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# Reforming Regional Air Connectivity: Strategic Insights into the Implementation of India's UDAN-RCS Scheme

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**ABSTRACT:** The UDAN-RCS (Ude Desh ka Aam Nagrik – Regional Connectivity Scheme), launched in 2016 under India's National Civil Aviation Policy, aims to enhance regional air connectivity by making air travel accessible and affordable for the common citizen. By subsidizing short-haul air routes and revitalizing underutilized airports, the scheme aspires to integrate remote regions into the national transportation network. As of 2024, UDAN has facilitated the operationalization of over 88 airports and sanctioned more than 600 regional routes. However, despite its ambitious scope and initial successes, concerns regarding its long-term viability have grown. Challenges such as infrastructure limitations, inconsistent passenger demand, financial stress on operating carriers, and delayed disbursement of Viability Gap Funding (VGF) have impeded sustained implementation and commercial self-sufficiency of many awarded routes. This study undertakes a comprehensive assessment of the operational, financial, and policy-related challenges confronting the UDAN initiative. Employing a mixed-methods approach, the research combines secondary data analysis, case study evaluations of successful and failed routes, and global benchmarking against similar regional connectivity models such as the European Union's Public Service Obligation (PSO) and Australia's Regional Aviation Access Program (RAAP). The analysis identifies systemic issues including the lack of real-time performance tracking, inadequate coordination between central and state authorities, and the absence of demand-responsive route planning. By addressing both institutional and technological bottlenecks, the paper provides actionable policy insights to transform UDAN from a subsidy-dependent initiative into a structurally robust model for inclusive aviation development.

## I. INTRODUCTION

India's civil aviation sector has witnessed exponential growth over the past two decades, emerging as one of the fastest-growing markets globally. While major metropolitan airports have seen rapid expansion in capacity and passenger traffic, regional air connectivity remained a critical gap in the country's transportation infrastructure. To address this imbalance and promote equitable access to air travel, the Government of India launched the UDAN-RCS (Ude Desh ka Aam Nagrik – Regional Connectivity Scheme) in April 2016 as a flagship initiative under the National Civil Aviation Policy (NCAP).

The scheme also aims to stimulate economic development in remote areas by improving connectivity to business hubs, religious canters, and tourist destinations, thereby unlocking their socio-economic potential. Over 600 routes and 88 airports have been operationalized under various phases of UDAN, covering a wide spectrum of geographies—from the northeast and tribal regions to island territories and hinterlands.

The context of these challenges is further complicated by the absence of data-driven route planning, limited coordination between central and state governments, and the evolving dynamics of post-pandemic air travel, which have altered consumer preferences and airline economics. Moreover, comparative global experiences—such as the European Union's Public Service Obligation (PSO) routes and Australia's Regional Aviation Access Scheme (RAAS)—indicate the importance of performance-based contracts, community engagement, and long-term sustainability mechanisms, which are still emerging features in the Indian model.



This research paper critically evaluates the design, outcomes, and gaps in the UDAN-RCS framework and seeks to answer the following key questions:

- What are the major challenges hindering the effective implementation of UDAN-RCS?
- How do infrastructural, financial, and policy factors interact to influence the success or failure of regional routes?
- What lessons can be drawn from international regional aviation models to strengthen India's approach?
- What strategic interventions are required to transition the scheme from subsidy dependence to structural viability?

## II. LITERATURE REVIEW

The UDAN-RCS (Ude Desh ka Aam Nagrik – Regional Connectivity Scheme) represents a significant policy intervention aimed at democratizing air travel in India. Scholarly and institutional literature on the scheme—primarily from government agencies such as the Ministry of Civil Aviation (MoCA), the Airports Authority of India (AAI), and performance audits by the Comptroller and Auditor General of India (CAG)—highlight both its potential and its implementation challenges. The literature points to a complex interplay between policy design, infrastructure readiness, financial support mechanisms, and market realities in determining the scheme's outcomes.

### 2.1 National Literature on UDAN Implementation

A 2023 progress report by the MoCA indicates that over 600 routes have been awarded under UDAN across multiple phases. However, only a fraction of these routes have achieved operational consistency beyond the subsidized period. The CAG (2023) performance audit emphasized issues of poor route sustainability, citing high route cancellation rates, delays in subsidy disbursement, and mismatches between airline capacity and passenger demand. Similarly, AAI reports flag concerns around ground infrastructure deficits, such as inadequate runways, absence of night landing facilities, and limited Air Traffic Control (ATC) support in regional airports. Several Indian policy analysts and aviation experts have argued that the UDAN scheme, while visionary, suffers from an overreliance on administrative route allocation rather than data-driven, demand-responsive planning. The lack of comprehensive market research and community consultation has resulted in route allocations that often do not align with actual travel needs, leading to underutilization and financial non-viability.

### 2.2 Insights from International Regional Connectivity Models

In contrast to India's centrally-driven UDAN model, international practices in regional aviation offer more decentralized, performance-based approaches. For instance, the European Union's Public Service Obligation (PSO) system mandates that essential air services be maintained through competitive bidding, with subsidies awarded to airlines based on clear performance metrics, passenger demand thresholds, and local government co-financing. Notably, PSO routes are reassessed periodically for effectiveness, and many are phased out once commercial viability is achieved.

Australia's Regional Aviation Access Programme (RAAP) and the Remote Air Services Subsidy Scheme (RASSS) further emphasize community consultation, service reliability, and tailored support for remote regions. These schemes prioritize long-term service continuity over short-term traffic metrics and involve regional stakeholders in subsidy distribution and airport maintenance.

### 2.3 Identified Research Gaps

While the existing literature provides a strong foundation for understanding the operational and policy dynamics of regional connectivity programs, several key research gaps remain in the Indian context:

- Absence of demand-driven route planning tools: Unlike international models, India lacks predictive analytics in identifying viable air routes based on socio-economic indicators, tourism patterns, or business activity clusters.
- No long-term subsidy roadmap: Current VGF allocations are time-bound (typically 3 years) and do not account for different gestation periods of regional markets.

- Underutilization of performance monitoring technologies: Real-time data dashboards for tracking route viability, subsidy use, and passenger feedback are still in early stages or absent entirely.
- Limited empirical research on stakeholder coordination: Most studies focus on policy frameworks but overlook operational friction between central agencies, airlines, and state governments.

### III. RESEARCH OBJECTIVES AND HYPOTHESES

This study is designed to critically examine the performance of the UDAN-RCS scheme in the Indian aviation landscape, with particular focus on identifying the key operational, infrastructural, financial, and policy-related challenges that affect its long-term sustainability. Drawing from national data, performance audits, and international benchmarking, the study aims to develop a strategic roadmap to enhance the scheme's effectiveness and scalability.

#### Research Objectives

The core objectives of the study are as follows:

- To assess the operational and infrastructural challenges faced during the implementation of UDAN-RCS routes and airport development, particularly in Tier-2 and Tier-3 cities.
- To evaluate the role of various stakeholders, including central and state governments, airport authorities, airline operators, and regulators, in ensuring coordinated and timely execution of the scheme.
- To benchmark UDAN-RCS against global regional connectivity models, such as the EU's Public Service Obligation (PSO), Australia's Regional Aviation Access Programme (RAAP), and the U.S. Essential Air Service (EAS), in terms of policy design, funding mechanisms, and performance outcomes.
- To propose strategic and technology-driven reforms that can shift the scheme from a subsidy-dependent framework to a sustainable, demand-responsive model grounded in digital governance, data analytics, and performance-based incentives.

#### Research Hypotheses

To guide the empirical and analytical aspects of the study, the following hypotheses have been formulated:

- H1: Significant infrastructure gaps (such as inadequate terminal capacity, lack of night-landing facilities, and absence of ground handling services) are a critical barrier to the sustainability of UDAN routes.
- H2: Delays in Viability Gap Funding (VGF) disbursement by the government adversely impact airline participation and route continuity under the UDAN-RCS framework.
- H3: The use of advanced route planning tools, including AI-driven demand forecasting and market viability assessments, can lead to improved route allocation and higher load factors.
- H4: Effective policy alignment and coordination at the state level—through aviation task forces, MoUs, and local airport support—are positively correlated with higher success rates and operational longevity of UDAN routes.

These objectives and hypotheses form the analytical foundation of the study and inform both the methodology and interpretation of results. By validating or refuting these hypotheses, the study aims to contribute both theoretically to aviation policy literature and practically to future decision-making by policymakers and aviation stakeholders.

### IV. RESEARCH METHODOLOGY

This study employs a mixed-methods research design to comprehensively analyse the implementation of the UDAN-RCS scheme in India. The mixed-methods approach integrates qualitative and quantitative research strategies to explore operational, financial, and policy-related dimensions of regional air connectivity. This approach was chosen to ensure a well-rounded understanding of the challenges and success factors associated with the scheme and to validate hypotheses using both empirical evidence and contextual analysis.

#### 4.1 Qualitative Analysis

The qualitative component involved a systematic review of secondary sources, including:

- Government policy documents and press releases from the Ministry of Civil Aviation (MoCA)
- Performance audits published by the Comptroller and Auditor General (CAG) of India
- White papers and industry reports by CAPA India, FICCI, and NITI Aayog
- Academic literature, news articles, and research studies relevant to aviation policy and regional development

This review aimed to identify policy intentions, implementation bottlenecks, institutional coordination challenges, and stakeholder perspectives on the scheme's viability.

#### 4.2 Quantitative Analysis

For the quantitative component, secondary data was collected and analysed from official and credible sources, including:

- Airports Authority of India (AAI) databases on route activity, passenger load factors (PLF), and airport utilization rates
- MoCA UDAN Dashboards and public datasets on operational routes, awarded contracts, and scheme phases
- CAG audit data on Viability Gap Funding (VGF) disbursement timelines, airline participation, and subsidy utilization

Descriptive and inferential statistical techniques were used to evaluate:

- Route performance trends
- Average and comparative PLFs across successful and underperforming routes
- Patterns of VGF delays and their impact on service discontinuation
- Route survivability post-VGF phase

These analyses helped quantify the extent of implementation issues and validate key hypotheses related to route viability and airline behaviour.

#### 4.3 Comparative Benchmarking

To place India's UDAN-RCS within a global policy context, the study conducted comparative benchmarking against established regional aviation support programs, namely:

- European Union's Public Service Obligation (PSO)
- Australia's Regional Aviation Access Programme (RAAP) and Remote Air Services Subsidy Scheme (RASSS)
- United States Essential Air Service (EAS) program

The benchmarking focused on key design parameters such as subsidy models, contract duration, route selection methods, stakeholder roles, and performance monitoring systems. This helped identify best practices and gaps in India's current approach.

#### 4.4 Case Study Analysis

To complement the macro-level data analysis, four case studies of UDAN routes were selected based on performance diversity and geographic spread:

- Delhi–Shimla: A well-performing route with high tourism appeal and government backing
- Tezpur–Guwahati: A failed route characterized by low PLF and operational discontinuity
- Mumbai–Jaisalmer: A tourism-driven seasonal success with state-level support
- Tirupati–Hyderabad: A religious pilgrimage route with consistent passenger demand

Each case was analysed on parameters such as route frequency, occupancy, ground infrastructure, VGF efficiency, and socio-economic relevance. These cases provided granular insights into the critical success and failure factors in route implementation.

The triangulation of these methods—literature review, data analysis, international comparison, and real-world case studies—ensures that the research findings are both empirically grounded and contextually informed. This approach enables the development of evidence-based recommendations for enhancing the effectiveness and sustainability of regional air connectivity initiatives in India.

## V. KEY FINDINGS

The analysis of UDAN-RCS implementation, supported by secondary data, case studies, and stakeholder insights, reveals several critical challenges and patterns that affect the scheme's long-term sustainability and effectiveness. These findings are categorized into six core areas:

### 5.1 Low Post-VGF Route Survivability

One of the most concerning findings is that only 7–10% of UDAN routes remain operational after the expiry of the Viability Gap Funding (VGF) period. This indicates a high dependency on subsidies for route viability and highlights the absence of a natural market demand strong enough to sustain operations beyond the initial three-year support window. Many routes that appear successful during the subsidy phase are discontinued due to unprofitable operations once funding ceases.

### 5.2 Delays in VGF Disbursement and Lack of Performance Monitoring

Timely disbursement of subsidies is critical to ensuring uninterrupted operations. However, data from CAG audits and airline reports show frequent delays in VGF disbursement, leading to cash flow issues for smaller regional carriers. In addition, there is no robust real-time performance monitoring system in place for tracking key metrics such as route viability, load factors, or compliance with service obligations. This administrative lag creates operational uncertainty and discourages airline participation in future bidding rounds.

### 5.3 Passenger Load Factors (PLF) Remain Below Industry Benchmarks

The average Passenger Load Factor (PLF) under UDAN is approximately 66%, which is significantly below the break-even threshold of 75–80% for regional routes. While some routes—especially those linked to tourism and religious destinations—report higher occupancy, a majority operate below sustainable capacity. Low PLF is often linked to poor demand forecasting, limited marketing, inconvenient flight schedules, and weak last-mile connectivity at smaller airports.

### 5.4 Characteristics of Successful Routes

A comparative review of high-performing routes (e.g., Delhi–Shimla, Mumbai–Jaisalmer, and Tirupati–Hyderabad) reveals a consistent pattern. These routes typically:

- Serve tourism-centric or religious destinations with predictable and recurring demand
- Operate from or to airports with adequate infrastructure, such as ATC towers, runway lighting, and terminal facilities
- Benefit from coordinated stakeholder involvement, including proactive support from state governments, airport authorities, and tourism departments

This suggests that route success is not merely a function of subsidy support, but a product of holistic ecosystem readiness.

### 5.5 Infrastructural Deficiencies at Regional Airports

Many regional airports under the UDAN scheme suffer from outdated or inadequate infrastructure, such as short runways, lack of Instrument Landing Systems (ILS), no night landing capabilities, and minimal terminal amenities. These deficiencies limit operational flexibility, reduce safety margins, and discourage full-service and regional carriers from entering these markets. Moreover, maintenance and staffing shortages further impact airport readiness.

### 5.6 Weak State-Level Aviation Frameworks

Another notable finding is the limited institutional involvement at the state level. Most Indian states do not have dedicated civil aviation policies, aviation development task forces, or interdepartmental coordination mechanisms. As a result, UDAN implementation remains heavily centralized, with inadequate support at the local level for ground operations, airport upgrades, and public awareness campaigns. This governance gap undermines the scheme's ability to adapt to regional contexts and optimize route performance.

In summary, the findings point to a complex set of interrelated challenges—including infrastructure deficits, financial constraints, poor planning mechanisms, and fragmented governance—that collectively hinder the effectiveness of the UDAN-RCS program. Addressing these issues requires a systemic and multi-stakeholder approach, supported by robust policy reforms and data-driven decision-making tools.

## VI. DISCUSSION

The results of this study underscore a critical paradox in the implementation of the UDAN-RCS scheme: while the policy framework is ambitious and well-intentioned, its execution is undermined by persistent gaps in infrastructure readiness, funding delivery, and stakeholder governance. These systemic issues limit the scheme's ability to achieve self-sustaining regional air connectivity.

### 6.1 Infrastructure as a Foundational Bottleneck

A consistent finding across underperforming routes is the inadequacy of supporting infrastructure at regional airports. Without functional air traffic control (ATC), night landing capabilities, reliable ground handling, or even basic terminal services, the operational scope of carriers is constrained. Moreover, weather-related disruptions and safety limitations further reduce the efficiency and reliability of regional operations. These findings align with existing literature (MoCA, AAI, CAPA) that emphasize infrastructure development as a prerequisite for commercial viability. Without modernizing regional airports, any demand stimulation through subsidies remains temporary and unsustainable.

### 6.2 Funding Gaps and VGF Dependency

The study also reveals that Viability Gap Funding (VGF), while critical for initial uptake, is plagued by delays and lacks transparency in disbursement. This has had a particularly negative impact on small regional operators, many of whom operate with thin margins and limited working capital. Unlike international programs such as the EU's PSO or the U.S. EAS, which offer longer-term, predictable funding models, India's short-term VGF cycles create an unstable planning environment for airlines.

### 6.3 Governance and Coordination Deficits

A significant implementation challenge identified in this research is the lack of institutional coordination between central and state governments. While the Ministry of Civil Aviation (MoCA) leads policy design and funding allocation, execution at the regional level often suffers from bureaucratic inertia, lack of interdepartmental cooperation, and absence of localized aviation policies. Unlike the Australian RASSS, which actively engages local governments and communities in identifying priority routes and supporting airport operations, India's top-down approach limits flexibility and responsiveness.

### 6.4 Route Planning Without Data

Another core concern is the absence of demand-driven, data-informed route selection. Current route allocations often rely on airline proposals or administrative decisions without sufficient backing from travel pattern data, socio-economic indicators, or tourism forecasts. This results in a mismatch between supply and demand, low load factors, and eventual route failure. International benchmarks show that AI-powered route planning models and GIS-based demand mapping tools can optimize route selection, improve PLF outcomes, and reduce VGF dependency. Integrating such technologies into India's route bidding and evaluation process is essential.



## VII. STRATEGIC RECOMMENDATIONS

### 1. Strengthen Infrastructure through Public–Private Partnerships (PPPs)

To overcome infrastructural bottlenecks at regional airports, the government should actively promote PPP models for airport development and maintenance. Offering incentives such as land lease concessions, tax breaks, and assured revenue-sharing can attract private players to invest in Tier 2 and Tier 3 city airports. Case studies from India's major airports (Delhi, Hyderabad) demonstrate how private participation can accelerate modernization and improve service quality.

### 2. Implement a Digital VGF Management Platform

Introduce a centralized digital platform for real-time tracking and automated disbursement of Viability Gap Funding (VGF). The platform should integrate performance-linked parameters such as Passenger Load Factor (PLF), route frequency, on-time performance, and customer satisfaction ratings. This would increase transparency, reduce delays, and ensure funds are directed toward genuinely performing routes.

### 3. Deploy AI-Based Route Planning and Demand Forecasting

Integrate Artificial Intelligence (AI) and machine learning tools into the route selection and bidding process. These tools can analyse historical passenger trends, tourism data, local economic indicators, and seasonal variations to identify high-potential routes. By shifting from administrative allocation to evidence-based planning, the scheme can optimize load factors and reduce post-subsidy failure rates.

### 4. Establish State-Level Aviation Task Forces

Institutionalize State Aviation Task Forces to improve vertical coordination between central and state governments. These task forces, supported by formal MoUs, can streamline project clearances, promote regional branding of UDAN routes, coordinate marketing, and monitor local airport readiness. Local political and bureaucratic ownership is essential for ground-level execution and stakeholder engagement.

### 5. Invest in Aviation Skill Development in Regional Areas

Address the human capital gap by launching aviation-specific vocational training programs in underserved regions. Courses in airport operations, ground handling, security, and air traffic services can be delivered through Industrial Training Institutes (ITIs), polytechnics, or public-private skill centres. Developing a local talent pipeline will reduce operational costs and boost employment.

### 6. Diversify Route Selection Based on Purpose-Driven Demand

Adopt a more segmented approach to route development by categorizing destinations into tourism, religious, medical, and economic hubs. Prioritize funding and promotion for routes with inherent, recurring demand such as pilgrimage circuits (e.g., Tirupati, Varanasi), tourist trails (e.g., Jaisalmer, Hampi), and medical centres (e.g., Vellore, Guwahati). This will ensure higher PLFs and public utility.

## VIII. CONCLUSION

The UDAN-RCS (Ude Desh ka Aam Nagrik – Regional Connectivity Scheme) stands as one of India's most ambitious initiatives to democratize air travel and integrate remote regions into the national economic mainstream. Since its inception in 2016, the scheme has made remarkable strides in expanding geographic reach, operationalizing previously inactive airports, and lowering airfare barriers for underserved populations. It represents a transformational policy vision aligned with broader national objectives of inclusivity, mobility, and balanced regional development.

However, the findings of this study reveal that the success of UDAN has been largely uneven and often short-lived, owing to a combination of infrastructural, financial, and governance-related shortcomings. A majority of routes remain unsustainable beyond the Viability Gap Funding (VGF) period, passenger load factors are below commercial thresholds, and infrastructure at many regional airports remains inadequate. Furthermore, the lack of real-time data monitoring, inconsistent state-level coordination, and limited adoption of advanced planning tools undermine the scheme's effectiveness and scalability.



The research confirms that for UDAN to fulfil its long-term promise, it must undergo a strategic evolution—from a centrally administered, subsidy-dependent program to a demand-responsive, infrastructure-backed ecosystem.

Comparative analysis with international models such as the EU's PSO and the U.S. Essential Air Service (EAS) reinforces the need for long-term planning, decentralized implementation, and community participation to ensure service continuity and public value.

By integrating these strategic reforms, India can not only resolve the current limitations of UDAN but also position itself as a global leader in sustainable, inclusive regional aviation. As global travel trends shift towards decarbonization, digital transformation, and regional resilience, UDAN has the potential to become a blueprint for emerging economies looking to bridge connectivity gaps while promoting equitable growth.

#### REFERENCES

1. Ministry of Civil Aviation (2023). UDAN Progress Report.
2. Airports Authority of India (2024). Route and PLF Data.
3. CAG (2023). Performance Audit Report on UDAN-RCS.
4. CAPA India (2022). Regional Aviation Outlook.
5. ICAO (2021). Green Aviation Strategy.
6. EU Commission (2020). PSO Framework. **rameworks)**



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