ANALYSIS OF INTERNATIONAL AIR TRASPORT (MUMBAI INTERNATIONAL AIRPORT)

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Abstract

In operation research Inventory management is an important function to any business, marketing, since inadequacies in control can result in serious and important problems. If the inventory not managed properly then it will be problematic in satisfaction of customers or curtailment of working capital will result and production, seat inventory, loss.

Last few decades on the changes within revenue management due to not use inventory management system. These changes are fundamental with many airlines they adopting new concepts such as bid price and origin and destination. These changing concepts have essentials airlines to look at their inventory management systems, as it is these systems that will actually implement the airlines chosen methodologies. But while revenue management has undergone change, inventory management, which is a key component of revenue management, has remained fairly static. Airline companies concentrate on optimization of the booking process in the reservations of seats with the 3 pillars of decision making: the right time, the right conditions and the right fare for a future flight for customer's satisfactions.

Introduction

The good organization is the business that produces products, sells and offers services to solve the customer's problems. Obtain the goodwill of the customers and getting the profit over the time are the foremost objectives and strategies of business. Operations Research (OR), also known as Operational Research, is a field of study that involves the application of mathematical and analytical methods to decision-making processes within organizations. Operation design and productions strategy is the part business that designs the principles and practices of management to perform production, sales, or services effectively. Competition in air transportations is increasing rapidly and the environment is too sensitive and alert to changes. These changes have resulted that assurance of a quality level, is very important to reduce accidents, increase safety, and reduce costs and customer satisfaction.

The Mumbai airport has two intersecting runways and it handles an average of 980 flights per day. In 2022-2023, 44 million passengers used Mumbai airport, i.e. a 105 per cent rise the passenger traffic at the Mumbai Airport.

The model of Expected Marginal Seat Revenue (EMSR) developed in this research paper is a decision framework for maximizing flight leg revenues which can be applied to multiple nested fare class inventories. It is applied to a dynamic process of booking limit revision for future flight departures, and overbooking factors as well as fare class upgrade probabilities are incorporated.

Airlines typically divide a pool of identical seats into different booking classes, each having different prices of air tickets. Mixing discount and higher-fare passengers in the same aircraft compartment offered the airline the potential of gaining revenue from seats that would otherwise fly empty.

Customers are seeking to get the lowest price for their ticket, while airline companies are trying to keep their overall revenue as high as possible and maximize their profit. However, mismatches between available seats and passenger demand usually leads to either the customer paying more or the airlines company losing revenue. Airlines companies are mostly equipped with advanced tools and capabilities that enable them to control the pricing process. However, customers are also becoming more constant with the development of various online tools or apps to compare prices across various airline companies.

The seat inventory control problem is to find the number of seats to make available to each fare class from the coach cabin of the aircraft, so as to maximize total expected revenues for an expected for future flight. In other words, an optimal booking policy is sought for the ticket sales, which requires the assessment of accepting a booking request relative to the decrease in expected total revenue associated with removing one seat from the available inventory.

To accelerate the integrated modernization, progress and extension of the amenities of airport that meets the needs of the international standard is the only important objective of the Airport Authority of India (AAI). Air transport value chain players include Airlines, Airports, aircraft and parts Manufacturers, Lessors, aircraft Maintenance providers, Computer Reservation Systems (CRS), Travel Agents and other service providers. Airlines are the key components of the air transport system that provide the actual transport services (Wensveen 2007). The airline industry more contributes to the national economy as well as global by transporting people, cargo and creating jobs and economic activity to increase the nation income and jobs.

Key words:

Overbooking Seats, Customer Satisfaction, Reduce the travelling cost, profitability, low customer charges,

Objectives:

1. To study of minimize the risk of overbooking or unsold seats in air transportation
2. To minimize investment inventory at minimum level to profitability.
3. To give appropriate suggestions to provide better customer service through fast delivery to customer and low customer charges.

Data Collection:

Secondary data: Review of related literatures from Google Scholar, Shod Ganga, Science direct.

Scope

Scope of the study is to find out passenger satisfaction in view of the different services provided by Mumbai International Airport Ltd. (MIAL). The study covers the different aspect of passenger satisfaction. Airport management will get help from this Customer satisfaction survey report.

Research Methodology:

Review of literature, Diagrammatical representation of data.

**Computer Reservation System and Global distribution System**

Computer Reservation System is also called as Central Reservation System.

Global distribution System (GDS) and Computer Reservation System (CRS) have the same functions but, CRS only provides information about airlines. With Global distribution System, you can reserve a ticket, book a hotel room or rent a car. This is why they are known as Global Distribution System because you can reserve everything with GDS.

Relationship between the pricing, reservation control and Computer reservation system (CRS)
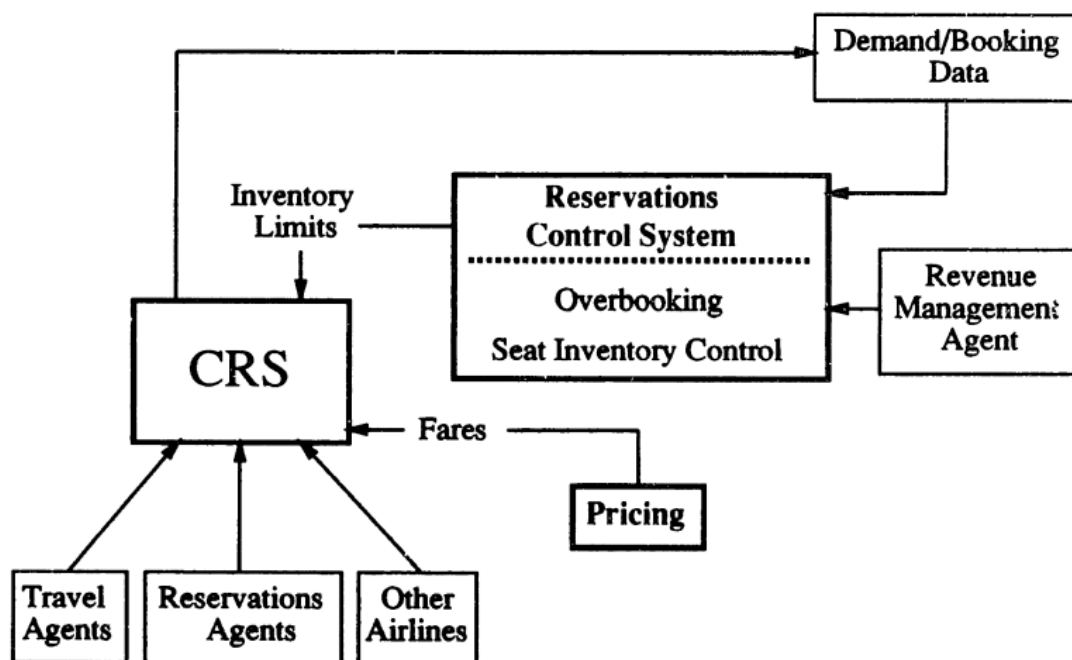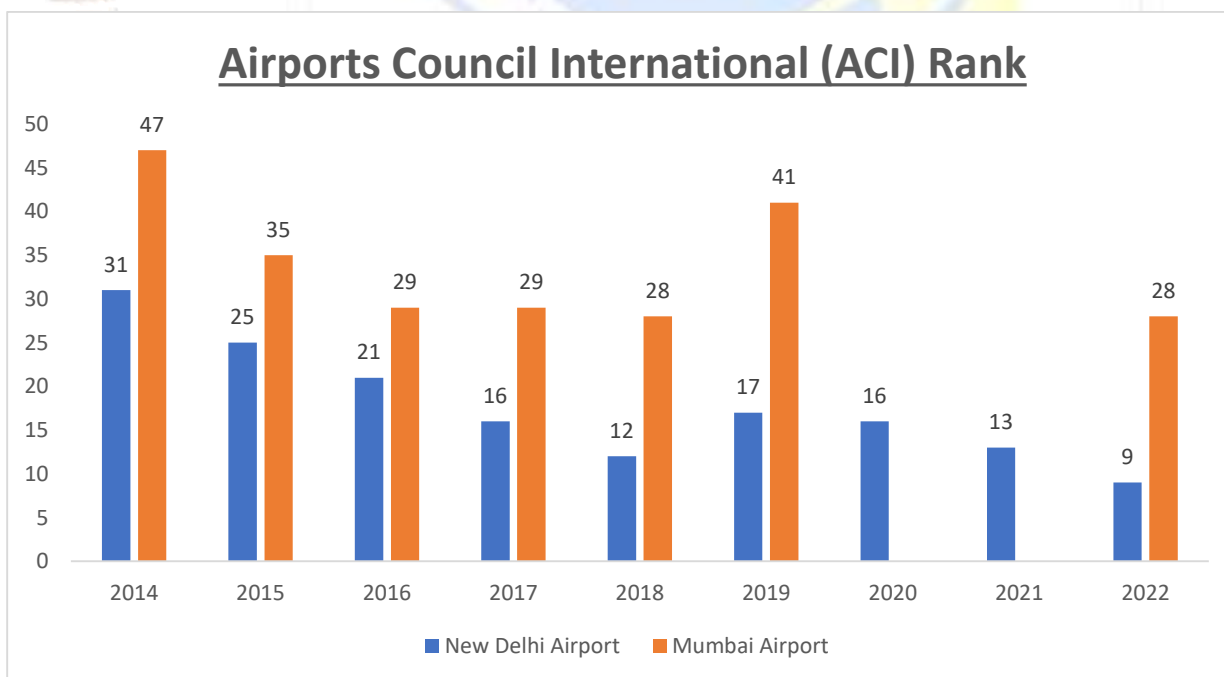
Goals of Airlines and Customer
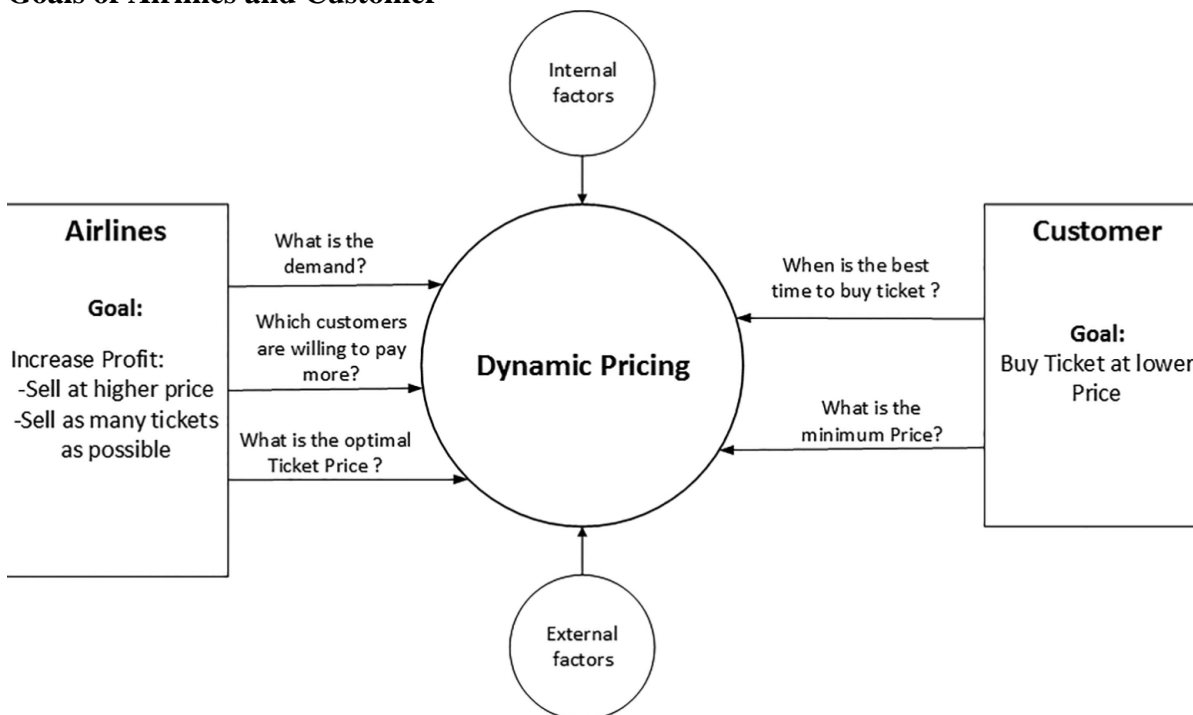
Airports Council International (ACI) Rank

Rank of Indian Airports in the world's busiest airports by total passenger traffic:

| Year	2014	2015	2016	2017	2018	2019	2020	2021	2022
New Delhi Airport	31	25	21	16	12	17	16	13	9
Mumbai Airport	47	35	29	29	28	41	-	-	28

Interpretation

Mumbai's Chhatrapati Shivaji Maharaj Airport and Delhi Airport are listed in world ranking by ACI rank. Also, Mumbai's Chhatrapati Shivaji Maharaj Airport Platinum rating by ACI and Asia-Pacific in green airports recognition (GAR) programme for 2023.

Passenger Traffic from year 2015 to 2022

Year	Passengers Traffic (Domestic +International)
2015	40637377
2016	44680555
2017	47204259
2018	49876769
2019	47055740
2020	16389870
2021	19786522
2022	38332106
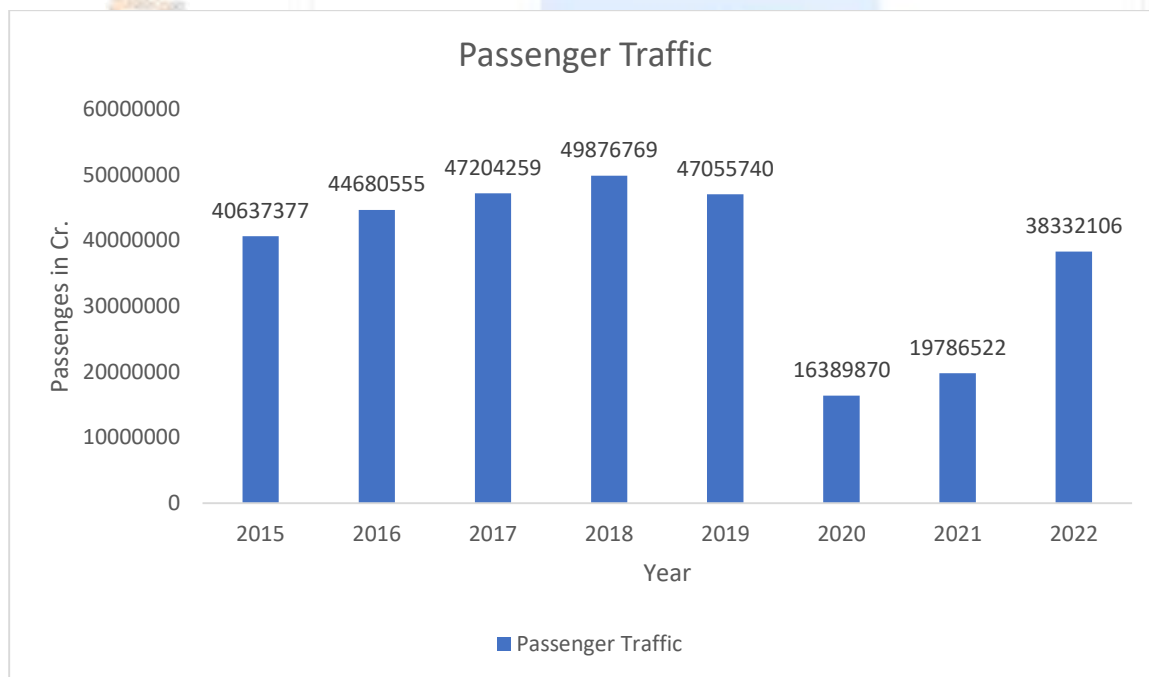
Interpretation:

From the above bar diagram we interpret that passenger traffic at the air transportation is increasing from the year 2015 to 2018. But due to CORONA pandemic start from March 2019 passenger traffic is decreasing.

Passengers Traffic International Airport Mumbai month wise from August 2022 to July 2023

Passenger Traffic: Joint Venture International Airports: Mumbai
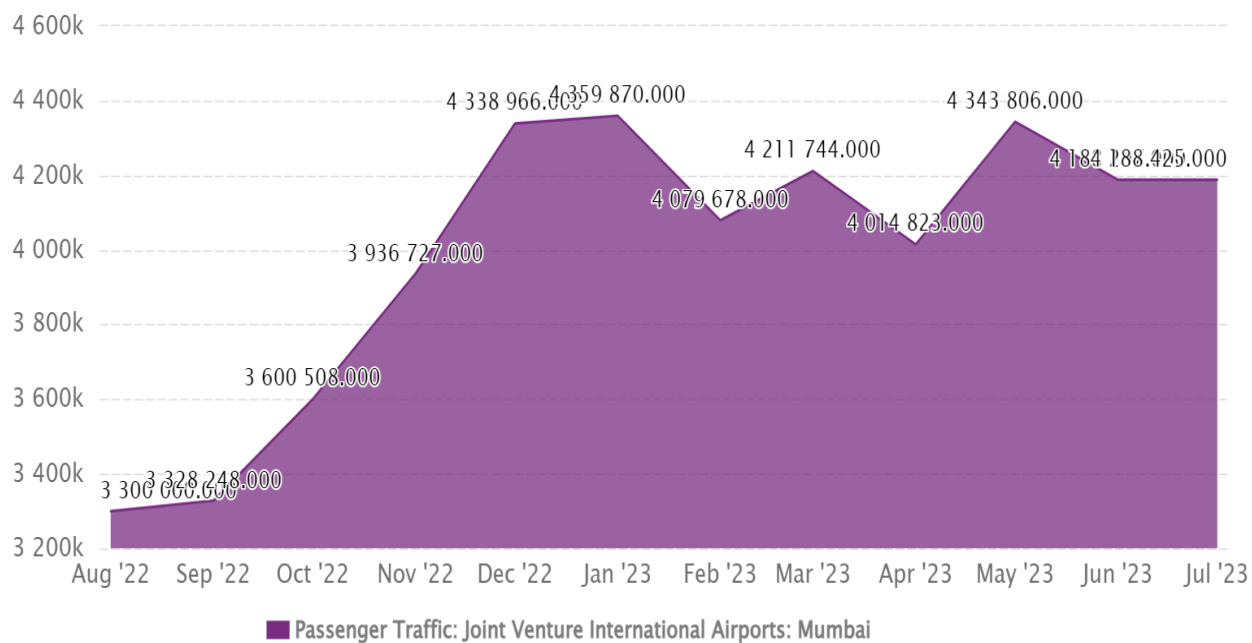
Interpretation:

Passengers traffic at the Mumbai airport is increasing in trends from the month of August 2022 to July2023, but some decreases trend in the month of February and April 2023.

Passengers Traffic (Domestic +International) in Top metro airports in Crores

H0: The passenger's traffic in the Mumbai Airport is not increase after the pandemic.
H1: The passenger's traffic in the Mumbai Airport is increase after the pandemic.

	Delhi	Mumbai	Bengaluru	Hyderabad	Chennai	Kolkata
2022-23	6.5	4.4	3.2	2	1.8	1.7
2021-22	3.9	2.2	1.6	1.2	0.95	1.1
% Growth	66	102	96	69	95	61

Interpretation

Reject H0, By the data we interpret that, in the financial year 2022-23, the year-on-year growth in Mumbai domestic and international passenger traffic combined was 102%. The Mumbai airport is the highest passenger traffic growth among all metro airports in the country for the second straight year in a row.

Research in Overbooking or unsold seats in air transportation

Overbooking of seats in airline is not done randomly. Airlines use an algorithm which suggests the number of seats to be overbooked on the basis of previous data about the number of last-minute cancellations.

For example, in July 2017, it was reported that United Airlines had forced a passenger to hold her two-year-old child on her lap over the duration of a 4 Hr. flight. This was after reselling the seat of child's just before time of departure to a standby passenger (Zhang, 2017).

Bumping

The vast majority of the time, passengers don't have any problems boarding their flights. But occasionally, airlines may "bump" passengers and have them give up their seats. "Denied boarding," is also known as Bumping, it will be happening when there are more passengers scheduled to fly on an airplane than available seats. The business practice of bumping is not illegal. Airlines oversell their scheduled flights to a certain extent in order to compensate for "no-shows." Most of the time, airlines correctly predict the "no shows" and everything goes smoothly. But sometimes, passengers are bumped as a result of oversales practices.

Not all airlines engage in the practice of selling more tickets than available seats on an aircraft. Some airlines simply sell enough tickets to fill every seat properly. Although this practice significantly reduces the chances that a passenger will be bumped, the airline may still bump passengers in rare circumstances - such as when the seat is needed for a Federal Air Marshall. It's important for passengers to understand why they may be asked to give up their seats and what rights they may have. Before an airline forces a passenger to give up his/her seat due to overbooking, the airline must ask passengers on the flight if they are willing to give up their seat voluntarily in exchange for compensation.

Voluntarily Giving Up Your Seat

If a flight has more passengers who are ready to fly than there are seats available, airlines must first ask passengers to give up their seats voluntarily, in exchange for compensation, before bumping anyone involuntarily. Airlines may offer passengers incentives, such as money or vouchers, to volunteer. There is no limit to the amount of money or vouchers that the airline may offer, and passengers are free to negotiate with the airline. If an airline offers a reduced rate ticket, free ticket, or voucher to passengers in exchange for volunteering to fly on a different flight, the airline must tell passengers about any and all restrictions that may apply to the use of the reduced rate ticket, free ticket, or voucher before passengers decide whether or not to give up their confirmed reserved space on the currently oversold flight.

Traditional upgrade optimization is conducted by sequentially optimizing the pricing for the cabins in the order of business, first, and economy cabins, respectively. After an upper cabin is optimized for seat allocation, the remaining seats therein are left to the next lower cabin for optimization.

Minimize investment inventory at minimum level to profitability. There are many factors affecting to minimize expenditure on airline inventory. Air travelling and Oil prices are linked oil supply reductions drive GDP declines. But oil and travel are negatively correlated when GDP demand surges drive price of oil increases. So, oil prices can either increase or decrease airline profit cycles, depending on the time period sampled.

Data from the (**Airline International Destination Satisfaction Study**,) showed that 40% of customers said positive customer experience would have more of an impact on their decision to rebook with an airline, than a cheaper price.

The majority of the customers are waited in the queue of security check point counter for 6-10 minutes duration of time. The maximum of the customers is thought that the departure or arrival time was very important while making a decision to choose the airline. The majority of the customers are thought that the fewer stops of flight and better connection was very important while making a decision to choose the airline. The majority of the passengers are thought that the air fare of the flight is very important while making a decision to choose the airline

Conclusion

1) In this paper, we presented a literature survey of ticket prediction and demand prediction models. We first presented an overview of dynamic pricing in airline industry which involves dynamic adjustment of ticket prices based on several internal and external factors. We explained the interaction between customers and airlines in deciding ticket prices dynamically.

2) Mumbai's Chhatrapati Shivaji Maharaj Airport and Delhi Airport are listed in world ranking by ACI rank. Also, Mumbai's Chhatrapati Shivaji Maharaj Airport Platinum rating by ACI and Asia-Pacific in green airports recognition (GAR) programme for 2023.

3) Mumbai domestic and international passenger traffic combined was 102%. The Mumbai airport is the highest passenger traffic growth among all metro airports in the country for the second straight year in a row.

4) In general, high percentage of passengers are dissatisfied with quality of services being provided by airport in order to increase the passenger's satisfaction level more concentration on airport facilities is needed.

5) There are number of problems and suggestions reported by passengers. These problems and suggestions should be studied carefully by MIAL in order to improve passenger satisfaction levels; that will have a direct impact on their business.
It is concluded from the study that customers are satisfied with the quality, service and, safety provided by the airlines.

References

1) Aydın, N., Birbil, Ş. İ., Frenk, J. B. G., & Noyan, N. (2013). Single-leg airline revenue management with overbooking. *Transportation Science*, *47*(4), 560-583.
2) Mahesh, R., & Prasad, D. (2012). Post-merger and acquisition financial performance analysis: A case study of select Indian airline companies. *International journal of engineering and management sciences*, *3*(3), 362-369.
3) Rothstein, M. (1985). OR Forum—OR and the airline overbooking problem. *Operations Research*, *33*(2), 237-248.
4) Thompson, H. R. (1961). Statistical problems in airline reservation control. *Journal of the Operational Research Society*, *12*(3), 167-185.

5) Mahesh, R., & Prasad, D. (2012). Post-merger and acquisition financial performance analysis: A case study of select Indian airline companies. *International journal of engineering and management sciences*, *3*(3), 362-369.

6) El-Haber, S., & El-Taha, M. (2004). Dynamic two-leg airline seat inventory control with overbooking, cancellations and no-shows. *Journal of Revenue and Pricing Management*, *3*, 143-170.

7) Belobaba, P. P. (1989) Application of a probabilistic decision model to airline seat inventory control', Operations Research, 37, 183– 197.

8) Bertsimas, D. and De Boer, S. (2001) 'Astochastic booking limit control policy for airline network revenue management', MIT, Preprint.

9) Brumelle, S. and McGill, J. I. (1993) 'Airline seat allocation with multiple nested fare classes', Operations Research, 41, 127–237.

10) Chatwin, R. E. (1992) 'Optimal Airline Overbooking', PhD thesis, Department of Operations Research, Stanford University, Stanford, CA.

11) Teffera, T. (2016). *Analysis of the determinants of profitability in the airline industry* (Doctoral dissertation, Dissertação de Mestrado não editada). Unity University, College of Business, Economics and Social Sciences, Etiópa).

12) Curry, R. E. (1990) 'Optimal airline seat allocation with fare classes nested by origins and destinations', Transportation Science, 24, 193– 204.

13) Archana, R & Subha, Dr. (2012). A study on service quality and passenger satisfaction on Indian airlines. International Journal of Multidisciplinary Research. 2.

14) Gabriel, D., (2013), "Inductive and deductive approaches to research", Retrieved from: https://deborahgabriel.com/2013/03/17/inductive-and-deductive-approaches-to-research /

15) Graham, A., (2013), "Understanding the low-cost carrier and airport relationship: A critical analysis of the salient issues", Tourism Management, vol. 36, pp. 66-76.

16) Grimme, W., (2011), "The growth of Arabian airlines from a German perspective – A study of the impacts of new air services to Asia", Journal of Air Transport Management, vol. 17, pp. 333-338.

17) Hannan, A., (2007), "Interviews in education research", Retrieved from: http://cecs6200.pbworks.com/w/file/fetch/69409200/UsingInterviewsinEducationResea rch.pdf

18) A. Alahyari (2014), Determinants Of Profitability In The Airline Industry, Eastern Mediterranean University, Cyprus, 1-65

19) IATA (2021), Economic Performance Of The Industry, Year-End Report

20) Chonsalasin, D., Jomnonkwao, S., & Ratanavaraha, V. (2021). Measurement model of passengers' expectations of airport service quality. International journal of transportation science and technology, 10(4), 342-352. https://doi.org/10.1016/j.ijtst.2020.11.001

21) Woo, M. (2019). Assessing customer citizenship behaviors in the airline industry: investigation of service quality and value. Journal of air transport management, 76, 40-47. https://doi.org/10.1016/j.jairtraman.2019.02.006

22) Stamolampros, P., & Korfiatis, N. (2019). Airline service quality and economic factors: an AR DL approach on US airlines. Journal of air transport management, 77, 24-31. https://doi.org/10.1016/j.jairtraman.2019.03.002

23) Gupta, H. (2018). Evaluating service quality of airline industry using hybrid best worst method and VIKOR. Journal of air transport management, 68, 35-47. https://doi.org/10.1016/j.jairtraman.2017.06.001

24) Guide Jr, V. D. R., & Van Wassenhove, L. N. (2009). OR FORUM—the evolution of closed-loop supply chain research. Operations research, 57(1), 10-18.

25) Hua, Y. C., & Li, C. H., (2012), "Exploring the perceived competence of airport ground staff in dealing with unruly passenger behaviours", Tourism Management, vol. 33, no. 3, pp. 611-621.

26) IATA, (2006), "Airline cost performance", Retrieved from: https://www.iata.org/wha twedo/Documents/economics/airline_cost_performance.pdf

27) ICAO, (n.d.), "Lowcost carriers (LCCs)", Retrieved from: https://www.icao.int/sustaina bility/Pages/Low-Cost-Carriers.aspx

Websites Referred

http://www.mumbaiairport.com

http://www.csia.com.in/atcsia/facilities.aspx

http://news.webindia123.com/news/Articles/India/20090131/1165855.html

http://www.dnaindia.com/money/1262972/report-how-p-and-g-gained-market-share-through-customerknowledge