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WORLD OUTLOOK ON ARTIFICIAL INTELLIGENCE IN THE DEVELOPMENT OF MODERN AIR TRANSPORT SYSTEM

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ABSTRACT

Emerging developments in Air Transport Services (Airline, Airports & ANS) will include change in all the major areas and functionalities that an airport serves. Airport is the main component of air transportation system, being the physical location where air and surface transfer of cargo and passengers takes place. In the 21st century, the airport design must focus on the demanding needs of passengers and freight forwarders.the modern airport system would undergo a modified outlook in its design as per the country's cultural outlook. Secondly, changing aircraft technological modification and their characteristics would also influence the airside of the airports and which will be impacted, as per the requirements of the length, orientation and spacing of the runways will be modified and accordingly, landside will also be impacted to improve the efficiency of passenger terminal building configurations with the support of developing artificial intelligence in the airport system..Once the AI applied, airlines, airports and ANS can effectively handle the growing passenger volume and address the associated challenges.

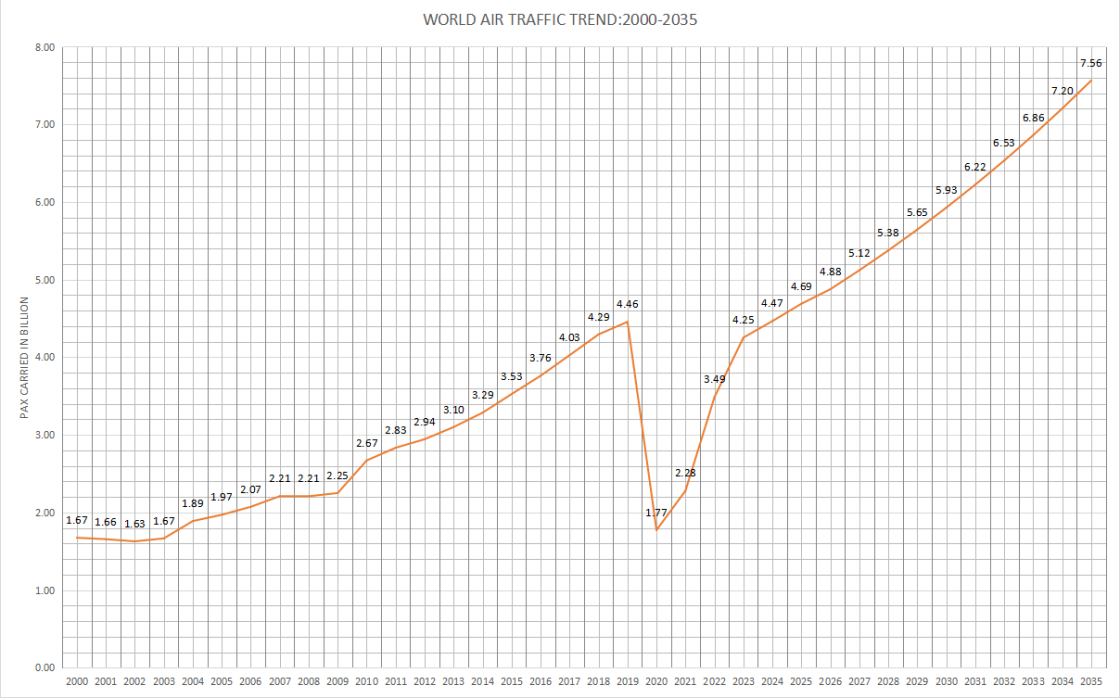
Key Words: Artificial Intelligence, Airline, Airport, Air Traffic Management, Biometrics, Smart Airports, Safety & Security, Passenger Process Flow

1.0 Introduction

Air transport is an important element of the economic system, as it has been an important means of long-distance traveling for decades.Airport is the main component of air transportation system, being the physical location where air and surface transfer of cargo and passengers takes place. In the 21st century, the airport design must focus on the demanding needs of passengers and freight forwarders. The design must provide fundamental of efficient operations where landing and take-off of aircraft, handling of passengers, cargo and crew. In addition, the airport must accommodate the advanced aircraft and navigation technologies. Globally, most of the governments have been planning to invest billions of Dollars for developing the modern infrastructure of the airports. The next section of the paper discusses few requirements for the construction of future airports.

2.0 Future Aspects of Airline & Airport Technology

Emerging developments of Airports will include change in all the major areas and functionalities that an airport serves. There are three main key scenarios which can be well thought out of are construction include changes in airport traffic, the infrastructure for supporting the enhanced traffic loads, and the methodologies used for managing these issues (Nuefville, R.D., 2000). As the governments are ready to reserve high amounts of investments for the purpose of modified construction of airports, and it has also become the major concern of technological sea change of the airline industry ; therefore, there are no economical constraints for the innovative and technologically advanced airport construction.



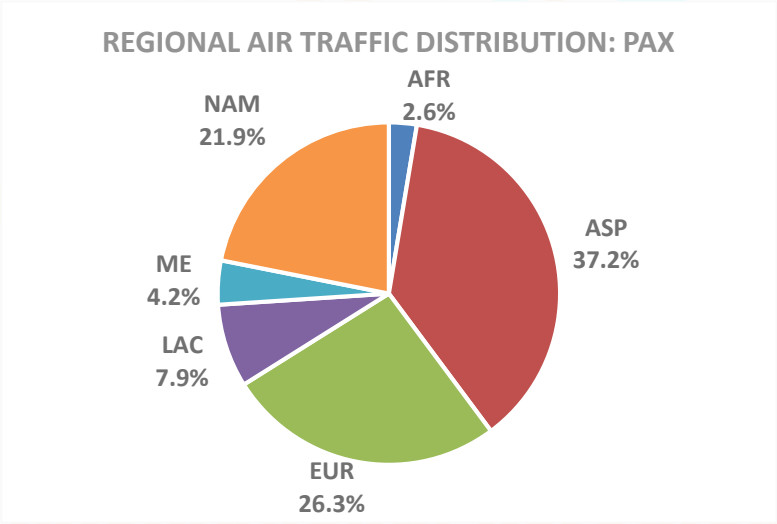
During the last 50 years, globally, air traffic has been increasing annually to 5.0% and this has increased the traffic from 310.44 million to 4.46 billion passengers carried during 2019. This increasing traffic load is the significant factor on which modern airport's infrastructure depends to meet with the demands of the increased number of passengers,aircraft movements and cargo handling. The travel demand will continue to grow, the International Air Transport Association (IATA) is projected that air travel will be doubled by 2037, reaching 8.2 billion

annually. This number means a great success for the industry but also a huge responsibility for airports and airlines, because of great safety risks there have to be strict regulations for passengers, staff and airplanes as well. The following table illustrates the global aviation statistic outlook region-wise during the year 2019

Table:1 Region-wise Air Traffic Movements: 2019

Regions	ATM in Million	Pax in Billion	Cargo in Million Tonnes	PLF in %	Annual Growth in %
Africa	1.25	0.24	1.00	73.00	3.4
Asia Pacific	12.82	3.40	22.00	82.00	4.2
Europe	9.11	2.40	10.00	84.00	2.1
Latin America & Caribbean	3.19	0.72	2.20	81.00	3.2
Middle East	1.26	0.38	6.70	74.00	4.1
North America	10.60	2.00	19.00	84.00	2.1
World	**38.23**	**9.14**	**60.90**	**79.67**	**3.2**

Source: Airport Council International Report, 2020



The above table:1 reveals the global air traffic reached to 9.14 billion passenger movement in 2019 and also seen cargo and ATM touched to 61.0 million tonnes of cargo and 38.23 million aircraft movements during the pre Covid period of 2019. Furthermore, Asia Pacific region seems to be more traffic concentrated region with high density of population being India & China most populous country, which will be resulting high traffic connectivity towards Middle East, European and North American regions.More importantly, domestic traffic plays a significant role in the Asia Pacific markets, especially China, India, Australia, Indonesia, Thailand, Bangladesh, Pakistan and so on. European region follows the second place in traffic density towards Asian and North American markets which is been used strongly to attract the global market opportunities. North America region stands in 3rd place in the air traffic distribution followed by Latin America & Caribbean, Middle East and African regions. The following chart illustrates the regional air traffic distribution.

It is also observed that the regional annual growth seen to be very optimistic during the next 15 years (2023-2038). Asia Pacific region is projected to grow @ AAGR of 4.2%, followed by Middle East (4.1%), Africa (3.6%), Latin America & Caribbean (3.2%),Europe & North America regions is projected to grow @ 2.1% annually respectively.

Table:2 Regional Airlines, Airports & ATC Systems: 2019

Regions	Airlines in No's	Airports in No's	ATC in No's
Africa	198	352	36
Asia Pacific	316	1214	35
Europe	375	756	44
Latin America & Caribbean	178	493	31
Middle East	68	114	14
North America	180	850	2
World	**1315**	**3779**	**162**

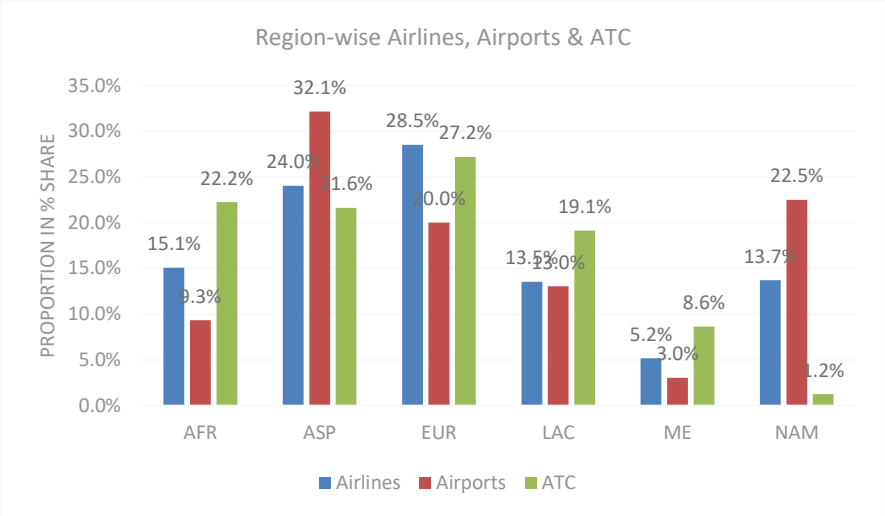
Source: ATAG Report, 2020

The above table-2 describes the regional scope of market opportunities comprised of supply chain market of airlines, airports & ATC to meet the growing demand of aviation markets at their regions.

Airlines: The largest pie is shared by the European carriers having 375 air carriers (28.5%) followed by Asia Pacific 316 air carriers with 24.0% share, Africa having 198 air carriers (15.1%), North America has 180 air carriers (13.7%), LAC with 178 air carriers (13.5%) and Middle East having 68 airlines (5.2%) regions.

Airports: Asia Pacific region has 1210 airports which is the largest share of 32.1% of the total in airport operations followed by North America having 850 airports sharing 22.5%, Europe with 756 airports (20.0%), Latin America & Caribbean has 493 airports (13.0%), Africa 352 airports (9.3%) and Middle East have 114 airports sharing the lowest of 3.0% amoung the regional airports concentrations.

Air Traffic Control (ATC): European region has the largest of 44 ATC operations sharing 27.2% of the total ATC operations followed by Africa has 36 ATC with 22.2%, Asia Pacific have 35 ATC sharing 21.6%, Latin America & Caribbean (31 ATC) sharing 19.1%, Middle East (14 ATC) with 8.6% share and North America has the lowest of 2 ATC sharing 1.2% the least share amoung the total regions.



3.0 Air Transport Economic Gross Value Added in Regional GDP:

Aviation provides rapid worldwide transportation network, which makes it essential for global business and tourism. It plays an indispensable role in assisting economic growth, particularly in developing countries. Airlines transported over 4.5 billion passengers in 2019, with revenue passenger kilometres (the distance flown by all passengers) totalling nearly 8.7 trillion. Air transport facilitates world trade and supports countries to contribute

in the global economy by increasing access to international markets and allowing the globalisation of production. The total value of goods transported by air, $6.5 trillion, represented 1% of all international trade and 35.0% of valuable trade. Aviation is indispensable for tourism, a major engine of economic growth, particularly in developing economies. Globally, 58% of international tourists arrival by air. Connectivity contributes to improved productivity by encouraging investment and innovation, improving business operations and efficiency, and allowing companies to attract high-quality employees. The following table-3 indicates the region-wise economic gross value contribution in the regional GDP.

Table-3 Region-wise Economic Gross Value in Billion USD

Regions	Economic Gross Value in Billion USD	Employment in Million	GDP Share %
Africa	62.5	7.70	2.7
Asia Pacific	944.0	46.70	3.1
Europe	996.0	13.50	4.4
Latin America & Caribbean	187.0	3.40	3.5
Middle East	213.0	3.40	7.6
North America	1170.0	8.30	5.0
World	**3572.5**	**83.00**	**4.4**

Source: Oxford Economics Report, 2020

Aviation's global economic impact (direct, indirect, induced and tourism catalytic) was estimated at $3.6 trillion, equivalent to 4.4% of world gross domestic product (GDP). North America region shares the maximum of US$ 1170.0 billion sharing 5.0% in the regions country's GDP followed by European region contributing US$ 996.0 billion sharing 4.4% in the regional GDP, Asia Pacific region shares 3.1% of the regions GDP contribution in value terms US$ 944.0 billion during 2019. Africa region share 2.7% in GDP with contribution of US$ 62.5 billion and Middle East region contributing US$ 213.0 billion sharing 7.6% of the regional GDP. The total employment opportunities generated by the aviation industry is approximately 83.0 million (Directly, Indirectly, Induced and Tourism). According to 2019-20, there are 1478 airlines operate a total fleet of over 33,299 aircraft. They serve almost 3,800 commercial airports through a route network of several million kilometres managed by 170 air navigation service providers.

3.1 World Air Transport Services in International Trade:

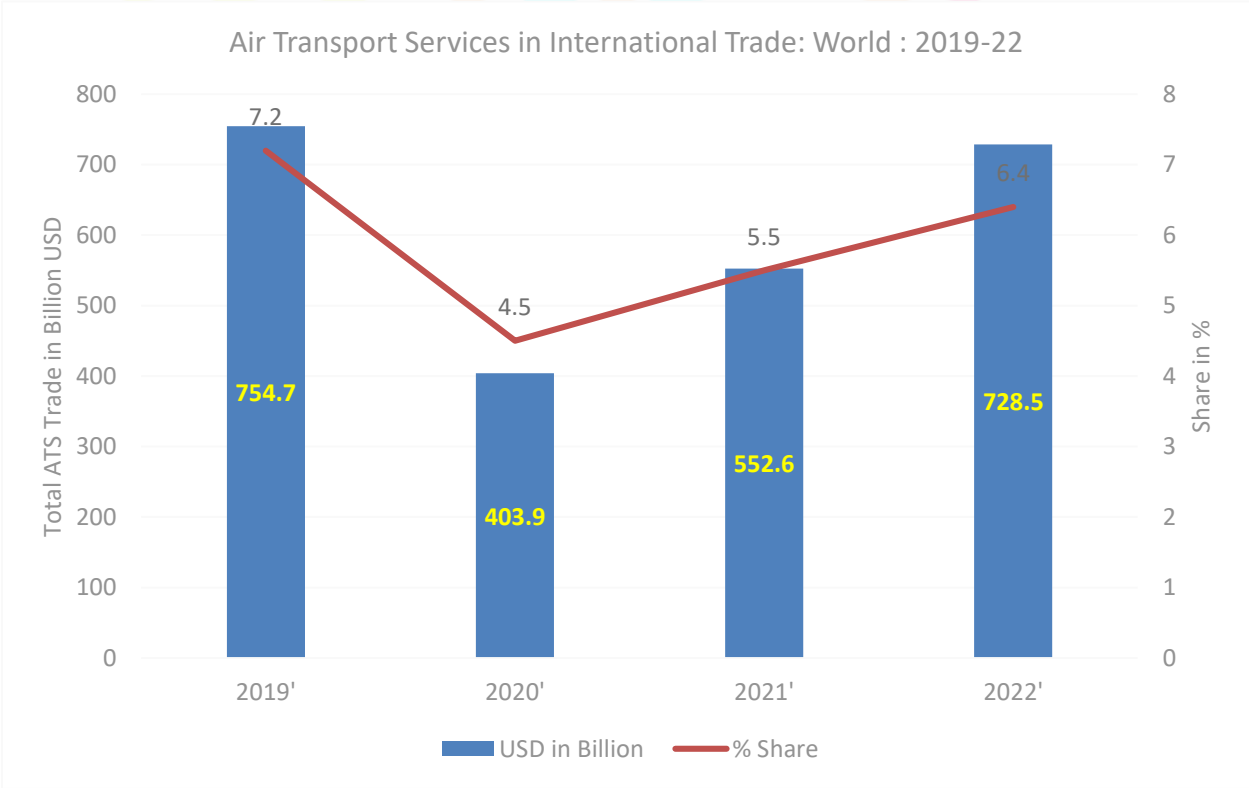
Efficient air transportation services can boost regional economic development by allowing access to the world market, facilitating integration and labor mobility and fostering local industries. Moreover, it also acts as a major facilitator of international trade in terms of the value of goods and services involved, and is important to specific industries, such as tourism, that are being developed by many lower income countries. Air transport services are defined as passenger and freight air transport (ISIC Rev 4, code 51), carried domestically or internationally. The STRI for this sector covers commercial establishment only. Air transport services are not only significantly traded in their own right but are an intermediate service for other kinds of trade. Air cargo transport is also a key determinant in meeting demand for time sensitive products, such as perishable goods, and often represents the only viable means of transport to remote, peripheral regions and landlocked countries. Air transport services contribute substantially to overall global trade in goods and services. Major exporters of air transport services are the European Union and the United States. The following table illustrates the air transport services in world trade and India during 2019-2022 for further understanding.

Table:4 World Air Transport Services (Goods & Services) in Billion USD & Share in World Trade: 2019-2022

Years	Export		Import		Total	
	Value in Billion USD	Share in %	Value in Billion USD	Share in %	Value in Billion USD	Share in %
2019	356.2	5.8	398.5	8.5	754.7	7.2
2020	189.5	3.7	214.4	6.0	403.9	4.5
2021	264.5	4.4	288.1	7.0	552.6	5.5
2022	361.4	5.2	367.1	7.6	728.5	6.4
% Change	+1.5		-7.9		-3.5	

Source: World Trade Organization, 2022

The total air transport services (Export & Import) accounts to US$ 754.7 billion of which export was US$ 356.2 billion and import was US$ 398.5 billion and their share in the export was 5.8% and import was 8.5% of the total international trade during the pre covid19 (2019). The overall AT service value declined to 46.5% (US$ 403.9 billion) in 2020 and thereafter increased by 37.0% (US$ 552.6 billion) and 32.0% (US$ 728.5 billion) in 2021 and 2022. The total share dropped to 6.4% from 7.2% in 2022. The share of air transport services in international trade may retain by 2023.



3.2 Air Transport Services: India in International Trade

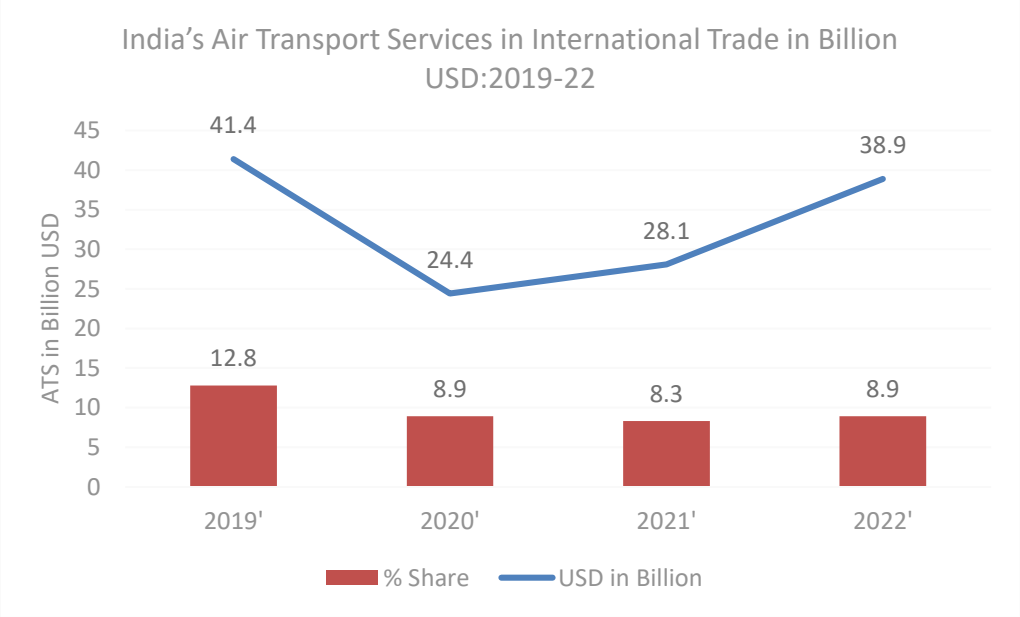
India's air transport service shares 12.8% of the total AT services of which India's export and import shares to 3.0% and 19.6% during pre covid19 (2019). The total value of air transport services accounts to US$ 41.4 billion during the same period. In 2022 the India's AT Service share has dropped to 8.9% from 12.8% in 2019. The overall AT service value declined to 41.1% (US$ 24.4 billion) in 2020 and thereafter increased by 15.0% (US$ 28.1 billion) and 38.0% (US$ 38.9 billion) in 2021 and 2022. The share of air transport services in international

trade may retain by 2023. The following table-5 highlights India's Air Transport Services Value and their share in total global trade.

Table-5 India's Air Transport Services in US$ Billion and their Shares in Total International Trade (2019-22)

Years	Export		Import		Total	
	Value in Billion USD	Share in %	Value in Billion USD	Share in %	Value in Billion USD	Share in %
2019	6.5	3.0	34.9	19.6	41.4	12.8
2020	5.5	2.7	18.9	12.3	24.4	8.9
2021	7.4	3.0	20.7	10.6	28.1	8.3
2022	8.3	2.7	30.6	12.3	38.9	8.9
% Change	+27.7		-12.3		-6.0	

Source: World Trade Organization, 2022



From the above subject related to air traffic demand, economic gross value and share of air transport services in international trade made a fact of how industry is moving towards growth and development in operations and economic contribution in the country's national income. These results supports in overseeing the regulations with good management to ensure safety regarding the processes from airlines, airports and ANS system. The management processes need to be updated to handle the growth of passenger numbers. So, the modern airline, airport system would undergo a modified outlook in its design as per the country's cultural outlook. Secondly, changing aircraft technological modification and their characteristics would also influence the airside of the airports and which will be impacted, as per the requirements of the length, orientation and spacing of the runways will be modified and accordingly, landside will also be impacted to improve the efficiency of passenger terminal building configurations with the support of developing artificial intelligence in the airport system..Once the AI applied, airports can effectively handle the growing passenger volume and address the associated challenges.

4.0 Artificial Intelligence (AI) and its Importance / Usable Fields:

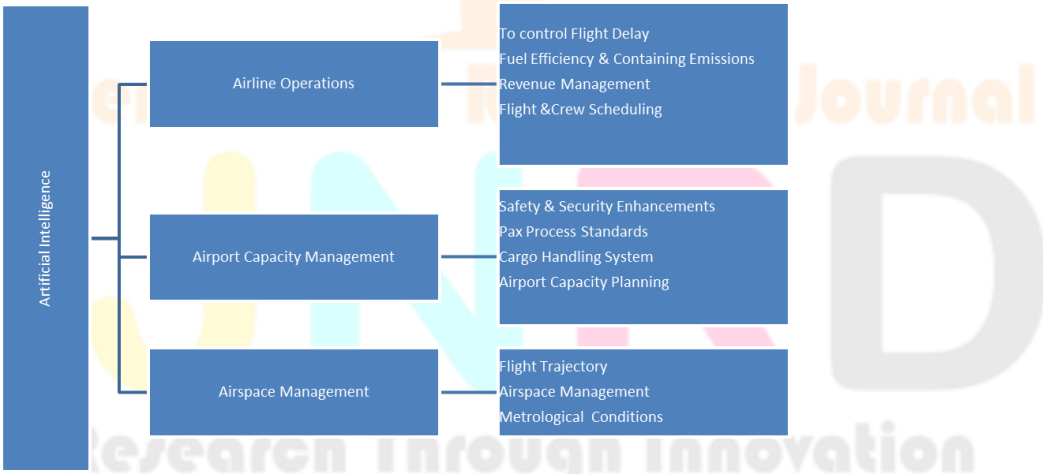
Artificial Intelligence is a branch of computer science, which is dedicated to create computers programs that can retroflex human thinking. Some AI programs can learn from their past by analysing complex sets of data and improve their performance without the help of humans to refine their programming. The core importance of AI is to speed up the tasks and processes with guaranteed accuracy and precision, making them a useful and valuable tool for decision making. It is also plays an important role to make error-free place with their simple techniques. AI can be used in four major areas, namely

1. Medical
2. **Air Transport**
3. Banking & Financial Institutions
4. Gaming & Entertainment

Role of AI in the Air Transport Industry:

The study major objective is to reveal the importance and contribution of AI in the air transport industry in the current environment of machine reading. Air Transport is the major systematic transport in the world and has become an urgent need of the hour is to to optimize their mode of operation.As on the year 2023, the the total passenger handled by air transport industry was 8.6 billion passenger, so there comes a role of an Artificial Intelligence, where the machine is involved in planning the routes along with the flight landing and take-off. Furthermore, artificial intelligence is been used in aircraft, navigation maps, taxing routes, and a quick examination of the entire cockpit panel to ensure the correct operation of each component. Hence, it gives very promising results and is being adopted very frequently. The ultimate aim of artificial intelligence in air transport is to give easier and more comfortable travel to human beings. Artificial intelligence (AI) can be utilized in the following areas for exploring the benefits to provide seamless travel to the travelling public.

Figure: 6 Artificial Intelligence in Aviation Operations



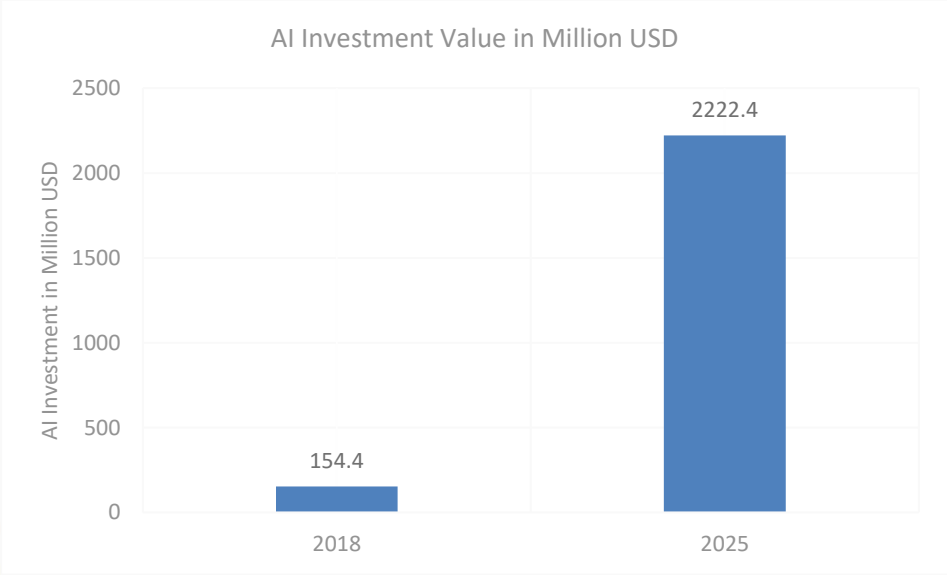
4.1 AI Investment in Air Transport Industry: 2018-2025

In fact, this technology is playing a crucial role in the aviation industry as airlines are investing in AI to help them become more efficient and competitive.From predicting flight delays to machine-learning technology, the use of AI is quickly becoming a real game changer in the aviation industry.The value of the global artificial intelligence market may be increased significantly in the coming period. The following table-6 discloses the AI investment in air transport industry.

Table:6 AI Investment in Air Transport Services:2018 - 2025

Years	AI Investment in Million USD
2018	154.4
2025	2222.4

The value of the global artificial intelligence market may be increased dramatically—from US$ 152.4 million in 2018 to a projected figure of US$ 2.2 billion by 2025.



In modern business, Artificial Intelligence (AI) and Machine Learning (ML) have affected strategy and decision-making positively in the form of predictive modeling. The use of ML (Machine Learning) and AI to predict arrival flight delays in the airport network. Flight delays carry severe social, environmental, and economic impacts. Deploying ML models during the process of operational decision-making can help to reduce the impact of these delays. Many literature review and critical appraisal were carried out on previous studies and research relating to flight delay prediction. In the literature review, the datasets used, selected features, selected algorithms, and evaluation tools used in previous studies were analyzed and influenced the decisions made in the methodology to evaluate flight delays and how to control flight delays.

4.2 AI & Airlines:

Air Transport is the major systematic transport in the world and has become an urgent need of the hour is to to optimize their mode of operation. So there comes a role of an Artificial Intelligence, where the machine is involved in planning the routes along with the flight landing and take-off charts. Furthermore, artificial intelligence is been used in aircraft, navigation maps, taxing routes, and a quick examination of the entire cockpit panel to ensure the correct operation of each component. Hence, it gives very promising results to perform more efficiently. The ultimate aim of artificial intelligence in air transport is to give easier and more comfortable travel to human beings.

Flight delay has become widespread in the United States with nearly one-quarter of all flights delayed by more than 15 minutes in 2007. The economic costs of delayed flights, including the direct effects of increased airline cost and the indirect effects of lost labour productivity for business travellers, an opportunity cost of time for leisure travellers, and

changes in consumer spending on travel and tourism goods and services. US net welfare would increase by $17.6 billion for a 10 per cent reduction in flight delay and by $38.5 billion for a 30 per cent reduction[1].

In today's interconnected world, efficient transportation systems are crucial for the global economy. Disruptions in the airline industry, such as flight cancellations or delays, have far-reaching economic consequences. According to a report by the International Air Transport Association (IATA), flight delays cost the industry approximately $30 billion annually[2]. Passengers affected by delays face financial burdens such as missed connections, additional accommodation costs, and loss of productivity. Furthermore, a study by the Air Transport Action Group (ATAG) estimates that for every minute of flight delay across all airlines worldwide, the industry incurs an additional $65 in costs[3]. These costs include increased fuel consumption, crew expenses, and potential penalties for violating airspace slots. In 2021 alone, air traffic control delays were responsible for more than 16 million minutes of delay, equating to a staggering cost of over US$ 1.0 billion.

The top 10 global airlines on time performance (OTP) for the year 2023 is outlined below-

Table:7 Top 10 Global Airlines OTP in %

Airlines	Ranking	On Time Arrival
Avianca Airlines	1	85.70%
Azul Airlines	2	85.51%
Qatar Airways	3	85.11%
Delta Airlines	4	84.72%
Iberia	5	84.38%
LATAM Airlines	6	84.00%
ANA	7	82.75%
JAL	8	82.58%
Saudia	9	81.29%
American Airlines	10	80.61%
Overall Average		***83.67%***

Source: Cirium, Annual Report 2023

From the above table-7, it is noted that global airlines average was 83.67%, which clearly outlines that approximately 16.0% of the average airlines is been delayed due to various reason. However, if the airlines uses AI in their operations, they may reduce further delay by 10.0% and push the airlines to perform above 95.0% of the top 10 global airlines. This may reduce their costs to more than 10.0% annually.

Fleet & Operations Management:

AI-powered systems has the prospective to assist airline operators to lower their operating costs and overhead by maximising their fleets and operations. Swiss Air and Lufthansa used AI and have stunning results in their experience in respective operations. Having applied AI technology for the purpose of improving efficiency,Swiss Air reclaimed US$ 5.4 million in 2019 and saw a boost in optimization efficiency for more than half its flights. Secondly, Lufthansa, also using AI to more accurately forecast wind patterns that blow from the north-east to south-west Switzerland. By helping to better predict wind patterns, the airline had a 40 percent improvement in accuracy, which in turn is helping with flight delays and cancellations at Zurich Airport.Thirdly, Delta Air Lines, American Airlines and Jet Blue invested in AI to optimize their respective operations.

[1] https://www.jstor.org/stable/24396355
[2] IATA Report, 2019
[3] ATAG Report, 2019

AI supports in Airline Operational Efficiency and Economic Gain:

a) Estimating and improving Flights Delays: .
b) Increased Fuel Efficiency & Containing Emissions
c) Pricing optimization and Revenue management
d) Streamlining airport check-ins and baggage procedures
e) Optimizing Flight & Crew Scheduling

4.3 AI & Airports:

AI in the airports would be revolutionizing the aviation industry by leveraging advanced technologies to enhance safety, efficiency, and the passenger experience.

Airport Safety & Security:

Airport being foremost centre for airlines to provide services and ensuring the highest safety and security especially with growing passenger volume. Special about aviation or airports in particular are the strict safety procedures, including comprehensive safety checks of staff, passengers and their luggage. The main goal for airlines and thus airports is to bring passengers safe to their destination, that is why the procedures above are necessary.Therefore, it has to prevent the following checks has to be followed before passengers enter into the aircraft:-

- Dangerous objects such as knifes, guns and other things which could get used as a weapon get into the plane
- Illegal substances are taken to the destination, or onto the plane in general
- Persons who are not allowed to fly enter the plane and further an other country
- Non-staff persons enter

By analysing data from various sensors and systems, AI algorithms can detect anomalies, predict potential risks, and provide early warnings to airport personnel. AI is able to detect unauthorized entries and can identify potential threats like left luggage.To sum-up the customer experience and safety are improved, especially in areas of interest for passengers.By analysing passenger data, AI algorithms can offer improved services, because of real-time information. AI can also facilitate seamless and contact less processes, such as automated check-ins, biometric authentication to relieve employees and shorten waiting times. So to be alert and careful, modern solution of artificial intelligence can be introduced and created for optimum use to have 100% safety free solution to benefit the airport service providers and provide efficient service to benefit the airlines and travellers.

Streamlining Passenger Process:

Streamlining airport passenger flow process is most critical factor for airport operator as well as to airlines.There are two processing system one for international and other for domestic sector. Airport capacity planning is done under the terminal pax process at various points from baggage to check=in immigration, security and exit to aircraft on the departure side, whereas on the arrival side baggage, immigration,customs and exit from the terminal. Managing huge passenger volumes and optimizing operations to ensure processes are according to plan for a positive customer experience and unhindered departures. Important is the passenger flow for the satisfaction of passengers are fast passage of:

- Check-In & Baggage drop-off
- Security checks
- Immigration
- Customs

- Pick ups at the luggage carousel

To meet this pax flow process, AI is very important key element in providing solutions for better services and fast movement in the terminal to hold and expand the maximum capacity of the terminal. The following benefit would be supported by AI for smooth operations.

Self Check-in & Baggage Drop Off: This solution supports a quick and independent pre-flight experience, which partly already exists at airports. Passengers can scan their travel documents, select seats, print boarding passes, and even tag their own baggage, the ability is given due to Artificial Intelligence. This modern technology streamlines the check-in process and minimizes the need for manual assistance, which reduces the staff cost for a ground handling agencies. These factors are powerful for an better customer experience and better total efficiency.

Passenger Flow Management Systems: These systems can denote congestion points, optimize queue management, and provide real-time alerts to airport staff. By understanding passenger flow patterns, airports can optimize staffing, streamline security checkpoints, and improve the overall passenger experience.

Benefits and Impact of AI on Airport Management:

Enhanced Airport Operational Efficiency: AI-powered systems can modify and optimize various airport processes, such as baggage handling and security screening. This leads to improved efficiency, reduced delays, and increased throughput, allowing airports to handle growing passenger volumes more effectively.

Airport Intelligent Decision-Making: AI algorithms can process large amounts of data and provide actionable display to airport management. This enables informed decision-making in areas such as resource planning, maintenance scheduling, and capacity management, leading to more effective utilization of resources and improved operational performance.

Improved Airport Safety and Security: AI contributes to enhanced safety and security at airports. Intelligent video surveillance systems powered by AI can detect suspicious activities, identify potential security threats, and enable proactive response measures. AI algorithms can also analyse passenger data and profiles to identify high-risk individuals or suspicious behavior, strengthening security measures.

Personalized Passenger Experience: AI enables airports to provide personalized services and experiences to passengers. Through the analysis of passenger data, AI algorithms can offer tailored recommendations, real-time information, and personalized assistance, enhancing passenger satisfaction and engagement.

Airport Cost Savings and Revenue Generation: Optimization and automation driven by AI in various airport processes can lead to cost savings through improved resource utilization and reduced operational inefficiencies. Additionally, AI-enabled data analytic can uncover new revenue opportunities by identifying trends, demand patterns, and areas for service or process improvements.

4.4 Air Traffic Management:

Air Traffic Control (ATC) will become more complex in the future decades as aviation grows and becomes more complex, and it must be improved to ensure aviation safety. Nowadays, Artificial Intelligence (AI) plays an important role in data management and ATC decision-making. AI is been recognized as an important and great potential in controlling ATC systems by providing advanced air traffic management systems, optimized paths, decision support tools, and UAVs. Artificial intelligence (AI) is used in several ways to improve the efficiency and safety of air traffic control (ATC) operations. Some of the ways that AI is being used in ATC,which include:

Traffic Management Systems**:** Artificial intelligence (AI) is increasingly used in traffic management systems to improve the efficiency and safety of traffic flow. One of the main ways in which AI is being used in traffic management systems is through the use of advanced traffic prediction and optimization of algorithms. These algorithms generally make use of data science and python to analyse real-time data on traffic flow, weather conditions, and other factors to predict traffic congestion and suggest alternative routes or traffic control measures reduce flight delays. Furthermore, by analysing huge amounts of real-time data, including flight trajectories, weather conditions, and airspace capacity, AI algorithms can optimise routes, reduce congestion, and improve airspace capacity utilization. This would influence to improve flight efficiency, shorter travel times, and improved sustainability.

5.0 Future Trends:

Future trends in technology would be backed by biometric system in the airport management system towards seamless travel.

Biometrics: Biometric technologies, such as facial recognition and fingerprint scanning, will become more prevalent at airports. This will enable seamless and contact-less passenger processing, including automated self-service check-ins and boarding procedures that can reduce paper completely.The first biometric airport terminal is already functioning at Hartsfield Jackson Atlanta International Airport. Similar system is now operational at Dubai International Airport for first and business class passengers. These are supported by AI towards passengers seamless experience.

New Future Airport System called Smart Airports: Worldwide many international airports started rational thought process and implementing new airport system called Smart airports management System. Smart Airports are airports that use intelligent systems such as sensor devices, which are made to enhance operational efficiency. Airports will increasingly adopt the concept of smart airports and will leverage IoT (Internet of Things). This includes smart infrastructure, automated processes, real-time data analytic s, and predictive capabilities for improved decision-making. The goal of smart airports is the improvement of staff performance, optimization of passenger flows, improved sustainability as well as increased airport security.

6.0 Conclusion:

To conclude, the integration of AI technologies in AIR TRANSPORT SERVICES would have great impact for the addressed challenges multiplied by the growing passenger volume and leads to operational efficiency. Moreover, AI can also contain the costs and make economic gain approximately 10.0 - 20.0% annually for airlines, airports and air navigation services. To end, the study quoting “A study from 2013[4] showed a drop of 10.0% in flight delays could result in a US$ 17.6 billion increase in the US net worth, and a decrease of 30% could result in a staggering $38.5 billion increase in US net worth. Flight delays also have a severe impact on the environment. A study from 2018[5] showed that the extra emissions due to flight delays were estimated at 5529 tonnes, while excess fuel usage was estimated at 1,752,937 L. The deployment of machine learning models predicting flight delays could lead to a significant improvement in air transport, along with economic benefits and a smaller environmental footprint”.

[4] Peterson, E.B.; Neels, K.; Barczi, N.; Graham, T. The economic cost of airline flight delay. Journal of Transport Economic Policy, 2013, Vol 47, page 107–121.\

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