# NAVIGATING THE LEGAL LANDSCAPE OF AI IMPLEMENTATION IN NIGERIA'S AVIATION: CHALLENGES AND OPPORTUNITIES

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## Abstract

The integration of Artificial Intelligence (AI) in the Nigeria's aviation presents a transformative opportunity for innovation, enhanced efficiency and safety. However, this technological advancement also raises critical legal concerns, provoking extensive discussions about its implications and potential challenges. This paper explores the legal framework governing AI implementation in Nigerian aviation, highlighting challenges and opportunities. The Nigeria's aviation industry is subject to various international and domestic regulations, such as the Civil Aviation Act, Federal Airport Authority of Nigeria, Nigerian Airspace Management Agency (Establishment Etc.) Act and the Nigerian Civil Aviation Authority (NCAA) Regulations etc. While these frameworks address traditional aviation issues, they lack specific provisions for AI applications, the gap in understanding AI among lawmakers, researchers and practitioners, all these present concerns about the efficacy of Nigeria's legal systems in addressing the challenges that emerge with the emergence of AI. Other challenges include data privacy, infringement on fundamental human rights concerns, security, liability and risk allocation concerns etc. However, despite these challenges, the paper identified some of the opportunities that abound which include improved decision making, enhanced safety and efficiency, increased accessibility and affordability. It therefore noted that a balanced approach, considering both innovation and regulation, would enable Nigeria's aviation to leverage AI's benefits whilst ensuring safety, security and legal compliance. The paper concludes that to fully harness AI's potentials, Nigeria as a country must develop a comprehensive legal framework that would address these challenges. It recommended establishment of AI specific guidelines, regulatory reforms, investment in education and training programs as well as collaboration with international organizations and stakeholders.

## 1.1: INTRODUCTION

The aviation sector is witnessing huge technological changes because of the integration of artificial intelligence. Artificial intelligence is revolutionizing various aspects of aviation including flight planning, crew management, maintenance, and customer service. In fact, it is reported that the global artificial intelligence in aviation market size, which was valued at USD 728.05 million in 2022, is estimated to reach USD 23 billion by 2031.[1] According to the European Union Aviation Safety Agency, artificial intelligence is "any technology that appears to emulate the performance of a human."[2]AI is a computer software that is

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1S. Umpirowicz, The Rise of Artificial Intelligence in Aviation: Transforming the Skies. *Symphony Solutions <https://symphony-solutions.com/insights/ai-in aviation#:~:text=How%20is%20artificial%20intelligence%20used,safety%2C%20and%20decision%2Dmaking.> accessed 10th October 2024*

2 V. Hilderman, AI in the Sky: How Artificial Intelligence and Aviation are Working Together

programmed to execute certain algorithms (i.e., sets of code that are programmed to perform tasks) to recognize patterns in large volumes of data, reach conclusions from such patterns, predict future behaviour and patterns, make informed judgments based thereon, and as a result, optimize business practices, among other things.[3]AI perceives and synthesizes data to make decisions, automate tasks, and mimic the human mind's capabilities.[4]

## 1.2: LEGAL FRAMEWORK OFARTIFICIAL INTELLIGENCE IN NIGERIA

The lack of precise legislation in Nigeria pertaining to the application and control of artificial intelligence presents a significant obstacle; nonetheless, there are legal frameworks that subtly tackle important artificial intelligence-related challenges:

1. The Nigerian Data Protection Act (NDPA) 2023

The NDPA imposes strict guidelines on the collection, storage, and processing of personal data which must be taken into consideration while designing AI systems. The provisions of this legislation are binding on AI system creators, AI controllers, and data processors that use AI systems. They have a stringent obligation to follow Nigerian data privacy rules throughout the duration of any AI system's life cycle. The NDPA essentially addresses issues of data protection and privacy.

2. The Cybercrimes (Prohibition, Prevention, etc.) Act 2015

The Cybercrimes Act proscribes unauthorized access to networks, computer systems, or data with the intention of obtaining private or sensitive material, such as trade secrets or confidential information. A violation of the Act is committed when someone intentionally accesses or intercepts computer data, content, or traffic data without authorization, including transmissions produced by artificial intelligence. This highlights the significance of safeguarding digital information and privacy and covers hacking, data breaches, and illegal surveillance.

3. The Federal Consumer Commission Protection Act 2023

The Federal Consumer Commission Protection Act (FCCPA) proscribes businesses from purposefully providing customers with incorrect or misleading trade descriptions of their goods or services. All branding components that could sway consumers' decisions to buy, including labels, advertisements, catalogues, emails, or proposals, fall under this category. Where a business uses generative AI for marketing, it must carefully review AI-generated content to make sure it is accurate and true.

. In order to protect consumers from being misled, companies are required by the FCCPA to correct any misleading material and refrain from changing or hiding trademarks or trade descriptors in any way. This highlights the significance of being open and truthful with customers.

3Artificial Intelligence Key Legal Issues

4Intelisoft, Artificial Intelligence (AI) in the Law Industry: Key Trends, Examples & Usages

4. The Copyright Act 2022

Works created by AI are not protected by copyright in Nigeria since human authorship is required according to the Nigerian Copyright Act. Where AI systems are found to be using or exploiting intellectual materials without authorization, the Act provides remedies for copyright infringement, such as account of profits, damages, and injunctions. To enable authors to pursue legal action against AI-driven rights violations, this precaution guards against possible infringement of the intellectual property and rights of human creators.

Artificial intelligence (AI) regulation in Nigeria is governed by a number of agencies, all of which are vital in determining the ethical and legal framework surrounding AI technology. Nigeria is still in the process of creating laws specifically pertaining to AI, but a number of government organizations have started addressing the wider regulatory requirements of AI. These organizations are in charge of regulating cyber security, technological adoption, and data protection, making sure that AI is used properly, among them are The Federal Ministry of Science, Technology and Innovation, Nigerian Data Protection Regulation (NDPR), National Information and Technology Development Agency (NITAD) and the National Office for Technology Acquisition and Promotion (NOTAP). In addition to this, the National Assembly is working to establish rules specifically for AI that addresses issues of ethics, accountability, transparency, and regulation of AI technologies. The speaker of the House of Representatives, Rt. Hon Tajudeen Abbas assured earlier this year that the 10th National Assembly will establish a legal framework to govern the adoption of Artificial intelligence in the country.[5] AI is here to stay thus creating a clear legislative framework to encourage the growth of an AI ecosystem that is both long-lasting and sustainable, is mandatory.

## 1.3: OPPORTUNITIES FOR ARTIFICIAL INTELLIGENCE IN THE AVIATION INDUSTRY

1. Air Safety and Airplane Maintenance

Artificial intelligence is tackling the challenge of unplanned maintenance, which accounted for more than 7% of flight delays in 2023.[6] With AI, the aviation industry can enhance air safety through data analysis from diverse sources like aircraft sensors, flight data recorders, and weather inputs. This helps to identify potential safety concerns, raising overall safety standards. AI-powered predictive maintenance solutions enable airlines to track aircraft components in real-time, forecast faults, and plan repairs before they become very bad. This pro-activeness reduces downtime, cuts repair costs, and improves operational efficiency. *Predix* empowers GE Aviation Fleet Support to handle a higher volume of engine data more swiftly and accurately, significantly boosting diagnostic capabilities.[7]

5DailyAsset, 10th NASS to Provide Legal Framework for AI Regulation <https://dailyasset.ng/10th-nass-to-provide-legal-framework-for-ai-regulation/> accessed 10th October 2024

6 S. Umpirowicz, The Rise of Artificial Intelligence in Aviation: Transforming the Skies. Symphony Solutions https://symphony-solutions.com/insights/ai-in aviation#:~:text=How%20is%20artificial%20intelligence%20used,safety%2C%20and%20decision%2Dmaking. Accessed 10th October 2024

7*Ibid.*

2. Crew Management

The integration of AI into aviation for crew scheduling enhances reliability and efficiency for passengers' confidence and safety. AI helps airlines to ensure that the right crew members with the right skills and experience are available for each flight. This reduces delays, improves safety, and enhances the overall travel experience. AI can undertake automatic inventory management by analyzing patterns and maintenance schedules and identify potential aircraft malfunctions.

3. Logistics and Operation

The adoption of AI technologies in the aviation industry presents the opportunity for a smoother and more efficient journey. Automated check-in systems speed up the process, reduces wait times while virtual assistants powered by AI provides passengers with flight updates and navigate them through the airport. AI can also be employed to track and manage baggage, minimizing errors and improving accuracy of baggage delivery. Eindhoven Airport, for example, uses an innovative AI-powered luggage-handling system called *BagsID.*[8]With this system, no tags are required. Passengers take a photo of their luggage, drop it off, and retrieve it hassle-free at their destination. This innovative AI system tracks bags using photo recognition. This is a game-changer for efficient and error-free airport experiences.

4. Sustainable Flights

The aviation sector contributes 2% to global energy-related carbon dioxide emissions.[9] Consequently, the integration of AI is an opportunity to curb this emission. In fact, the International Air Transport Association is aiming for net-zero emissions by 2050[10], and artificial intelligence will advance this target. By leveraging advanced analytics and machine learning, airlines can make smart decisions on flight routes, fuel use, and operations. This data-driven approach minimizes carbon footprint, aligning with sustainability goals and fast-tracking the industry's shift to a greener future.

5. Feedback Analysis

Customer feedback is a vital aspect of any business endeavor. In aviation, artificial intelligence can help the industry to understand it better. It can survey and sift through various feedback channels like social media, blog posts, comments, customer review sites, etc., to detect patterns, sentiments and recurring themes, be it a complaint or compliment. This proactive approach improves efficiency and safety by helping to address passengers' concerns promptly.

8*Ibid.*

9*Ibid.*

10*Ibid.*

6. Customer Service

Artificial intelligence can be employed to simplify, enhance and personalize airline services including convenient booking experience based on past travel choices and budget. AI can also improve customer service by recommending travel itineraries; Chabot can enable passengers to interact with airport staff using voice or text commands. AI applications can also provide real-time information about flight status and delays, while flight route optimization lowers operational costs. These incidences reduce wait times and make the customer's experience smoother.

## 1.4: CHALLENGES OF INTEGRATING AI IN THE AVIATION INDUSTRY

1. Technical Hurdles

Any useful application of artificial intelligence in the aviation sector will require complex integration of hardware and software to cover every aspect of airline. This presents a serious hurdle especially for countries like Nigeria that consume but do not produce technology. Aircraft components are safety-critical and therefore, require high quality standards. This is because errors can have fatal consequences. However, complex artificial intelligence may not be reliably used due absence of official certification of AI systems.

**2.** Regulatory Challenges

The complexity of the legal implications arising from the use of AI is a serious issue for consideration. Often, the question of the threshold of liability for AI systems can be unsettling, and the aviation sector is not an exception. It is even worse considering the transboundary nature of the aviation industry and its international regulatory regime.

3. Ethical Issues

The application of AI raises ethical considerations. AI has the potential to perpetuate existing bias and discrimination, especially if the data used to train the AI system is biased.[11] For example, if a facial recognition system is trained on data that predominantly includes faces from one racial group, it may not accurately recognize faces from other groups.[12] The integration of AI in the aviation sector also carries the risk of sensitive information about passengers, employees, and the aviation industry as a whole being misused. It may also be difficult to determine how AI arrived at its decision in the operation of airlines, and this could raise questions as to the transparency and accountability of the decisions made by AI systems.

4. Cyber security

Ensuring cyber security in aviation is increasingly important. This is because more devices and systems are becoming digitized and interconnected with many of the communications carried out wirelessly. The wireless nature of the communications can be targeted by

11 L.F. Dsouza, Ethical Considerations of AI in the Aviation Industry. Available at Medium: <https://medium.com/@lynnfdsouza/ethical-considerations-of-ai-in-the-aviation-industry-be12bf7677fe> accessed 10th October 2024

12*Ibid.*

malicious attacks.[13] Examples of communication-related attacks include those targeting communication signals (e.g. signal jamming and false data/command injection).[14] Navigation-related attacks include GPS spoofing, eavesdropping, single tone frequency attacks, navigation modification attacks, and surveillance-related attacks including those seeking to conduct illicit/unauthorized surveillance of aircraft and their movements.[15]

## 1.5: RECOMMENDATIONS AND CONCLUSION

1. Mandatory Certification for Aircraft Components[16]This is necessary in order to create standards and certification methods for AI technologies integrated into the aviation industry. This will ensure sufficient reviewing whether the system is reliable and boost public trust.
2. Need to develop a comprehensive regulatory framework. The NCAA and indeed other relevant authorities should establish a clear and comprehensive regulatory framework for AI implementation in aviation. This framework will have to address AI specific issues ranging from data protection, human rights, liability and accountability, cyber security etc.
3. The integration and application or output of AI should be examined through a traditional backup system or safety net.
4. Encouraging collaboration and knowledge sharing between stakeholders including regulatory bodies, airlines, aviation companies, research institutions etc. This should include regular workshops, conferences, and seminars to share best practices as well as address challenges.
5. To ensure safety in the application of AI in the aviation industry, it is necessary to keep a human in the loop or in command.
6. Implementing robust data protection and cyber security measures aimed at safeguarding sensitive information and preventing cyber threats. This should include regular security audits, penetration testing and employee training programs.

Aviation has been an indispensable discovery in the history of mankind. It holds many important elements together. Simply put, it drives the economy of the world. The advent of AI permeates everywhere, and the aviation is no exception. AI will further propel the advancement of aviation in terms of safety and ease. At the same time, it comes with risks. Consequently, the development of aviation must be approached holistically to make it safe and reliable. Regulation should meet its emerging demands.

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[13] G. Dave *et al,* Cybersecurity Challenges in Aviation Communication, Navigation and Surveillance, Computers & Security, Volume 112, 2022102516, ISSN 0167-4048,<https://doi.org/10.1016/j.cose.2021.102516. https://www.sciencedirect.com/science/article/pii/S0167404821003400> accessed 10th October 2024

[14] *Ibid.*

[15] *Ibid.*

[16] C. S. Strathaus, Ethical Foundations for Artificial Intelligence in Aviation <https://www.research-in-bavaria.de/artificial-intelligence-and-ethics-in-aviation/> accessed 10th October 2024.