New regional aviation policy in India:
Early indicators and lessons learnt

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Abstract

In this article, we study the new regional aviation policy of India along with data collected on the performance of the scheme since its introduction in 2016. The scheme has multiple objectives. First, it wants to increase footprints of civil aviation to unserved and underserved airports of India. Second, it intends to make flying more affordable. It comes out, the aviation market in the country has expanded due to the addition of new routes under the scheme but data indicates that there is a regional imbalance in the performance of the scheme. Moreover, there are still questions on the long term sustainability of many routes and finding a solution for neglect of some priority regions. We have identified economic and commercial challenges that need to be addressed for the program to achieve its goals. The insights gathered during the study can be generalized and policy makers and managers of remote area air-connectivity schemes of different countries should find them useful.

Keywords: Regional air connectivity, Remote regions, Public policies, India

1. Introduction

Deregulation of airline industries across the world has ushered free-market competition. Greater efficiency, better quality of service and success found by entrepreneurial ventures have spurred growth of commercial aviation (Goetz and Vowles, 2009). Passenger traffic volume has grown with the addition of new routes, lower fares, higher frequency and more choices. In this regard, several studies have established the positive influence of air connectivity to a region on its economic growth (e.g; Mukkala, 2013; Baker et al, 2015; Airports Council International Europe, 2015; Brathen et al, 2018).

However, most of the past research on airline competition and efficiency have focused on dense routes. Not much work has been done on post-liberalization developments in low traffic regional routes (Fageda and Flores-Fillol, 2012). When airlines compete with each other for a profit, there could be a natural exclusion of regional services on low traffic and low revenue-potential routes.

Indeed, there are regions in every country that airlines ignore due to commercial unviability of operation. Air connectivity to such areas may be supported through direct government subsidies or cross-subsidization under policy regulations (IATA, 2017). State support for regional and remote air connectivity is provided in many countries. Some of the schemes, viz. Essential Air Services (EAS) in the USA, Public Service Obligations (PSO) in Europe, Remote Air Subsidy Scheme (RASS) in Australia are in operation for decades. Similar schemes are also present in Canada (Metrass-Mendes et al., 2011), Russia (Russian Government, 2018), China (Zhang, 2013; Ge, 2017) and Brazil (Baldwin, 2014).

There can be multiple objectives for state interventions in inclusive air transportation. Routes identified as 'regional', 'remote', 'commercially unviable' or 'isolated areas' are selected to ensure equity in access to a prominent public infrastructure. Countries, which have already got a well-developed air transport network, promote connectivity to far-flung areas through 'lifeline' services across difficult terrains for ensuring a minimum frequency of domestic connectivity. State schemes in the USA, Canada, Australia as well as in Europe fall under this category.

Another objective for state funding is to promote territorial cohesion, social and political integration by connecting remote and isolated regions of a country (Reynolds-Feighan, 1999). Countries that are geographically spread out may need to address the alienation of some of its communities e.g. subsidized air connectivity to Kaliningrad- an exclave of Russia, island connectivity in Spain, southwest province connectivity in China and north-east connectivity in India. Countries also develop national transportation networks to connect small airports to a hub or develop regional hubs to disperse the load on a few metropolitan centers. Airlines are incentivized to establish hubs in a non-major airport and for increasing departures from and to that airport (Núñez-Sánchez, 2015).

Fageda et al. (2018) have critically reviewed the schemes and policies of different countries supporting air connectivity in remote areas. They have classified various policies into the following four categories: Route-based policies, Passenger-based policies, Airline-based policies and Airport-based policies. A mix of more than one category is also adopted by some. The route-based policies are most commonly used and are prevalent in USA, Europe and Australia. Passenger based policies aim to provide direct benefit (discounted tickets etc.) to certain categories of passengers. Airline specific policies are seen in countries having state carriers. Airport-based policies incentivize carriers for operating to specific airports.

These policies have contributed to different kinds of impacts of the air connectivity in remote regions. Such impacts include the reduction of barriers to movement of passengers and goods and stimulating long-term growth in the area, the generation of new profitable routes for airlines, increase of employment, and providing to the population with better access to public services. However, many of these policies have received criticisms. Positions against these policies question in some cases the real need of government intervention given that in some cases they are applied in routes/regions where air services could be viable on a commercial basis. Furthermore, it is typical for the determination of service levels, fares, and subsidies to be arbitrary. A further criticism relates to the lack of proper incentives to provide air services efficiently and the possible distortion of competition. Even if there is room for improvement in their specific implementation, it is not generally questioned that these policies may contribute to the well-being of citizens living in remote regions.

While past research has focused on developed countries, commercial aviation in developing economies is expanding at a rapid pace. In particular, India is a country with the second largest population in the world and has immense diversity. At present, the Indian aviation market is ninth-largest in the world, valued at USD 16 billion and poised to become the third-largest aviation market after the USA, China and overtaking the UK by 2025 (International Trade Administration, 2018). In spite of this exponential growth, the per-capita air travel penetrations in the country is just 0.08 air trips per annum. This is not only minuscule compared to developed nations but also very small in comparison to developing nations like China and Brazil. Further, most of the traffic is concentrated on trunk domestic routes.

Hence, there is a latent scope for expansion of commercial aviation in India although some regions cannot be part of the expansion without external support. The government has been experimenting with policy measures and schemes to add underserved and unserved airports to the national network, mostly achieving minimal success. To this point, subsidized connectivity to its northeastern region has existed on a small scale for more than a decade.

The new Indian Regional Connectivity Scheme (RCS) was started in 2016. The Indian RCS is an ambitious program that employs a combination of route-based and airline-based policies. It has a budget higher than the entire PSO program in Europe or the EAS program in the United States and has effects on a vast number of routes in the domestic market.

Some operators have seen commercial opportunity (demonstrated in their bidding strategies) but a few participate as an obligation under the prevalent regulations. Although the Government has promised support to ensure commercial feasibility, there are questions on the sustainability of the program due to rising costs as well as operational reasons. Furthermore, the focus of the program is, support air services in unserved and underserved airports so that it does not necessarily meet the special needs of remote regions, particularly in the north-east part of the country.

In this paper, we provide an in-depth analysis of the Indian RCS. We analyze data related to relevant characteristics of airports, routes and regions benefited by the program to interpret the early indicators and infer about the future of the program. In addition, we have identified economic and commercial challenges that need to be addressed for the program to achieve its goals.

Previous studies on regional air connectivity policies focus on specific programs in remote regions of developed countries. Furthermore, most of these previous studies examine route-based policies. Not intended to be exhaustive, examples of such studies include Grubesic and Matisziw (2011) and Özcan (2014) for the US, Calzada and Fageda (2012) and Fageda, Jiménez, and Díaz (2012) for Spain, Angelopoulos et al. (2013) for Greece, Lian and Rønnevik (2011) for Norway, or Di Francesco and Pagliari (2012) for Italy.[1]

[1] Some studies provide inter-country comparisons of route-based policies within Europe (Williams and Pagliari, 2004; Williams, 2010; Calzada and Fageda, 2014), Europe vs Us (Wittman et al., 2016) or Europe vs Australia (Merkert and Hensher, 2013)

Here, we analyze a program that directly affects all regions of a huge developing country that, in turn, has regions that can be considered remote. Hence, we add to previous literature by examining a policy with unique characteristics in terms of both the scale, the diversity of tools employed and the socio-economic and geographical context in which it is applied.

The paper is organized as follows. The second section discusses the policies implemented in India to support regional connectivity with a particular focus on the Regional Connectivity scheme. Data analysis is presented next. Critical evaluation of the findings and postulates implications for the future of the program is in the fourth section. The way forward for RCS is discussed at the end.

2. Policies to support regional connectivity in India

The Air Corporation Act, 1953 nationalized all the existing private airlines in India and consolidated them into two state undertakings, one domestic carrier- *Indian Airlines* and other international carrier *Air India*. In 1981, a regional airline *Vayudoot* was formed as a joint venture between the two state airline entities. It was conceived to provide connectivity to the North-Eastern region of India. This region consists of eight Indian states – *Assam*, *Meghalaya*, *Arunachal Pradesh*, *Nagaland*, *Manipur*, *Mizoram*, *Tripura* and *Sikkim*. They are situated in the foothills of eastern Himalayas and is connected to other parts of India through a narrow corridor (Figure 1). This area is relatively sparsely populated and lags in economic development.

At the peak of its operations, *Vayudoot* connected 100 airports in India with hubs at major metros. Soon the model became financially unviable and the government of India merged it with *Indian Airlines* in 1993. *Vayudoot* finally ceased operation in 1997 (Air India, 2009).

In 1994, The Air Corporation Act of 1953 was repealed through the Air Corporations (Transfer of Undertaking and Repeal) Act (Government of India, 1994). This act repealed the nationalization of civil aviation, paving way for private airline participation. The act also transferred state entities- *Indian Airlines* and *Air India* into limited companies that were merged under the name of *Air India* in 2007. In the same act, new private companies like *Jet Airways* were able to provide services as fully-fledged airlines. Since *Air Deccan* started operations in India in 2003, several low-cost airlines like *IndiGo*, *SpiceJet* or *GoAir* have launched services and become very relevant players in the Indian market.

In comparison to China, deregulation and privatization have reshaped completely the aviation industry in India. Private and low-cost airlines have become dominant players in the

Indian airline market while the state-owned airlines still enjoy a dominant status in the Chinese market. In this regard, the five largest Indian private carriers concentrated 79% of total passengers in 2016, being IndiGo the largest airline and Air India having a share of less than 15% (Wang et al, 2018). In contrast, the "big three" state-owned airline groups concentrated 71% of total passengers in China in the same year. The study of Wang et al. (2018) shows that the presence of a low-cost carrier on a route lead to lower prices and more demand both in China and India.

Another study that provides a relevant comparison between China and India is that of Yu et al. (2019) that examines the efficiency performance of major Chinese and Indian air carriers. They found that low-cost carriers and private ownership have a positive and significant influence on airline efficiency. In part, the worse performance of state-owned airlines could be associated to the use of these airlines for social goals in addition to commercial services. Furthermore, they found that Air India is much more efficient than its Chinese counterparts, probably indicating that state-owned airlines operating in an environment dominated by private and low-cost airlines tend to become stronger in efficiency.

Thus, state-owned airlines in India may have to provide commercial and social services in an environment characterized by the intense competition spurred by low-cost airlines, which are generally very efficient firms capable to offer low fares. To this point, such low-cost airlines may be able to offer flights on thin routes where traditional network airlines could not operate profitably. Calzada and Fageda (2019) provide evidence in this line for Europe where the big expansion in the number of routes with air services in recent years is mainly linked to low-cost airlines. The high and growing presence of low-cost airlines in India could justify focusing public intervention in remote regions where not even low-cost airlines could profitably offer flights.

Bearing this is mind, to provide better connectivity to the North-East region of India and other remote and priority areas, the Government of India issued Route Dispersal Guidelines (RDG) in March 1994, stipulating the mandatory capacity deployment. Domestic routes were segregated as follows:

Category I: It consists of 12 domestic major trunk routes.

Category II: Routes connecting stations in North Eastern region, *Jammu and Kashmir*, *Andaman and Nicobar* islands, and *Lakshadweep* islands (Remote regions).

Category III: Routes other than those in Category-I and Category-II.

Every operator had to deploy 10 % of domestic Category I capacity to Category II and 50 % of Category I capacity to Category III routes. In 1996, *Indian Airlines* formed a new subsidiary regional airline, *Alliance Air,* to operate the remote North East region of India. From 2003 onwards, Ministry of Development of North Eastern Region (MDoNER) of India granted a subsidy of INR 35 crores (approximately USD 5 million) per annum to *Alliance Air* for providing air connectivity to North-East India. License was granted to new regional airlines to operate in the region. This scheme achieved limited success in enhancing connectivity to remote areas (Fageda et al., 2018).

2.1 Regional connectivity scheme - UDAN

The government of India introduced the National Civil Aviation Policy (NCAP) in 2016 (Government of India, 2016a). One of the key policy area is Regional connectivity. Regional connectivity scheme or UDAN whose acronym in Hindi language means 'Let the common citizen of the country fly' was introduced in the same year. The objectives, as mentioned in the scheme documents include "to *enhance regional connectivity through fiscal support and infrastructure development*" and "*promote tourism, provide employment and promote balanced regional growth and make flying affordable for the masses"*. The scheme seeks to increase civil aviation footprint pan-India and provide connectivity to remote locations. The objectives are economically justified and development-oriented. However, the demand for resources from multiple activities (subsidies, infrastructure development etc.) may lead to complexities and conflicts, as would be seen later in this paper.

Under new policy the previous RDG guidelines were modified in 2016 as follows: (Government of India, 2016c).

Category I: It consists of 20 domestic major direct trunk routes.

Category II: Routes connecting stations in North-Eastern region, *Jammu and Kashmir*[2], *Himachal Pradesh*, *Uttarakhand*, *Andaman and Nicobar* and *Lakshadweep*.

Category II A: Routes within the North Eastern region, *Jammu and Kashmir*, *Himachal Pradesh*, *Uttarakhand*, *Andaman & Nicobar*, *Lakshadweep* and *Cochin-Agatti-Cochin*.

Category III: Routes other than those in Category-I and Category-II.

[2] In 2019, the state of *Jammu and Kashmir* has been bifurcated into two Union administered territories: *Jammu and Kashmir* and *Ladakh*. Hence Category II and IIA are applicable to both territories.

The operators have to mandatorily deploy 10 % of domestic Category I capacity to Category II and 35 % of Category I capacity to Category III. Further, 10 % of domestic Category II capacity has to be deployed on Category II A. Thus the scope of Category II and II A was expanded to include other remote regions.

The new RCS scheme has two components. The first is to operationalize regional airports to undertake scheduled flights. The second is to pursue new regional flight routes connecting underserved and unserved airports with each other as well as with well-served airports. Unserved airports have been defined as those which do not have any scheduled operations for the last two flight schedules. Underserved airports have been defined as those having no more than 7 scheduled flights in a week in the current schedule. The operating airlines under this scheme have to offer some seats at a lower price and they can claim subsidy, viability gap funding (VGF), to compensate for the loss. The underserved airports will receive maximum of 30 % of the subsidy funding and rest shall be for underserved airports**.**

A RCS route is a pair of origin-destination with either or both airports falling under the unserved or underserved airport category. The scheme is specifically for operations through fixed-winged aircraft (applicable to a maximum of 80 seats, irrespective of capacity), helicopters (for remote/specific area introduced in RCS-2) as well as seaplanes (introduced in RCS-3). The scheme provides support to airline operators in two ways. First by reducing operational cost as airport operators provided benefits (lower charges and taxes etc.). Second by providing VGF on the 50% of the seats allocated to RCS routes (40 seat cap). A maximum permissible VGF (cap) has been worked out in terms of stage length, category of RDG operation and aircraft type (fixed-wing, helicopter) as well as taking due cognizance of the various cost elements from the stakeholders. The VGF cap is revised quarterly and the indexation is based on consumer price index as well as aviation turbine fuel prices.

Cross-subsidization of VGF for RCS routes comes through Regional Connectivity Fund (RCF), which is financed by a levy on domestic departures (except on Category II/IIA routes under RDG, RCS routes and aircraft with less than 80 seats). Rest of the funding is done by the government (Mishra, 2018). To make airfare affordable to passengers, the fare against the subsidized seats (50 % of seats offered on RCS route) are capped. The airfare caps are worked out in terms of stage length (distance) and type of aircraft operations – fixed-wing and helicopter. The airfare cap revision takes place every quarter and the indexation is based on the consumer price index.

The tenure of the RCS scheme is 10 years. The provision of VGF shall be considered until the seventh year. Operators need to bid for routes under a reverse auction where the decision is based on minimum subsidy sought. The routes initially would be exclusive to successful operators for a fixed tenure of three years. Later it shall be demand-driven and proposed to be left to market forces. The focus is sustenance of long term operations and not VGF dependent for perpetuity. Acknowledging changes in market dynamics, the scheme provisions are to be reviewed every three years. Three rounds of RCS bidding process have been released by the Ministry of civil aviation (MoCA)- version 1 in December 2016, version 2 in September 2017 and version 3 in October 2018 (additional version 3.1 in February 2019).

Under the RCS scheme, the federal and the state governments both have to contribute towards subsidy funding. A Memorandum of understanding (MoU) is signed by MoCA, as implementing agency with the various state governments, participating in the scheme. The state government is expected to contribute 20% of VGF support to airlines (or 10% in case of Union administered Territories and North-Eastern states), VAT of 1% or less on ATF; and ensure fueling infrastructure. Further, state governments have to provide essential land free of cost; electricity, water, other necessary utility facilities at concessional rates as well as develop roads and other multi-modal connectivity to the airport. Additional concessions are also being provided by some state governments.

For the RCS flights, the airport operator shall waive-off the landing and parking charges, passenger service charges (PSF), user development fees (UDF) or any other similar charges. Airlines operating RCS flights shall be allowed to undertake ground handling functions of their flights. Airports Authority of India (AAI) which manages most of the airports in India would waive off terminal navigation landing charges (TNLC), and offer discount on the route navigation and facilitation charges (RNFC) (mainly benefits aircraft with more than 80 seats).

2.2 First three phases of the RCS scheme

Under RCS-1, five airlines viz. *Air Odisha*, *Air Deccan*, *Turbo Megha Airways (Trujet)*, *Alliance Air* and *SpiceJet* were awarded 128 new regional fixed-wing routes for 70 airports which include 27 serving, 12 unserved and 31 underserved airports (Government of India, 2019b). Among the five the first three were new operators; *Alliance Air* (Regional subsidiary of *Air India*) is promoted by the government. *SpiceJet* is a commercial airliner with more than 10% domestic market share and had mostly bid for zero-VGF. Interestingly, instead of offering all seats of the aircraft under RCS, it bid for only 50% of seats and hence offered only 25% of total seats with capped fares.

Annual Viability Gap Funding(VGF) allocation required (all figures in million)			
	After RCS-1	**After RCS-2**	**After RCS-3**
Fixed Wing Aircraft (INR)	2130	4900	8950
Helicopters (INR)		1300	
Sea Plane (INR)			170
Tourism areas (INR)			2550
Total (INR)	2130	6200	11670
Total (approximate USD)	**320**	**930**	**1750**

Source: Press Information Bureau (India) (Government of India, 2016b; Government of India, 2018)

Table 1: VGF allocation for various rounds

In RCS-2, fifteen airlines were awarded 325 routes involving 86 bid proposals. Under this scheme, scheduled Helicopter service was also included in Category II A area. Large national operators, *SpiceJet* and *Indigo* (market leader) have bid zero-VGF for certain routes.

RCS-3, focused on stations with tourism potential. To boost tourism along the coastal routes, seaplanes connecting through water aerodromes have been introduced. Further, the MDoNER subsidy routes of North East India was included in this scheme. The subsidy on tourism routes shall be provided by the Ministry of Tourism (Government of India, 2019a). As shown in Table 1, the annual VGF subsidy outgo would be approximately USD 320 million for RCS-1, USD 930 million for RCS-2 and USD 1750 million for RCS-3.

3. Data and Analysis

RCS team at Airports Authority of India (AAI), the implementing agency for the program periodically publishes the list of airports (both unserved and underserved) and RCS flight legs (A – B non-stop) that have been operationalized under the scheme. The list, accessed on 30th May 2019, on the RCS website, mentions 23 unserved airports, 16 underserved airports and 178 RCS routes which have been awarded and are operational (Government of India, Airports Authority of India, 2019). RCS-3 flight legs mentioned in the list have started operations recently and hence have been excluded from the analysis. Certain RCS legs mentioned are non-operational, majorly allotted to *Air Odisha*, *Air Deccan* and *Jet Airways*. The first two were new carriers and the third is a large established carrier that has gone bankrupt. All three have stopped operations.

Data for analysis has also been drawn from the weekly RCS passenger database (3 September 2017 to 23 September 2018) published on AAI website and various Letter of Award (LoA) issued to successful bidding airlines. Variables that were analyzed are the number of seats under RCS, RCS fare for the sector, VGF bid, seats booked under RCS and non-RCS, maximum airfare of the non-RCS seat and Passenger Load Factor (PLF %). Additional data against the airports and sectors were compiled (Table A4, Table A5 and Table A6). The analysis was done with the purpose of understanding the progress of RCS, generate insight into possible antecedents of success and hidden challenges.

There were many intuitive findings. The descriptive statistical analysis is summarized in Table 2. We define a RCS route as a metro route which have either of the airports (departure or arrival) as one of the six prominent metropolitan cities of India – New Delhi, Mumbai, Bengaluru, Hyderabad, Chennai or Kolkata. Flight legs on metro routes tend to have higher Passenger Load Factor (PLF %) compared to non-metro routes. This is on expected lines as the six major metros are the hub for business, education as well as medical needs of the hinterland. More passengers travel to metropolitan cities and their airports serve as gateways to the national network and international destinations. Finding also shows that the ratio of maximum airfare to RCS capped fare on metro routes are higher than non-metro routes. This shows that there is a relatively higher demand from business travelers on metro routes so that airlines are able to sell the non-RCS subsidized seats at a higher premium on such routes.

Parameter	Alternate Hypothesis	Results from t-statistics
Metro versus Non metro: Passenger Load Factor (PLF %)	$\mu_{Metro} > \mu_{Non\ Metro}$	$\mu_{Metro} = 73.87$, $\sigma_{Metro} = 15.32$; $\mu_{Non\ Metro} = 48.56$, $\sigma_{Non\ Metro} = 20.54$; $t\ (953) = 29.08$, $p = 0.0$.
Metro versus Non metro: Ratio of Maximum Airfare to RCS capped fare	$\mu_{Metro} > \mu_{Non\ Metro}$	$\mu_{Metro} = 2.81$, $\sigma_{Metro} = 2.71$; $\mu_{Non\ Metro} = 1.66$, $\sigma_{Non\ Metro} = 1.46$; $t\ (2168) = 13.59$, $p = 0.0$

Metro versus Non metro: Ratio of VGF to RCS capped fare	$\mu_{Metro} < \mu_{Non\ Metro}$	$\mu_{Metro} = 0.99$, $\sigma_{Metro} = 0.85$; $\mu_{Non\ Metro} = 1.46$, $\sigma_{Non\ Metro} = 0.70$; $t\ (90) = -2.93$, $p = 0.004$
Operational versus Non-operational routes: Ratio of VGF to RCS capped fare	$\mu_{Operational} < \mu_{Non\ Operational}$	$\mu_{Operational} = 1.17$, $\sigma_{Operational} = 0.82$; $\mu_{Non\ Operational} = 1.60$, $\sigma_{Non\ Operational} = 0.54$; $t\ (130) = -3.72$, $p = 0.0003$
Existing versus New airline: Ratio of VGF to RCS capped fare	$\mu_{Existing\ Airline} < \mu_{New\ Airline}$	$\mu_{Existing\ Airline} = 1.03$, $\sigma_{Existing\ Airline} = 0.84$; $\mu_{New\ Airline} = 1.79$, $\sigma_{New\ Airline} = 0.20$; $t\ (93) = -7.92$, $p = 0.00$
Alliance Air versus Other airlines: Ratio of VGF to RCS capped fare	$\mu_{Alliance\ Air} > \mu_{Other\ Airline}$	$\mu_{Alliance\ Air} = 1.76$, $\sigma_{Alliance\ Air} = 0.10$; $\mu_{Other\ Airline} = 1.24$, $\sigma_{Other\ Airline} = 0.80$; $t\ (125) = 6.61$, $p = 0.00$
Zero VGF route versus Non-zero VGF route: Passenger Load Factor	$\mu_{Zero\ VGF} > \mu_{Non\ Zero\ VGF}$	$\mu_{Zero\ VGF} = 0.70$, $\sigma_{Zero\ VGF} = 0.22$; $\mu_{Non\ Zero\ VGF} = 0.58$, $\sigma_{Non\ Zero\ VGF} = 0.21$; $t\ (378) = 7.28$, $p = 0.00$

Table 2: Analysis of passenger data (*Based on RCS data for the period: 3 Sep 2017 to 10 Mar 2019*)

Since RCS fare and VGF cap are both distance-based, we have taken the ratio of VGF sought by the airline to RCS capped fare for a route as a suitable metric for comparison. A lower or nil VGF sought for a route decrements the ratio implying that airlines have assessed a better revenue prospect on the route. Findings show that the value of the ratio on metro routes is lower than non-metro routes. Thus, airlines have asked for lesser subsidy support for metro routes in comparison to non-metro routes. Higher participation of established players is also observed in these routes as they have the capacity to forego subsidy (zero VGF demand) and gain from increased traffic which feeds to their existing networks.

Our findings also show that, the ratio of VGF sought to RCS capped fare on operational routes is lower than non-operational routes. The routes having better commercial viability attracted more bidders pushing the subsidy demand lower. While for others, routes bid-winning airlines either could not generate adequate resources (aircraft etc.) or had to suspend operation after some time due to sustained losses. Mainstream commercial airlines (except government promoted *Alliance air*) have shown interest primarily for routes with potential for demand growth. The ratio of VGF sought to RCS capped fare on existing larger airlines is lower than new airline companies. Subsidy demand from airlines, like *SpiceJet*, *Indigo* and *Alliance Air* was lesser than from *Air Odisha*, *Air Deccan* and *Truejet*.

The ratio of VGF sought to RCS capped fare on *Alliance Air*, which is a wholly-owned regional subsidiary of government carrier, *Air India* is higher than other commercial airlines. It seems that routes won by Alliance Air have a higher cost and lower revenue potential, shunned by private airlines, who may not share the welfare objective pursued by public-funded airline. The ratio of PLF on zero VGF routes is higher than for non-zero VGF routes. PLF indicates the extent of capacity utilization in the generation of revenue. Existing large commercial airlines have won the zero-VGF routes expecting a profitable expansion of their network.

The above statistical findings corroborate with later period passenger data as well. The data reveal the concentration of RCS flights in economically forward southern, western and northern region of India. Only a handful of RCS routes are operational in Eastern and North-Eastern regions. The RCS routes falling under RDG Category III are shown in Figure 1. The RCS routes falling under priority sector - RDG category II and II A are illustrated in Figure 2. Further, Figure 1 also shows the emergence of small hubs, which are connecting more than two other airports on RCS routes. Most of these small hubs, viz. *Allahabad*, *Hubli*, *Kadapa*, *Kannur*, *Nasik* and *Jaisalmer* are not even state capitals.

The top thirty airports in term of total RCS flight departures are shown in Table A4. Out of these, twelve are unserved and four are underserved airports. Only one airport from the eastern region (viz. *Kolkata*) and one airport from the northeast region (viz. *Jorhat*) find mention in this list in the twentieth and thirtieth positions respectively. *Kolkata* is a metropolitan city and is a major transportation hub of the country with many international routes.

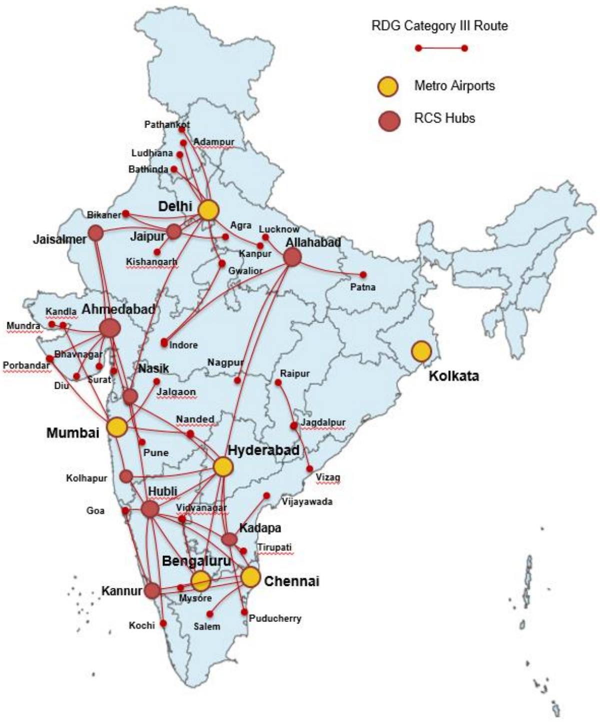

Figure 1: RCS routes under RDG Category III (*Based on RCS data for the period: 3 Sep 2017 to 10 Mar 2019*)

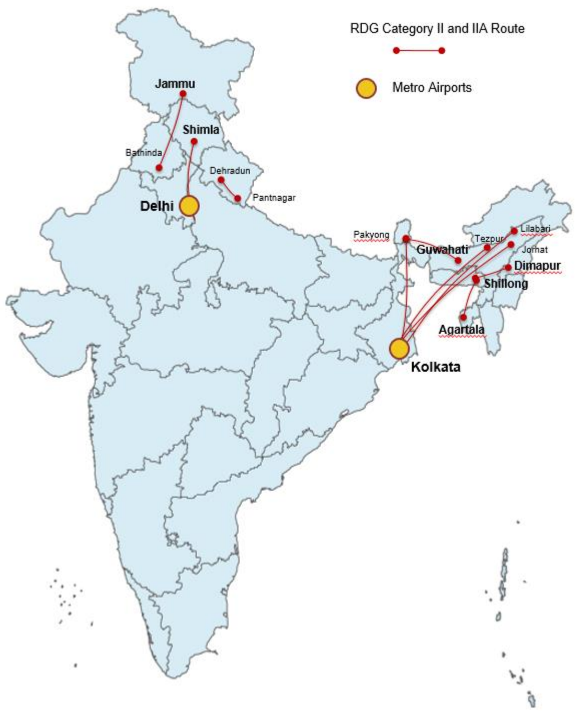

Figure 2: RCS routes under RDG Category II and II A (*Source: Weekly RCS data for the period: 3 Sep 2017 to 10 Mar 2019)*

Out of the top thirty airports, only ten airports are located in regions where the per capita income is below the national average. In addition, in only four airports the population of their region is below one million inhabitants. Therefore, the regions most benefited by the RCS tend to be relatively rich regions in the national context and densely populated. This is not surprising to the extent that the program focuses on airports and not on regions. Indeed, it comes out that the RCS has promoted air traffic for unserved and underserved airports in richer and densely populated regions.

Furthermore, most underserved and unserved airports in Table A4 have at least one existing airport that is located relatively close although surface distance is not the only determinant of travel time in India. In 5 of the 6 underserved airports, an existing airport can be found within 200 kilometers. In 6 of the 12 unserved airports, an existing airport can be found within 200 kilometers and other 5 have an existing airport within 300 kilometers. Hence, we can infer that underserved and unserved airports mostly benefited by the RCS are usually located in regions that had available an existing airport. This does not exclude that the region's air connectivity improves with more airports offering flights. However, the program does not seem to concentrate resources in regions that are really isolated.

The top fifty RCS routes are listed in Table A5. Most of these routes provide daily flights with aircraft having around 70 seats. The high load factors reported in many of the routes in Table A5 is remarkable. Load factor is higher than seventy percent in thirty-one routes, and only three routes have a load factor of below 50 percent. It is also observed that the high homogeneity in the subsidy per passenger (aside from those routes where the bidding airline operates without subsidies). In most cases, such subsidies are between INR 3000-3500. One of the main criticisms of the policies to support regional air connectivity is its high heterogeneity in the implementation so that it is usual to find high differences in the subsidies per passenger across routes (Fageda et al., 2018). While this is not an issue for the Indian RCS, such homogeneity can harm the most isolated or remote regions to the extent that the passenger subsidy in such regions should be higher to guarantee the viability of the service.

Half of the top fifty RCS routes can be qualified as short-haul routes given that the flight distance is less than 350 kilometers. To this point, the use of public resources to support air transport is only clearly justified, where there are no surface transport alternatives. Aviation is more competitive as the trip distance increases. On the other hand, support for air connectivity requires much less initial investments than in roads or rail transportation. Hence, an argument in support of the RCS is that it helps in the optimal utilization of resources in improving the country's transport connectivity. Keeping this in mind, regions that can be defined unambiguously as remote are those where surface transportation is not viable and unfortunately they do not appear among the several short-haul routes listed in Table A5.

It must be also stressed that only six RDG category II route (*Delhi – Shimla, Shimla – Delhi, Bhatinda – Jammu, Jammu- Bhatinda, Jorhat – Kolkata, Kolkata – Jorhat*) figures on the list. The first four routes are being operated by state-owned *Alliance Air*. *Kolkata – Jorhat* and *Jorhat- Kolkata* ranked lowest among the top fifty routes, being the only RCS route touching either eastern or northeastern regions of India. RCS flights falling under category II and II A routes are shown separately in Table A6. It is seen, the northern region takes up the top position. Most of the RCS flights in the northeast region have stopped operations and hence presently there is even lesser connectivity than those shown in Figure 2.

4. Discussion and implications

India has a huge population and glaring diversity. Designing a sustainable model for regional connectivity is not easy. The economic growth of recent years has created opportunities by generating resources while bringing extremity in making growth more equitable. The RCS has two broad objectives: to increase the aviation footprint pan India and to promote remote region connectivity. The new scheme relies majorly on free-market competition and its success depends on private sector participation. So far, it has been able to add a significant number of new airports as well as routes, but their spread is not consistent across the country. The scheme has not been very successful in attracting commercial airlines to operate on low demand routes even after a subsidy outgo that has surpassed schemes at other major countries.

Indeed, our data analysis in previous section suggests that RCS has effectively contributed to improve the overall air connectivity in India but remote regions have not been particularly benefited by program. Regarding RCS routes, the comparison between metro and non-metro routes shows a lower demand and higher need of subsidies for the latter ones. The data also reveals the concentration of RCS flights in economically forward southern, western and northern region of India detriment to Eastern and North-Eastern regions. In this regard, the regions most benefited by the RCS tend to be relatively rich in the national context, densely populated and with several airports

4.1 Situation report

We use the results from the data analysis of the previous section to evaluate some key aspects of the performance of RCS and predict future directions.

4.1.1 Regional imbalance

During the launch of RCS, the government unequivocally emphasized that all the five regions of India would get equally benefitted and no region would garner more than 25% of subsidy. While south, west and north have done exceptionally well in terms of airport additions, east and north-east have lagged behind. *Trujet*, which is a new regional airline with major hub at *Hyderabad*, operating with 70 seat aircraft has been able to sustain by focusing on the south and west India. On the other hand, *Air Deccan* and *Air Odisha*, operating with 20 seat aircraft, for routes in eastern and northeastern part had to close down. Table A4 shows that the number of RCS flights originating from the north-east region of India is much less in comparison to other airports. In terms of remoteness, the regions north-east are ranked among the highest. Still, only one airport from there, *Jorhat* appears at the thirtieth position in the ranking of RCS airports in order of the number of flights taking off.

The south, west and north India, which are relatively well off, are also well connected through railway as well as road networks. However, the scenario changes completely in the eastern and northeastern regions of India. In this regard, the policymakers have failed to convert the promised equitable allocation of subsidy budget into mechanism through which routes with lower demand can get bigger support.

As we mention above, part of the problem is that RCS focuses on airports and not regions. Such focus may have allowed to increase the number of airports with scheduled commercial traffic in the country but it has not been effective in generating new opportunities for the remote and poorer regions in the eastern and northeastern part of the country. Some specific programs directly targeted to remote regions may be advisable if the goal is to improve the air connectivity of remote regions.

4.1.2 Multiple airport regions

Some new RCS airports which are not far from bigger airports have flourished. In India, population density is very high and new airports can cater to a sizeable number of passengers whose travel time to catch a flight has reduced substantially. Moreover, the RCS airports offer new direct destinations that have attracted business passengers as well as those who would travel for recreation and personal business.

Multiple airports in a region doing well do not indicate the misplaced priority of RCS. First, one of the two major objectives of the scheme is to promote commercial aviation in the country. The new RCS airports have helped in demand creation. Second, the surface distance is not the only determinant of travel time in India. Due to the state of roads and traffic congestions, the time to reach an airport in a metropolitan city can be prohibitive. Bearing this in mind, the fact that RCS airports are usually located in regions that had available an existing airport suggests that the program does not concentrate resources in regions that are really isolated.

4.1.3 Passenger flow and low demand routes

Statistical analysis of RCS data is in line with the Gravity model of demand. Metros with large population, commercial activities and gateway for other destinations tend to attract more traffic. As such, there is high mobility of people from Tier 2 and Tier 3 cities to metros for livelihood, education, government work, medical care, etc. Further, the metro routes from Tier 2 and Tier 3 cities are spokes to hub and feed traffic to the airline network. Thus, metro routes are easily aligned by existing carrier networks providing more destinations and help in achieving economies of scale. Metro routes also have a higher propensity for business travel. Hence, higher PLF helps the airlines to exploit premium fares on Non-RCS seats and earn better revenues on these legs. On the other hand, the number of airlines and consequently the participation in bidding under RCS is limited. Therefore, due to inadequate competition, the subsidy outgo on denser routes has not come down contrary to expectations.

Under the RCS scheme, destinations with potential demand have attracted commercial airlines and in some dense routes peak demand ticket prices are multiples of capped fare on VGF seats. In contrast, flight operations stopped within few weeks on a number of routes. These are mostly non-metro routes operated by new entrants. In these routes higher VGF were sought, still, airlines could not generate enough demand to cover operational costs, leading to the discontinuation of the service.

The failure of the RCS scheme to support air services in low demand routes explains the regional imbalance mentioned above given that many of these low demand routes should be served from airports located in the eastern and northeastern parts of the country. Indeed, low demand routes usually serve sparsely populated and relatively poorer regions. Insufficient demand to make profitable the service for airlines does not contradict the particular needs of air accessibility for remote regions that are not effectively covered by RCS. Service levels need to be defined to balance the social needs for accessibility vis-a-vis the subsidy demand. At present, the scheme does not focus on these criteria.

4.1.4 Airline market

As we mention above, private and low-cost airlines dominate the aviation market in India. To this point, data show that flight legs operated by the state-owned airline *Alliance Air* are having higher VGF to RCS fare ratio. One explanation for this could be these routes do not have sufficient demand to allow the exploitation of scale economies or did not fit in the network scheme of other large carriers or the new regional airlines and hence were unviable. Low-cost carriers (LCC, viz. *Indigo* and *Spicejet*), and the new regional carrier *Trujet*, have done fair amount of due diligence on commercial feasibility and have targeted potentially self-sustaining ones. This corroborates with the fact that LCCs have majorly bid for zero-subsidy and gained an operational monopoly on these sectors for 3 years.

Indigo and *SpiceJet* have more than 100 aircraft each. A new entrant often starts with a few aircraft. Any operational grounding results in more disruption and cancellations. This leads to a higher cost of operations as the aircraft is not utilized fully and can adversely impact future demand. This also points to the fact that lowering of entry barriers have not been of much help.

As seen in Table A5 and A6, the majority of the routes operational under the RCS are by large players now. Though this is an encouraging sign, in advanced economies smaller or subsidiaries operate on regional routes (Forbes, S. J. & Lederman, M., 2007).

4.2 Challenges affecting RCS

While RCS has contributed to increase the aviation footprint pan India, two clear shortcomings of the program are the regional imbalance and the inadequate service in low demand routes. The success of RCS, therefore, hinges on redressal of multiple challenges.

4.2.1 Capacity augmentation

Structural cost drivers for airlines are determined by how they control economies of scale, scope and distance (Scheraga, 2004). Airlines seek to efficiently deploy resources by offering more flights, exploring new destinations and flying on longer routes. The structural drivers are difficult to change through short term or medium-term actions. The regular passenger aviation market is still lucrative and new routes with better revenue predictability can be discovered. Therefore, airlines commit resources to less risky options and not bid aggressively for RCS routes where uncertainties are higher.

Capacity augmentation is a strategic decision taken by airlines. It is not easy to quickly augment aircraft capacity, especially regional aircrafts. Aircraft acquisition is a tedious process. Further, ready to deploy trained manpower (flying crew as well as technicians) for smaller aircrafts is a major bottleneck in the short and mid-term.

4.2.2 Absence of adequate infrastructure

The facilities at many RCS airports are not favourable to host commercial flight operations. In the absence of revenue visibility, the airport operators are not ready to fund the development. There are airstrips that allow twenty-seater aircraft only. Airline companies with such aircraft did not find success (viz. *Air Odisha* and *Air Deccan*) under RCS-1. A notable example is of *Pakyong* airport which is a greenfield table-top airport in the state of *Sikkim* (North-East India). *Sikkim* is a landlocked and hilly region devoid of railway connectivity. Being the first airport in this strategically located state and a popular tourist destination, it was expected to attract private sector airlines. Two RCS flights, one to *Kolkata* and another to *Guwahati* started operations. However, in the absence of instrumental landing (ILS), radar and adequate runway area, the aircraft operation is based on visual flight rules (VFR). Fluctuating weather conditions led to massive cancellation of flights. Challenges in operational viability led to permanently closure of the routes and airport remains non-operational at present (Adhikary, 2019).

4.2.3 Unavailability of slots at metro airports

Routes have been awarded out of busiest and heavily congested airports (viz. *Mumbai* and *Delhi*). Most of the RCS routes are operated on small aircraft which are slow and have an impact on already constrained runway capacity due to higher separation requirements and slower runway exits. Since the majority of RCS routes are VFR routes (Visual Flight Rules) the slots would have to be day-time slots. The only off-peak period which can be allotted are the afternoon slots.

4.2.4 Operational viability

While the RCS attempts to address financial viability, operational viability has got limited attention. The growth forecast in the domestic market has ensured that the demand for pilots, engineers and management personnel remains very high. There is a shortage of pilots and foreign talent when hired can drive up the cost. Moreover, the majority of RCS airports are VFR making them inaccessible during adverse weather conditions such as fog or limited visibility. Some airports are owned by defense establishments, where there are specific requirements e.g. foreign pilots may not be allowed to operate.

4.2.5 Limited participation of States

Most of the states have not actively engaged with the scheme beyond the land they provided at easier terms. Airports are complex business with multiple stakeholders. Airports need ecosystems of ancillary services supported by appropriate infrastructure like access roads, buildings etc. States need to proactively invest in them instead of waiting for demand to grow and market forces to take care of the requirements. But many states lack the resources for investment in such infrastructure development.

4.2.6 Selection and Prioritization

The scheme offers a list of unserved and underserved airports to be connected. The airlines are free to draw routes choosing at least one airport from this list. The scheme, thus, does not have control over routes and airports that would become operational. The mechanism is transparent and easier to implement. However, airports and routes with less potential for passenger traffic continue getting ignored.

4.2.7 Review and Update

RCS scheme performance is periodically reviewed and the lessons learnt are incorporated in the next version. However, this feedback mechanism has failed to help the neglected regions. The policymakers seem to be aware of the problem as reflected in the latest scheme documentations. The shrinking subsidy pie, and squeeze in funds have given them limited maneuverability. Each scheme iteration locks in subsidy commitment for three years on awarded routes. It is therefore imperative to scout for new funding sources. Some start has been made, in RCS-3, potential tourism routes are drawing subsidy from the ministry of tourism (Government of India. (2019a, January 25)).

4.2.8 Fare escalation in non – RCS Routes

As discussed earlier, the VGF subsidy is funded through RCF collected via a levy on domestic routes. This levy is actually passed on by most carriers to the airline passengers flying non-RCS routes. The levy is sector length specific and therefore passengers in some sectors may be over-charged.

5. Policy recommendations

The discussion above recounts the achievements of the RCS while highlighting its failures in meeting some of the scheme objectives. In this section, we present some recommendations to improve the scheme performance. The focus of the scheme objectives is on airports while it distributes the subsidy among routes selected through open competition. Though this is not a real contradiction, through it one can interpret many of the program outcomes. The expectation of fairness in route selection from market competition has overshadowed the neglect of a set of airports. In the past, traffic distribution rules were enforced on commercial airlines. Though the rule continues in a new form (RDGs), creating synergy with RCS is desired. The RCS subsidy allocation policy keeps the total financial commitment within limit while relinquishing control on micro-allocation to airports.

When an airline decides to fly to a new destination, it has to bear costs, for example towards leasing new aircraft, building facilities and hiring manpower etc. This investment is subject to risk. Along with financial risk, the airline faces multiple other risks viz. operational risk, network design risk and market risk (Walters, 2018). From the discussions of the previous section, it comes out that risks are higher for many airports under the RCS. The government also faces risks of force majeure and sunk cost. At the same time, both government and the commercial airline have distinct capabilities and options for risk diversification (Estache et al., 2011). The design of RCS should be based on a thorough assessment of such risks and diversification options. It can be suggested that instead of a single type of contract, specially designed contracts should be offered for routes flying to different groups of RCS airports. An example is the period of exclusive operation allowed for the airline can be increased from three to five years in cases where it is expected that amortization of costs is expected to take longer.

The policy of providing distance specific VGF can be revised and priority VGF mechanism for remote regions can be introduced. Previous research has shown that more than the fare, the level of service, especially the number of seats and frequency of flights stimulates demand for air travel (Matisziw and Grubesic, 2010). The scheme should focus more on the number of seats and less on VGF minimization. If more flights originate from an airport, the amount of subsidy and other incentives can be increased.

In our analysis, aviation infrastructure and airports emerge as major bottlenecks for the growth of regional aviation in India. Metropolitan airports that can spur demand from remote regions have limited spare capacities and remote area airports are underdeveloped. Preferential allocation of slots at larger airports for RCS flights can stimulate demand. Efforts made at prodding state governments to invest more in smaller airports under their jurisdictions have met with limited success. In such environment inviting private investments have helped (Cruz and Marques, 2011; Carnis and Yuliawati, 2013) Even airlines could be asked to participate in a vertical contract with the airports (Xiao et al., 2016). Such partnerships can be used for airport infrastructure development and capacity expansion.

There are many best practices and learnings from remote area connectivity schemes of other countries and regions. Based on their analysis we propose some recommendations specific to the north-eastern region of India.

5.1 Augmenting air connectivity in the North-East Region of India

The north eastern part of India is strategically located with very long and sensitive international border. Most of the area is mountainous terrain and bestowed with natural beauty of fauna and flora. Except *Assam*, all other states are small with significant proportion of tribal population. The states are agriculture based economy. Handful industries are concentrated mainly to mining and oil exploration. The states are ranked lowest in terms of GDP. *Guwahati*, capital of *Assam* is the only hub in the region with air connectivity to metros. The states farthest from the mainland of India- *Mizoram*, *Tripura*, *Manipur* and *Nagaland*, each have one airport with connectivity to at least one of the metro airports and do not fall under the purview of under-served airport category. RDG, has thus, ensured that some of the airports in the region are well connected. Airlines also have managed to keep operations to bare minimum to meet the guidelines. *Sikkim* and *Arunachal Pradesh* at present are devoid of air connectivity.

Under the RCS 1, *Shillong*, capital of *Meghalaya* is mentioned as an under-served airport. The other under-served airports mentioned are *Jorhat*, *Lilabari*, *Tezpur* all are in the state of Assam. RCS routes *Guwahati-Pakyong-Guwahati*, *Kolkata-Pakyong-Kolkata*, *Kolkata-Tezpur-Kolkata*, *Agartala-Shillong-Agartala* and *Dimapur-Shillong-Dimapur* have ceased operations. The only operational route is *Kolkata-Jorhat-Kolkata*. The main deterrent at both *Pakyong* airport in *Sikkim* and *Shillong* is the weather. In the absence of instrumental landing and due to smaller runway length, most flights have to be cancelled. Moreover, fair weather airports - *Bagdogra* and *Guwahati* are within four hours of surface time from the two airports. *Tezpur* is also four hours of surface time from *Guwahati*. With the coming up of a bridge on the river *Brahmaputra*, small airports like *Passighat* and *Lilabari* also are within four hours of surface time from *Dibrugarh* airport. Smaller aircrafts offering a limited number of connections per week, therefore, could not compete with alternative transport modes. Stimulating air connectivity in the region would need a holistic and concentrated effort.

Figure 3: Prominent airports in North East India

Bearing this in mind, different public policy options can be considered to increase air connectivity in North East India:

- **Airport specific focus**: Infrastructure improvement at most of the airports of the region should be given the highest priority. The airports should be capable of handling flights throughout the year. For faster implementation, the airports can be put under public-private partnership for joint investment and risk-sharing. *Pakyong*, *Shillong*, *Tezpur* and *Jorhat* hold good tourism potential. Airport based subsidy or revenue sharing model between airport and airlines can be implemented.

- **Government schemes linked stimulation for local demand**: Government of India has already targeted establishing hundred smart cities across India (Government of India., 2019c). Out of this, eight falls in the north-east region. *Passighat* in *Arunachal Pradesh* is one such smart city. The respective state governments need to channel these funds along with its investments in developing ecosystems that nurture demand. Developing surface infrastructure, augmentation of the services sector, viz. tourism, education and healthcare and establishment of SEZs are some of the options that can be looked into.

- **Direct subsidies to the local population:** The local population has a lower per-capita income. The propensity for air travel among the residents is less. For travel outside the region, a direct subsidy scheme can be implemented for the residents in North East India.

- **Development of regional hubs:** Due to the variety of factors discussed earlier, a hub-and-spoke system can bring efficiency and lower cost. At present, *Guwahati* is the only major airport in the region, and it is not yet a full-fledged transportation hub. Another airport at *Dibrugarh*, located in the eastern part of the region has fair weather and scope for a longer runway. It also holds potential as a hub. With the bridge connectivity across river *Brahmaputra*, the airport has better surface connectivity to adjoining *Arunachal Pradesh*. Guwahati should be promoted as a major national hub and a new hub can be developed at *Dibrugarh*.

- **Public service obligations:** A widely used instrument to improve air connectivity in remote regions is the imposition of public service obligations (PSOs) in specific routes. PSOs have been used in aviation markets that have been affected by intense processes of deregulation and privatization as it is the case of India. A clear advantage of the PSOs is that any potential distortion is restricted to the specific routes affected by the policy (Fageda et al., 2018). However, a usual criticism is that the definition of "remote" to determine the beneficiary routes is not always based on objective parameters. In our context, the use of PSOs would imply changing the focus from airports to routes that provide services to remote areas. To this point, it is not too questionable that a large part of North East India could be defined as a remote area using objective parameters such as income, population density or travel times in surface transportation.

In many cases, these different lines of public interventions can be complementary. For example, the implementation of PSOs may be accompanied by subsidies to the local population (eg; France, Portugal, Spain) while the combination of PSOs and investments in small airports can promote hub-and-spoke operations (eg; United States). Eventually, the combination of the latter two tools may facilitate the development of regional hubs in North East India.

6. Conclusion

Analysis of data, presented in this article, has been rewarding. The lessons learned, can be utilized in improving future iterations of the program. Many of them could be useful for other countries implementing their own remote area connectivity schemes. RCS implementation has been a big step towards increasing the civil aviation footprint in India. Within three years of the launch of the program, routes have been added to the national network without any subsidy requirement. Formation of new small hubs in tier-2 cities connecting three or more RCS airports is encouraging. Still, most of the goals of the program have remained unachieved and the present performance does not hold promise for early success.

The scale of RCS is enormous when compared to any past initiatives in India. Globally too it is among the largest programs. Effective management of large scale programs is difficult and RCS lacks a clear performance management strategy. In such an environment, small successes can get exaggerated while failures might get neglected. The iterative structure of RCS can provide the opportunity to correct shortcomings only when new iterations can utilize learning from the past. Continuous objective evaluation of correct performance criteria and a functional feedback mechanism should be adopted.

RCS management has been more focused maximizing the number of operational routes. However, no clear attention was paid to demand assessment and is left to bidders (the airline operators). Although routes have been later designated as Priority RCS and Tourism RCS in RCS-3, it seems focus on long term sustainability is missing.

The RCS majorly focuses on financial viability. As a result, many technical impediments are not addressed quickly. In multiple studies including the present one, it has been found that airports that provide connectivity to metropolitan or hub destinations have a much higher likelihood of becoming successful. In India, most large airports are operating at their near maximum capacities and cannot offer much space for regional aviation. The effort at augmenting and expanding capacities at these places has been piecemeal and slow. Moreover, under the RCS infrastructure development gets lesser priority and airlines have to wait for airports to get necessary facilities even after winning bids to operate there. With the growth in passenger demand in dense routes, there is a crunch in specialized airline resources. The shortage in availability of pilots and trained personnel find rare mention in RCS documentations.

Till now, remote areas have not benefitted from RCS, possibly due to the absence of focused commitment for them. VGF cap and the airfare cap have been uniformly set based on distance and the operating equipment. As such, there is no additional incentive to foray into priority sectors like the Northeastern region. Marginally higher VGF was set for priority sectors under RCS-2, however, its impact has been negligible. The dual objective of expanding the aviation market and providing connectivity to remote regions may not be achievable within one scheme. Specific and focused programs should be developed for remote regions.

Most of the RCS routes presently operational are with major LCCs. The new regional entrants are not able to capture any significant market share. With fewer aircraft they had to maintain expensive maintenance facility conforming to regulations, which it has increased their fixed costs. Further, in the case of maintenance checks, when an aircraft is grounded for an extended period the airline can fail to fulfill schedule obligations. Thus, lowering of entry barrier has not really helped RCS as envisaged.

Various intervention strategies need to be employed to generate sustainable demand for air travel to remote regions. First, the infrastructure needs to be available before tendering routes. Second, flights from this region can be given priority access to hub airports. Another strategy can be to spur contractual and marketing arrangements of small regional airlines with larger carriers for hub operations. Carriers entering into such an arrangement may be provided with the option to show consolidated capacity as compliance with RDG guidelines. In section 5 prescriptions to improve the performance of RCS were presented.

The three years monopoly given to airlines for RCS 1 routes would come to an end in 2020. A clearer picture will emerge regarding the sustenance of routes beyond the subsidy regime. It is likely there would be routes that would find commercial success and this can free-up capital for investment in remote areas.

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Appendix

	Routes awarded	Routes started*	Routes functional
RCS – 1	128	54	48
RCS – 2	218	88	78
RCS – 3	263	52	52

RCS routes including tourism and priority sectors) on fixed wing aircraft only. Some routes that are allotted to more than one airline is counted twice.
*No of routes started is based on the RCS Team publication dated 22 July 2019 on the website India, Airports Authority of India, 2019)

Table A1: Route allotment statistics

	New operators	National operators	Total operators*
RCS - 1	3	1	4
RCS - 2	8	3	11
RCS - 3	7	3	10

Data excludes *Alliance Air*, which is wholly owned subsidiary of Public Sector Company: *Air India*
* Four airlines *Air Odisha*, *Air Deccan*, *Jet Airways* and *Zoom Air* are not operational at present. First two bid under RCS–1 and the remaining had bid under RCS–2 and 3

Table A2: Airlines participating in RCS

Sector type	Total	With subsidy	Without subsidy	Flights operated	Average PLF %)
Metro*	68	41	27	18276	72.42
Non-Metro	60	54	6	7525	50.38
Grand Total	128	95	33	25801	62.09

*Metro sectors have either of departure or arrival airport in metropolitan cities viz. Delhi, Mumbai, Bangalore, Hyderabad, Chennai or Kolkata.
Source: RCS weekly passenger data for the period 3 Sep 2017 to 10 Mar 2019.

Table A3: RCS sectors and flights on metro and non-metro routes.

Rank	Departure Airport	Region of India	Indian State	Airport Type#	Total RCS Flights operated	Population2011 Census)	State GDP@ 2017-18) Current Price	Per Capita State IncomeNSDP) 2017-18) @ Current Price	Nearest Existing Airport for RCS airports
Overall India statistics					**25801**		**17095005**	**114958**	
1	Hyderabad*	Southern	Telengana	Metro	2463	7749334	753811	180697	
2	Delhi*	Northern	Delhi NCT	Metro	2278	16314838	690098	328985	
3	Chennai*	Southern	Tamil Nadu	Metro	1853	8696010	1461841	171583	
4	Mumbai*	Western	Maharashtra	Metro	1703	18414288	2411600	176102	
5	Kadapa	Southern	Andhra Pradesh	RCS - Underserved	1393	2882469	809547	143935	Tirupati137 km) Bangalore250 km)
6	Hubli	Southern	Karnataka	RCS - Underserved	1370	1847023	1350257	187649	Goa184.4 km)
7	Nanded	Western	Maharashtra	RCS - Unserved	1000	3361292	2411600	176102	Aurangabad269 km) Hyderabad281 km)
8	Jaipur	Northern	Rajasthan	Existing	940	6626178	835558	99487	
9	Vidyanagar	Southern	Karnataka	RCS - Unserved	897	2452595	1350257	187649	Bangalore286 km)
10	Bikaner	Northern	Rajasthan	RCS - Unserved	835	2363937	835558	99487	Jodhpur249 km) Jaipur348 km)
11	Jaisalmer	Northern	Rajasthan	RCS - Unserved	703	669919	835558	99487	Jodhpur283 km) Jaipur572 km)
12	Ahmedabad	Western	Gujrat	Existing	639	7214225	1314680	174652	
13	Bangalore*	Southern	Karnataka	Metro	591	8499399	1350257	187649	
14	Bhatinda	Northern	Punjab	RCS - Unserved	543	1388525	479141	142644	Chandigarh204 km)
15	Kandla	Western	Gujrat	RCS - Unserved	538	2092371	1314680	174652	Ahmedabad320 km)
16	Puducherry	Southern	Puducherry	RCS - Underserved	533	950289	32962	203583	Chennai145 km)

17	Mysore	Southern	Karnataka	RCS - Unserved	526	3001127	1350257	187649	Coimbatore190 km) Bangalore208 km)
18	Allahabad	Northern	Uttar Pradesh	RCS - Underserved	505	5954391	1376324	55456	Varanasi126 km) Lucknow200 km)
19	Gwalior	Northern	Madhya Pradesh	RCS - Underserved	472	2032036	728242	82941	Lucknow335 km) Delhi353 km)
20	Kolkata*	Eastern	West Bengal	Metro	407	14112536	999585	93711	
21	Vijayawada	Southern	Andhra Pradesh	Existing	374	4517398	809547	143935	
22	Salem	Southern	Tamil Nadu	RCS - Unserved	349	3482056	1461841	171583	Tiruchirappalli149 km) Bangalore235 km)
23	Shimla	Northern	Himachal Pradesh	RCS - Unserved	349	814010	140613	167044	Chandigarh124 km)
24	Indore	Northern	Madhya Pradesh	Existing	338	3276697	728242	82941	
25	Jammu	Northern	Jammu & Kashmir	Existing	322	1529958	138488	83717	
26	Adampur	Northern	Punjab	RCS - Unserved	307	2193590	479141	142644	Amritsar100 km) Chandigarh150 km)
27	Ludhiana	Northern	Punjab	RCS - Unserved	258	3498739	479141	142644	Chandigarh118 km) Amritsar155 km)
28	Goa	Western	Goa	Existing	248	818008	70493	422149	
29	Kanpur	Northern	Uttar Pradesh	RCS - Unserved	237	4581268	1376324	55456	Lucknow81 km)
30	Jorhat	North Eastern	Assam	RCS - Underserved	221	1092256	288494	74204	Dimapur130 km) Guwahati324 km)

*Metro airports are six major International airports of India situated in metropolitan cities: Delhi, Mumbai, Bangalore, Hyderabad, Chennai, Kolkata.

#Existing airports are those airports which are other than the above Metro Airports and have non RCS flights as well. Many of them are State Capitals and some are International airports.

@State GSDP is in INR in 10 millions). Per capita NSDP Income is in INR
Source: http://www.censusindia.gov.in/;http://pibmumbai.gov.in/; http://www.esopb.gov.in/Static/PDF/GSDP/Statewise-Data/StateWiseData.pdf and Weekly RCS passenger flight data for the period: 3 September 2017 to 10 March 2019

Table A4: Top thirty airports based on total RCS flight departures

Rank	Sector	RDG Category	RCS Scheme	Total Flights operated	Airline Operating the sector	Date of Commencement	Block Time min)	Dist. km)$	Weekly Freq.	Aircraft seat capacity	Seats under RCS	Fare on RCS seats INR)	Subsidy VGF) per pax on RCS seats INR)	PLF %)	Surface Time min)
1	Hyderabad-Kadapa	III	RCS-1	547	Trujet	27-Apr-17	65	304	7	72	36	1920	3402	77.32	450
2	Kadapa-Hyderabad	III	RCS-1	545	Trujet	27-Apr-17	75	337	7	72	36	2000	3456	76.58	450
3	Hyderabad-Nanded	III	RCS-1	539	Trujet	27-Apr-17	60	246	7	72	36	1670	3060	64.08	300
4	Kandla-Mumbai	III	RCS-1	538	Spicejet	10-Jul-17	100	550	7	78	20	2500	0	90.34	645&&&
5	Mumbai-Kandla	III	RCS-1	538	Spicejet	10-Jul-17	80	533	7	78	20	2500	0	93.87	645&&&
6	Nanded-Hyderabad	III	RCS-1	538	Trujet	27-Apr-17	60	246	7	72	36	1670	3060	71.91	300
7	Mumbai-Porbandar	III	RCS-1	536	Spicejet	10-Jul-17	80	533	7	78	20	2500	0	93.34	974&&&
8	Hyderabad-Puducherry	III	RCS-1	534	Spicejet	16-Aug-17	95	678	7	78	39	3040	0	88.60	820
9	Puducherry-Hyderabad	III	RCS-1	533	Spicejet	16-Aug-17	90	650	7	78	39	2800	0	83.43	820
10	Chennai-Mysore	III	RCS-1	526	Trujet	20-Sep-17	80	428	7	72	36	2330	3816	74.14	540

11	Mysore-Chennai	III	RCS-1	526	Trujet	20-Sep-17	85	428	7	72	36	2330	3816	77.31	540
12	Hyderabad-Vidyanagar	III	RCS-1	524	Trujet	21-Sep-17	65	306	7	72	36	1920	3402	67.82	430
13	Vidyanagar-Hyderabad	III	RCS-1	524	Trujet	21-Sep-17	65	306	7	72	36	1920	3402	69.27	430
14	Delhi-Bikaner	III	RCS-1	516	Alliance Air	26-Sep-17	75	404	7	70	35	2250	3790	77.08	510
15	Bikaner-Delhi	III	RCS-1	515	Alliance Air	26-Sep-17	75	389	7	70	35	2170	3700	76.46	510
16	Kadapa-Chennai	III	RCS-1	474	Trujet	16-Nov-17	60	260	7	72	36	1750	3249	67.94	370
17	Chennai-Kadapa	III	RCS-1	472	Trujet	16-Nov-17	50	228	7	72	36	1670	3059	60.02	370
18	Jaipur-Jaisalmer	III	RCS-1	470	Spicejet	29-Oct-17	75	511	7	78	12	2300	0	74.32	600
19	Jaisalmer-Jaipur	III	RCS-1	468	Spicejet	29-Oct-17	75	511	7	78	12	2250	0	72.39	600
20	Nanded-Mumbai	III	RCS-1	462	Trujet	16-Nov-17	95	480	7	72	36	2500	3960	84.71	720
21	Chennai-Hubli*	III	RCS-2	461	Spicejet/Indigo	14-May-18	80	607	7	78	39	2840	0	53.73	830
22	Mumbai-Nanded	III	RCS-1	461	Trujet	16-Nov-17	85	480	7	72	36	2500	3960	81.74	720
23	Hubli-Chennai*	III	RCS-2	460	Spicejet/Indigo	14-May-18	80	622	7	78	39	2840	0	56.34	830
24	Kadapa-Vijayawada	III	RCS-1	374	Trujet	01-Mar-18	60	313	7	72	36	1920	3420	74.05	410
25	Vijayawada-Kadapa	III	RCS-1	374	Trujet	01-Mar-18	60	346	7	72	36	2000	3519	70.93	410
26	Bangalore-Vidyanagar	III	RCS-1	373	Trujet	01-Mar-18	60	261	7	72	36	1750	2907	71.74	340
27	Vidyanagar-Bangalore	III	RCS-1	373	Trujet	01-Mar-18	55	280	7	72	36	1830	2808	75.31	340

28	Delhi-Shimla#	II	RCS-1	352	Alliance Air	27-Apr-17	70	313	7	36	20	1920	3440	80.23	480&
29	Chennai-Salem	III	RCS-1	349	Trujet	25-Mar-18	50	304	7	72	36	1920	3060	78.26	370
30	Salem-Chennai	III	RCS-1	349	Trujet	25-Mar-18	70	269	7	72	36	1750	3060	79.25	370
31	Shimla-Delhi#	II	RCS-1	349	Alliance Air	27-Apr-17	70	313	7	16	8	1920	3440	83.34	480&
32	Bhatinda-Jammu	II	RCS-2	322	Alliance Air	05-Apr-18	60	332	7	70	35	1980	3700	55.83	390
33	Jammu-Bhatinda	II	RCS-2	322	Alliance Air	05-Apr-18	65	332	7	70	35	1980	3700	51.25	390
34	Jaipur-Bikaner	III	RCS-2	321	Alliance Air	27-Mar-18	60	332	7	70	35	1810	3520	53.06	330
35	Bikaner-Jaipur	III	RCS-2	320	Alliance Air	27-Mar-18	60	332	7	70	35	1810	3520	46.33	330
36	Delhi-Adampur	III	RCS-1	309	Spicejet	01-May-18	70	441	7	78	20	2000	0	89.81	410
37	Adampur-Delhi	III	RCS-1	307	Spicejet	01-May-18	65	413	7	78	20	1900	0	91.23	410
38	Delhi-Ludhiana	III	RCS-1	258	Alliance Air	02-Sep-17	75	346	4	70	35	2000	3530	71.75	330
39	Ludhiana-Delhi	III	RCS-1	258	Alliance Air	02-Sep-17	75	346	4	70	35	2000	3530	65.41	330
40	Delhi-Kanpur	III	RCS-1	237	Spicejet	03-Jul-18	75	489	7	78	20	2250	0	95.22	460
41	Gwalior-Indore	III	RCS-1	237	Alliance Air	31-May-17	75	519	3	70	35	2500	4220	35.75	570
42	Indore-Gwalior	III	RCS-1	237	Alliance Air	31-May-17	75	519	3	70	35	2500	4220	39.01	570
43	Kanpur-Delhi	III	RCS-1	237	Spicejet	03-Jul-18	95	493	7	78	20	2250	0	90.75	460
44	Gwalior-Delhi	III	RCS-1	235	Alliance Air	31-May-17	60	278	3	70	35	1830	3360	61.30	410

45	Ahmedabad-Hubli	III	RCS-2	224	Indigo	01-Jul-18	100	946	7	180	40	3199	0	66.47	1130
46	Hubli-Ahmedabad	III	RCS-2	224	Indigo	01-Jul-18	95	985	7	180	40	3199	0	67.22	1130
47	Delhi-Bhatinda	III	RCS-1	222	Alliance Air	27-Apr-17	80	291	3	70	35	1830	3360	72.68	360
48	Bhatinda-Delhi	III	RCS-1	221	Alliance Air	27-Apr-17	80	270	3	70	35	1750	3270	72.78	360
49	Jorhat-Kolkata	II	RCS-2	221	Indigo	01-Aug-18	130	811	7	180	40	3199	0	68.82	1860[&&]
50	Kolkata-Jorhat	II	RCS-2	221	Indigo	01-Aug-18	135	811	7	180	40	3199	0	67.14	1860[&&]

* Earlier *Spicejet* and *Indigo* 7 flights each in a week. Now only *Indigo* is operating. # Payload restriction due runway constraints at *Shimla*.
$ Distance mentioned is Stage Length as in RCS Letter of Award.
& Hilly terrain
&& International border with neighbouring country in line of sight, hence longer surface distance
&&& Sea in line of sight, hence longer surface distance

Source: RCS weekly passenger data for the period 3 Sep 2017 to 10 Mar 2019.

Table A5: Top RCS route by total departures since inception of RCS till 10 March 2019

Rank	**Sector**	**RDG Category**	**RCS Scheme**	**Total Flights operated**	**Airline Operating the sector**	**Date of Commence-ment**	**Block Time min)**	**Dist. km)[$]**	**Weekly Freq.**	**Aircraft seat capacity**	**Seats under RCS**	**Fare on RCS seats INR)**	**Subsidy VGF) per pax on RCS seats INR)**	**PLF %)**	**Surface Time min)**
28	Delhi-Shimla*	II	RCS-1	352	Alliance Air	27-Apr-17	70	313	7	36	20	1920	3440	80.23	480[&]
31	Shimla-Delhi*	II	RCS-1	349	Alliance Air	27-Apr-17	70	313	7	16	8	1920	3440	83.34	480[&]
32	Bhatinda-Jammu	II	RCS-2	322	Alliance Air	05-Apr-18	60	332	7	70	35	1980	3700	55.83	390

33	Jammu-Bhatinda	II	RCS-2	322	Alliance Air	05-Apr-18	65	332	7	70	35	1980	3700	51.25	390
49	Jorhat-Kolkata	II	RCS-2	221	Indigo	01-Aug-18	130	811	7	180	40	3199	0	68.82	1860[&&]
50	Kolkata-Jorhat	II	RCS-2	221	Indigo	01-Aug-18	135	811	7	180	40	3199	0	67.14	1860[&&]
91	Pakyong-Guwahati	IIA	RCS-2	69	Spicejet	28-Oct-18	65	350	7	78	39	1980	0	63.09	770[&]
92	Guwahati-Pakyong	IIA	RCS-2	68	Spicejet	28-Oct-18	65	350	7	78	39	1980	0	77.69	770[&]
95	Kolkata-Tezpur#	II	RCS-2	57	Zoom Air	26-Apr-18	0	715	3	50	25	3200	5019	52.53	1560[&&]
96	Tezpur-Kolkata#	II	RCS-2	56	Zoom Air	26-Apr-18	0	683	3	50	25	3110	5019	52.52	1560[&&]
114	Kolkata-Lilabari@	II	RCS-2	36	Spicejet/ Alliance Air	15-Jan-19	115	867	7	78	39	3470	0	33.83	1860[&&]
115	Lilabari-Kolkata@	II	RCS-2	36	Spicejet/ Alliance Air	15-Jan-19	120	878	7	78	39	3470	0	31.88	1860[&&]
117	Pantnagar-Dehradun	IIA	RCS-1	27	Alliance Air	04-Jan-19	60	180	7	48	24	1500	2594	44.16	430[&]
119	Dehradun-Pantnagar	IIA	RCS-1	26	Alliance Air	04-Jan-19	50	180	7	48	24	1500	2594	38.31	430[&]
125	Agartala-Shillong#	IIA	RCS-1	7	Air Deccan	26-Apr-18	0	239	7	18	9	1670	3156	40.56	810[&&]
126	Dimapur-Shillong#	IIA	RCS-1	7	Air Deccan	26-Apr-18	0	282	7	18	9	1830	3655	1.11	480[&]
127	Shillong-Agartala#	IIA	RCS-1	7	Air Deccan	26-Apr-18	0	239	7	18	9	1670	3156	30.83	810[&&]
128	Shillong-Dimapur#	IIA	RCS-1	7	Air Deccan	26-Apr-18	0	282	7	18	9	1830	3655	1.11	480[&]

* Restriction on maximum payload # Presently non-operational @ Presently only Alliance Air is operating
$ Distance is Stage length as per RCS Letter of Award.

	& Hilly Terrain && International border with neighbouring country in line of sight, hence longer surface distance

Source: RCS weekly passenger data for the period 3 Sep 2017 to 10 Mar 2019.

Table A6: RCS route under RDG category II and IIA by total flight departures till 10 March 2019