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Exploration and Assessment of the Factors Affecting the Implementation of Urban Air Mobility (UAM) in India

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ABSTRACT
This study explores what helps and hinders Urban Air Mobility (UAM) in India, using industry research and expert opinions. Challenges include unclear regulations, high costs, safety worries, and poor infrastructure. Opportunities come from government support, new technology, and growing demand for air transport. UAM promises faster, eco-friendly travel but faces issues like insufficient infrastructure, affordability, public trust, and legal barriers. Safety concerns and costs, like insurance, heavily impact adoption. Better infrastructure and efficient operations need regulatory changes. The study suggests investing in infrastructure, clarifying laws, and raising public awareness to boost UAM. By tackling these, India can lead in sustainable urban transport.

Keywords: Urban Air Mobility, Infrastructure, Regulations, Affordability, AHP

INTRODUCTION

1.1 Background

Urban Air Mobility (UAM) represents a transformative approach to addressing urban congestion by integrating advanced aerial systems into existing transportation networks. By leveraging electric vertical take-off and landing (eVTOL) aircraft, automation, and data-driven air traffic management, UAM offers a convenient, efficient, and eco-friendly alternative to ground-based travel in densely populated areas. As urbanization accelerates and road congestion worsens, UAM aims to reduce travel times, lower carbon emissions, and enhance the quality of life in cities. This innovative system enables on-demand air transport for passengers and cargo, unifying multimodal transport systems to meet the growing global demand for faster, more sustainable mobility solutions. However, the path to widespread UAM adoption is fraught with challenges, including evolving regulatory frameworks, high infrastructure costs, and the need for public acceptance. Lawmakers and aviation authorities are actively developing safety standards and operational guidelines to integrate UAM into controlled airspace, but these efforts must balance innovation with safety and accessibility to ensure scalability and public trust.

The successful deployment of UAM hinges on overcoming technological, economic, regulatory, and societal barriers. Key infrastructure requirements, such as vertiports, charging stations, and advanced air traffic control systems, demand significant investment and thoughtful urban planning to minimize disruption to existing ecosystems. Advances in battery technology, autonomous flight systems, and secure communication networks are critical to ensuring UAM's scalability and sustainability. Additionally, public acceptance depends on addressing concerns related to noise, safety, cybersecurity, and equitable access. High costs associated with aircraft manufacturing and operational management pose further challenges, requiring innovative financing models and public-private partnerships. This dissertation explores these critical factors, analyzing public perception, cost structures, technological advancements, and regulatory hurdles to propose strategies for UAM's integration as a safe, sustainable, and inclusive transport modality. By examining these interconnected issues, this work aims to contribute to the discourse on how UAM can reshape urban mobility and overcome barriers to achieve widespread adoption in the future.

1.2 Advancements in Emerging Technologies

Due to significant developments in electric propulsion, battery performance, autonomous flight systems, and air traffic control, UAM is now a real and viable idea. A fuller understanding of how the various factors affecting UAM will be applied in practice will be needed for successful operation. Safe research into the viability, scalability, and use of these technologies is key to enabling safe and effective operations, while offering the maximum potential benefits.

1.3 Regulatory Frameworks and Public Acceptance

It is necessary that UAM is not only approved by the public, but also the regulatory agencies. Legislators must work on establishing very specific legal frameworks for urban zoning, noise pollution, safety, and airspace management. At the same time, the future of UAM technology will be subject to the public's perception and willingness to adopt it. Explaining technology and facilitating widespread adoption requires that we understand some of the societal concerns that may play a role in UAM, particularly safety, cost, and an environmental examination.

1.4 Rising Industry Demand

Significant players in aviation and mobility have heavily invested in UAM and are creating and testing UAM solutions, including aerospace manufacturers, urban planners, and mobility service providers. As the aviation and mobility industries prepare for large scale adoption of UAM, research-informed opinions and insights into the elements that shape UAM deployment will be required. Industry leaders, policymakers, and urban planners will find it especially beneficial to scrutinize the regulatory, control, economic, technological, and social elements influencing the establishment and effective implementation of UAM innovations; to ensure UAM is a feasible and sustainable forms of urban transport.

Urban Air Mobility (UAM) uses eVTOL aircraft to reduce urban congestion, offering efficient, sustainable transport. This study explores adoption barriers—public acceptance, infrastructure, affordability, and regulations—through case studies. It provides tactical recommendations for safe, scalable UAM integration into existing transport systems, addressing technological, economic, and regulatory challenges.

LITERATURE REVIEW

Urban Air Mobility (UAM) research has surged, exploring eVTOL aircraft, battery technology, and AI-driven air traffic control to enhance operations, prioritizing safety, vertiports, and airspace integration. It addresses infrastructure, legal barriers, pricing, operational costs, and consumer demand. Psychosocial factors like public acceptance, noise, and trust in autonomous systems are analyzed. UAM could revolutionize transit and reduce congestion, but scalability, costs, and regulatory delays pose challenges. Further research is needed for affordable scalability, consistent global regulations, and effective air traffic management to ensure safe, sustainable UAM integration. Urban Air Mobility (UAM) research highlights eVTOL aircraft, battery technology, and AI-driven air traffic control to enhance safe, efficient urban transport, yet faces significant hurdles. Regulatory frameworks lack global harmony, with varying airspace rules, safety protocols, and vertiport integration policies (FAA, 2020; Rao et al., 2023). Liability for autonomous vehicle accidents remains underdeveloped (International Airport Review, 2023). Infrastructure challenges include insufficient urban air traffic management systems, vertiport capacity planning, and multimodal connectivity (Chen et al., 2024; NASA, 2023). Economic viability is understudied, with limited cost-benefit analyses and pricing strategies impacting consumer demand (Goyal et al., 2023; Deloitte, 2023). Public-private partnerships offer financing potential (International Airport Review, 2023). Social acceptance, hindered by safety concerns, noise pollution, and psychological barriers like fear of autonomous flight, requires further exploration (Rao et al., 2024; Deloitte, 2023). Sustainability issues, including lifecycle emissions and battery disposal, need deeper investigation (Sahu et al., 2022; Pathak et al., 2023). Noise mitigation in urban areas remains under-researched (NASA, 2020). Public engagement through stakeholder involvement and education campaigns is critical but underutilized (Deloitte, 2023). Economic scalability models are scarce, lacking robust forecasts for operational costs and regulatory shifts (VTOL Aviation India, 2023). Global regulatory standardization is essential to reduce costs and enable cross-border UAM operations (WEF, 2024). Ongoing research is vital for scalable, sustainable UAM integration.

3.1 Conceptual Framework & Theoretical Models

Urban Air Mobility (UAM) research emphasizes integrating eVTOL aircraft with existing transport networks to alleviate urban congestion, requiring seamless intermodal connectivity (Roland Berger, 2024; KPMG, 2022). Regulatory barriers, including airspace management and safety compliance, demand flexible frameworks (IEEE, 2023; WEF, 2024). NASA's UAM Grand Challenge provides simulation tools to assess operational efficacy (NASA, 2022). High infrastructure and operating costs challenge financial viability, necessitating public-private partnerships (Deloitte, 2023; VTOL Aviation India, 2023; Tata Advanced Systems, 2023). Public acceptance hinges on addressing noise, safety, and trust in autonomous systems, with transparency in automated flight systems being critical (Deloitte, 2023; Tandfonline, 2022). Airspace congestion, privacy, and liability concerns further complicate adoption (Airbus, 2022).

Vertiport construction faces challenges like limited site availability and high costs, requiring integration with smart city technologies (Bell Textron, 2023; Airbus, 2022). AI-driven traffic management ensures safe coexistence with traditional aviation (NASA, 2022; Springer, 2023). UAM's sustainability depends on renewable energy and battery advancements, reducing emissions compared to conventional helicopters (ePlane, 2023; Nature, 2019). Scalable, cost-effective solutions and global regulatory alignment are essential for UAM's successful integration into urban transport systems.

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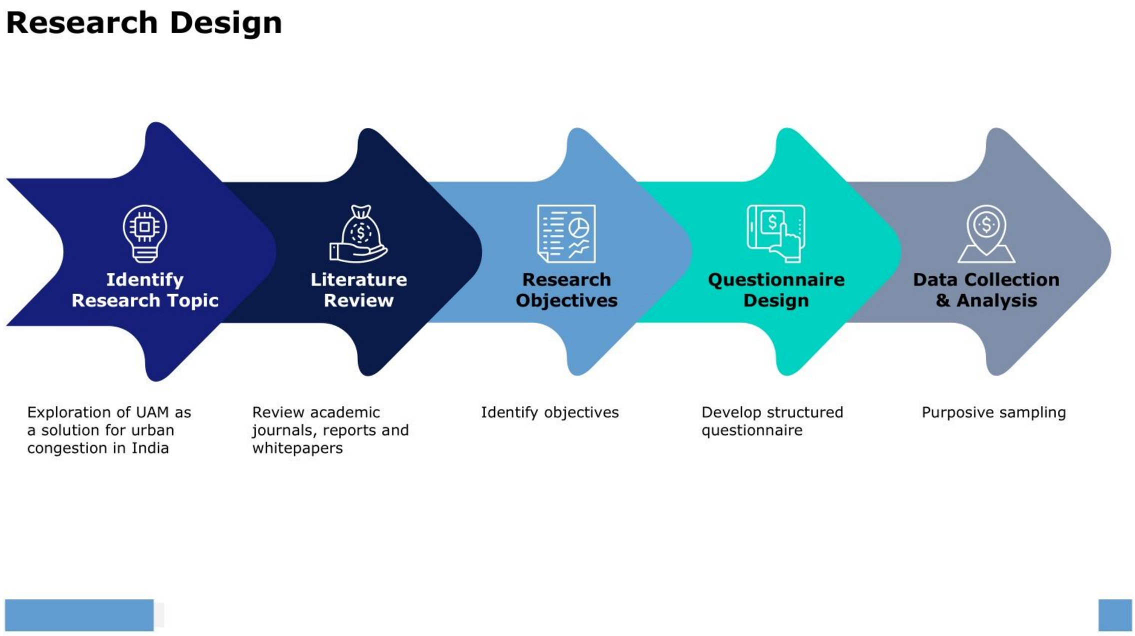

Figure 1.1: Flowchart of Research Design
Source: Author

RESEARCH METHODOLOGY

Purposive sampling was employed to focus on key informants with specialized knowledge in UAM-related activities, suitable for exploratory research requiring expert insights (Etikan, Musa, & Alkassim, 2016). The sample included professionals from five companies—HAL, NewSpace, Seahorse Air, ePlane, and Thrust Tech Aircraft Ltd—selected for their expertise in aircraft manufacturing, aeronautical engineering, UAM innovation, and aerial vehicle systems research. Despite the small sample size, their diverse experience ensured high-quality, contextually relevant responses aligned with the dissertation's goals. Descriptive analysis and multi-criteria decision-making methods were applied to extract insights from quantitative and qualitative data. Responses were analyzed to create profiles based on role, experience, and organizational affiliation, while averages and frequencies assessed trends in UAM integration potential in India across infrastructure adequacy, environmental considerations, and safety perceptions, identifying recurrent themes, agreement levels, and outliers.

3.3 Sampling Method & Justification

The study utilized purposive sampling to select key informants from five companies—HAL, NewSpace, Seahorse Air, ePlane, and Thrust Tech Aircraft Ltd—with expertise in aircraft manufacturing, aeronautical engineering, UAM innovation, and aerial vehicle systems research, ensuring high-quality, contextually relevant responses for exploratory research (Etikan, Musa, & Alkassim, 2016). Descriptive analysis and the Analytical Hierarchy Process (AHP) were applied to analyze quantitative and qualitative data, with AHP chosen for its ability to manage uncertainty, model complex multi-criteria issues, and rank factors like infrastructure accessibility, psychological acceptability, environmental sustainability, and economic viability (Kahraman et al., 2003; Saaty, 1980). This approach, supported by prior supply chain studies, provided strategic insights for UAM adoption in India (Kumar, Tyagi, & Sachdeva, 2021; Kumar, Tyagi, Garg, Sachdeva, & Panchal, n.d.). Responses were profiled by role, experience, and affiliation, with trends in UAM integration potential assessed via averages and frequencies across infrastructure, environmental, and safety perceptions. Regulatory challenges, including unharmonized airspace rules and liability frameworks, were noted (FAA, 2020; International Airport Review, 2023). Infrastructure issues, such as vertiport capacity and multimodal connectivity, require robust air traffic management systems (Chen et al., 2024; NASA, 2023). Economic viability hinges on cost-benefit analyses and public-private partnerships, while public acceptance faces barriers like noise, safety concerns, and trust in autonomous systems (Goyal et al., 2023; Deloitte, 2023; Rao et al., 2024; Tandfonline, 2022). Sustainability challenges, including lifecycle emissions and battery disposal, highlight UAM's potential for reduced emissions through renewable energy (Sahu et al., 2022; Nature, 2019). Global regulatory alignment, advanced infrastructure, and public engagement are critical for scalable UAM integration (WEF, 2024; Airbus, 2022).

4.1 Data Analysis & Interpretation

This chapter analyzes the major drivers of Urban Air Mobility (UAM) adoption in India, based on an analysis of the primary data supplied by industry practitioners. The chapter has two main parts:

First, a profile study identified the credibility and variety of opinions obtained from experts, both at an individual- and corporate-level. This included counts of the years of experience, specialization area, and background.

Second, the study ranks the criteria for making decisions that impact the implementation of UAM using the **Traditional Analytical Hierarchy Process (AHP).** The AHP approach provides a structured understanding of which aspects (including cost, safety, infrastructure, and public approval) are considered most important by the experts through pairwise comparisons and weight computations.

4.1.1 AHP Pairwise Comparison Matrix and Weights

The factors that facilitate the adoption of Urban Air Mobility (UAM) in India were determined and ranked using the Analytic Hierarchy Process (AHP) which is a structured decision-making tool. Using methods, Kumar, Tyagi, & Sachdeva (2021), established this combined process, which is reported below.

Step 1: Construct a Pairwise Comparison Matrix (Matrix A1) For the four basic factors (F1, F2, F3 and F4) compared each pair with a scale of relative importance (scaling from Saaty). Experts provided their views on how important each factor is. The comparisons are displayed in their respective matrix:

- Greater relevance is indicated by values >1.
- Values less than one indicate less significance.
- When comparing a component to itself, its diagonal value is 1.

Step 2: Compute Geometric Mean (GMi)

- Each factor's row in Matrix A1 was used to calculate its geometric mean, reflecting its relative influence:
- $GMi = (x_1 * x_2 * ... * x_n)^{(1/n)}$
- where x1, x2, ..., xn are row entries, and n is the number of factors.

Step 3: Normalize Geometric Means (A2-NWi)

Normalized weights (NWi) were derived by dividing each GMi by the sum of all geometric means:
NWi = GMi divided by the sum of all GMi values.
These weights represent each factor's priority.

Step 4: Verify Consistency (A3 and A4)

Consistency was checked by:
Multiplying Matrix A1 by the weight vector (A2) to form Matrix A3.
Dividing A3's row values by A2 weights to create Matrix A4.
Averaging A4 values to obtain the maximum eigenvalue (λ_max).

Step 5: Calculate Consistency Ratio (CR)

The Consistency Index (CI) was computed as:
$CI = (\lambda\_max - n) / (n - 1)$
Using Saaty's Random Index (RI = 0.90 for n = 4), the Consistency Ratio was:
CR = CI / RI

A CR less than 0.1 confirms matrix reliability.

Table 1.1 Pairwise comparisons between main factors

Pairwise comparisons between main factors								
	A1					A2	A3	A4
	Pairwise comparisons between factors							
	F1	**F2**	**F3**	**F4**	GMi	NWi		
F1	1	1.304	2	1.154	1.317	0.319	1.277	4
F2	0.767	1	1.533	0.885	1.010	0.245	0.979	4
F3	0.500	0.652	1	0.577	0.659	0.160	0.638	4
F4	0.867	1.130	1.733	1	1.142	0.277	1.106	4
GMi	0.759	0.990	1.518	0.876	4.127	1		
							Max value A4	4

Step 6: Sub-Factor Weight Calculation

The same AHP method was also used to compare the corresponding sub-factors (e.g., F11, F12, F13...) for each core factor (F1, F2, F3, F4):

- Each set of sub-factors was represented by a pairwise matrix.
- Sub-Factor Weights were calculated using normalized weights and geometric means.

Table 1.2 Pairwise comparisons between sub factors of F1

	A1				A2	A3	A4
	Pairwise comparisons between sub factors of F1						
	F11	**F12**	**F13**	**GMI**	**Nwi**		
F11	1	1.214	0.944	1.047	0.347	1.041	3
F12	0.824	1	0.778	0.862	0.286	0.857	3
F13	1.059	1.286	1	1.108	0.367	1.102	3
				3.017	1		
						Max value A4	3

Table 1.3 Pairwise comparisons between sub factors of F2

A1					A2	A3	A4
Pairwise comparisons between sub factors of F2							
F21	**F22**	**F23**	**F24**	**GEOMM**	**Nwi**		
1	1.345	1.560	1	1.204	0.295	1.182	4
0.743	1	1.160	0.744	0.895	0.220	0.879	4
0.641	0.862	1	0.641	0.771	0.189	0.758	4
1	1.345	1.560	1	1.204	0.295	1.182	4
				4.073	1	Max value	4

Table 1.4 Pairwise comparisons between sub factors of F3

A1				A2	A3	A4
Pairwise comparisons between sub factors of F3						
F31	**F32**	**F33**	**GMI**	**Nwi**		
1	1.257	0.978	1.071	0.355	1.065	3
0.795	1	0.778	0.852	0.282	0.847	3
1.023	1.286	1	1.096	0.363	1.089	3
			3.019	1		
					Max value A4	3

Table 1.5 Pairwise comparisons between sub factors of F4

A1				A2	A3	A4
Pairwise comparisons between sub factors of F4						
F41	**F42**	**F43**	**GMI**	**Nwi**		
1	1.094	0.795	0.955	0.315	0.946	3
0.914	1	0.727	0.873	0.288	0.865	3
1.257	1.375	1	1.200	0.396	1.189	3
			3.028	1		
					Max value A4	3

Step 7: Calculating the Global Weight

Each sub-factor's global weight was determined by multiplying its corresponding sub-factor weight by the core factor weight (NWi):

Global Weight=Core Factor Weight × Sub Factor Weight

This provided the final ranking of all the system's sub-factors, indicating which components have the greatest impact on UAM adoption and use.

Table 1.6 Global Weight Calculation

	Core Factors' Weight	Sub Factors	Sub Factors' Weight	Global Weight
F1	0.319	**F11**	0.347	0.111
		F12	0.286	0.091
		F13	0.367	0.117
F2	0.245	**F21**	0.295	0.072
		F22	0.220	0.054
		F23	0.189	0.046
		F24	0.295	0.072
F3	0.160	**F31**	0.355	0.057
		F32	0.282	0.045
		F33	0.363	0.058
F4	0.277	**F41**	0.315	0.087
		F42	0.288	0.080
		F43	0.396	0.110

Table 1.7 Sub-Factor - Global Weights

Sub Factors	Global Weight
F11	0.111
F12	0.091
F13	0.117
F21	0.072
F22	0.054
F23	0.046
F24	0.072
F31	0.057
F32	0.045
F33	0.058
F41	0.087
F42	0.080
F43	0.110

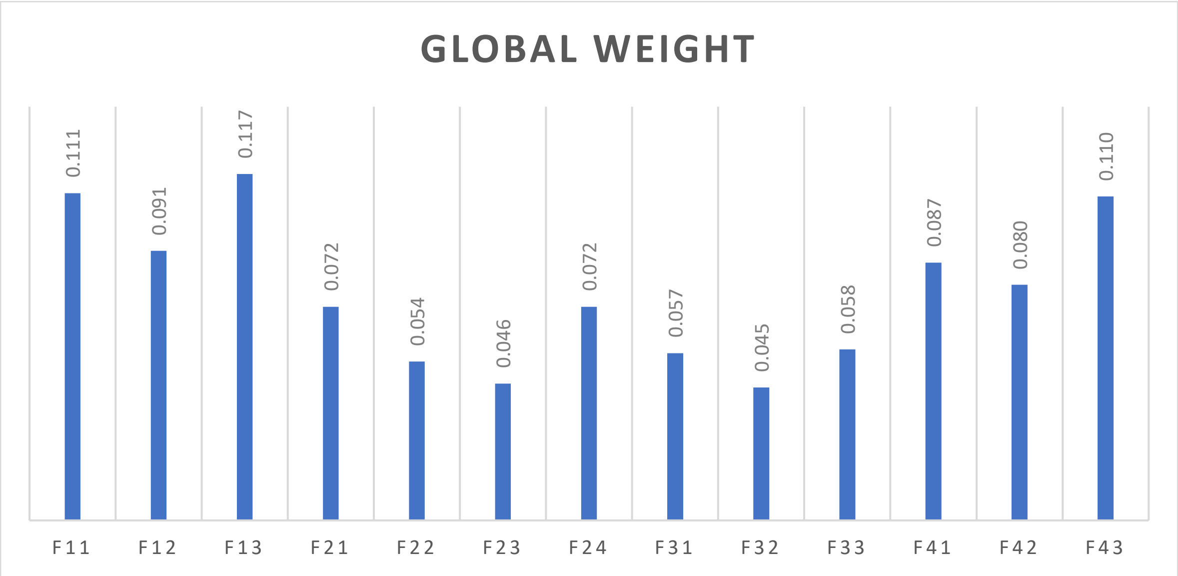

Figure 1.2: Global Weight Bar Diagram

RESULT

The Analytic Hierarchy Process (AHP) prioritized sub-factors for Urban Air Mobility (UAM) implementation, using pairwise comparisons, normalization, and consistency checks to derive global weights for four main factors (F1–F4), guiding stakeholders in optimizing regulations and infrastructure (Kahraman et al., 2003; Saaty, 1980). Environmental Compliance (F13) at 0.1172 is critical, followed by Infrastructure & Regulations (F11) at 0.1107, Maintenance & Repair Facilities (F43) at 0.1096, and Service Reliability (F41) at 0.0872, while lower-weighted factors like Insurance Cost (F23) at 0.0463 and Affinity to Automation (F32) at 0.0450 remain relevant. Purposive sampling selected experts from HAL, NewSpace, Seahorse Air, ePlane, and Thrust Tech Aircraft Ltd, ensuring high-quality insights (Etikan, Musa, & Alkassim, 2016). Descriptive analysis and multi-criteria methods profiled responses and assessed UAM integration trends in India (Kumar, Tyagi, & Sachdeva, 2021). Regulatory barriers, including unharmonized airspace rules, hinder adoption (FAA, 2020; International Airport Review, 2023). Infrastructure challenges, like vertiport capacity, require robust air traffic systems (Chen et al., 2024; NASA, 2023). Economic viability depends on cost-benefit analyses and partnerships, while public acceptance faces noise and safety concerns (Goyal et al., 2023; Deloitte, 2023; Rao et al., 2024). Sustainability, including emissions and battery disposal, needs further research, though UAM's renewable energy potential is promising (Sahu et al., 2022; Nature, 2019). Global regulatory alignment is essential for scalable UAM integration (WEF, 2024; Airbus, 2022).

4.2 Interpretation of Trends and Patterns

4.2.1 Trends from AHP Model

The evaluation and ranking of sub-factors influencing Urban Air Mobility (UAM) using the AHP model reveal critical insights into stakeholder priorities across four broad categories: regulatory, economic, psychological (social acceptance), and infrastructure. The computed global weights underscore the dominance of cost-related and infrastructural concerns. Sub-factors such as Environmental Compliance (0.1172) and Infrastructure & Regulations (0.1107) emerged with the highest global weights, pointing to financial viability as the most pressing challenge for UAM implementation. This finding is in line with prior research suggesting that capital access, development costs, and return on investment are formidable hurdles, particularly in emerging markets like India where economic constraints can significantly delay early adoption. Simultaneously, infrastructure- and safety-related sub-factors also feature prominently in the rankings. High weights for Maintenance & Repair Facilities (0.1096) and Service Reliability (0.0872) suggest that stakeholders are not only concerned with costs but are equally attentive to the readiness and dependability of UAM support systems. These aspects, such as vertiport availability and technical maintenance capabilities, are widely recognized in global literature as foundational prerequisites for regulatory clearance and eventual public adoption.

Meanwhile, regulatory sub-factors such as Value of Time Savings (0.0723) and Perception of Automation Costs (0.0538) received moderate emphasis, indicating that while regulations are necessary, they are presently viewed more as facilitators than as immediate roadblocks. This outlook suggests a belief that policy frameworks will evolve organically alongside technological advancements, rather than needing to be fully formed in advance—a trend noted in ongoing European and American UAM initiatives. On the other end of the spectrum, social and psychological factors received the least weight, with Affinity to Automation (0.0450) and Insurance Cost (0.0463) ranking the lowest. This may reflect a current lack of urgency around public perception issues in the Indian context, possibly due to the nascent stage of UAM deployment. However, international case studies warn that public trust and social readiness become critical as the service nears commercialization. The relatively low emphasis on social acceptance at this stage could lead to underpreparedness during operational rollout if not addressed proactively. Overall, the findings illustrate a layered prioritization—where economic and technical readiness take precedence, regulatory alignment is expected to follow suit, and public acceptance, though not yet critical, looms as an eventual determinant of success.

4.3 Statistical Findings & Significance

The Analytic Hierarchy Process (AHP) analysis provided a comprehensive assessment of the factors influencing the adoption of Urban Air Mobility (UAM) in India. Regulatory factors emerged as the most influential category with a priority weight of 0.319, underlining the critical role of government rules, environmental compliance, and legal structures. Among the sub-factors, Environmental Compliance (0.1172) ranked highest, emphasizing stakeholders' concern for sustainable deployment. Infrastructure & Regulations (0.1107) and Legal Framework (0.0912) followed closely, indicating the significance of urban integration and swift legal approvals. Infrastructural factors ranked second (0.2766), drawing attention to the foundational role of physical systems that support UAM. Maintenance & Repair Facilities (0.1096) topped this category, highlighting the need for robust backend systems to ensure operational continuity. Service Reliability (0.0872) and Technology Integration (0.0797) also received strong weights, showing that seamless operations and technological readiness are valued by stakeholders. Economic factors held a moderate influence (0.2447), with Value of Time Savings (0.0723) and Liability Cost (0.0723) leading the group, suggesting a shared emphasis on operational efficiency and legal protections. Other economic sub-factors like Perception of Automation Costs (0.0538) and Insurance Costs (0.0463) were seen as relevant but less urgent concerns. Psychological factors, while ranked lowest overall (0.1596), still offered valuable insights into user perceptions. User Experience (0.0579) was the highest-ranked sub-factor here, indicating that comfort and convenience will shape user behavior. Safety & Trust (0.0566) and Affinity to Automation (0.0450) suggest a need to build public confidence in autonomous systems. Together, these results offer a nuanced picture of UAM readiness, where infrastructural and regulatory preparedness are emphasized, while human-centered concerns are emerging but not yet dominant.

The dependability and internal consistency of expert judgments were verified through the consistency ratio (CR), which remained below the 0.1 threshold across all levels of the AHP hierarchy, in accordance with Saaty's (1980) guidelines. This statistical robustness lends credibility to the model's outputs. Additionally, the prioritizations align closely with global trends documented in leading studies. The prominence of Environmental Compliance and Infrastructure & Regulations is in line with NASA (2021) and EASA (2021), both of which stress the need for environmentally responsible and policy-aligned growth in UAM. Similarly, the elevated importance of Maintenance & Repair Facilities and Service Reliability echoes concerns raised by Smith & Goyal (2022) and Roland Berger (2020) regarding operational preparedness in high-frequency aerial mobility systems. The dual emphasis on time efficiency and liability reduction, captured in the importance of Value of Time Savings and Liability Cost, mirrors findings from McKinsey (2021) on the viability of future urban transport systems. Overall, the AHP results provide a validated, empirically grounded framework that accurately captures stakeholder priorities and informs both scholarly discourse and policy-level decision-making in the evolving landscape of UAM.

FINDINGS & DISCUSSION

5.1 Key Insights & Implications

The study offers distinctive insights into how stakeholders—particularly those associated with or adjacent to the aviation sector—perceive the implementation of Urban Air Mobility (UAM) in India. These findings complement and extend a growing international and domestic literature base on UAM adoption. Among all the factors considered, regulatory aspects emerged as the most influential, with a global weight of 0.3191. Environmental compliance (F13) was ranked as the top concern under this domain, reaffirming the perspective of Rajendran et al. (2021), who argue that UAM must align with national environmental policies and sustainable development goals. This emphasis is further supported by Goyal et al. (2022), who highlight the absence of a coherent national framework for eVTOL operations in India. From a global standpoint, Fagnant and Kockelman (2015) maintain that regulatory clarity is a prerequisite for scaling autonomous and airborne transport systems, while Al Haddad et al. (2020) emphasize the proactive role of public authorities in zoning, risk management, and community engagement. These views are consistent with the responses to Q1.1 and Q1.3 in the present study, which suggest that Indian stakeholders view both regulatory gaps and environmental safeguards as critical to enabling UAM. The results point to a clear demand for comprehensive, forward-looking policy frameworks that go beyond traditional civil aviation norms.

Economic considerations ranked third overall (0.2446) but were marked by strong stakeholder emphasis on time efficiency (F21) and liability costs (F24). These priorities align with Reinhardt and Meurer's (2021) findings that UAM offers significant reductions in urban travel time, particularly for high-value business users. However, Wu and Zhi (2020) caution that financial sustainability remains fragile, particularly when insurance and liability costs are considered—an observation that resonates with the weight assigned to Q2.3 and Q2.4 in this analysis. Studies by Roland Berger (2021) and KPMG (2022) add another layer to this argument, indicating that early adopters often underestimate the capital investments needed for airspace management, urban retrofitting, and skilled workforce acquisition. This validates the stakeholder concerns expressed in the AHP model and implies a strong need for long-term financial planning, public-private risk sharing, and cost transparency from early stages. Psychological factors, although the lowest in overall importance (0.1596), surfaced as meaningful when examined through sub-factors like Safety & Trust (F31) and User Experience (F33). Bauranov and Rakas (2021) argue that public skepticism, especially in risk-averse societies like India, is a key bottleneck in the diffusion of autonomous aerial mobility. Similarly, Bösch et al. (2018) note that acceptance of pilotless or semi-autonomous operations is equally as important as engineering readiness. These perspectives resonate with the moderate importance assigned to Q3.2 and Q3.3 in the current study, indicating that psychological and experiential dimensions will become increasingly relevant as UAM moves from concept to consumer-facing reality.

Infrastructure emerged as the second-most important domain with a weight of 0.2765, affirming the view that physical and digital readiness are foundational to UAM scalability. Sub-factors such as Maintenance & Repair Facilities (F43) and Service Reliability (F41) were highly prioritized, reinforcing McKinsey & Company's (2023) conclusion that vertiports and ground support systems are among the most significant implementation bottlenecks. Furthermore, Buchholz et al. (2022) emphasize the need for integrating UAM into broader smart city frameworks, including traffic coordination, communication systems, and weather analytics. The stakeholder feedback in this study—especially regarding Q4.1 and Q4.3—aligns with these global perspectives, emphasizing the necessity for a multi-layered, resilient infrastructure strategy. Overall, the findings demonstrate a convergence between the study's empirical outcomes and established research, highlighting both shared global challenges and India-specific readiness gaps that demand targeted policy and investment strategies.

The AHP analysis and stakeholder survey yielded several key conclusions that reflect the current state and future priorities for Urban Air Mobility (UAM) in India. Regulatory clarity emerged as the most critical factor, with the highest weight (0.3191), indicating that stakeholders are navigating a significant policy vacuum. The strong emphasis on environmental compliance (F13) suggests an urgent need to align UAM with India's FAME II goals and the 2070 Net Zero Target. This calls for immediate action from the government, ideally through a dedicated framework under the Directorate General of Civil Aviation (DGCA) in coordination with the Ministry of Housing and Urban Affairs (MoHUA). Economically, while the value of time savings (F21) was recognized, concerns about liability costs (F24) reflect underlying uncertainty about risk-sharing. This underscores the need for pilot programs and sandbox-style regulatory environments, similar to those introduced in the 2021 Drone Rules, to clarify insurance and accountability structures. Infrastructure was the second-most prioritized factor (F4: 0.2765), particularly regarding vertiport development and MRO (Maintenance, Repair, and Overhaul) capabilities. This suggests a need to integrate UAM infrastructure into national platforms like the Gati Shakti Infrastructure Plan and the Smart Cities Mission. Though psychological factors carried less weight overall, elements like user comfort and trust in automation were still viewed as important. Building public confidence through awareness campaigns, transparency, and adherence to global safety standards—such as those by ASTM and EASA—will be essential to the successful adoption of UAM. These findings offer a roadmap for coordinated regulatory, infrastructural, economic, and social efforts in shaping India's UAM landscape.

CONCLUSION & RECOMMENDATIONS

Through interviews with aerospace professionals, startup executives, and government-affiliated specialists, this study investigated the primary factors affecting the acceptance and integration of Urban Air Mobility (UAM) in India. Using a mixed-methods approach that combined the Analytic Hierarchy Process (AHP) with a structured questionnaire, the study effectively identified and prioritized key influencing domains: regulatory, infrastructure, economic, and psychological. Regulatory considerations emerged as the most critical, with a global weight of 0.3191. Stakeholders emphasized the urgency of establishing robust legal frameworks, integrating UAM into urban planning, and ensuring environmental compliance. These findings align with international literature underscoring the importance of operational licensing, airspace management, and sustainability (NASA, 2021;

EASA, 2021). Infrastructure ranked second (0.2765), with participants highlighting vertiport availability, technology integration, and the readiness of maintenance and repair facilities as pivotal for implementation. This mirrors global insights that consider infrastructure readiness as foundational to UAM scalability (Roland Berger, 2022; KPMG, 2022). Economic factors followed (0.2446), led by sub-factors such as time savings and liability costs, while concerns around insurance and automation expenses also influenced stakeholder evaluations. Although psychological factors ranked lowest (0.1596), user experience and safety perception were still seen as meaningful, suggesting that public trust will become increasingly important as UAM nears commercialization. The model's internal consistency was validated with a satisfactory consistency ratio (CR < 0.1), affirming the reliability of expert judgments. Overall, the results present a coherent view of stakeholder priorities and provide actionable insights for aligning policy, infrastructure, and public readiness with the evolving UAM ecosystem in India.

5.2 Limitations of the study

This study provides useful insights but has key limitations. The sample, limited to five organizations, may not capture India's full urban diversity. The focus on expert opinions excludes voices from end users, planners, and civil society. Concentration on major cities overlooks issues in tier-2, tier-3, and rural areas. Rapid technological and regulatory shifts could affect the long-term relevance of findings. Additionally, while AHP aids structured decision-making, it may not fully reflect the complex, interdependent nature of emerging sectors like UAM. Broader, more inclusive, and adaptive research approaches are needed to strengthen future assessments of urban air mobility in India.

5.3 Suggestions for Future Research

Future research should explore public perceptions through conjoint or choice modelling, conduct region-specific case studies, and assess emerging UAM technologies. Comparative policy analysis and simulation-based modelling can further inform regulatory strategies and evaluate operational, environmental, and financial implications to support Urban Air Mobility development across diverse Indian contexts.

REFERENCES

1. Al Haddad, C., Chaniotakis, E., Straubinger, A., Plötner, K., & Antoniou, C. (2020). Factors affecting the adoption and use of urban air mobility. Transportation Research Part A: Policy and Practice, 132, 696-712. https://doi.org/10.1016/ j.tra.2019.11.025
2. Bauranov, A., & Rakas, J. (2021). Designing airspace for urban air mobility: A review of concepts and approaches. Progress in Aerospace Sciences, 125, 100726. https://doi.org/10.1016/j.paerosci.2021.100726
3. Bösch, P. M., Becker, F., Becker, H., & Axhausen, K. W. (2018). Cost-based analysis of autonomous mobility services. Transport Policy, 64, 76-91. https://doi.org/10.1016/j.tranpol.2017.09.005
4. Buchholz, N., et al. (2022). Urban Air Mobility Infrastructure: Integration with Smart Cities. Journal of Urban Technology, 29(2), 33-55.
5. Deloitte. (2021). Urban air mobility: Closer than you think. https://www2.deloitte.com/us/en/pages/about-deloitte/articles/press-releases/deloitte-study-urban-air-mobility.html
6. EASA. (2021). Study on the societal acceptance of urban air mobility in Europe. European Union Aviation Safety Agency. https://www.easa.europa.eu/en/ domains/drones-air-mobility
7. Fagnant, D. J., & Kockelman, K. (2015). Preparing a nation for autonomous vehicles: Opportunities, barriers and policy recommendations. Transportation Research Part A: Policy and Practice, 77, 167–181.
8. Goyal, S., Sharma, A., & Singh, P. (2022). Regulatory challenges and urban air mobility in India: A review. Journal of Air Transport Management, 101, 102192.
9. KPMG. (2022). The advanced air mobility revolution: Challenges and opportunities. https://assets.kpmg.com/content/ dam/kpmg/ie/pdf/2022/07/ie-advanced-air-mobility-revolution.pdf
10. McKinsey & Company. (2023). Advanced air mobility: Disruption with a new purpose. https://www.mckinsey.com/ industries/aerospace-and-defense/our-insights
11. NASA. (2021). Urban Air Mobility Market Study. National Aeronautics and Space Administration. https://ntrs.nasa.gov/api/citations/20220015688/downloads/Challenges-Sec-UAM.2022-10-18.pdf
12. Rajendran, A., Kumar, R., & Joshi, H. (2021). Environmental compliance in urban air mobility: Policy implications for India. Environmental Management, 68(3), 321-333.
13. Reinhardt, C., & Meurer, T. (2021). Time efficiency in urban air mobility: A comparative analysis. Journal of Air Transport Management, 93, 102044.
14. Roland Berger. (2021). Urban Air Mobility: The rise of a new mode of transportation. https://www.rolandberger.com/en/Insights/Publications/Urban-Air-Mobility.html
15. Wu, W., & Zhi, L. (2020). Economic feasibility and risk assessment of urban air mobility. Journal of Transportation Research, 85, 14-22.
16. Young, S., Prevot, T., & Johnson, M. (2022). NASA's UAM Grand Challenge: Operational insights and future directions. NASA Technical Reports.
17. Chien, S., Ding, Y., & Wei, C. (2024). Value of travel time savings in urban air mobility and ground transportation. Transportation Research Part A: Policy and Practice. https://www.sciencedirect.com/science/article/ abs/pii/S0969699724001017
18. De Vos, J., & Struben, J. (2024). Perceptions and economic impacts of automation in urban air mobility: A comprehensive review. Transportation Research Part A: Policy and Practice.

https://www.sciencedirect.com/science/article/pii/S0965856424001708

19. Kasliwal, A., Furbush, N. J., Gawron, J. H., McBride, J. R., Wallington, T. J., De Kleine, R. D., & Keoleian, G. A. (2019). Role of flying cars in sustainable mobility. Nature Communications, 10(1). https://www.nature.com/articles/ s41467-019-09426-0
20. Roland Berger. (2018). Urban air mobility—The rise of a new mode of transportation. https://www.rolandberger.com/en/Insights/Publications/Urban-Air-Mobility.html
21. European Union Aviation Safety Agency. (2021). Study on the societal acceptance of urban air mobility in Europe. https://www.easa.europa.eu/en/domains/drones-air-mobility
22. Federal Aviation Administration. (2020). Concept of operations for urban air mobility. https://www.faa.gov/air-taxis/uam_blueprint
23. Han, U., & Gannot, S. (2021). A review of unmanned aerial vehicle (UAV) regulations and frameworks. Drones, 10(1), 81. https://www.mdpi.com/2226-4310/10/1/81
24. Johnson, M. D., Bohrer, T. R. V., et al. (2016). UAS traffic management (UTM) concept of operations to safely enable low altitude flight operations. https://www.researchgate.net/publication/303902685
25. Johnson, D. J., & Smith, A. B. (2021). Assessment of the environmental compliance of aviation regulations and their impact on industry practices. Journal of Environmental Management. https://www.sciencedirect.com/science/article/pii/S0969699721000260
26. Shaheen, S., Cohen, A., & Zohdy, I. (2016). Shared mobility: Current practices and guiding principles. USDOT Report. https://rosap.ntl.bts.gov/view/dot/42193
27. D'Angelo, G., Soto, M. C. Z., et al. (2022). Social attitudes toward unmanned aerial systems (UAS): A review. Drones, 6(2), 28. https://www.mdpi.com/2504-446X/6/2/28
28. Waller, D. D. R., & Williams, E. K. (n.d.). Perceived risk and the adoption of emerging technologies: The case of UAVs. ProQuest Dissertations & Theses. https://www.proquest.com/openview/83449cee64aea7bf5c47737bfe33ba45
29. Coykendall, J., Metcalfe, M., Hussain, A., & Dronamraju, T. (2022). Advanced air mobility: Disrupting the future of mobility. Deloitte Insights. https://static1.squarespace.com/static/645ac985b05ca72d9ae0cf69/t/64ffd916c3e24b79ed42a167/1694488856865/Deloitte+Advanced+Air+Mobility+eri-advanced-air-mobility.pdf
30. Straubinger, A., Rothfeld, R., Shamiyeh, M., Büchter, K., Kaiser, J., & Plötner, K. (2020). An overview of current research and developments in urban air mobility—Setting the scene for UAM research. https://www.sciencedirect.com/science/article/abs/pii/S0969699719304302
31. Gorham, R. (n.d.). Air pollution from ground transportation: An assessment of causes, strategies and tactics, and proposed actions for the international community. The Global Initiative on Transport Emissions. https://wgbis.ces.iisc.ac.in/biodiversity/sdev/gorham.pdf
32. Adams, K. G., Collins, R. E., et al. (2020). A study of the impact of advanced air mobility (AAM) on the national airspace system. Journal of Aerospace Information Systems. https://arc.aiaa.org/doi/abs/10.2514/1.D0431
33. Krylova, M. (2022). Urban planning requirements for the new air mobility (UAM) infrastructure integration. ResearchGate. https://www.researchgate.net/publication/360658187
34. Smith, A. J., Brown, M. D., et al. (2023). Evaluation of urban air mobility (UAM) concepts and their implications for urban planning. Journal of Urban Planning and Development. https://www.sciencedirect.com/science/article/abs/pii/S0969699723001035
35. Kumar, N., Tyagi, M., Garg, R. K., Sachdeva, A., & Panchal, D. (n.d.). A framework development and assessment for cold supply chain performance system: A case of vaccines. Retrieved from https://www.sciencedirect.com/science/article/pii/S0959652622017450
36. Kumar, N., Tyagi, M., & Sachdeva, A. (2021). Depiction of possible solutions to improve the cold supply chain performance system. Department of Industrial and Production Engineering, Dr B R Ambedkar National Institute of Technology, Jalandhar, India.