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A linear programming for Airport Privatization – "No Frills"

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ABSTRACT *-India has the exquisite and exorbitant population. Transport system that India has various component of rail, road and off-road transport. Air Transport plays the crucial role in the country's economic growth. As per the recent report, India stands in the third position in terms of number of flyers as per a statistic revealed by International Air Transport Association (IATA). In the competitive environment there is a need to improve the transport for a country's economic growth. Forecasts interpret that in next twenty years air transport would have doubled the number of passengers. Advanced air transport facilities needed to accommodate the increasing volumes of air transport and sustain their operational efficiency. Long term options to maximize efficiency or productivity in both operation and resource are to be planned. The Ministry of Civil Aviation has drafted National Civil Aviation Policy 2015 to promote the growth of Indian aviation with a multiplier effect on the economy. A linear programming model has been proposed to study and exploit the intricacies of "No Frill Airports" in order to substantiate the Airport privatization policy in order to sustain and improve the airport efficiency. In order to exploit the in-depth features of the operational efficiency of airports, the DEA is adopted. The Data envelopment analysis (DEA) method is used for analyzing and evaluating the data analytics of airport privatization. DEA is a nonparametric method used in operations research and multi-output production functions and applied in many industries. DEA develops a function whose form is determined by the most efficient producers. It is a linear programming-based technique for measuring the performance efficiency of organizational units which are termed as Decision Making Units (DMUs). This technique aims to measure how efficiently a DMU uses the resources available to generate a set of outputs which are then analyzed and exploited for functional derivative which are dependable and contributing factors for airport operation. This enables the user to investigate and evaluate the intricacies of "No Frill Airports" which yields the Airport privatization for improving the airport efficiency..*

keywords—*Indian Airports, efficiency, privatization, customer satisfaction, NCAP2015,National Civil Aviation Policy, Government of India, need of the hour, data analysis, DEA,AHP*

I. INTRODUCTION

Considering the population in account and the economy aspects for the growing nation, the need of hour for our Country is to reduce the travel time of our passengers inside the country and to global. The only best way is to use the air transport facility and a hence solution is much needed to either go for introducing more number of airports owned by the government in the country or to privatise them and run. Currently in India, there are 68 licensed Aerodrome 'Public Use' Category and 16 Aerodromes licensed under 'Private Use' Category.

For privatizing of the airports the state has to play a vital role to regulate and over sea the management and the operation aspects of the airports so that the standards laid down by the International Civil Aviation Organisation

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and state standards for the operational safety and their efficiency of the airports are upheld. Regulation of airport operational efficiency necessitates the demarcation of performance criteria and standards. For the airport operational efficiency the standards and recommendations are disseminated by ICAO to the international airports and where an impact on safety is anticipated. The states have additional bench marks and standards in particular to the physiognomies of national airport operations.

Initially, the Ministry of civil aviation had a disagreement with the Airport Authority of India on privatizing the most profitable airport in Mumbai and Delhi. Under revenue sharing, the government of India shared these two airports for privatization with GMR and GVK group. Similarly, MADC owned Nagpur airport. In addition to these airports, several other airports are operated by private consortiums namely Cochin international airport, Rajiv Gandhi International airport, Bengalure International airport, and Kazi Mazrul airport.

Privatization in foreign countries

Many foreign countries have emerged in promoting the emergence of private airports. Hundreds of airports have already promoted the airports to become fully privatized or partially privatized European countries though they have very less number of privately owned airports they have encouraged to have more number of public-private partnership in this industry. In Australia the large airports are owned by private companies Osaka's Kansai airport at Japan is getting expanded to double its capacity by the private owners and Kukuoka the fourth largest aiport in Japan is heading for fully privatized in the year 2019. Brazil has a plan of making all the 54 airport she has towards privatizing. Private and Public- private partnership airport ownership creates for more venture, more value with capacity and a better flyer experience in the world

Need of Privatisation

The privatization is aimed at increasing number of regional airports to make connectivity and providing ease of commutation to the businessmen and passengers. It is witnessed that the delay found in high level, the planes are overcrowded with poor or reduced number of services provided to the passengers. Privatized airports are run as businesses, intended to make a profit by aggressively developing various profit centres, tailoring their services to many different groups (including airlines, originating passengers, transfer passengers, meeters and greeters, and employees). Recent research at Oxford University has shown that the management approach of privatized airports is—not surprisingly—significantly more passenger-friendly than that of traditionally managed airports. Privatization models may vary from service contracts management contracts financing for operation or Long term lease or sale. Service contrats are the ones that include cleaning and basic services, airport remodelling, bus transport operations, and allowing franchises in airport terminals

Current scenario in India

As Air transport is found to play a vital role in the country's economic growth with the Competitive Environment in the globalization of businesses, India's approach is to improve airport efficiency. The Forecast by Boeing reveals as the air transport will be double in the next 20 years and hence Advanced air transport facilities needed to accommodate the increasing volumes of air transport and sustain their operational efficiency. As the

Passenger and Cargo services are connected with civil Airports makes the study on the Airport much needed. Long term options are necessary to maximise efficiency or productivity in both operation and resource.

Government of India licensed private airports in India:

- Bokaro, Jharkand
- Birlagram, Nagda, Madhya pradesh
- TAAL Airfield, Hosur, Tamil Nadu
- Burnpur, West Bengal
- Baikunth, Chattisgarh
- Mithapur, Gujarat
- Rourkela, Orissa
- Raigarh(JSPL), Chattisgarh
- Mundra Port, Gujarat
- Kankroli, Udaipur, Rajasthan
- Savitri Jindal Airstrip, Angul, Orissa
- Beas, Punjab
- Ravva Heliport, Ravva, Andhra Pradesh
- Shirpur, Maharashtra
- Sri Sathya Sai Airport, Puttaparthy, Andhra Pradesh
- Banasthali, Rajasthan

All these are owned by private organizations and are categorized as private airfields, not for public use unless authorized.

Details of Airports} P, PP & PPP

The list of International Airports in India:

State	City	Airport
Bihar	Gaya	Gaya Airport
Assam	Guwahati	Lokpriya Gopinath Bordoloi International Airport
Andhra Pradesh	Hyderabad	Rajiv Gandhi International Airport
Gujarat	Ahmedabad	Sardar Vallabhbhai Patel

		International Airport
Karnataka	Bengaluru	Bengaluru International Airport
Delhi	New Delhi	Indira Gandhi International Airport
Kerala	Kochi	Cochin International Airport
Karnataka	Mangalore	Mangalore Airport
Kerala	Kozhikode	Calicut International Airport
Madhya Pradesh	Bhopal	Raja Bhoj Airport
Kerala	Thiruvananthapuram	Trivandrum International Airport
Maharashtra	Mumbai	Chhatrapati Shivaji International Airport
Madhya Pradesh	Indore	Devi Ahilyabai Holkar Airport
Maharashtra	Pune	Pune Airport
Maharashtra	Nagpur	Dr. Babasaheb Ambedkar International Airport
Rajasthan	Jaipur	Jaipur International Airport
Meghalaya	Shillong	Zaruki International Airport

Tamil Nadu	Coimbatore	Civil Aerodrome
Tamil Nadu	Chennai	Chennai International Airport
Uttar Pradesh	Lucknow	Amausi Airport
Tamil Nadu	Tiruchirappalli	Tiruchirapalli International Airport
West Bengal	Kolkata	Netaji Subhash Chandra Bose Intl Airport

Privatized Airport Environment

In the privatized airport, the state governments state the necessary standards for operational safety and efficiency of airports and they will be looking over the management and operation. The Regulation of airport operational efficiency requires the definition of performance criteria and standards as ICAO promulgate standards and recommendations.

II. OBJECTIVE

Tenacity for this idea is to study the current models of Airports developed and maintained, to identify and compare different aspects of their operations and also to understand the customer perspective of the service quality of the Airports. This would explore the possibilities for identifying conditions for creating efficient No-frills Airports in India. Airport privatisation policy helps airport authorities to improve airport efficiency and this thesis expected to establish an Airport Efficiency Evaluation System (AEES)

National Civil Aviation Policy 2015

The Government of India, Ministry Of Civil Aviation has drafted National Civil Aviation Policy 2015 to promote the growth of Indian aviation sector in a significant manner as the development of this sector has a multiplier effect on the economy. The Mission of NCAP2015 is to have safe, secure, affordable and sustainable air travel with access to various parts of India and the world.This policy aims at promoting the growth of Indian aviation sector in a significant manner as the development of this sector has a multiplier effect on the economy.

Passenger Amenities

Construction, modification & management of passenger terminals, development & management of cargo terminals, development & maintenance of apron infrastructure including runways, parallel taxiways, apron etc.,

- Provision of Communication, Navigation and Surveillance which includes provision of DVOR / DME, ILS, ATCt radars, visual aids etc., provision of air traffic services, provision of passenger facilities and related

amenities at its terminals thereby ensuring safe and secure operations of aircraft, passenger Privatisation of Airports

- The AAI was involved in a tussle with the Ministry of Civil Aviation over the issue of privatisation of its two most profitable airports at Delhi and Mumbai. The Government of India handed over these two airports to private companies for the purpose of modernisation in 2006 under revenue sharing agreement to the GMR Group and GVK group respectively. the Nagpur Airport was transferred to the Maharashtra State owned MADC.
- In addition to these, several Greenfield airports are being operated by Private consortiums, namely, Cochin International Airport (first of its kind in India), Bengaluru International Airport, Kazi Nazrul Islam Airport at Durgapur in West Bengal, and Rajiv Gandhi International Airport at Hyderabad.
- The National Institution for Transforming India, also called NITI Aayog, was formed via a resolution of the Union Cabinet on January 1, 2015.
- The three best-rated airports according to the review presentation made by NITI Aayog were Delhi, Mumbai, and Hyderabad.
- The NITI Aayog, in its review of the infrastructure sector for the financial year 2015-16, stated that privatised airports recorded higher performance with regard to customer satisfaction when compared with their counterparts operated solely by the Airports Authority of India (AAI).
- With the passenger and freight traffic growing 18 per cent and 6 per cent, respectively, during 2015-16, the Aayog has laid down plans for the aviation ministry to undertake to improve capacity utilisation at airports. It has suggested that an assessment be done to find out if runway utilisation could be increased at congested airports to deal with the growing traffic.
- To improve air transport connectivity in the country, the NITI Aayog has suggested steps to make non-operational airports viable. It has recommended that methods such as viability gap funding be deployed to make these airports viable. Most of these airports are currently non-operational due to lack of traffic and airlines reluctant to operate from these. However, the government expects that on back of lower airport charges and a host of tax benefits, these airports will pick up commercially.
- The Regional Connectivity Scheme (RCS) in the draft aviation policy has proposed to cap fares at Rs 2,500 for a one-hour flight. It proposes a 2 per cent levy on all domestic and international flights on metro routes to support regional connectivity
- Cost Comparisons of the Airports (Capex and Opex) would be done and the Charges for Airports & Air Navigation Services are collected for the analysis, from the government sources.

III. REVIEW OF LITERATURE

Dmitry Pavlyuk , 2012 , Transport and Telecommunication Institute, December 2012,Transport and Telecommunication Institute, Latvia reveals about the airport efficiency and spatial competition among airports in Europe. Historically managed by government, many airports were involved into privatisation process to attract private investments and improve operational efficiency. Tolga Ülkü , 2014 . Empirical analyses of airport efficiency and costs: Small regional airports and airport groups in Europe This dissertation first deals with the efficiency of 85 small regional European airports for the years 2002-2009 by applying a bounded measure of data

envelopment analysis and also addresses the comparison of airports belonging to two airport groups AENA and DHMI for the years between 2009 and 2011. AENA in Spain, Avinor in Norway and DHMI in Turkey are the National public corporations which operate the majority of airports in the country. PO-LIN LAI, April 2013, Logistics and Operations Management Section Cardiff Business School, Cardiff University

The author has Focussed, A study on the relationship between Airport privatisation and airport efficiency on the most popular method for assessing airport efficiency, with Data Envelopment Analysis (DEA). Using both input and output variables the Airport Efficiency Evaluation System is established and showed the result was that the approach by adopting AHP/DEA-AR model in particular can provide more accurate values of relative efficiency than using the traditional DEA approach

Scott D. Widener, *University of Miami*, October 2010, Measuring Airport Efficiency with Fixed Asset Utilization to Minimize Airport Delays. The author has three predictive equations for airport efficiency allow for three different views on how to address the issue of airport efficiency in a systemic way, which incorporates all stakeholders, and causes the airports to internalize delays, which had long been treated as an externality to the airport, borne by the airlines and consumers. Based upon these three predictive regression equations, coupled with the data envelopment analysis models, a systemic assessment of the entire aviation system can be made to identify not just poor performing parts of the entire national airspace, but those most likely to impact others.

Desolation Observed

In India less importance given in finding the performance measure and efficiency so far.The issues are the absence of dedicated general aviation terminals, heliports and fixed based operations in connection to producing more airports getting privatized. Also the Restricted timings at key metro airports and lower priority clearance relative to commercial traffic limits the utility of private travel to be considered. there are Limited night landing facilities exist at smaller airports which shall be addressed.

The Lack of hangar space and parking bays increases the need for ferry flights resulting in increased costs when opting to go for privatizing airports. The country has Limited facilities for maintenance, refurbishment and re - configurations, which results in aircrafts being sent to overseas at significant expense. These shall get overcome by obtaining permission to operate at civil enclaves, Severe shortage of skilled pilots and engineers

Questionnaire- I/P and O/P variables

The questionnaire shall be administrated into two as Self Administrated and Interviewer Administered.
In Self-Administered, On-line questionnaire, Postal questionnaire and Deliver and collection questionnaire are conceivable. In the case of Interviewer Administered Telephone questionnaire and structured questionnaire are done. The questions that might possibly be put forth may be about

- The status quo about the airport industry
- The need for recommending privatization
- Customer satisfaction
- hindrances to the Airport authorities
- financial gain for both the customers and airports
- customers choice in making airports more worthy

IV. RESEARCH METHODOLOGY

Population Size	Total No of Private Airports 16
Sampling Plan	10 Airports with 100 Customers in each
	Airport Directors
Sampling Method	Random Sampling
Data Collection Method	Expert Interview
Secondary source	AAI Publications
	MoCA Reports
	DGCA Websites and Publications

V. DATA ANALYSIS

As the study has multiple inputs and outputs it is planned to adopt Data Envelopment Analysis (DEA) and an Analytic Hierarchy Process (AHP) to establish the AEES

DEA can help to recognise relative efficient airports. However, only using DEA may not provide robust results about the efficiency of airports because stakeholders may weight the relative importance of input and output variables differently. For example, airport managers may focus on financial performance, but civil aviation authorities (i.e. the public sector) may place emphasis on the number of passengers or aircraft movements.

Therefore, it is necessary to develop and demonstrate the applicability of an integrated DEA and AHP evaluation model for addressing this concern. AHP outlines the preferences of different stake holders (i.e. airport managers or airport analysts).

VI. DEA/ AHP METHODS

DATA ENVELOPMENT ANALYSIS (DEA)

Data envelopment analysis (DEA) is a linear programming methodology to measure the efficiency of multiple decision-making units (DMUs) when the production process presents a structure of multiple inputs and outputs.

DEA- Data Envelopment Analysis is a state of the art benchmarking technique which is particularly useful for multi-criteria benchmarking studies.

- In DEA, the productivity of a unit is evaluated by comparing the amount of output(s) produced in comparison to the amount of input(s) used.
- The performance of a unit is calculated by comparing its efficiency with the best observed performance in the data set. There exist many different DEA models, each with its own characteristics.
- ANALYTIC HIERARCHY PROCESS (AHP)
- The AHP is a decision making technique that depends on the study of both mathematics and psychology.
- Decomposing the elements into goals criteria and alternatives and then to study these elements using both qualitative and quantitative analysis
- Used in both individual and group decision-making environments.

Analytic Hierarchy Process (AHP)

- Is one of Multi Criteria decision making
- Is a method to derive ratio scales from paired comparisons
- Intelligence is the product of an analytic process that evaluates information collected from diverse sources, integrates the relevant data into a cohesive package, and produces a conclusion or estimate about a criminal phenomenon by using the scientific approach to problem solving

Based on the report that could be available after analysing the variables and the weightage given it is expected to give the country a proposal as whether to promote more privatization or to improve the government owned airports.

VII. CONCLUSION

The Recent revolution of the private airport would be analyzed and after analyzing the Relationships between Airport efficiency and the privatization is expected using efficient models. This would give the solution as whether the Airports under private management are more efficient than those under public management. As Sufficient number. of variables are used in the analysis a Dependable Airport Efficiency Evaluation System for India shall be given.

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