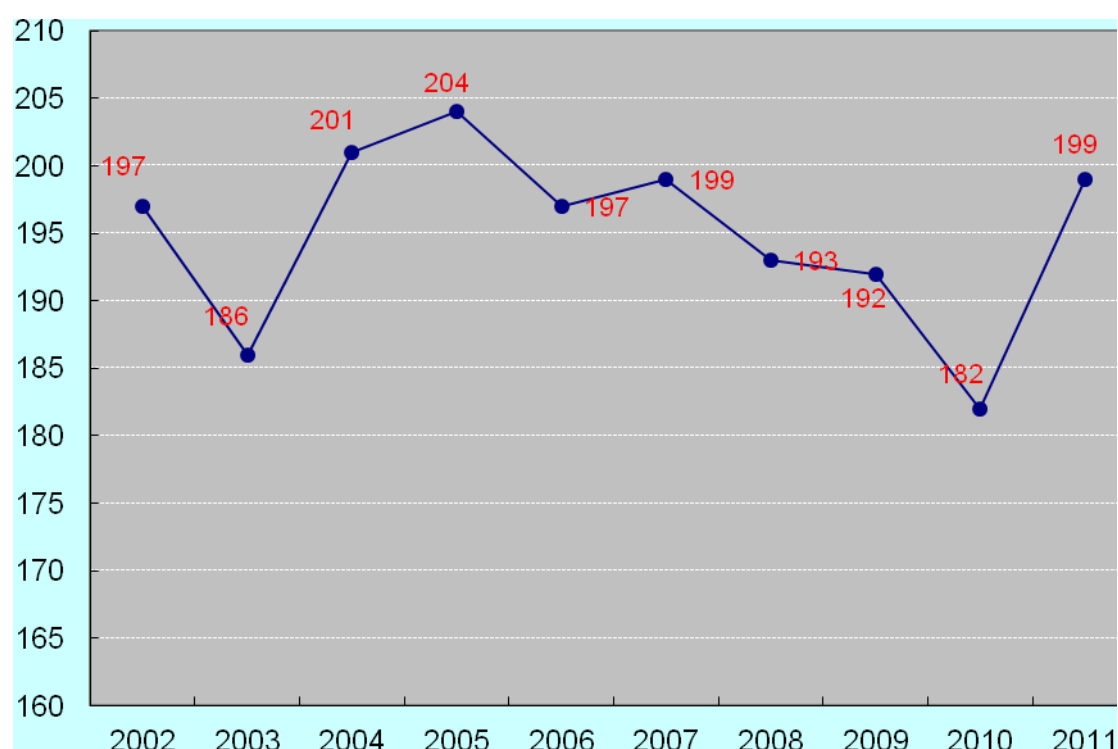


Figure8 : Taiwan registered civil aircraft, 2002-2011



Figure9 : Taiwan air carriers revenue passengers of transportation category, 2002-2011

In terms of the air cargo as shown in Figure 10, the international air cargo was more than domestic one. In the past ten years, the international air cargo took up almost 97 percent of the total amount. The numbers of international air freight increased gradually from 129 million tons in 2002. In 2006, the number reached a total of 173 million tons, but than a decreasing trend in the following three years. The air cargo reached a maximum in 2010 and then reduced to

173 million tons in 2011. Accordingly, the number of air cargo had almost 34.2% growth over the decade. As for the domestic air cargo, the numbers decreased annually from 57 thousand tons in 2002 and remained around 50 thousand tons in 2011.

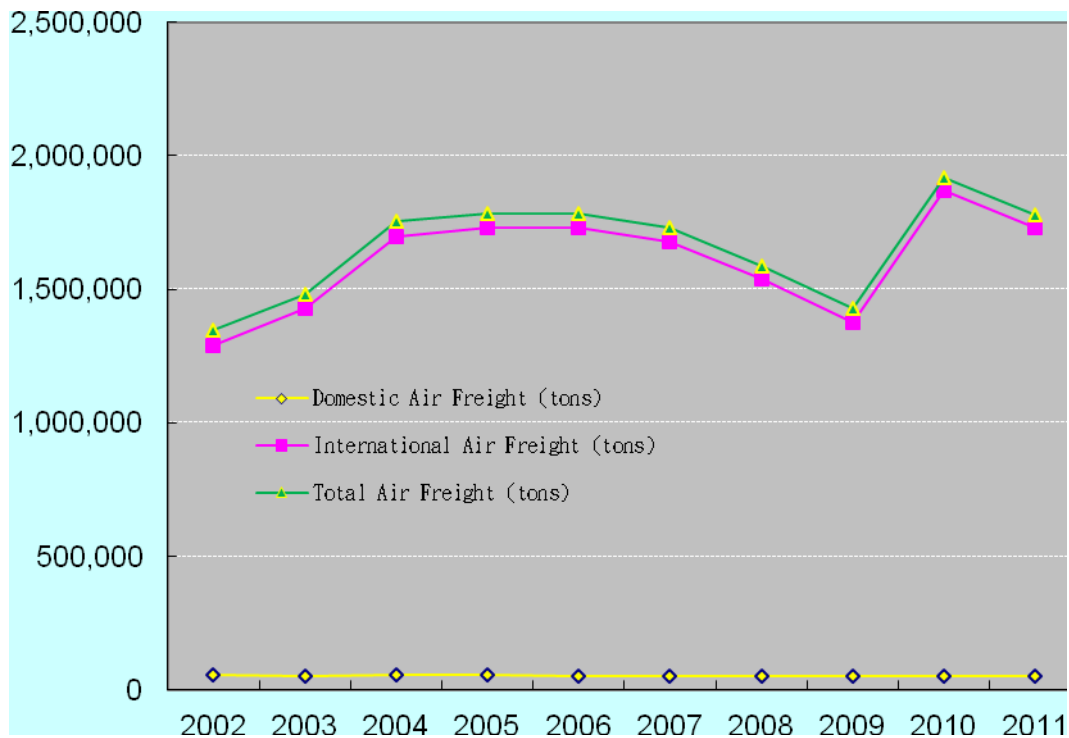


Figure10 : Taiwan air freight of transportation category air carrier, 2002-2011

In terms of the number of flights, the numbers of domestic flights were 2.3 times more than the numbers of the international flights in 2002 (figure 11). While through the expansion of international airlines and the downsizing of domestic flight over the last decade, the numbers of international flights in 2011 were 1.4 times more than the numbers of domestic flights. The domestic flights dropped from 192,000 flights in 2002 to 87,000 flights in 2011, a reduction of nearly 54 percent. Differently from the domestic routes, international airlines increased from 83,000 flights in 2002 to 122,000 flights in 2011, a 47 percent growth.

Overall speaking, the domestic and international transportation services showed contradictory trends to the civil aviation industries over the period from 2002 to 2011. There was a significant increase on international air transport for both passenger and cargo. The number of passenger increased 49 percent, the cargo increased 34 percent, and the numbers of flights increased 47 percent over the period. Meanwhile, the numbers of domestic air transport declined significantly since the number of passengers decreased almost 52 percent, the numbers of flights also decreased 54 percent, however the numbers of cargo services remained constant ever since 2002.

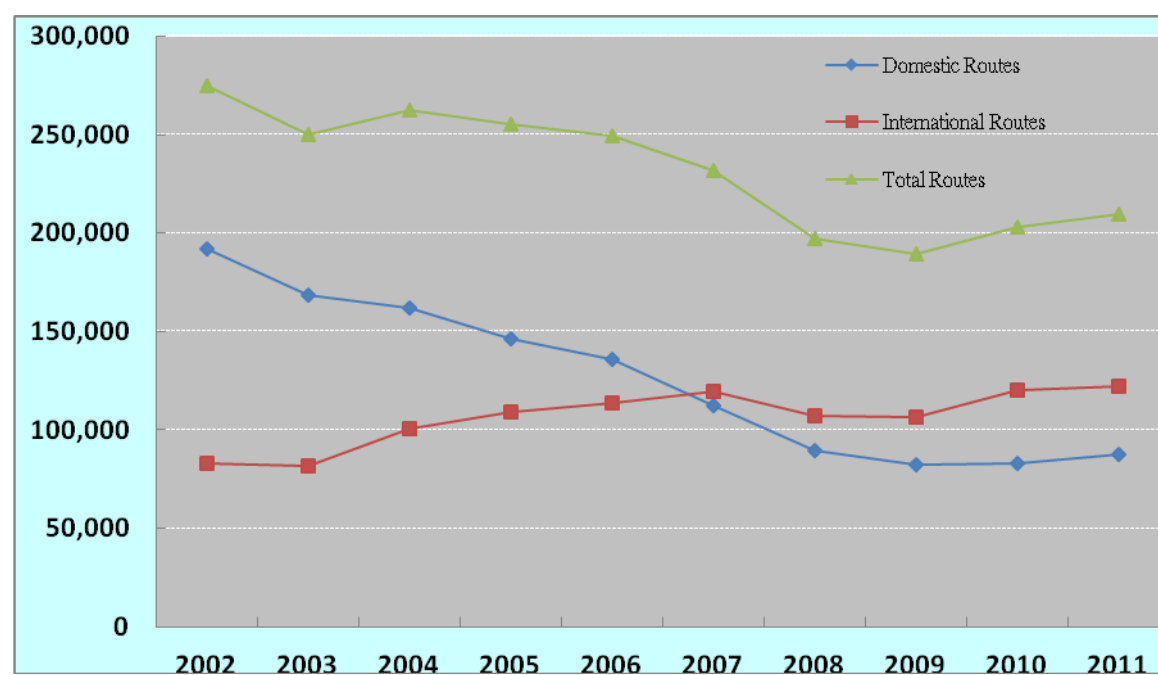


Figure11 : Taiwan flight departures of transportation category, 2002-2011

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 decreased annually from 9,773 hours in 2002 to 4,724 hours in 2011.

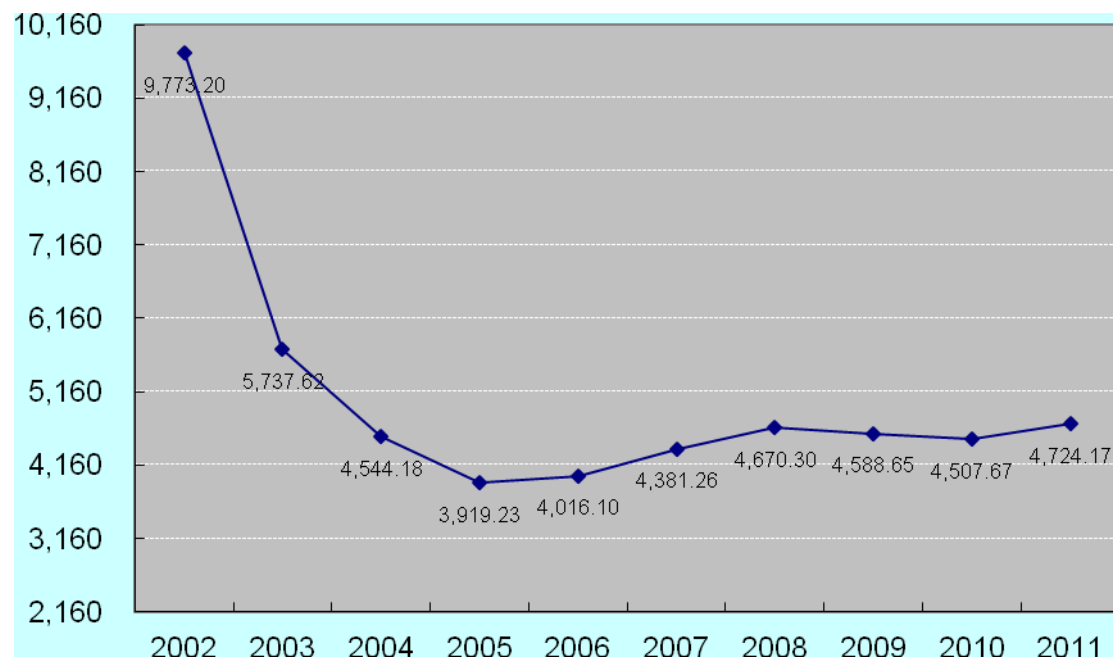


Figure12 : Taiwan air carriers flight hours of general aviation, 2002-2011

Public Aircraft

Due to different requirement of assignments, public aircraft 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.

After the promulgation of Aviation Occurrence Investigation Act on June, 2004, investigations of public aviation aircrafts were then officially the responsibility of Aviation Safety Council, Executive Yuan. 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 35 helicopters and 2 fixed-wing aircrafts under the NASC command. Till the end of year 2011, there were 29 helicopters and 2 fixed-wing aircrafts currently running by the NASC. In addition, the Civil Aeronautics Administration still owned 1 light aircraft in order to assist the airport navigation facilities flight test.

According to the data of NASC, as shown in Figure 13, the total numbers of flights were plotted against the total flight hours in recent years as showing in the curve graphs. From the graph, the total flight hours of 2002 was less than 1000 hours, but rapidly increased, to a total of 9,400 flight hours in 2005 and remained stable in continuous 3 years. In 2009, the total flight hours almost reached 10 thousand hours. In 2011, the total flight hours declined to 6,286 hours.

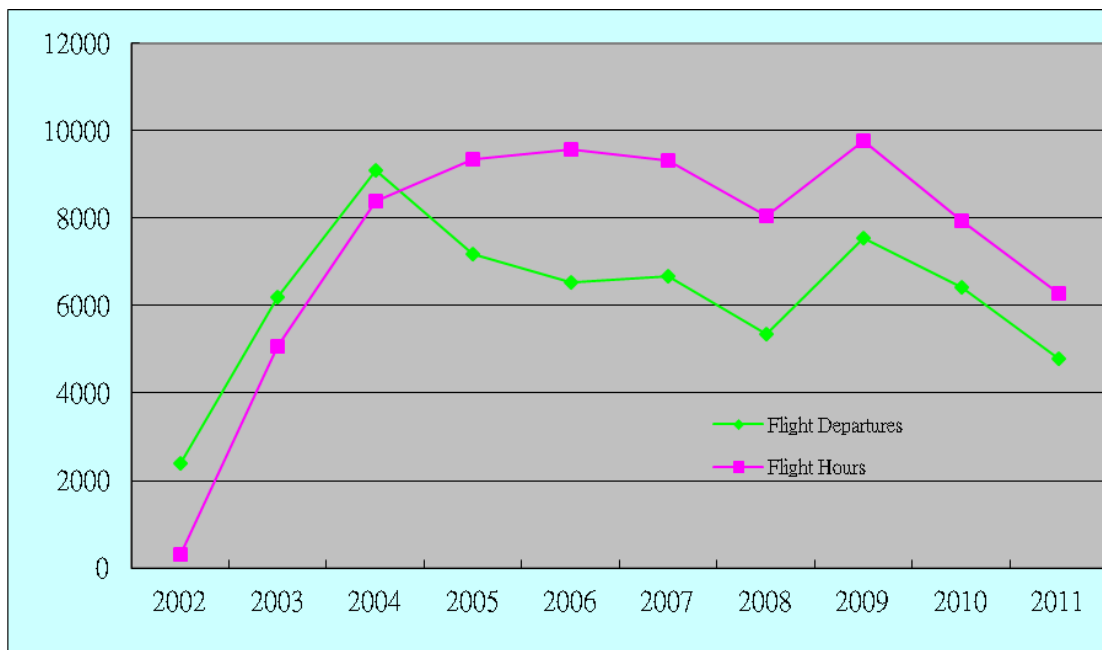


Figure13 : Total flight numbers and total flight hours of National Airborne Service Corps, 2002-2011

Activities of Ultra-Light Vehicle

The Ministry of Transportation and Communications added related provisions to civil aviation acts in 2003, concluded “Ultra-light Vehicle Regulation” in the following year, ultra-light vehicle then formally under CAA’s supervision. Furthermore, according to the CAA data, till the end year 2011, there are 19 available airspaces nowadays, and 7 of them were legal airspaces, among them, 1 is connected airspace and only 4 airfields could formally carried out ultra-light vehicle activities. Twelve ultra-light vehicle activity associations were approved by the Ministry of the Interior based on Citizen’s Organization Law. There was no formal statistics of ultra-light vehicle number in Taiwan.

Statistics and Analysis of Aviation Occurrence data, 2002-2011

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 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

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 engine 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.

The Boeing Company (USA) has presented a statistical summary of commercial jet airplane accidents worldwide. The statistics is confined to worldwide commercial jet airplanes that were heavier than 60,000 pounds (or 27,000 kg) 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. If occurrence involved 2 or more aircrafts, the numbers of occurrences were counted based on the numbers of aircrafts in the occurrence.

The definition of jets for statistics of the Civil Aeronautics Administration 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 by the Civil Aeronautics Administration, Taiwan.

Judging from the above information, global aviation accident data mainly focus on the large aircrafts (Maximum Take-Off Weight in excess of 15,000 kg or 27,000 kg). For local aviation accident data statistics, all size of aircrafts are accounted and categorized. Taking advantage of sharing the same pool of flight operation data from CAA, the statistics of this report adapts the definition of aircraft category used by CAA. The aviation occurrence data presented in this report are confined to all Taiwan domestic aircraft (except military airplanes and unmanned aerial vehicles), including:

- Aircraft of transportation category
 - Commercial Jet airplanes (models listed in Table 1)
 - Turboprop airplanes (models listed in Table 2)
- General Aviation (models listed in Table 3)
- Public aircraft (models listed in Table 4)
- Ultra-light vehicles
- Private owned vehicle: including a Robinson R-22 helicopter registered in March 2011.

A glossary of aviation and technical terms used in this document can be found in appendix 1. 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 etc.

Table 1 : Types of Taiwan commercial jet airplanes

BOEING	BOEING	AIRBUS	FOKKER	EMBRAER
737	MD-80	A300-600	F-100	E-190 AR
747	MD-90	A310		
757	MD-11	A320		
767		A330		
777		A340		

Table 2 : Types of Taiwan commercial turboprop airplanes

ATR	FOKKER	DORNIER	DE HAVILLAND	SAAB
ATR72	F-50	Do-228	DHC-8	340

Table 3 : Types of Taiwan general aviation aircrafts

BELL	AEROSPATIALE	KAWASAKI	HILLER	其他
Bell 206	AS-365	BK117	UH-12E	BN-2B
Bell 412				ASTRA SPX
Bell 430				KA32A11BC
				Hawker 400XP
				GV-SP
				BD-700-1A10

Table 4 : Types of Taiwan public aircrafts

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

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.

Overview of Taiwan aviation occurrences

From 2002 through 2011, the total number of aviation occurrences in Taiwan was 59, including those Taiwan air carriers' aircraft occurred outside the country. In general, transportation category aircraft occurrences accounted for the most (33). The remaining 26 occurrences were general aviation, public aircrafts, ultralight vehicles or foreign-registered aircrafts. Of those 59 occurrences, 242 fatalities were resulted, majorly due to the occurrences involving two transportation category aircrafts. Of the Taiwan carriers' transportation category occurrences, 2 were fatal, resulting in 227 fatalities. The details were shown in Table 5.

Table 5 : Aviation Occurrence Statistics in Taiwan, 2002-2011

	Number of Occurrence			Fatalities	
	Total	Fatal	Hull Losses	Total Fatalities	Aboard
Civil Aviation Transport Category					
<i>Commercial Jet airplane</i>	27	1	3	225	225
<i>Turboprop airplane</i>	6	1	1	2	2
Sum	33	2	4	227	227
General Aviation Aircraft	3	1	1	2	2
Public Aircraft	8	2	4	5	5
Ultra-light vehicle	11	5	11	8	8
Occurrences related to Sabotage, hijacking or terrorism	0	0	0	0	0
Foreign-Registered Aircraft Occurrence in Taiwan/ Occurrences Investigated by ASC	5	0	0	0	0
Total	59	10	20	242	242

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.

Fatal/ hull loss aviation occurrences in Taiwan, 2011

As shown in the Table 6, totally 6 aviation occurrences occurred in 2011, including 3 local civil aviation transportation category aircrafts, 1 public aircraft and 2 ultralight aircrafts. There was no fatality or serious injury of civil aviation transportation and public category aircrafts. The occurrence of Ultralight resulted in 2 hull losses one of them resulted in 1 fatality. The details were shown in Table 6.

Table 6 : Aviation fatal/ hull loss occurrence Statistics in Taiwan, 2011.

	Number of Occurrence			Fatalities	
	All	Fatal	Hull Loss	Total Fatalities	Aboard
Civil Aviation Transportation Category					
<i>Commercial Jet airplane</i>	2	0	0	0	0
<i>Turboprop airplane</i>	1	0	0	0	0
Sum	3	0	0	0	0
General Aviation Aircraft	0	0	0	0	0
Government Aircraft	1	0	0	0	0
Ultra-light Aircraft	2	1	2	1	1
Occurrences of Foreign-Registered Aircrafts Occurred in Taiwan	0	0	0	0	0
Total Sum	6	1	2	1	1

For transportation category aircraft, none of the occurrence in 2011 resulted in crew/passenger fatal or injured or aircraft hull loss, as shown in the Table7.

Table 7 : Fatalities or injuries caused by transportation category aircrafts in Taiwan, 2011

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

Occurrences involving civil transportation aircrafts

The cumulative numbers of passengers over the past 10 years were 247 million passengers. Of the passengers on board, 206 passengers were reported fatal. The majority of fatalities were caused by the catastrophic occurrence, CI611 occurrence in 2002

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. The fatality rate involving transportation category aircraft occurrences was 0.83⁷ fatalities per million passengers over the past decade. It's about 0.01 less than that of 2010. This was resulted from on board passengers of 2011 was more than those of 2001 by 520 thousand passengers. The fatality rate was about 1 fatality per 1.2 million passengers. The fatality rate could also be shown as 0.0357 fatalities per 100 million passenger-km, or in flight mileage as 1 fatality per 28 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
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	22.1	585.06	0	0
2009	0	0	22.3	569.2	0	0
2010	0	0	25.4	600.5	0	0
2011	0	0	25.9	601.2	0	0
Total	206	10	246.93	5776.57	0.83	0.0357

Note: Fatalities not including flight crew and cabin crew.

Fatal occurrence rate with 5-year moving average

The average occurrence rates of local turboprop airplanes of civil transportation category airplane were decreased since the year 2002. The occurrence rates were all zero from year 2007 to 2011. The occurrence rates

⁷ The global fatalities rate of western built aircraft operation for 2011 was 0.07 (per million passengers) announced by IATA.

of turbojet airplanes were also decreased since the year 2002. From the year 2007 to 2011, the 5 years moving average occurrence rates were all zero (0.0) which were the same as those of turboprop airplanes. Figure 14 is a 5-year moving average of fatal occurrence rate by million departures of Taiwan transportation category airplanes. From the figure, it showed clearly the fatal occurrence rates per million departures of local transportation category airplanes over the past decade.

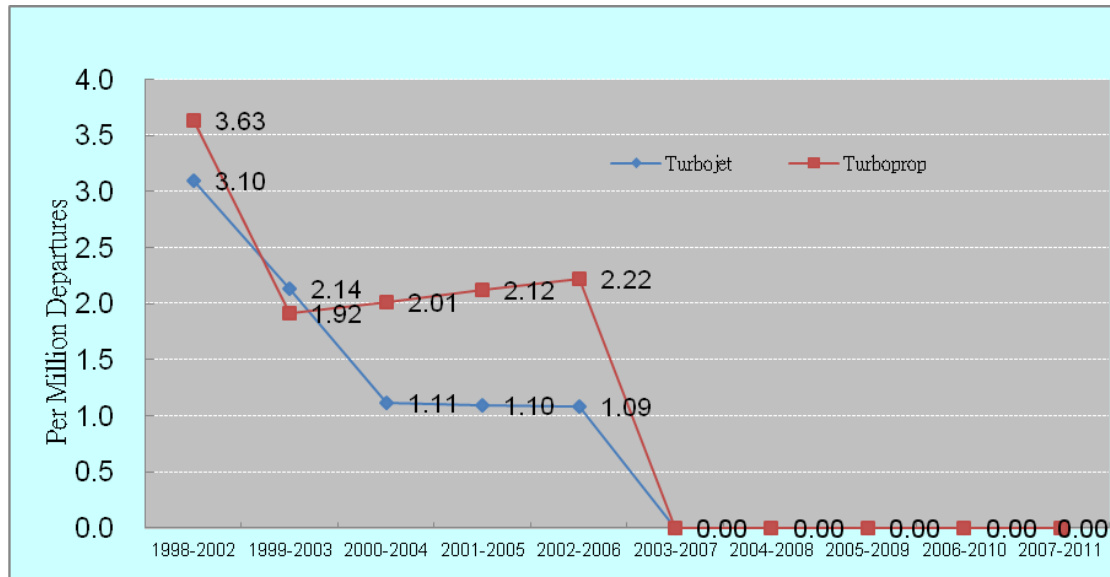


Figure14 : 5-year moving average of fatal occurrence rate by million departures, Taiwan transportation category airplane, 2002-2011

Hull loss occurrence rate with 5-year moving average

From 2007 through 2011, 5-year moving averages of hull loss occurrence rate in Taiwan were all zero. The commercial jet airplanes had a higher hull loss occurrence rate than fatal occurrence rates. This difference suggested that there were some occurrences where commercial jet airplanes hull loss occurrence resulted in hull loss, but without fatalities. The 5-year moving average hull loss rate of turboprop airplanes was 1.26 in year 2011, which was higher than that of 2010 (1.25). This was resulted from the cumulative numbers of occurrence were the same while the number of departures of the year 2011 were less. The 5-year moving average hull loss rate of Taiwan transportation category airplanes from 2002 to 2011 was shown in Figure 15.

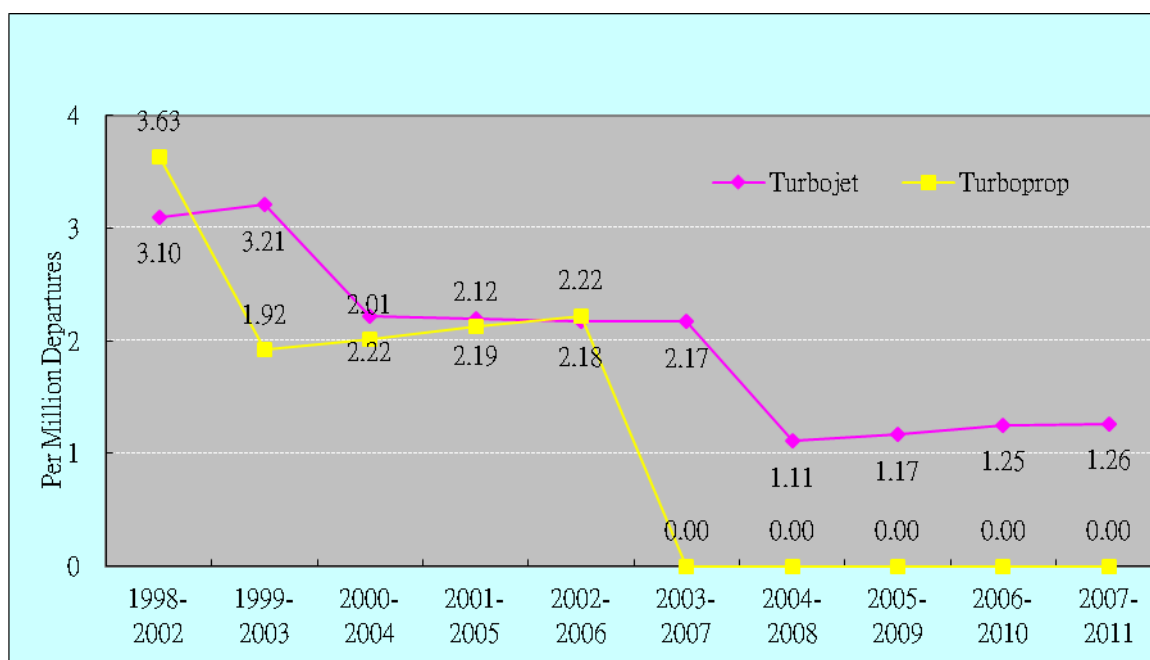


Figure15 : 5-year moving averages of hull loss occurrence rates by million departures, Taiwan transportation category airplane, 2002-2011

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 0.54 per million flight hours or 1.75 per million departures. In figure 17, the hull loss occurrence rate of turboprop airplane was 1.35 per million flight hours or 1.31 per million departures. From 2002 to 2011, the hull loss occurrence rate of commercial jet airplane was going down with little rising in year 2007 and then little decrease annually. The 10-year moving average hull loss occurrence rates for turboprop airplanes showed a decreasing trend except that the rates were kept constant from 2009 to 2011 over the past decade.

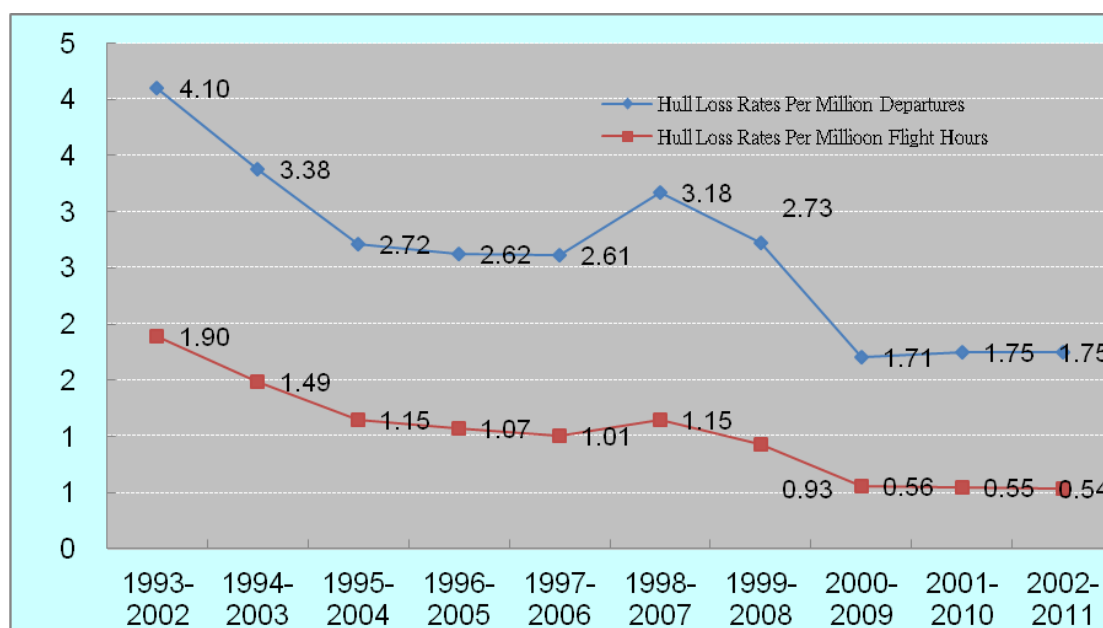


Figure16 : 10-year moving averages of hull loss occurrence rates of Taiwan commercial jet airplanes

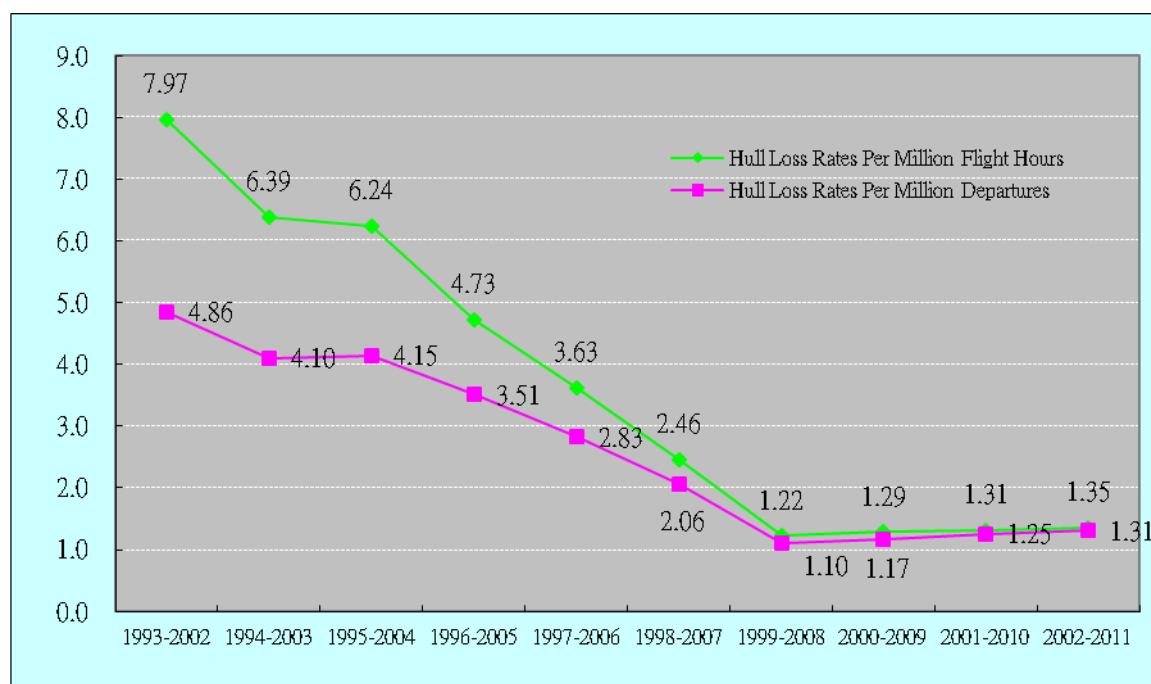


Figure17 : 10-year moving averages of hull loss occurrence rates of Taiwan turboprop airplanes

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 15 over the past 10 years. The average accident rate was 2.38 per million flight hours, or 6.06 per million departures. The yearly number and rate distribution of accidents was shown in Figure 18.

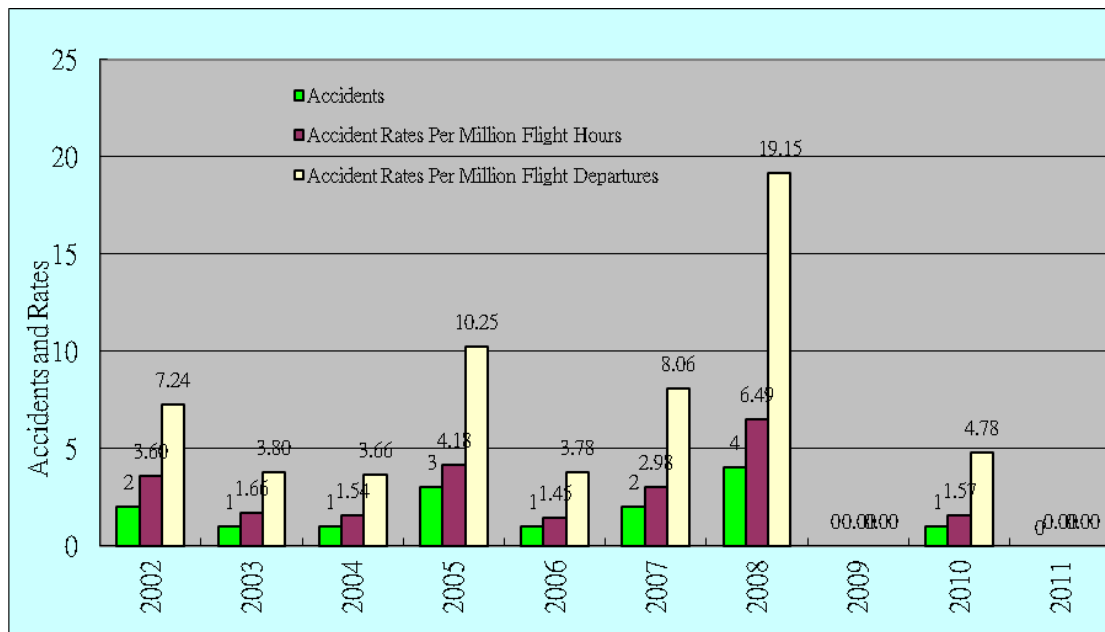


Figure18 : Numbers and rates of transportation category airplane accidents (ICAO definition), 2002-2011

Of the total 15 accidents, 13 of them were related to commercial turbojet airplanes. Of these 13 commercial turbojet accidents, 3 resulted in hull loss or fatalities, a total of 225 fatalities. There were 2 accidents involving turboprop airplanes. Of these 2 accidents, 1 accident resulted in 2 fatalities. Together, there were 4 transportation category airplanes accidents resulting in hull loss and 227 on board aircraft fatalities. The details were shown in Table 9.

Table 9 : Number of transportation category airplanes accidents (by ICAO definition), 2002-2011

	Total number of accidents	Numbers of hull loss or fatal accidents	Fatalities
Commercial jet airplanes	13	3	225
Turboprop airplanes	2	1	2
Total	15	4	227

From the severity level of injury and aircraft damage, a total of 15 accidents were distributed to different levels 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 and 5 cases respectively. Numbers for 「fatal/serious injury w/o aircraft substantial damage accidents」 were 2, and 「hull loss w/o injuries accidents」 were 2 as well.

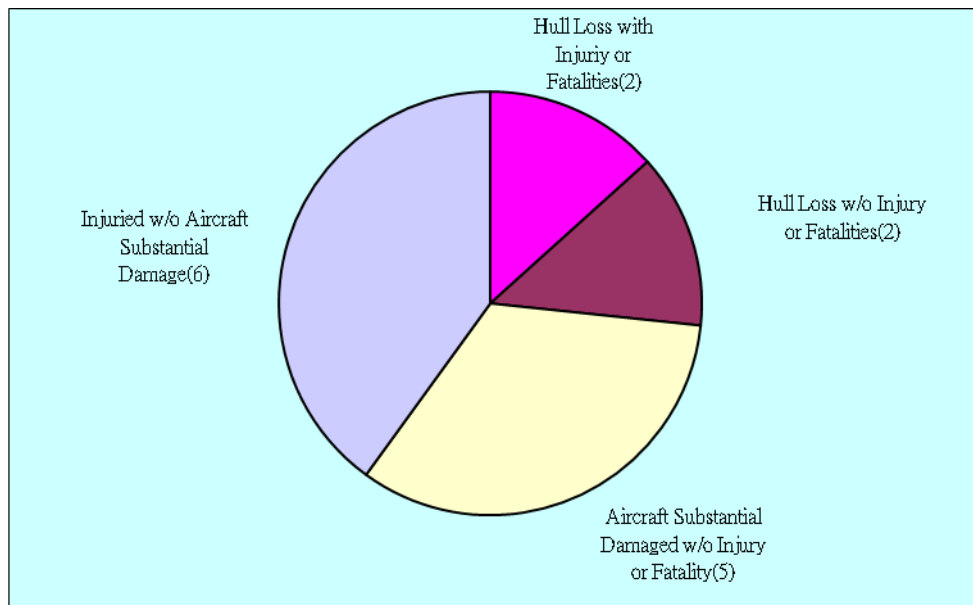


Figure19 : Transportation category accidents by severity classification, 2002-2011

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 33 transportation category occurrences happening at different phases over the last decade as shown on Figure 20. Among all these occurrences, 12 of them were the most prevalent cited occurrences taken place at landing phase.

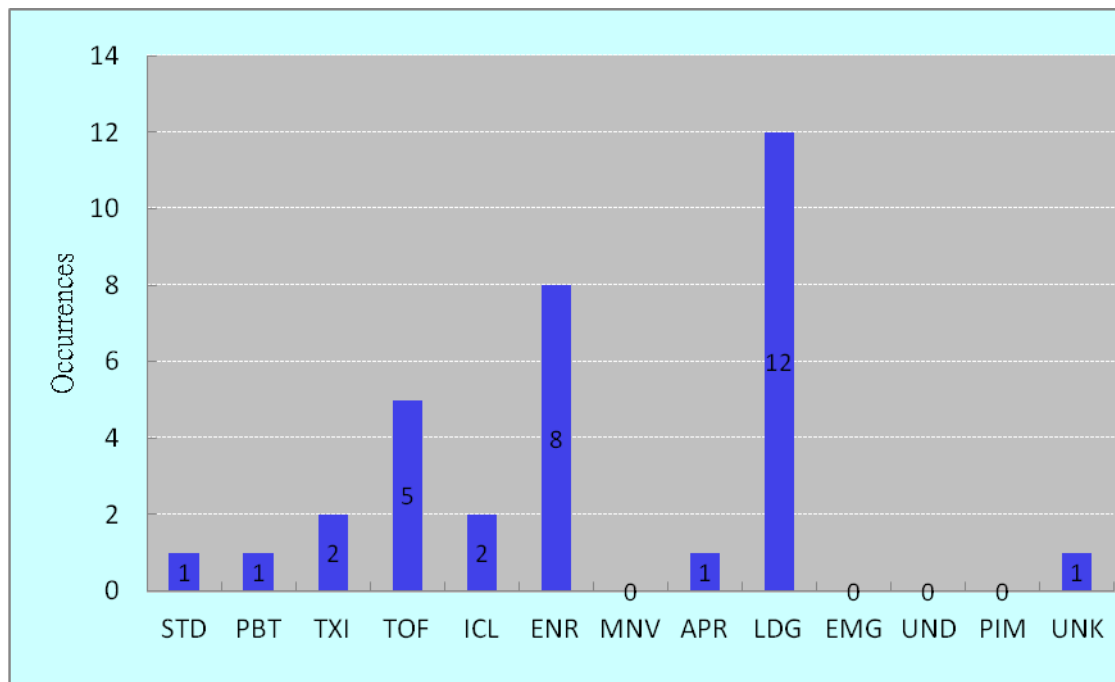


Figure20 : Occurrences distribution of transportation category airplane 2002-2011 by flight phase

Occurrence category by ICAO definition :

There were total 33 transportation category airplane occurrences happening over the last ten years as shown in Figure 21. The runway excursions overall were the most frequent and a total of 9 occurrences were reported. The second most frequent occurrences were the SCF-NP (system/component failure or malfunction/ non-powerplant), accounting for 5.

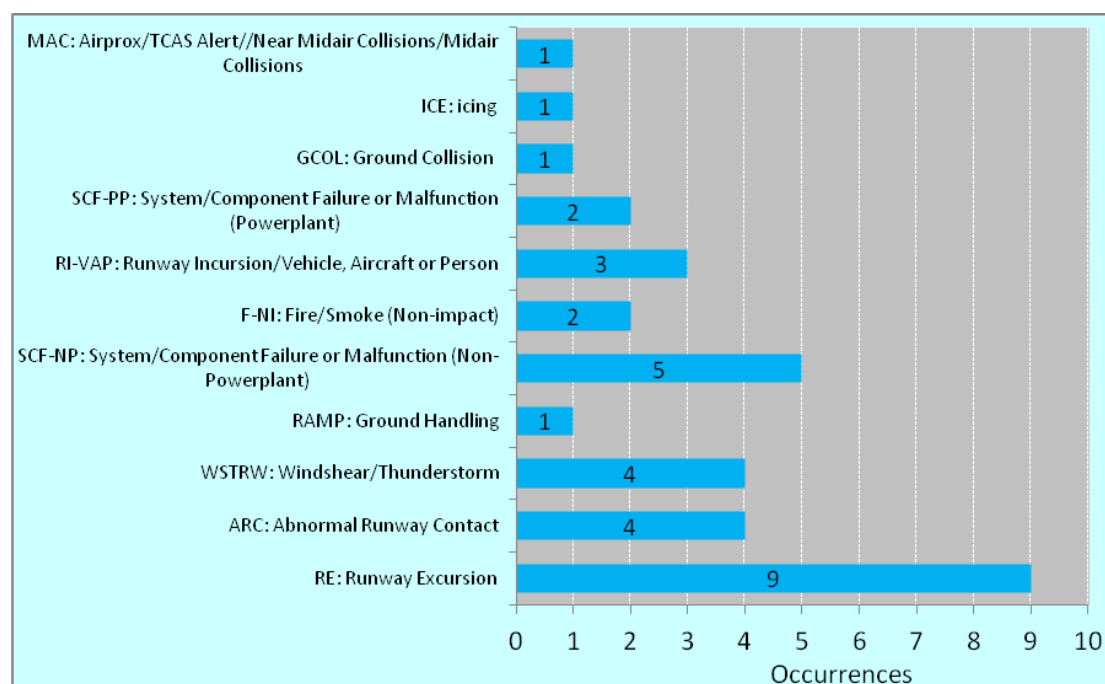


Figure21 : Occurrences distribution of transportation category airplane 2002-2011 by ICAO occurrence category

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 related. Personnel related classification included pilot and other personnel such as: maintenance personnel, air traffic controller, and management personnel. Environmental related categories included those causes related to weather, airport facilities, air traffic facilities, time of the accident (day or at night), 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 belonging to this category. Broad causes and/or factors for airplane of transport category occurrences over the last ten years were shown in Figure 22. In total, these 33 occurrences were all closed.

Within each occurrence, there was at least one cause that explained why the occurrence had happened, and some might have two or even more causes and factors. As shown in Figure 22, personnel were cited as causes/factors in 69.7 percents (51.5 percent were pilot related, 18.2 percent were other personnel such as maintenance personnel and air traffic controller related), followed by 33.3 percents of environment-related causes/factors and by 27.3 percent of aircraft-related causes/factors as indicated in the figure

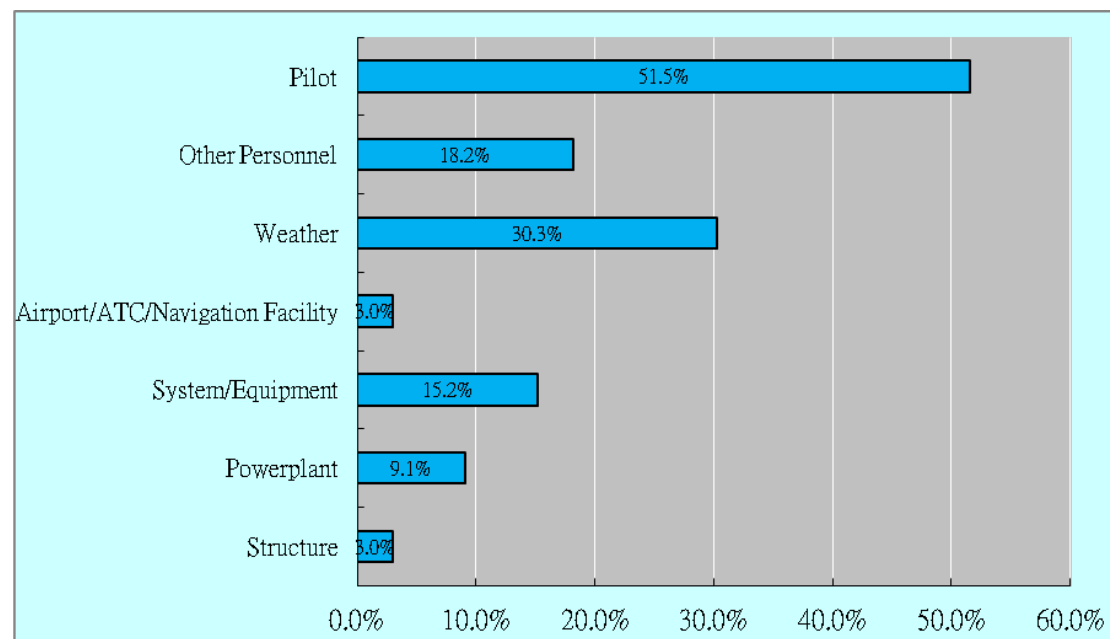


Figure22 : Broad causes/factors for airplane of transport category, 2002-2011.

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. The ASC classified the occurrence of general aviation aircraft as Class IV occurrence. Few corporations provide both transportation service and GA service. The following statistics were all related to general aviation service aircraft and helicopters. As indicated in Table 12, 3 occurrences occurred over the past ten years, 1 of them were fatal occurrences, resulting in 2 hull losses and 2 fatalities. The other 1 occurrence has no fatality or hull loss. This then led to an average of 5.53 occurrences per 100 thousands hours, 3.69 hull loss occurrences and 1.84 fatal occurrences per 100 thousands hours over the past decade. The fatal occurrences occurred in 2009. No occurrence occurred in 2010 and 2011.

Table 10 : Occurrence rate of general aviation / helicopter of transport category, 2002-2011

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
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
2010	0	0	0	0	4,753	0.00	0.00	0.00
2011	0	0	0	0	4,956	0.00	0.00	0.00
Total	3	1	2	2	54,220	5.53	1.84	3.69

Occurrences Involving Public Aircraft

From 2002 to 2011, there were a total of 8 public aircraft occurrences, which resulted in 2 fatal occurrences and 4 hull loss (including economically not repairable) occurrences. The statistics chart was shown as Figure 23.

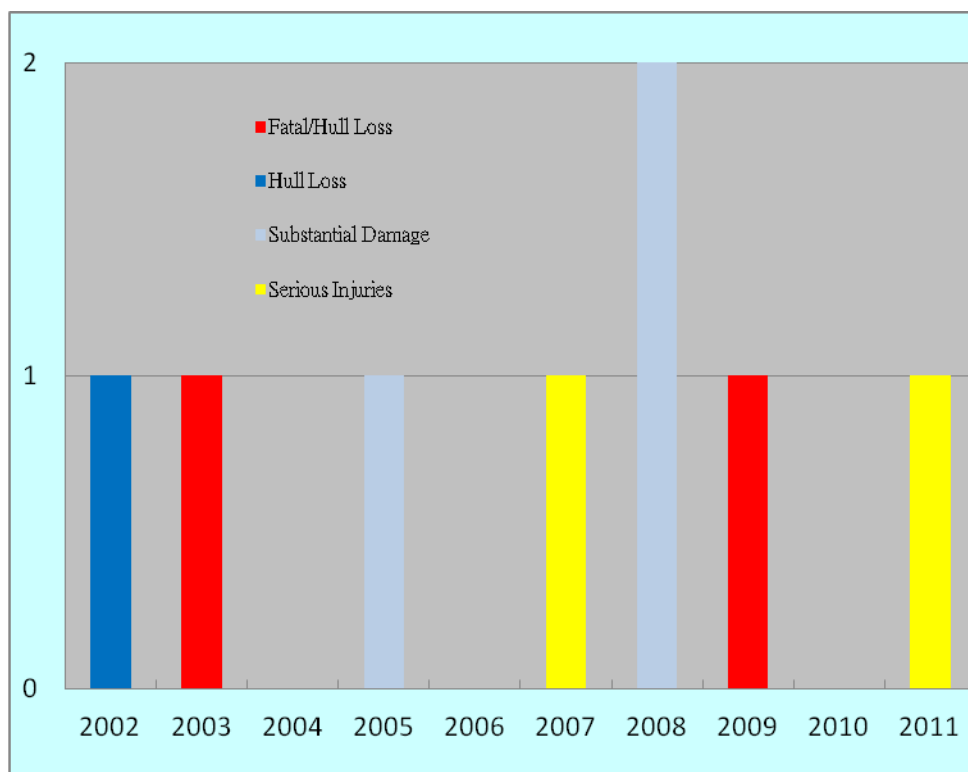


Figure23 : Occurrences statistics of public aircrafts, 2002-2011

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 formally been part of the investigation scope of Aviation Safety Council. 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 2011. As indicated in Table 13, a total of 11 occurrences occurred during these 8 years, and 5 of them were fatal accidents resulting in 8 fatalities. All 11 occurrences were resulted in hull loss.

Table 11 : Ultra-light vehicle occurrences, 2004- 2011

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	3	2
2008	0	0	0	0
2009	1	1	1	2
2010	1	0	1	0
2011	2	1	2	1
Total	11	5	11	8

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. The recommendations recipients would draft corrective actions and execution plan to solve potential safety problems.

From April 1999 to December 2011, there were 75 aviation occurrences investigation completed. In total, the council has made 604 aviation safety recommendations. Within these recommendations, a maximum of 51.0% were presented to associated organizations of Taiwan government agencies, approximately 33.6% were presented to aviation industries, and approximately 15.4% were presented to foreign associated organizations (as shown in Figure 24).

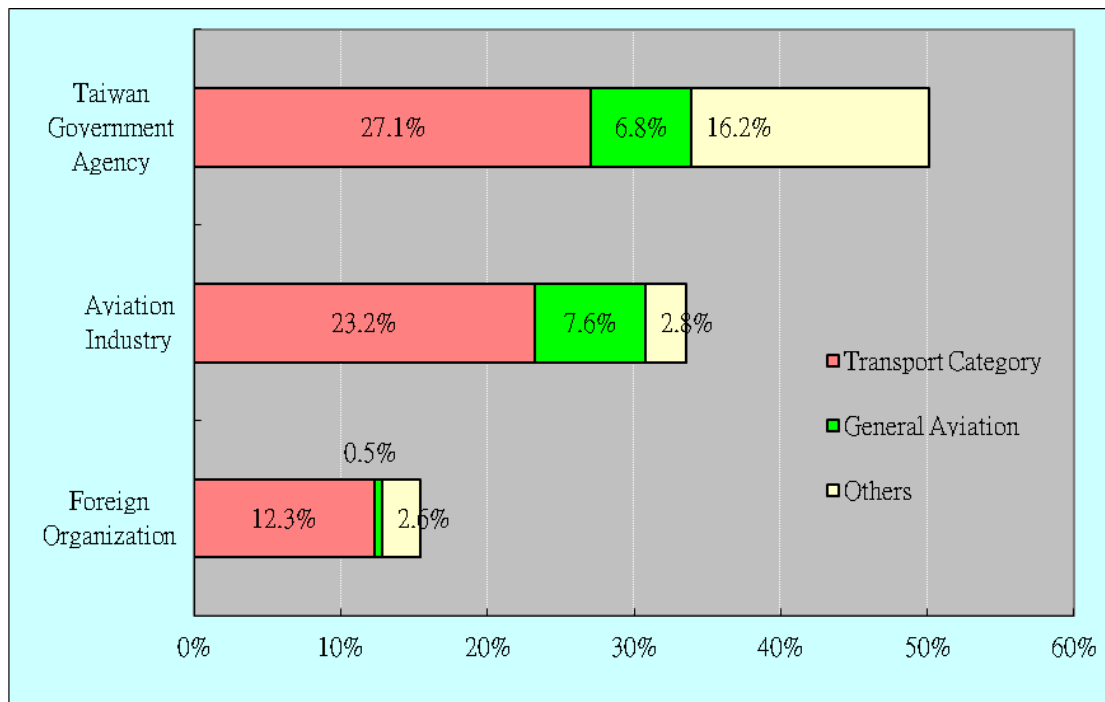


Figure24 : Statistics of Aviation Safety Recommendations, 1999.4-2011.12

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 Commission (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 continuously and then label as “under supervision”. Such items have regular follow-ups in every six months until the cases closed. 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 December 2011, there were total 386 action plans being presented by related Taiwan government agencies according to the aviation safety recommendations. Six of them is in the status of “under supervision”, and 11 of them is in the status of “under evaluation”. Of all the plans, 369 plans were identified as “accepted”. The statistics was shown in Figure 25, where the percentage of accepted plans was as high as 95.6%, with only 1.6% in the state of “under supervision”.

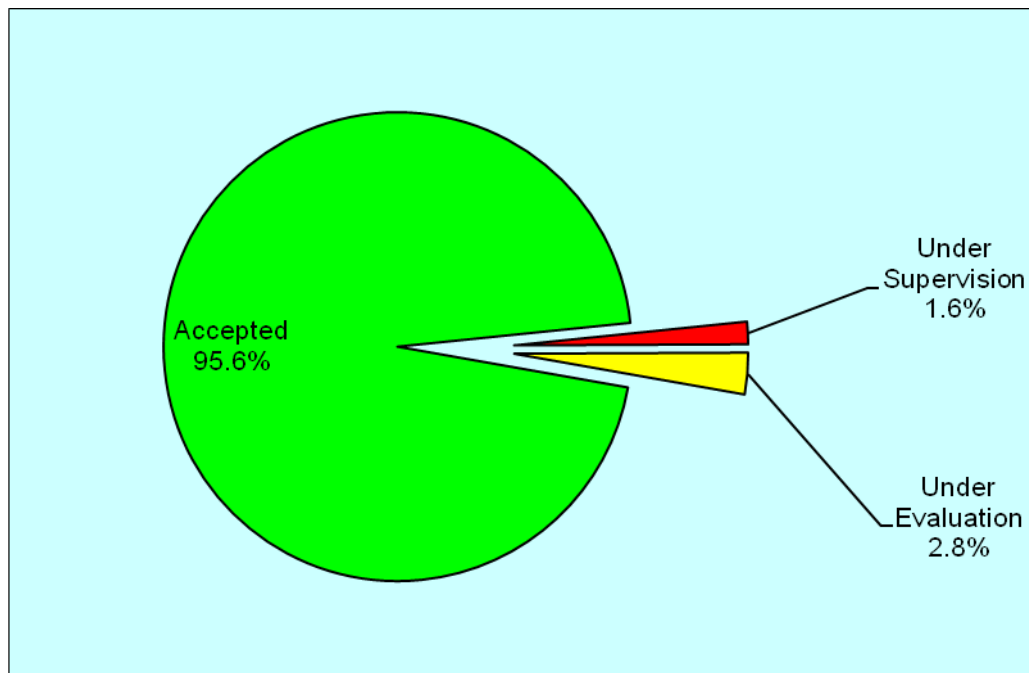


Figure25 : Statistics of action plans status

Definitions of Terms

Definitions of Civil Aviation Legal Terms

Aircraft : Means any machine that can derive support in the atmosphere from the reactions of the air other than the reactions of the air against the earth's surface.

Aeroplane : Means a power-driven heavier-than-air aircraft, deriving its lift in flight chiefly from aerodynamic reactions on surfaces which remain fixed under given conditions of flight.

Helicopter : Means a heavier-than-air aircraft supported in flight chiefly by the reactions of the air on one or more power-driven rotors on substantially vertical axes.

Civil Air Transport Enterprise : An enterprise engaged in the carriage of passengers, baggage, 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 transporting 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 :

Death or serious injuries : 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 fingers, 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 Damaged : 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.

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) :** From completion of Initial Climb through cruise altitude and completion of controlled descent to the Initial Approach Fix (IAF).
- **Instrument Flight Rules (IFR):** A set of rules governing the conduct of flight under instrument.
- **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 discernible 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-In-flight (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 specifying 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 gross 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 Occurrence : 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 Occurrence : An aircraft damaged to the extent that is not economically feasible to repair 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 Social-Economic Indicator in Taiwan, 2002-2011

Year	Unit	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Economic Growth Rate	%	5.26	3.67	6.19	4.70	5.44	5.98	0.73	-1.91	10.88	4.03
Gross National Product	Million Dollars	10,654,141	11,025,130	11,737,391	12,031,145	12,555,170	13,243,277	13,013,147	12,930,401	14,020,591	14,133,099
Gross National Product Growth Rate	%	5.25%	3.48%	6.46%	2.50%	4.36%	5.48%	-1.74%	-0.64%	8.76%	0.64%
Gross Domestic Product	Million Dollars	10,411,639	10,696,257	11,365,292	11,740,279	12,243,471	12,910,511	12,698,501	12,512,678	13,603,477	13,745,010
Gross Domestic Product Growth Rate	%	4.85%	2.73%	6.25%	3.30%	4.29%	5.45%	-1.64%	-1.46%	9.03%	0.96%
Average National Income	Dollar	419,317	430,748	454,640	462,853	478,968	501,848	482,982	477,188	519,067	518,315
Average National Income Growth Rate	%	4.92%	2.73%	5.55%	1.81%	3.48%	4.78%	-3.76%	-1.20%	10.02%	-0.57%
Participation Rate of Labor Force	%	57.34	57.34	57.66	57.78	57.92	58.25	58.28	57.9	58.07	58.17
Population	Thousand People	22,521	22,605	22,689	22,770	22,876	22,958	23,037	23,119	23,162	23,224
Population Growth Rate	%	0.51%	0.37%	0.37%	0.36%	0.47%	0.36%	0.34%	0.36%	0.19%	0.27%
Number of Households	Thousand Household	6,925	7,047	7,180	7,293	7,395	7,512	7,656	7,805	7,937	8,057
Number of Households Growth Rate	%	1.80%	1.76%	1.88%	1.57%	1.40%	1.58%	1.92%	1.95%	1.69%	1.51%

Appendix2: The Operations of Airline Companies in Taiwan, 2002-2011

Year			2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
The Nationality of Airlines		Number of Companies	13	12	12	12	12	12	12	12	13	13
		Operations of Civil Aviation Transporting Industry	8	8	7	8	8	8	8	7	8	8
		General Aviation Industry Operators	7	6	6	6	6	6	6	6	7	7
		Number of Registered Aircrafts	197	186	201	204	197	199	193	192	182	199
Aircraft of Civil Air Transport Enterprise	Domestic Passenger Flight	Passengers aboard	10748282	9949410	10435597	9571448	8606339	6320000	4908889	4564516	4824917	5192341
		Passenger- Kilometers	3335551	3083657	3281672	3020943	2748635	1973000	1473750	1268615	1238689	1361636
	International Passenger Flight	Passengers aboard	13926689	12308978	15738207	17081082	18085793	18470000	17192364	17775123	20603129	20708375
		Passenger- Kilometers	47722077	43527445	53986238	57772630	60294197	61314000	57032361	55649773	58812536	58761490
	Total Number of Passenger Flight	Passengers aboard	24674971	22258388	26173804	26652530	26692132	24790000	22101253	22339639	25428046	25900716
		Passenger- Kilometers	51057628	46611102	57267909	60793574	63042833	63287000	58506111	56918388	60051226	60123127
	Domestic Cargo Flight	Tonnage	57104	53159	55267	54555	53621	52383	49911	51076	50981	51462
		Passenger- Kilometers	8690	8077	7422	7023	6975	6450	6314	5626	5298	4886
	International Cargo Flight	Tonnage	1287590	1427700	1698853	1730241	1731481	1679542	1536589	1376553	1868875	1728436
		Passenger- Kilometers	8733977	9489420	11274247	11391722	11489345	11139070	9488982	8598983	11868040	10585121
	Total Sum of Cargo Flights	Tonnage	1344694	1480859	1754120	1784796	1785102	1731925	1586500	1427629	1919856	1779898
		Passenger- Kilometers	8742667	9497497	11281670	11398744	11496320	11145520	9495296	8604609	11873339	10590007
	Flight Routes	Domestic Routes	191978	168440	161863	146114	135943	112528	89813	82447	83019	87703
		International Routes	82719	81779	100745	109094	113546	119369	107210	106761	119982	121989
		Total	274697	250219	262608	255208	249489	231897	197023	189208	203001	209692
Helicopter for Civil Air Transport Enterprise		Flight Hours	313.55	260.82	306.58	399.57	387.88	580.22	361.22	270.35	244.93	231.72
		Number of Flights	448	548	738	1140	1012	461	460	630	484	67
		Passengers Aboard	3563	2641	4153	6137	5007	4606	2088	2709	2517	698
Helicopter for General Aviation		Flight Hours	9773.20	5737.62	4544.18	3919.23	4016.10	4381.26	4670.30	4588.65	4507.67	4724.17

Appendix3: The Operation Statistics of Public Aircraft, 2002-2011

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(T raining)	2396	322 : 05	AS-365 10	S-76B 2		
					BE-200 1	B-234 3		
					BE-350 1	UH-1H 8		
2003			6194	5079 : 15	AS-365 10	S-76B 2		
					BE-200 1	B-234 3		
					BE-350 1	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(T raining)	9094	8399 : 02	AS-365 10	S-76B 2		
					BE-200 1	B-234 3		
					BE-350 1	UH-1H 20		
2005			7187	9358 : 09	AS-365 10	S-76B 2		
					BE-200 1	B-234 3		
					BE-350 1	UH-1H 20		
2006			6518	9577 : 54	AS-365 10	S-76B 2		
					BE-200 1	B-234 3		
					BE-350 1	UH-1H 20		
2007			6663	9324:06	AS-365 10	S-76B 2		
					BE-200 1	B-234 3		
					BE-350 1	UH-1H 20		
2008			5338	8061:02	AS-365 10	S-76B 2		
					BE-200 1	B-234 3		
					BE-350 1	UH-1H 20		
2009			7547	9756:15	AS-365 10	S-76B 2		
					BE-200 1	B-234 2		
					BE-350 1	UH-1H 15		
2010			6408	7944:27	AS-365 10	S-76B 2		
					BE-200 1	B-234 2		
					BE-350 1	UH-1H 15		
2011			4796	6285:50	AS-365 10	S-76B 2		
					BE-200 1	B-234 2		
					BE-350 1	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 2010 only counted serviceable aircraft.

Appendix4: Aviation Occurrences and Rates (by Flight Hours) of Civil Aviation Transport Category Airplane, 2002-2011

Year	Fatal Aviation Occurrences of Jet Transport Aircraft							Fatal Aviation Occurrences of Turboprop Aircraft							Fatal Occurrences for All Aircrafts in National Civil Air Transport Enterprise						
	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
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
2010	0	0	0	571,651	0.00	0.00	0.00	0	0	0	66,234	0.00	0.00	0.00	0	0	0	637,885	0.00	0.00	0.00
2011	0	0	0	550,665	0.00	0.00	0.00	0	0	0	41,629	0.00	0.00	0.00	0	0	0	592,294	0.00	0.00	0.00
total	1	3	1	5,568,018	0.18	0.54	0.18	1	1	1	743,858	1.34	1.34	1.34	2	4	2	6,311,876	0.32	0.63	0.32

Appendix5: Aviation Occurrences/ Rates (by Departures) of Civil Aviation Transport Category Airplane, 2002-2011

Year	Fatal Aviation Occurrences of Commercial Jet							Fatal Aviation Occurrences of Turboprop Aircraft							Fatal Occurrences for All Aircrafts in National Civil Air Transport Enterprise						
	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 Departures	Fatal/Hull Loss Rate Per Million Departures
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
2010	0	0	0	150,402	0.00	0.00	0.00	0	0	0	58,979	0.00	0.00	0.00	0	0	0	209,381	0.00	0.00	0.00
2011	0	0	0	180,667	0.00	0.00	0.00	0	0	0	61,824	0.00	0.00	0.00	0	0	0	242,491	0.00	0.00	0.00
total	1	3	1	1,711,223	0.58	1.75	0.58	1	1	1	763,391	1.31	1.31	1.31	2	4	2	2,474,614	0.81	1.62	0.81

**Appendix6: Aviation Occurrences Involving Illegal Actions in Airlines
(Suicide, Damaging on Purpose, Terrorists), 2002-2011**

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

**Appendix7: Statistics of Aviation Safety Recommendations,
1999-2011.12**

Accepted by Type Aircraft	Government Related Agency	Aviation Industry	International Organization	Total	Percentage
Civil Air Transport Enterprise	164	140	74	378	62.60%
General aviation Enterprise	41	46	3	90	14.90%
Other	103	17	16	136	22.50%
Total	308	203	93	604	100%
Percentage	51.0%	33.6%	15.4%	100%	

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