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Sustainable Aviation and Aeronautical Development: Lessons for Bangladesh

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Abstract: Bangladesh's aviation sector shows signs of growth in passenger demand and air traffic, but it continues to face significant limitations in infrastructure, safety systems, and modern aviation standards. At the same time, global advances in sustainable aviation fuel (SAF), air traffic management, and aeronautical education offer a framework that Bangladesh could adapt. This paper examines current shortcomings in Bangladesh's aviation and aerospace context, then outlines how integrating modern practices — especially sustainability, technical education, and infrastructure upgrades — could foster safer, more efficient, and eco-friendly aviation growth. The goal is to highlight realistic pathways for national aviation development and to encourage engagement from young aeronautical enthusiasts.

Keywords: *Bangladesh Aviation, Air Traffic Growth, Infrastructure Limitations, Aviation Safety, Sustainable Aviation Fuel (SAF), Aeronautical Education, Modernization Strategies.*

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I. INTRODUCTION

Air travel demand in Bangladesh has surged in recent years. For example, the main airport in Dhaka reportedly handled over 9.3 million international passengers in 2024.

Yet, despite this growth, the country's aviation infrastructure and regulatory systems lag behind modern global standards. Many airports operate under constrained capacity, and key safety or navigation upgrades are delayed or missing.

Modern aviation worldwide is increasingly shaped by concerns for sustainability, safety, and technological efficiency. Through the adoption of sustainable aviation fuels (SAF), improved air traffic management, and stronger aeronautical education, many countries are pushing aviation towards a cleaner and more robust future. Bangladesh — with its growing demand — has the opportunity to learn from these developments. This paper reviews the current aviation challenges in Bangladesh and proposes actionable measures inspired by modern aerospace practices.

II. CURRENT SHORTCOMINS IN BANGLADESH'S AVIATION SECTOR

➢ *Infrastructure and Overload Issues*

- The main international airport Hazrat Shahjalal International Airport (HSIA) in Dhaka relies on a single active runway, despite handling hundreds of flights daily (commercial, private, military) — a situation that raises serious safety and congestion concerns.
- Many domestic airports remain inactive or have limited operations; plans for reviving some (e.g. Bogra Airport) have only recently begun.
- Some airports' facilities are outdated and lack modern navigation or landing-assistance systems, these compromises both capacity and safety.

➢ *Safety, Regulation, and Operational Challenges*

- The regulatory body Civil Aviation Authority of Bangladesh (CAAB), which oversees airports and air traffic, has been criticized for limited long-term planning, underinvestment in modernization, and operational inefficiencies.
- Overloaded airports (especially in Dhaka) struggle with both passenger and cargo traffic; cargo terminals report chronic overcapacity, affecting reliability and logistics.

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Fig 1 Airport Terminal Expansion Project

➢ *Environmental and Sustainability Gaps*

- Use of conventional fossil-based jet fuel remains the norm. There is little evidence of widespread research, adoption, or policy backing for sustainable aviation fuels (SAF) or greener aviation alternatives.
- As global aviation shifts toward sustainability (fuel efficiency, emissions reduction, cleaner air travel), Bangladesh risks falling behind without strategic planning. (No publicly verified source showing large-scale SAF adoption in Bangladesh — this indicates a gap.)

➢ *Technical Education and Skilled Workforce Limitations*

- There is a lack of widespread, advanced aeronautical engineering education and research infrastructure in Bangladesh; this limits the development of a robust domestic aerospace workforce. (Public sources discussing this gap are limited; I cannot find systematic data confirming strong aerospace-engineering programs in Bangladesh.)
- Without technical education and research culture, implementing modern aviation technologies (fuel alternatives, air-traffic automation, safety systems) becomes harder.

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Fig 2 Aeronautical Engineering Laboratory with Wind Tunnel Testing

III. WHAT MODERN AVIATION SYSTEMS OFFER- LESSONS FOR BANGLADESH

➢ *Modern Aviation Worldwide is Evolving Along Several Important Dimensions Relevant to Bangladesh:*

- Sustainable Aviation Fuels (SAF) and Environmental Awareness: SAFs — derived from bio-waste, synthetic processes, or renewable carbon sources — allow aircraft to reduce lifecycle carbon emissions even without new engines. This "drop-in" nature means existing aircraft can use SAF without major redesign.
- Advanced Air Traffic Management (ATM) & Digitalization: Airports globally are adopting digital air-traffic control systems, automated surveillance, "Industry 4.0" technologies for ground operations, and smart scheduling to improve safety and efficiency.
- Infrastructure Modernization & Balanced Airport Network: Rather than overloading a single hub, modern aviation encourages distributing traffic across multiple well-equipped airports, adding redundancy, reducing congestion, and improving regional connectivity.
- Education, Research & Skilled Human Capital: Countries with strong aerospace sectors maintain universities and institutions focused on aeronautical engineering, research on sustainable aviation, and collaboration with industry. This ensures continued innovation and adaptation to new technologies.
- Policy, Regulation & Long-Term Planning: Robust regulatory bodies that follow international standards (e.g., from International Civil Aviation Organization — ICAO) and long-term infrastructure planning help maintain safety, sustainability, and scalability.

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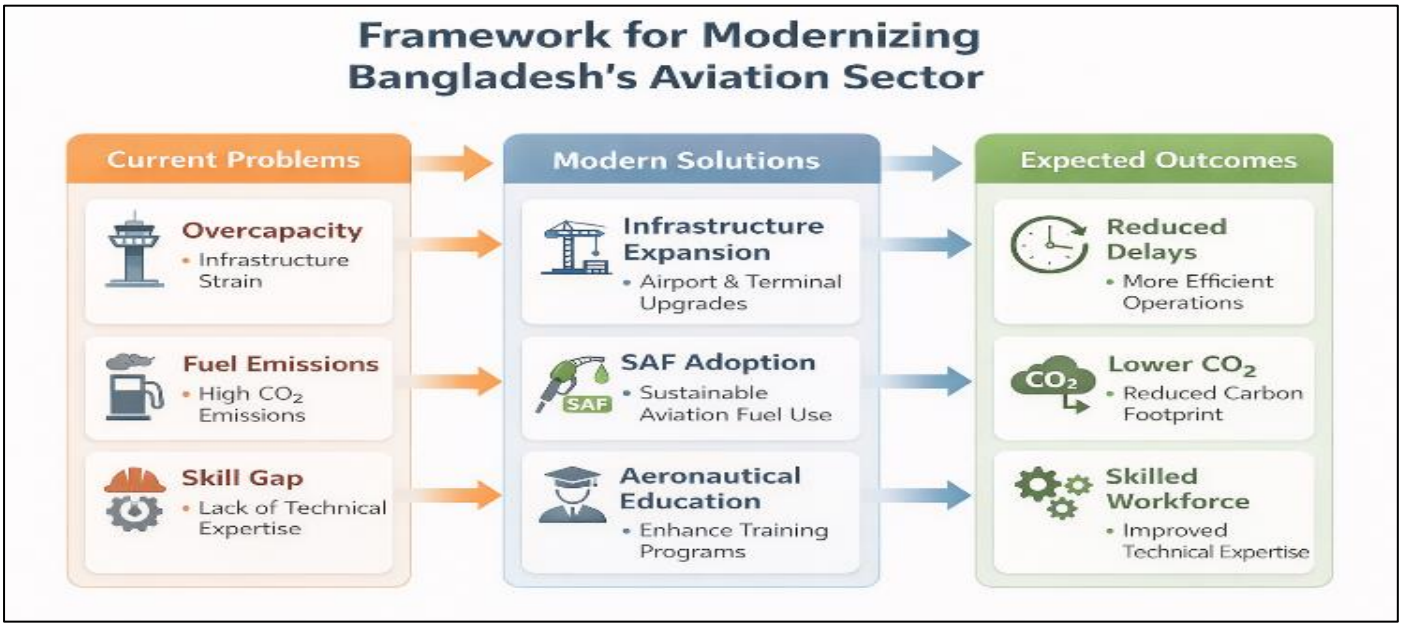

Fig 3 Framework Connecting Current Aviation Constraints with Proposed Solutions and Projected Impacts.

IV. RECOMMENDATIONS FOR BANGLADESH – A ROADMAP FOR IMPROVEMENT

Based on the analysis above, here are some actionable steps Bangladesh could take:

➢ *Invest in Airport Infrastructure & Network Expansion*

- Revive and modernize defunct or under-used airports (e.g., Bogra Airport) to distribute traffic and reduce pressure on major hubs.
- Upgrade existing airports — runways, navigation systems, radar, air-traffic control — to meet international standards and enhance safety and capacity.

➢ *Adopt Sustainable Aviation Practices*

- Promote research and pilot projects on SAF (biofuels, waste-derived fuels, synthetic fuels) in collaboration with international organizations.
- Encourage airlines operating in Bangladesh to adopt SAF blends gradually, with government incentives or subsidies to offset higher costs.

Fig 4 Sustainable Aviation Fuel (SAF) Refuelling Operation

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➢ *Strengthen Regulatory and Institutional Framework*

- Reform CAAB or relevant aviation authorities to include long-term civil-aviation professionals and ensure transparent, forward-looking policy planning.
- Implement international standards for safety, air-traffic management, maintenance, and environmental compliance (e.g. in line with ICAO).

➢ *Develop Aeronautical Education and Human Capital*

- Establish or strengthen university-level aerospace/ aeronautical engineering programmes.
- Foster partnerships with foreign aerospace institutions or universities for student training, internships, and knowledge transfer.
- Encourage local research (fuel, aircraft design, air-traffic control, airport management) by offering grants or scholarships.

➢ *Regional Integration and Diversification*

- Position Bangladesh as a regional aviation hub in South Asia by leveraging its strategic location, diaspora population, and growing travel demand. Several analysts believe South Asia could benefit from such a hub.
- Focus not just on major city airports but also on regional connectivity to support economic growth, domestic mobility, and decentralization of aviation infrastructure.

V. CONCLUSION

Bangladesh stands at a crossroads: its aviation sector shows real demand and growth potential, yet significant structural, institutional, and environmental shortcomings threaten to limit sustainable development. By learning from modern aviation practices — in sustainability, infrastructure, regulation, and education — the country has the opportunity to evolve into a safer, more efficient, and environmentally conscious aviation market. For young aeronautical engineering aspirants from Bangladesh or abroad, recognizing these gaps can be the first step toward contributing meaningfully to national progress.

Through strategic investments, policy reform, and educational initiatives, Bangladesh could transform its aviation landscape — benefiting economic growth, national connectivity, environmental sustainability, and global competitiveness.

REFERENCES

[1]. The Business Standard. (2025, July 22). *Dhaka's aviation crisis: Safety risks mount as infrastructure and policy lag behind*. *The Business Standard*. The Business Standard

[2]. Ruma Paul & Harshita Meenaktshi. (2025, October 18). *Flights resume at Dhaka airport after fire forced operations to halt*. *The Star* (Reuters). The Star

[3]. International Civil Aviation Organization. (2025). *State-Level Initiatives for Developing Sustainable Aviation Fuel (SAF) in Bangladesh* (ICAO 60-DP-07-15). ICAO

[4]. International Air Transport Association. (2025). *Developing Sustainable Aviation Fuel (SAF)*. IATA. IATA

[5]. International Air Transport Association. (2025, December 9). *Airlines warn green fuel goals at risk as supply falls short*. Reuters. Reuters

[6]. Experts Warn of Rising Bird Strike Risks at Dhaka Airport. (2025, January 8). *The Business Standard*. The Business Standard

[7]. Aviation sector sees transformational strides over past year. (2025, August 7). *Outlook Bangla*. Outlook Bangla

[8]. Aviation Express. (2025). *Bangladesh's critical infrastructure risks and regulatory oversight concerns*. Aviation Express

[9]. B. Wang. (2024). *Sustainable aviation fuels: Key opportunities and challenges in lowering carbon emissions for aviation industry.*