Chapter One

Global Air Transport Developments,
Problems and Prospects: An Introduction
Man's insatiable desire to explore the frontiers of technology continues. This is by far the most powerful force which has propelled man towards adventure and exploration. Manned free balloons and gliders had once kept the dream alive until it became a reality on 17 December 1903 when the Wright brothers launched the first successful flight by a heavier-than-air powered machine. Since then, new technological developments in aircraft and engine design have greatly increased payload capabilities, range and speed, and brought aircraft to the point where they perform an indispensable public service in the carriage of passengers, freight and mail.

The jet age has moved into supersonic and satellite-based transport, shrinking global distances, promoting interdependence within the international community and conferring enormous economic advantages on mankind. Today the world of aviation is undergoing an unprecedented change. As the aviation industry looks towards the 21st century, it is confronting great opportunities and numerous challenges. The deregulation and liberalization of international civil aviation as well as rapid globalization of the world market have brought dramatic and

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3The Indian delegate to the 26th ICAO Assembly (Plenary Meeting), Montreal, 23 September-10 October 1986, ICAO Doc. 9494, A26-Min PH-14, pp. 20 and 21.
fundamental changes in the structure of air transport industry. These
global changes have also added new problems to those already existing.

An attempt is made in this chapter briefly to highlight some of these emerging problems. This chapter encompasses the objective of
the study; the role of air transport in the global development; regulation
of air transport in the pre- and post- deregulation phases; impact of
deregulation on the global air transport; an overview of the international
air law conventions including the Chicago Convention of 1944; bilateral
air services agreements such as liberal and open skies types; regionalism
in international air transport; recent air transport developments in India;
current air transport problems and challenges of air transport in the 21st
century. Finally this chapter will identify four aspects of air transport
for elaboration further in this study, viz. i) air safety and security, ii) air
cargo regulations, iii) aviation related environmental problems and iv)
legal issues relating to the implementation of the new Communications
Navigation Surveillance/Air Traffic Management (CNS/ATM) system.

Objective of the Study

The objective of this study is to highlight the role of air transport
in contemporary global society for passenger and cargo traffic, and its
importance in the development of the world economy. The regulation
of international air transport has ensued through national legislation,
bilateral agreements and multilateral treaties, regardless of the changing
nature of laws in the pre- and post-deregulation era. This study will,
however, be limited only to four aspects of civil aviation i.e. air safety
and security, air cargo regulations, aviation-related environmental
problems, and the legal aspects of implementation of CNS/ATM.
While there is some arbitrariness in selection of these focal points, it is submitted that these areas are somewhat interrelated. Also these clusters of issues have not received focussed scholarly attention.

The term "aviation" is often used incorrectly in lieu of the term "air transport". "Air transport" is more specific, referring usually to commercial air transport. "Aviation" is generic and includes military, state and private flying, aircraft manufacturing, air navigation, non-commercial air transport and speciality air services. The scope of this study is confined only to civil air transport, and not military or defence.

The Role of Air Transport in Global Economy

Civil aviation has, through the unremitting efforts of several generations in the past, greatly developed and become an important component of the modern transport system. It is both a service and an economic activity, determined by technological developments, military considerations, political expediency, national pride, considerations of national security, financial advantage, tourism promotion, etc. "The air, ocean and the canopy of outer space unite all nations and our planet," said Albert Plesman, the Dutch aviation pioneer, many years ago, and this has by now become a reality. The aeroplane has established itself as a widely accepted and preferred mode of transport for mankind across

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the continents. In the 1950s global routes became a matter of fact, with a sustained quest for larger and speedier aircraft. One of the major successes after the advent of flights was the introduction of the jet era, which brought about ultimate speed, safety, reliability and comfort in air transport.\footnote{Gray W. Salewicz, "Major Developments in Jetliner Technology", in Mark Blacklock, ed., International Civil Aviation Organization: 50 Years Global Celebrations, 1944-1994 (London, 1995), pp. 51-56.}

The evolution of the aeroplane into a major instrument of transport extending over sovereign territories and oceans has produced numerous regulatory problems for national aviation authorities. On the technical side, the problems include: the co-ordination of techniques and laws; the provision of meteorological services; the establishment of radio contact; air safety and security; environmental protection; aircraft nationality and registration; licensing of flight crews; airline operations and airport services.\footnote{See 18 Technical Annexes to the Chicago Convention 1944, ICAO Doc. E/P1/5000 (August 1988); also see, Jacob Shenkman, International Civil Aviation Organization (Geneva, 1955), p. 258.} The economic problems include: the formulation of economic policies and strategies over air transport; rules and regulations to implement basic aviation laws; licences and permits for national and foreign carriers; air carrier schedules and tariffs; air transport policy regulations \textit{vis-a-vis} trade, tourism and taxation; and bilateral and multilateral international regulations over air transport.\footnote{See ICAO Manual, n. 4, pp. 1-2.}

Air transport has, in addition to generating economic activity through airline operations, become an integral tool for conducting much of the world business - a means of distributing goods and services. In
so doing, air transport contributes substantially to economic growth and
development, acts as an essential service provider, a major investment
for capital and labour, and a contributor to the balance of payments. In
short, air transport is a particularly important yet often underestimated
catalyst for economic and social development.10

Air transport contributes over US$ 1,410 billion per year to the
world economy, in addition to the 24 million jobs for the world
workforce. By 2010 AD aviation's economic impact could exceed $1800 billion per year, with over 33 million jobs provided. The world
airlines, contributing substantially to the growth of global tourism, trade
and international understanding, now carry more than 1.5 billion
passengers every year, and by 2005 AD the number of people travelling
by air could exceed 2.5 billion each year.11 World airlines carried over 23
million tonnes of freight in 1994, representing approximately a third of
the value of the world's manufactured exports; they offer an
indispensable service to shippers and consigners throughout the world.
Air freight traffic is expected to increase faster than passenger traffic,
and an estimated 28 million tonnes of freight is expected to be carried
by 2000 AD.12

**Regulation of Air Transport: Pre and Post Deregulation Phases**

The commercial air transport has changed significantly over the

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11See The Economic Benefits of Air Transport (Published by ATAG, Geneva,
12A.D. Groenewege, "Dangerous Goods: A History (part II)"; Insight - A
November-December 1996, p. 43.
past two decades. Economic regulations shaping the industry and scheduled air services since the First World War were replaced by airline deregulation in the 1970s. At the same time, non-scheduled air transport, which developed on the basis of unilateral national regulations after the Second World War, was also affected. The whole air transport regulations reveal two phases: the pre-deregulation and post-deregulation phases. 13

In the first phase, air transport regulations have been completely controlled by national aeronautical authorities and international organizations. They have shown a strong tendency to impose rules and regulations on the airline industry and its related activities: aircraft manufacturing, airports, air traffic control, and air travel distribution. The national authorities have enforced airline regulations in view of airspace sovereignty, air safety standards, consumer interests, military and national security and national prestige. 14 In other words, the regulation of international air transport becomes a matter of organizing the international activity of air traffic in such a rational way that the waste of resources, harmful pollution, discrimination, economic loss, unsafe flights and lack of supply quantitatively as well as qualitatively are presented and corrected. This can be achieved by preserving the quality of the product offered on the market by screening the entry and quantity of competitors and limiting competitors, while preventing or eliminating the dominance in a given market of the competitors.

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14 Peter Haanappel, "The Transformation of Sovereignties in the Air", Air and Space Law, vol. 20, no. 6, 1995, pp. 311-17 at p. 312.
designated by an authority. In the commercial field, the governments have not just acted as regulators of the privately-owned industry, but acted as operators.

The resources for the construction and operation of airports as well as for major airlines themselves were all in the public sector. The main legal resource of air transport, take-off and landing time slots, and transit rights over national territory were regulated as a public monopoly by which nation-states limited foreign competition, conceding access to other states and their airlines only in exchange for reciprocal ranking of air space. Rate regulations, entry restrictions, curbs on the number of air carriers, airport charges, etc, are a few examples of regulatory controls on air transport, which have been promoted in the name of public interest. The governments have almost universally regulated air transport as an industry.

The introduction of the public (government) sector and the regulatory structures have been accepted by the international law as a matter of domestic jurisdiction of states. The Paris Convention of 1919 accepts a state's sovereign rights over its airspace, involving the national government in the regulation of the aircraft industry. The Warsaw Convention of 1929, the Magna Carta of aviation liability, has sought to

1 Wassenbergh, n. 5, p. 145.
18 See Article 1 of the Paris Convention for the Regulation of Aerial Navigation (known as the Paris Convention), 1919.
unify numerous rules relating to international carriage by air of persons and property and the rights of passengers and consignors of cargo. It establishes international responsibility of carriers and sets limitations on liability in the event of death or injury of passengers, and loss of or damage to or delay in transport of cargo. The legal regime governing the liability of air carriers in the carriage of passengers, baggage and cargo, comprises a number of international instruments collectively known as the 'Warsaw System', accepted at national and global levels.

**Chicago Convention on Civil Aviation, 1944**

The Chicago Convention of 1944 and the Bermuda Bilateral Agreement of 1946 have laid down the foundation for a national and international regulatory framework for international air transport, which could essentially be protectionist in nature and oriented towards maximum governmental involvement in the management of the world's scheduled international air services. The Chicago Convention, a world charter for civil aviation, establishes privileges and restrictions on all contracting states and reaffirms the principle that every state has complete and exclusive sovereignty over its airspace territory. No scheduled international air service may, it states, operate over or into the

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20 Peter Haanappel, n. 14, p. 313.

territory of a contracting state without the consent of that state.\textsuperscript{22} It provides for the adoption of international standards and recommended practices (SARPs) regulating air navigation and other technical matters. Because of these technical regulations today, at any given moment more than 10,000 aircraft from 1,200 airlines are safely operating across the continents and national boundaries with easy access from one air traffic control to another. All follow the same rules of the air.\textsuperscript{23}

The Chicago Convention has also established principles, structures and procedures for the International Civil Aviation Organization (ICAO) with a view to ensuring the peaceful use of aircraft and meeting mankind's safe, regular, efficient and economical air transport needs. The convention also entrusts the ICAO with the task of ensuring the safe, orderly and worldwide growth of international civil aviation, full respect for all the contracting states, equal opportunities for them to operate international airlines and the avoidance of unreasonable competition.\textsuperscript{24} The ICAO has been responsible for establishing guidelines and standards for navigational aids, technical characteristics for landing areas, aircraft certification, licensing of pilots and other specialized personnel, etc. Yet the agreement has left to the individual states the freedom to determine the internal regime of air transport and recognizes that states have extensive freedom vis-a-vis the rest of the world to do as they see fit with their own airspace, take-off and landing

\textsuperscript{22}Article 6 of the Chicago Convention.

\textsuperscript{23}Gray W. Salewicz, "Thousands of SARPS keep the industry Aloft", see in Blacklock, n. 7, p. 36.

\textsuperscript{24}See objectives of the ICAO, Article 44 of the Chicago Convention 1944.
capacities.\textsuperscript{25}

The 31st session of the ICAO Assembly acknowledged that the ICAO had over the past 50 years effectively and efficiently fulfilled its mandate. But it also expressed the view that the organization needed to become even more efficient when faced with rapidly evolving technological, economic, social and legal challenges under global financial constraints.\textsuperscript{26} In his opening remarks to the Assembly, the President of the ICAO, Assad Kotaite, acknowledged that the ICAO was not beyond constructive criticism and enthusiastically embraced beneficial change. He said: "We can change, we can adapt to a world that is changing rapidly around us. We can meet the enormous challenges - technological, economic, human, environmental - of our era and our future era."\textsuperscript{27}

Bilateral Air Agreements

Numerous bilateral agreements have been concluded by individual states granting traffic rights to one another. The goal of bilateral regulation in international air transport typically aims to implement some kind of inter-governmental agreement -- or understanding -- concerning air services between the territories of any two countries. The regulatory framework of bilateralism, which governs the conduct of scheduled international air services, is a consequence of

\textsuperscript{25}The legal regulatory framework is based on Articles 1 (sovereignty), 5 (right of non-scheduled flight), 6 (scheduled air services), 7 (cabotage), 15 (airport and similar charges) and 96 (definition) of the Chicago Convention.

\textsuperscript{26}31st Session of the ICAO Assembly (Plenary Meeting), Montreal, 19 September to 4 October 1995, ICAO Doc. 9661, A 31-min p.1-11.

\textsuperscript{27}See ICAO Journal (Montreal), July/August 1996, p. 37.
the principle of national sovereignty over territorial airspace\textsuperscript{28} and the requirement for permission or authorization to operate over or into a contracting state.\textsuperscript{29} Bilateralism involves the trading of market access and routes, the establishment of administrative and operating conditions and the exchange of concessions for each partner’s designated carriers.\textsuperscript{30}

Under bilateralism, the contracting states could at the same time act as representatives of their own national aircraft companies. The governments have, through bilateralism, protected and promoted the national airline industry by adopting protectionist policies.\textsuperscript{31} The national airline industry in practice dictated the air policies of many states. The same has been true for setting air tariffs; the contracting states reserve the power of authorization, but could otherwise turn tariff pricing over to the IATA, which is founded by the airlines. Traffic rights in airspace over areas not subject to national sovereignty are omitted from this system.\textsuperscript{32} Many of the traditional bilateral tools regulating market access, capacity, pricing and dispute resolution are being widely questioned over their responsiveness and suitability in providing the most efficient and economical development of air transport in the global world economy.\textsuperscript{33} The traditional bilateral air

\textsuperscript{28}Article 1 of the Chicago Convention.

\textsuperscript{29}Article 6 of the Chicago Convention.


\textsuperscript{31}Wassenbergh, n. 6, p. 175.

\textsuperscript{32}See Winter, n. 16, p. 133.

\textsuperscript{33}See ICAO. AT. Conf.14. WP14, p. 2.
services system is under growing pressure from various liberalization initiatives and is increasingly being seen as inadequate to accommodate the air transport industry and evolving travel needs.\textsuperscript{34}

\textbf{De-Regulation of Air Transport since 1978}

The second phase of the air transport law, the post-deregulation phase, has been characterized by a turn towards market orientation. The goal is still growth, but now the structure of the combined public sector organization and tight governmental regulations are regarded as unsuitable to effectively satisfy the increasing demand for air transport. The impetus for this development came from America in the late 1970s, with the passage of the US Air Cargo Regulation Act 1977, the Airline Deregulation Act 1978 and the International Air Transport Competition Act 1979.\textsuperscript{35}

The passage of the Airline Deregulation Act 1978 dramatically altered the airline industry. The Act removed statutory controls on domestic airline operations and led to profound changes in the structure of the airline industry. Market forces, not governmental agencies, began to regulate the industry. The result was an increase in competition, subsequent low fares and service expansion which brought air travel to millions who previously could not afford it.\textsuperscript{36} The deregulation was


vigorously promoted in the international sphere by the United States and welcomed in principle by other parts of the world, notably the European Union (EU), Canada, Australia, New Zealand, South Africa and, to varying degrees, a number of countries in Asia and Latin America.  

Unlike the US which made a rapid transition to the deregulated regime, Canada and the European Union made gradual approaches - more evolutionary than revolutionary. In Canada, the deregulation process which started in 1979 by the Federal Ministry of Transport has removed all capacity constraints on CP Air's share of the trans-continental market. Much more freedom was given in 1984 by the New Canadian Air Policy, which eased entry conditions, gave carriers more freedom to lower fares, removed all restrictions on conditions of service in route licences and repealed the regional air carrier policy. It was not until 1 January 1988 that the deregulation became an official policy.  

In the EU, the liberalization process began in 1988 with some flexibility to increase capacity on EU cross-border routes. In January 1993, the third package liberalization measures deregulated cross-border services in air carrier licensing, market access, fares and rates and competition. On 1 January 1997 freedom was given to EU member states to determine their own internal domestic air policy without discrimination between community carriers.

38 See Tae Oum, William Stanbury and Michael Tretheway, "Airline Deregulation in Canada", in Button, n. 36, pp. 5-42.
Impact of De-regulation on Global Air Transport

The attitude of the government and the industry towards the regulation of air transport has undergone a profound change over the past few years in almost all parts of the world. The worldwide impact of deregulation, privatization and globalization forced all parties to rethink the ground rules by which the airline industry had been regulated since the Chicago Convention 1944. Even many countries in Africa, which once adopted a defensive position against liberalization, have recognized powerful pressures for changes in the regulatory system. As Assad Koitae rightly said, "today an industry in structural transition as it seeks to evolve from one which is national flag carrier and government protected to one that will be in a more open, competitive, and sometimes a multinational environment." The global economic forces are compelling the governments and airlines everywhere to redefine their respective roles in air transport.

New concepts of ownership, financing, management and operation of air transport are emerging. Traditional patterns of state involvement are increasingly being questioned. Many governments have begun to pursue competitive policies domestically - including the continuing movement to privatise many government-owned airlines - and to expand foreign holdings in airline equity. As a result, there is a significant growth in the number of alliances over marketing, code


sharing and computer reservation system\textsuperscript{42}.

On the bilateral side, the general liberalization of the world trading has created an encouraging background for new aviation policies. Internal changes in the airline industry are also generating the same effect. Alliances, code sharing and other inter-airline agreements are changing the structure of the airline industry and producing new pressures to overcome the limitations of restrictive bilateral agreements.\textsuperscript{43}

Soon after the conclusion of the Bermuda II Agreement in 1977 and following the start of the deregulation in the United States, many countries have reached new liberal bilateral air service agreements, characterised by greater market access and minimal capacity restrictions which significantly reduced government controls on air carrier pricing.\textsuperscript{44} Under the Chile-US bilateral agreement of 1989, for example, an open skies regime was agreed upon proposing multiple designation, free capacity and free tariffs.\textsuperscript{45}

More recently, a few states have concluded or are currently proposing and negotiating “open skies” bilateral agreements, which could create a regulatory regime relying on sustained market competition for

\textsuperscript{42} \textit{Outlook for Air Transport to the Year 2003}. See ICAO circular 252-AT/103, pp. 21-23.


the achievement of air service goals and is largely devoid of a *priori* governmental management of access and pricing. According to the US Department of Transportation (DoT), the "open skies agreement" envisages open entry to all routes; unrestricted capacity and frequency on all routes; a liberal charter agreement; open code sharing opportunities; self-handling at airports; an explicit commitment to non-discriminatory operation of an access to CRSs and model safety and security provisions.

The US-Netherlands open skies bilateral agreement of 4 September 1992 - an example of the above kind - promote increased competition, better services, lower fares and new opportunities for all who participate. In May 1995, the US invited a group of countries to share their vision of liberalisation of the "open skies" policy and consequently reached new liberal agreements with Canada, the EU and many other countries. In November 1996, a liberal bilateral agreement was signed between Australia and New Zealand, which provided for a single aviation market with the unrestricted right to fly anywhere in other country.

**Regionalism In Air Transport**

The aviation liberalization within regions is also advancing fast.

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46 ICAO Manual, n.4, p.2.2-2.
47 See DoT order 92-8-13, Docket 48130.
48 See Wasenbergh, n.5, pp.85-86.
50 See BOK Henaku, *Regionalism in International Air Transport Regulation* (Leiden, 1993)
The EU has achieved this liberal regional pact. The US and Canada - each with its own domestic deregulations - have now reached agreement which would go a long way in creating a single aviation market between the two countries and this will eventually be extended to Mexico. In South America, aviation co-operation is one of the major objectives of the Mercosur Agreement and the Andean Pact. In May 1991, the five Andean pact countries adopted a resolution to open their skies for each other's carriers. The agreement, named Cartagena Accord, applies to the third, fourth, fifth and sixth freedom carriage by all countries. In July 1996, fourteen Caribbean states concluded a multilateral agreement on the operation of air services within the Caribbean Community which covers third and fourth freedom air services and air taxi operations. In the African region, states sought to increase co-operation in implementing the provisions of the Yamoussoukro Declaration 1988 concerning liberalized traffic rights for African Airlines, particularly at the regional and sub-regional levels. In South-East Asia, the Association of South East Asian Nations (ASEAN)

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53 Mercosur consists of Argentina, Brazil, Paraguay and Uruguay.
54 Namely, Colombia, Venezuela, Ecuador, Peru and Bolivia.
55 Third freedom - to carry passengers from the home country to another country; fourth freedom - to carry passengers to the home country from another country; the fifth freedom - to carry passengers between two countries by an airline of a third on a route with origin/destination in its home country; and the sixth freedom - to carry passengers between two countries by an airline of a third on two routes connecting in its home country.
is developing a free trade area which may lead to a single aviation market. In South Asia, seven regional air carriers have formed the Association of South Asian Airlines (ASAA) in August 1997, as an integral part of the South Asian Association of Regional Co-operation (SAARC).

Independent of the Chicago/bilateral developments, efforts have been undertaken during the Uruguay Round of GATT negotiations to establish a General Agreement on Trade in Services (GATS), including air services as well. The texts of GATS and its sectoral annexes have already been approved. The GATS sets forth the unconditional MFN treatment and other general obligations with respect to foreign service providers, with market access and national treatment being subject to specific national commitments. Contrary to the Chicago/bilateral system, reciprocity is not required, and an overall rather than sectoral balance is sought. The Application of GATS to civil aviation is, however, limited to ancillary (soft) rights and not traffic related (hard) rights. While ancillary rights were partly governed by the Chicago Convention and partly negotiated bilaterally along with traffic rights, they will now be subject to GATS or to a double regime. Conflicts of obligations will arise, and real effects on the liberalization of air services

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58 The founder members of the ASEAN are Indonesia, Malaysia, the Philippines, Singapore, and Thailand. Subsequently, Brunei, Vietnam, Laos and Myanmar joined, and Vietnam.

59 SAARC members are Bangladesh, Bhutan, India, the Maldives, Nepal, Pakistan and Sri Lanka.

are difficult to predict.  

Recent Developments of Air transport in India

In the air transport sector the liberalization/"open skies" policy started in India in the late 1980s. A strong consumer demand and constraints on the rapid expansion of national carriers and tourism potential have favoured this policy. India first introduced the "open skies" policy in cargo services and chartered flights for domestic and foreign carriers. The "open skies" policy in cargo has facilitated the emergence of all-cargo airlines in India. India's new economic policies in the early 1990s have triggered far-reaching fiscal, trade, industrial and economic reforms, aimed at accelerating growth, employment, productivity and technical innovations. The government repealed the Air Corporations Act 1953 and passed the Air Corporations (Transfer of Undertakings and Repeal) Act in 1994. The new Act ended 40 years of state monopoly and a large number of private domestic airlines are now operating in the Indian skies.  

The Airports Authority of India Act was passed in September 1994 and came into force on 1 April 1995 to promote an integrated development of airports, besides ensuring safety standards. The government has recently adopted an Airport Infrastructure Policy to utilize domestic and foreign capital for airport development. India's

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"open skies" policy in cargo services as well as its liberalization of tourist charters has not only given considerable boost to exports and imports but also promoted tourism. In the exchange of traffic rights under bilateral agreements, India is adopting a more flexible approach by negotiating fresh entitlements, or reviewing the existing ones. India approves of the progressive liberalization of rules over international traffic - but not at the cost of its national carriers.\(^6^4\)

India has, ever since it ratified the Chicago Convention on 15 December 1945,\(^6^5\) adhered to its basic principles, participated actively in and made a significant contribution to, the development of international air transport. Its commitment to the ICAO is demonstrated by its active involvement in the development of the Future Air Navigation Systems (FANS) concept since its inception. The future communication, navigation, surveillance and air traffic management (CNS/ATM) system proposed by FANS, has great potential to overcome the inadequacies of the present system, thereby improving safety and making more efficient use of airspace. At the 10th Air Navigation Conference in Montreal in September 1991, India endorsed the FANS concept for the implementation of satellite technology for CNS in civil aviation in a phased manner. India's position at the Conference was in favour of approving the transition from the existing terrestrial CNS system to the satellite-based CNS system. It cannot be denied, however, that in the beginning developed countries will benefit

\(^{6^4}\)The chief delegate of India to the 29th Assembly Session (Plenary Meeting) Montreal, 22 September- 8 October 1992, ICAO Doc. 9601, A 29-Min p/1-14, p.30.

\(^{6^5}\)See ICAO 50 Years, Notification of Acts of signature, ratification or accession. Attachment to state letter Le 3/2-9/54.
in a major way by the introduction of this new technology at the cost of developing countries.

New Challenges For Air Transport in 21st Century

Civil aviation, in its march towards 21st century, is indeed full of achievements which have made air transport one of the most efficient means of bringing people closer and aiding their development. And yet there are many challenges which should be tackled in order to ensure the sustenance of the achievements and serve the airline industry. The ICAO Council identified 11 major challenges for global civil aviation. They include communication, navigation surveillance and air traffic management (CNS/ATM); airport and airspace congestion; commercial developments and economic regulations; financial resources; unlawful interference with civil aviation; human factors in flight safety; environmental protection; the enhancement of ICAO standards; safety oversight and legal aspects.66

Civil aviation is entering a new phase of space technology, poised to develop its CNS/ATM system by FANS. The new satellite-based system will meet international aviation needs well into the 21st century, greatly enhance capacity - particularly in oceanic airspace - and thereby reduce airspace and airport congestion presently being experienced around the world. It will also allow aircraft to follow optimal flightpaths, saving time, fuel costs and increasing aircraft utilization. Particularly there will be a great change in the way pilots and controllers interact with each other. The major element of change involves

transition from ground-based to satellite-based system, individual to
global orientation and analogue (speech) to digital (data) technology. However, transition to this new system - one of the largest undertakings
ever envisaged to be carried out by the aviation community - will fundamentally effect the aviation administration, airlines and law enforcing authorities in the future.67

The demand for air transport has increased steadily over the years, averaging 6% per annum during the 1980s and most of the 1990s. Industry sources expect the demand to grow at this rate right up to the year 2000 AD. If this rate of growth remains steady, the volume of traffic could double every 12 years.68 This growth scenario, however, signals the imminence of airport and airspace congestion, requiring more financial resources for the aviation industry.

The congestion threat now remains the air transport's biggest and long-term challenge. It causes delays and unreliability of flight schedules for the passengers, reduces the efficiency of airline and airport operators, and forces a massive waste of energy and material. A study of the European Civil Aviation Conference (ECAC) 1995 shows that the improvement potential in ATM efficiency alone could be as much as ECU 2.5 billion per year and about 5% of the total airline costs. In the United States, air traffic control delays are estimated to cost the airlines

and their customers more than US$ 3 billion per year.69

One of the key challenges facing airports is the possible advent of larger aircraft, given the limited extent to which air traffic and subway slots can be increased. The aviation business environment will continue to change with considerable impact on the management and operation of airlines and airports. In particular, the following trends should be recognized for airports: increasing competition both among airports and between airports and other entities offering similar services; the establishment of autonomous airport authorities and privatization; new approaches in financing; and the growing role of charging systems in capacity management and decongestion. The major challenges to airports on the economic front are: the threat of airlines to blame their economic ills on airport charges; the possibility of gradual erosion in airport property rights and the right to retain profits from non-aeronautical activities.70

There is a need to find the necessary financing for air transport investment in order to ensure that traffic growth and consequent economic benefits are maintained and that financial polarization between the developed and developing countries is avoided. To assist efforts at financing air transport development up to 2010 AD, the ICAO has launched a study on investment requirements over the next 20 years for (a) fleet renewal and expansion, which represents the bulk of airline investment needs, and (b) airport and en route facilities. Traffic growth and fleet retirement patterns are the primary factors

69Ibid., p. 6.
70Oris W. Dunham, Jr., "ACI - The Voice of the World Airports", in Blacklock, n. 7, pp. 303-7 at p. 304.
influencing aircraft acquisition. Some 11,000 commercial jets worth $8,000 billion (1991 prices), it is estimated, will be delivered to airlines and leasing companies worldwide over the period 1991-2010.71 According to information collected from states and other sources, airport and route facility infrastructure requirements up to 2010 AD are estimated to be between $250 and $350 billion (1991 prices). The financing of this huge amount presents a serious challenge to the airline industry as a whole, primarily because the requirement reflects aircraft price increases, which are outstripping general inflation spiral.72

As the world approaches the 21st century, one of the main and perhaps most pressing challenges facing the mankind is the preservation of the environment and its fragile ecosystem. Civil aviation as a leader in economic and technological development, together with travel and tourism, has a major role in improving the quality of environment. Major aviation related environmental problems of the future are aircraft noise and engine emissions; air pollution near airports; depletion of ozone layer and the greenhouse effect; consumption of resources and waste disposals, etc..73

Another important challenge facing the aviation industry is unlawful interference with civil aviation, which not only causes human casualties but also undermines the trust in air transport. Unfortunately, the instances of unlawful interference continue to grow along with air

71See Investment Requirements for Aircraft needs and for Airport and Route Facility Infrastructure to the Year 2010. ICAO Circular 236-AT/95, p. 7.
72Ibid.
traffic growth. More than two billion people are expected to travel annually in the 21st century. In the words of Edmund Faller:

One of the major challenges, faced by the international aviation community as it approaches the next millennium, remains the safeguarding of air transport against acts of unlawful interference, to ensure that those two billion passengers will be able to reach their destinations without the constant threat of criminal acts of violence jeopardising their safety.\textsuperscript{74}

To combat this, it is essential that the ICAO member states adhere uniformly to high standards of safety and security. These standards must be toughened and continually reviewed and the governments have the capacity to monitor and ensure progress.

The deregulation of international civil aviation as well as the rapid globalization of world markets has brought about dramatic and fundamental changes in the structure of the air transport industry as a whole. Free-market principles now control international civil aviation to a large extent and the aviation industry is likely to experience profound changes in the years to come. By the turn of the century, experts predict, the global airline structure may well have been reduced to a mere half-dozen mega-carriers, each with subsidiary operations in major regions, such as North America, Europe and Asia.\textsuperscript{75}

Law follows technology. The advent of aerospace craft and its use for transcontinental carriage of passengers and cargo will undoubtedly call for serious examination of the adequacy of both air law

\textsuperscript{74}Quoted in F.A. Campbell, "Response to Hijacking", in Blacklock, n. 7, pp.207-290, at p.290.

\textsuperscript{75}Captain LHD Bakker, "IFALPA - A Brief Background", in Blacklock, n.7, pp.103-109, p.104.
and space law to meet the problems posed by the technological revolution. The technological developments in civil aviation imply an expansion of the corpus of air law in general and, in particular, the legal regime designated to regulate the technical aspects of international civil aviation. With the expansion comes the necessity to review some of the underlying assumptions and legal principles. These new technologies pose new challenges for a creative jurisprudence.76

The future regulatory arrangements, which the ICAO secretariat has proposed at the Fourth Worldwide Air Transport Conference in Montreal in 1994, were mostly based on the work of the ICAO group of experts on the Future Regulatory Arrangements for International Air Transport (GEFRA). The conference accepted the proposals relating to ownership and control, state aids/subsides, competition laws, the environment, taxes and various "doing business issues" such as ground handling, currency conversion and remittance of earnings, employment of non-national personnel, sale and marketing of air service products and computer reservation systems. The other proposals dealing with the "safety net" and safeguards were considered by the conference to provide a starting basis for regulatory arrangements, but were shelved for further definition.77

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The Conference reached a consensus on a number of related matters involving adherence to the International Air Services Transit Agreement, the ICAO's leadership role in the economic regulation of international civil aviation, co-operation with the World Trade Organization, the ICAO's environmental work, the promotion of training to regulate international air transport and the ICAO's future work on economic regulation. The Conference concluded *inter alia* that any change in approach to international regulation should have due regard to the objectives of participation and to the interests of all stakeholders in international air transport - including customers, airlines, airports and employees. The ICAO should, it recommended, continue to play its role in the evolution of future regulatory arrangements for international air transport on a bilateral, regional and global basis, taking into account the interests of all stakeholders and the states' effective participation in international air transport.  

Problems of Air Transport in Focus

The aviation industry has always been in the forefront of advanced and innovative technologies. These advances enabled the industry to transport more than 1.5 billion passengers annually - a figure expected to double in every 12 years. Nevertheless, this growth scenario risks facing new problems such as the application and implementation of new technologies; constraints on infrastructure; customs, immigration and mandatory visa clearances; the completion of embarkation and disembarkation cards; systematic examination of all incoming luggage, treatment of unaccompanied and mishandled baggage as cargo; and the

\[78\] Ibid.
disinfecting of aircraft with passengers aboard. Complicated documentary and inspection requirements, inadequate storage and overtime charges for clearance impede freight movements.

The fundamental constraints of air transport are: inadequate management staff/specialist training; growing unionism and difficulties in labour relations; scarce financial resources for aircraft acquisition, construction of new airports, modernization of old ones, and installation of air navigation facilities; growing consumer awareness and demand for better facilities; threats to safety, security and unlawful interference with civil aviation; illicit transport of narcotics by air, alcoholism and smoking in aircraft; ageing fleets; steady increase in airport and air navigation charges; growing environmental problems -- including air/noise pollution by aircraft and the impact of new measures of environmental regulation; the proliferation of taxes. - including value-added tax, passenger facility charges and airport securities charges on international air transport; worldwide inflation, unstable currencies, rapidly rising airline costs and air charges, increasing fuel prices, illegal discounting of tariffs and growing fare wars among airlines; and increasing airport and airspace congestion.

The expanding technologies of civil aviation, coupled with deregulation and privatization, have caused serious economic and financial problems to many airlines, particularly in the developing countries. The problems include state ownership or government interference in decision-making by the airline management; inadequate airport and aircraft maintenance facilities; lack of well-trained staff and specialists to cope with modern technologies; political instability,
economic fragility, large foreign debts and low per capita income. It is fundamental that the financial resources for the development of air carriers, airports and air traffic control facilities should be made more accessible to all. At present the developed states and large air carriers have easy access to inexpensive capital, while the developing countries and small airlines companies struggle with difficulties as the capital is available only at unreasonably high interest rates.

Well-established airlines are continuously seeking new ways and means of increasing their domination on the market through total or partial mergers, purchase of equity in other carriers, joint marketing agreements and co-operative ventures. At the same time, powerful computer systems are playing an increasingly important role in marketing air transport products and are among the most potent forces influencing the global international aviation developments. This new restructuring of the aviation industry will have a negative impact on the developing countries.

The present study will, however, focus on the following four issues: (a) safety and security; (b) air cargo management; (c) aviation-related environmental problems; and (d) legal issues relating to the application of the satellite-based CNS/ATM system.

81 Groenewege, n. 73, p. 22.
1. Air Safety And Security

The safety of life in the air has been the central problem, and the need for safety, security and regularity in air services involves the creation of suitable aerodromes, appropriate navigational aids, an efficient weather reporting system and also the maintenance of airworthiness and airline standards. The creation of a wide spectrum of aviation standards - the rules of air, the design of aerodromes, air traffic control, aeronautical information, aircraft maintenance and flight safety and security in aviation - will be highlighted in chapter II.

The problems of air safety and security are increasing with the growth of civil aviation. Issues like freedom and sovereignty in airspace are linked to air safety and security. In this context, a brief historical evolution of aviation manifesto up to the Chicago Convention will be discussed. The maintenance of international air safety and security has become a matter of great importance to the national governments and international organizations. The issues involved in the maintenance of air safety are also global in nature, which can be solved effectively by global organizations like the ICAO. The ICAO's role in maintaining air safety and its various programmes like the safety oversight programme, the Annex 17 of the Chicago Convention, the ICAO security manual, etc. will be discussed.

The phenomenal rise in aerial navigation, profound changes in aircraft design, engineering and speed and intense competition among the airlines all point to the increasing need for legal and other measures ensuring safety in the air. Aircraft accidents are caused due to mechanical defects, human failures in the cockpit, air traffic control
tower and airport, unlawful interference with civil aviation, environmental hazards, etc. The aim of an aircraft accident investigation is to prevent future disasters. Various issues involved in aircraft accidents -- including the development process of accident investigation from the Paris Convention 1919 till the Chicago Convention 1944 -- Article 26 and Annex 13 of the Chicago Convention and the aircraft accident manual of the ICAO will be major highlights in this respect. The issue over the limits of liability to passengers remains unresolved between the developed and developing countries. The liability limits will be briefly examined on the basis of the Warsaw Convention 1929 and other related protocols.

The safeguards for international civil aviation against acts of unlawful interference have been a matter of grave concern to the governments and the ICAO over the past four decades. The costs resulting from unlawful interference in terms of lost human lives, disruption of air services and adverse economic impact are incalculable. The international customary law has proved to be inadequate in persuading the states to co-ordinate a clampdown on terrorist acts directed against civil aviation. This called for specific undertakings by states through various conventions, agreements, declarations and national legislation. Most important conventions adopted by the ICAO are the Tokyo Convention 1963, the Hague Convention 1970, the Montreal Convention 1971, the Montreal Protocol (supplementary to the Montreal Convention) 1988 and the Convention on the Marking of Plastic Explosives for the Purpose of Detection 1991.
2. Problems of Air Cargo

Air cargo made very small beginnings in the postwar period, and it was for long believed that when specialized aircraft became available many of these problems would recede. We have, however, a wide range of aircraft designed specifically for cargo. In recent years - and particularly after the liberalization of the economies - the movement of cargo has increased in a big way. However, this surge has caused new problems in cargo regulations: cargo aircraft development and operation, mechanical system of cargo handling, storage of air cargo, loading and unloading of cargo, cargo insurance, customs and immigration clearance of cargo, cargo pricing, etc. The issues relating to international freight movements include airways bill registration, goods checking, customs and entry reporting, customer advice, delivery of documents, customs clearance and goods delivery. Building equipment, information system and well-trained staff are important in air cargo regulation.

The legal rules and regulations are essential for the smooth operation of civil aviation in both domestic and international spheres. This is no exception to air cargo regulations. The entry of new operators, pricing policy, the rights to fly, frequency and capacity, etc. have to be well defined. Some of these controls are self-imposed as a result of inter-airline operations, but the principal agents of regulations are the governments of independent sovereign states. In order to bring about necessary standardization between the countries, the powers of civil aviation regulation have been delegated to the ICAO and the IATA. An attempt will be made to highlight the economic regulations
of the ICAO, tariff regulations by the IATA and their role in regulating air mail, courier services, and the transport of dangerous goods and live animals by air.

The rights and obligations of carriers operating in air transport and different rules governing their liability to damage, loss or delay of cargo moved by air need an analysis. In air law, the liability of the carrier to passenger and cargo claims is governed by the Warsaw System. The convention was later amended by a protocol adopted at The Hague in 1955, by another protocol at the adopted at Guatemala City in 1971 and by four more protocols adopted in Montreal in 1975. It was also supplemented by the Guadalajara Convention 1961. The main focus will, however, be on the Warsaw Convention 1929 as amended by the Hague Protocol 1955, and the Montreal Protocol No. 4, which adopted new cargo regulations. This will also study the Chicago Convention on cargo regulations.

3. Aviation and Environmental Problems

The environmental impact of aviation has so far attracted far too less attention. Aviation industry groups concerned over environmental issues primarily focus on aircraft route and engine emissions, whereas the operational areas of aircraft ground activity, passenger, baggage, cargo and mail processing at airports have received limited attention. Airports utilize large land areas, contribute to air and groundwater pollution, produce huge waste and consume a great amount of energy. There is a need for an urgent upgradation of airports and their infrastructure. The main environmental issues facing world aviation are air pollution, the depletion of ozone layer, the greenhouse effect, the
contamination of surface water, soil and ground water, waste disposal, noise and engine emissions, national resource conservation and sustainable development, environmental laws and legislation and technology transfers.

These global aviation-related problems can only be solved by international agencies like the ICAO and the IATA. The ICAO's environmental-related activities are largely undertaken by its Council through its Committee on Aviation Environment (CAEP), and Annex 16 of the Chicago Convention [aircraft noise and aircraft engine emissions] and the airport planning manual seeking to protect the airport-related environment. The IATA's role has considerably increased in environmental matters in the recent past. Its environmental policies over aircraft noise are enforced by its environmental task force.

4. Legal Issues of CNS/ATM

The application of satellite technology assumes special significance in the context of rapid expansion of the aerospace industry in the changing aviation scenario. The present terrestrial technology is unable to cope with growing demands of air traffic. Hence, there is a need for a new management system. Recognizing the increasing limitations of the current system and the need for its improvements, the ICAO formed the FANS (Future Air Navigation Systems) committee in 1983. The committee has concluded that the exploitation of satellite technology is the only viable solution to overcome the shortcomings of the present terrestrial system on a global basis for the foreseeable future.
In using space technology, the development of the CNS/ATM system by FANS comprises four elements: the use of satellite and terrestrial-based facility for ground/air communications; employing of satellites to be initially provided by America and Russia to establish the required navigation programmes; the provision of surveillance service by means of an automatic and dependable surveillance system; and the improvement of air traffic control practices and facilities with the help of enhanced data exchanges. The new CNS/ATM computer combination promises improved safety, navigation precision and a substantial saving of costs and flying time, as it is predicted that air traffic will continue to grow in the years to come.

The implementation of the aeronautical CNS/ATM system by satellites in future is one of the most challenging aspects of civil aviation today. It combines the problems of airspace with those of outer space and telecommunications. Its regulation will not only have an impact on avionics but also will influence the structure and contents of legal regulation over technical aspects of civil aviation.

The major legal issues of this future system include the rights and obligations of states currently engaged in civil aviation; the problem of sovereignty over airspace vis-a-vis navigational controls from space; the financing of large capital investments; sharing of benefits from those investments; the protection of intellectual property rights in these systems and the principle of non-discrimination over access to the system. The other major legal problems of CNS/ATM bear upon its global coverage capability, which extends over several Flight Information Regions (FIRs), national boundaries and even ICAO
regions. In most cases, the FIRs) are at present associated with boundaries of the states (except oceanic regions) and the establishment of an overall coherent legal system without contradictions or tensions between national and international systems.

The ensuing chapters will examine these four issue areas predominantly from a legal perspective.