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The Importance of Safety & Security, Operation, Profit and Passenger Services in Indian Airports

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Abstract*: The number of functional airports and airstrips in India has tremendously increased due to the growth and demand of the aviation sector in the country. At present, no interface exists, which correlates all the five functional aspects (Safety, Security, Operation, Profit, and Passenger Services) of an airport. The study in gauge the functionality aspects and profit potential. The study acts as a checklist to evaluate all the aspects of operating an airport and also acts as an evaluation tool to measure the quality of services rendered in the airports. The study contributes towards better efficiency in airport management and draws out the lacunae in the present system of operation. The study considers Indian passengers as the target respondents. The study adopts a Quantitative research strategy, and regression weights were used to test the formulated hypothesis. The proposed study undertakes Structural equation modeling along with AMOS to construct the proposed hypothesized model. The study finding concludes that functional aspects play a positive role in curving the perception of passengers.

Keywords: Indian Airline, SEM, Airport, Safety, Security, Operation, Passenger services, Profit

I. INTRODUCTION

The aviation industry has transformed rapidly and the industry has shown economic growth with the entry of civil airlines and adoption of low fare airlines (Kanthe, 2013). India's airline sector is mostly untapped with colossal growth prospect taking into consideration (Nagpal & Saranga, 2017). The Indian aviation growth rate is one of the fastest amongst "the Asia-Pacific region," it is currently placed ninth largest in the aviation market worldwide. India's domestic air transportation sector includes several segments such as ground handling services, helicopter services, maintenance services, repair organizations and training institutions (Subash et al., 2017). In India, airlines are operated by "Scheduled" and "Non-Scheduled" Operators. Scheduled Operators and non-scheduled Operators are an integral component in the expansion and progress of the air transportation sector (Chanparn et al., 2017). They also oblige aircrafts maintenance activities like Maintenance, repair, and overhaul (MRO) and ground level handling (Subash et al., 2017). The Indian cargo and passenger aviation market is mainly dominated by scheduled domestic operators.

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After the scrapping of Air corporations Act, 1953, the first Indian low-cost carrier Air Deccan airline commenced operations in the year 2003. The success of first low-cost airline encouraged the entry of other carriers namely Spicejet, GoAir, Indigo, Jet Airways and Jetlite, Air India, Vistara airlines to carry out their operation in the aviation business (CAPA, 2017).

II. LITERATURE SURVEY

Barros et al., (2007) have performed an assessment towards level of service for passenger transfer at airports. The study uses regression analysis to identify the passenger facilities and services and overall perception of level of service at Bandaranaike International Airport in Sri Lanka. The study findings indicate that courteousness of the security staff and flight related information displays are then most important factors to be found by transfer passengers at Bandaranaike International Airport. Bogicevic et al., (2013) studied quality of airport service and passenger satisfaction. The study indicates key passenger satisfiers in the context of airport service quality such as airport environment and cleanliness. Similarly, the major dissatisfies were airport security-check, signage and dining facilities at airport. Arif et al., (2013) analyzed the methods and techniques to improve traveler satisfaction in the airline industry. The study was conducted at United Arab Emirates airports. The study had selected 78 travelers randomly. The data collection process was administered based on the questionnaires formulated. Statistical tools such as Chi-square analysis was used to ascertain the comparison between the selected airports. Harrison et al., (2013) have performed an investigation towards identifying the factors which influences passenger experience. The study found that to enhance passenger experience, the need of passengers should be well-understood. Jiang and Zhang (2016) have studied the assessment of service quality at airport. The study had conducted an airport passenger survey at Melbourne airport. The finding indicates vital inconsistency between expectation of passengers' perception towards service quality and the actual service quality at the airport. Factors such as parking at parking, airport immigration, Wi-Fi access at airport, and baggage facilities are cause of concern for passengers and should be dealt urgently by airport management.

III. PROPOSED SYSTEM

"The prime motive of the research is to identify the importance of safety & security, passenger services,

operations and profit with respect to Indian Airports." The objectives of the present research are as follows:

- To identify the factors that plays an important role for an airport to operate
- To develop a Structural equation model based on the identified factors

IV. METHODOLOGY

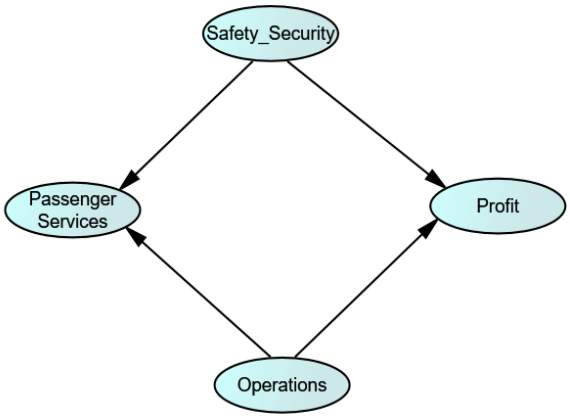

Figure 1 Research Model

The proposed study considers adopting a standard procedure for performing the research work. The proposed research adopts Quantitative research strategy. 200 passengers were preferred to take part in the research collection process. A well formulated likert-based questionnaire was formulated. The questionnaire was made based on existing literature, focus group discussions and interviews with domain experts. The questionnaire formulated was divided into two parts; The demographic information about the respondents and the second section of the questionnaire was designed to measure the dependencies of variables in the study. The Proposed framework embraces information on four attributes which includes safety & Security, Passenger Services, Operations and Profit were "all measured by using a five-point scale." The target audience was requested to "rate" the provided questionnaire on a five-point scale of High-Low importance, indicating how well the factors are important towards the selection of an airport (Malhotra, 1999). The resulting analysis involves descriptive statistics and Structural equation modeling using SPSS & AMOS 21.0, which is designed to calculate and test the "structural equation models" with the higher level of accuracy. The research path diagram of the SEM is shown in the above figure. The study considers the "hypothesis" on the basis of the path diagram:

H01: There is a positive influence of Safety & Security on Passenger Services

H02: There is a positive influence of Operations on Passenger Services

H03: There is a positive influence of Safety & Security on Profit

H04: There is a positive influence of Operations on Profit

V. RESULT ANALYSIS

The principal idea of structural equation modeling is to elucidate the model of a series of interrelated dependence associations simultaneously between a set of latent or unobserved constructs, each measured by one or more observed variable (Hair et al., 2017). Structure equation modeling is based on the postulation of causal relationships where a change in one variable results in a change in another variable. According to (Loke, 2017), structure equation modeling is a confirmatory method which allows wide-ranging methods for evaluating and altering theoretical models. It is used to test the hypothesis. To perform the structural equation modeling, (Park et al., 2017) has suggested a two-stage approach to perform SEM analysis.

- The first stage is the Measurement model stage. In this phase, the analysis was carried out by specifying the causal associations between the theoretical constructs and the observed variables.
- The second stage is the structural model stage. A structural model can be tested once all the theoretical constructs in the first stage were validated and suitable fit achieved (Lambie et al., 2017). The structural model "specifies how the latent variables are associated with each other". The prime idea of the structural model is to test the hypothesis to answer the research questions. To estimate the structural model, goodness-of-fit indices are observed to evaluate whether the hypothesized structural model fits the data.

A. *SEM Analysis Results*

The analysis carried out on 50 items using confirmatory factor analysis to find if the empirical data fits the hypothesized model. Figure 2 portrays the casual relationship between Safety & Security, Passenger Services, Operations, and Profit. The proposed research work applies SEM mechanism for evaluating the supportability of the obtained "empirical information" from the sample of the study with the hypothesized model (Marcoulides and Yuan, 2017). This part of the study performs internal validation check for the presented SEM based approach using the standard model fit technique (Wu et al., 2017). The measurements of confirmatory factor analysis are used for re-specifying the proposed hypothesis where the components of the SEM are used for structuring. The system also applies two-step modeling to perform validation of the presented confirmatory factor analysis to evaluate the better fitness of the presented structural model. For model validity, the study evaluates "Comparative Fit Index (CFI)", "Incremental Fit Index (IFI)", and "Root Mean Square Error of Approximation (RMSEA)" (Wu et al., 2017).

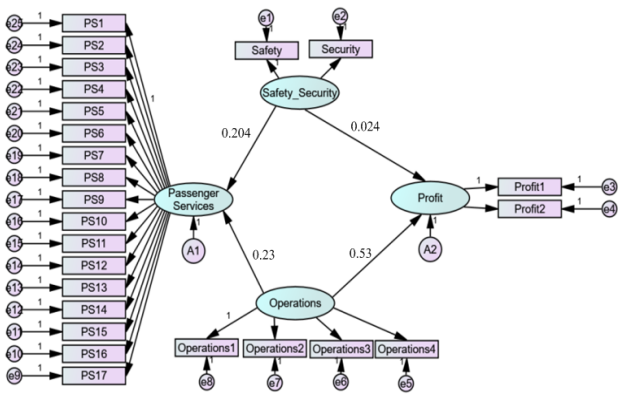

Figure 2 Hypothesized model for Research Variable

Table 1 Regression weights of Proposed SEM

	Estimates	S.E	*p*	*Hypothesis*
Passenger Services ← Safety & Security	.763	.043	.00***	**Accepted**
Passenger Services ← Operations	.638	.050	.00***	**Accepted**
Profit ← Safety & Security	.027	.064	.705	**Accepted**
Profit ← Operations	.438	.093	.00***	**Accepted**

For effective analysis, the proposed system carries out standardized (Table 2) calculation of regression weights for hypothesis testing. The prime reason behind this is that normally standardized regression coefficient results when the variance value of both independent as well as dependent variable are made to 1. It is done to check the amount of standard deviation that changes analysis where the dependent variables are normally altered. **The outcome in Table 4.2 shows that Safety & Security had a positive influence on Passenger Services (.763), Operations had a positive influence on Passenger Services (.638), Safety & Security had a positive influence on Profit (.027), and Operations had a positive influence on Profit (.438). Therefore, the entire four null hypotheses were accepted.**

B. Goodness of Fit Estimation

Table 2 Goodness of fit for the Hypothesized estimated model

Measures	Goodness of Fit Estimation	Hypothesized model
Absolute Fit Measures	Likelihood-ratio chi-square ($\chi 2$)	2321.294
	Degrees of freedom	261
	Non-centrality parameter (NCP)	2060.294
	Goodness-of-fit index (GFI)	.697
	Root mean residual (RMR)	.170
	Root mean square error of approximation (RMSEA)	.146
	Expected cross-validation index (ECVI)	6.638
Incremental Fit Measures	Adjusted goodness of fit index (AGFI)	.623
	Normed fit index (NFI)	.658
Parsimonious fit measures	Parsimonious norm fit index (PNFI)	.572
	Parsimonious goodness of fit index (PGFI)	.560
	Model (AIC)	2449.294

"RMSEA" value can be carried out for evaluating null hypothesis also as it is considered to be the measure of absolute fitness on the basis of the non-centrality attribute and depends on the degree of freedom, sample size, and chi-square value. Normally, the value of RMSEA is configured to zero if the value of the degree of freedom is found to be more than chi-square value. A closer look at Table 2 shows RMSEA value of .146, and hence it directly expresses its goodness in model fit or a perfect fit.

RMR is considered to be an absolute measurement of the fitness of the model and is represented as the normal difference between the predicted co-relational value and the observed value of correlation. The calculation highlighted in Table 2 shows that RMR value for the proposed study is found to be .170 that is a positive sign of goodness in model fit. "Non-centrality parameter" (NCP) value is found to be 2060.294.

It is important to test the model fit parameters as they can provide the baseline for accepting or rejecting the proposed relationships between the constructs considered for the proposed study. Safety & Security and Operations are the two exogenous constructs and Passenger Services, and Profit is the two endogenous constructs considered in the proposed model. The results of Hypothesized model provided positive support for the entire four null hypotheses considered.

B. Direct, indirect & total path effect of structural model for Passenger

The following equations derived from results of Passengers' SEM model and can be utilize to evaluate the "degree of direct, indirect, and total effects" on Safety & Security, Operations, Passenger services and Profit on selecting a particular airport (what makes an airport better than the other) i.e. Brand equity estimation of an airport.

- *Impact of Safety & Security on Passenger Services*

Direct path: Safety & Security → Passenger Services = 0.204

Indirect path: Safety & Security → Operations → Passenger Services = 0.204 x 0.226 = 0.046104

Total path = Direct Path + Indirect Path = 0.204 + 0.046104 = 0.250104

Results of direct and indirect path relationships between Safety & Security and Passenger Services are 0.204, 0.046104. The total effect (both direct and indirect) of between Safety & Security and Passenger Services is **0.250104**.

- *Impact of Operations on Passenger Services*

Direct path: Operations → Passenger Services = 0.226

Indirect path: Operations → Safety & Security → Passenger Services = 0.226 x 0.204 = 0.046104

Total path = Direct Path + Indirect Path = 0.226 + 0.046104 = 0.272104

Results of direct and indirect path relationships between Operations and Profit are 0.226, 0.046104. The total effect (both direct and indirect) of between Operations and Passenger Services is **0.272104**.

- *Impact of Safety & Security on Profit*

Direct path: Safety & Security → Profit = 0.024

Indirect path: Safety & Security → Operations → Profit = 0.024 x 0.527 = 0.012648

Total path = Direct Path + Indirect Path = 0.024 + 0.012648 = 0.036648

Results of direct and indirect path relationships between Safety & Security and Profit are 0.024, 0.012648. The total effect (both direct and indirect) of between Safety & Security and Profit is **0.036648**.

- *Impact of Operations on Profit*

Direct path: Operations → Profit = 0.527

Indirect path: Operations → Safety & Security → Profit = 0.527 x 0.024 = 0.012648

Total path = Direct Path + Indirect Path = 0.527 + 0.012648 = 0.539648

Results of direct and indirect path relationships between Operations and Profit are 0.527, 0.012648. The total effect (both direct and indirect) of between Operations and Profit is **0.539648**.

Table 3 Total, Direct and Indirect Path Analysis Result of overall Structural Model for Passengers

Path	Total Path	Direct Path	Indirect effects
Safety & Security → Passenger Services	**0.250104**	0.204	0.046104
Operations → Passenger Services	**0.272104**	0.226	0.046104
Safety & Security → Profit	**0.036648**	0.024	0.012648
Operations → Profit	**0.539648**	0.527	0.012648

Therefore, Overall Total Path = **0.250104 + 0.272104 + 0.036648 + 0.539648 = 1.098504**

VI. CONCLUSION

The airport is an important stakeholder of the Aviation ecosystem. As a consequent, the functional aspects of the airport (Safety & Security), Operations, Passenger Services, and Profit gains importance for study. All these functional aspects have to be studied in relation to each other to assess the airport in totality. The adopted methodology includes Statistical modeling, which does not pose overhead of complex computing as compared to complex mathematical models and optimization techniques. The study had considered various constructs which are believed to be directly or indirectly influences the selection of an airport. The validity of the proposed model is statistically checked using multiple model fitness indexes to claim the superior goodness in fit iteratively and thereby proving the quality of the model. The positive construct of the hypothesized model enunciates the interdependence of the functional aspects. The validity of the proposed model is statistically checked using multiple model fitness indexes to claim the superior goodness in fit iteratively. The study found that there is a positive influence of Safety & Security on Passenger Services, the positive influence of Operations on Passenger Services, the positive influence of Safety & Security on Profit, and the positive influence of Operations on Profit.

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AUTHOR PROFILE

Group Captain Venkatesh Chari, He is a serving officer from the Flying (Pilot) branch of IAF with approximately 6000 hours of operational flying in India and abroad. He has held many positions of responsibilities in aviation and related tasks. IAF has awarded him many serving medals along with the highest flight safety badge. He is pursuing his PhD from Jain University Bangalore. He is an alumnus of National Defense Academy. He holds PGDBA (Symbiosis, Pune), Masters in Aviation Laws & Air Transport Mgt (NALSAR, Secunderabad) and MSc in Defense & Strategic Studies (Madras University). His areas of interest are Aviation Management, Aviation Policies, Brand Building, Training and Strategic Management. (a) Paper Published*. Growth of Indian Aviation: Management and Sustenance Strategy. May 2019. International Journal of Management and Economics. Chetan Publisher Aurangabad. -ISSN No: 2231-4867. UGC Referred Journal (May 2019) No 64206. Impact Factor: 6.81(SJIF), b) Paper presented and abstract published in COSMAR 2018 at Indian Institute of Science, Bangalore. Topic: Managerial Opportunities and Challenges in the Aviation Industry Quick Reply