ABSTRACT

Indian civil aviation being a service-oriented industry demands prioritizing passenger interests. To accurately gauge consumer interests, it is important to consider the behavioral characteristics of passengers. This thesis provides a comprehensive overview of the passenger characteristics and itinerary attributes in the selection of airline itinerary among three different itinerary types (nonstop, direct and connected), available in the Indian domestic aviation market. A revealed preference-based questionnaire survey (RP) and a stated choice survey (SP) is employed to collect data from 658 and 614 respondents, conducted in Jammu and Kashmir, India (May 2023), respectively to study the airline itinerary choice behavior of passengers. The data comprises of socio-economic characteristics, itinerary specific attributes and attitudinal statements to evaluate the latent traits of flyers. This thesis adds to the international literature based on connection time preferences of air passengers, the value of travel time savings and willingness to pay for airline service attributes. Moreover, it recognizes the different classes of passengers based on the itinerary type. A joint estimation of RP and SP data is carried out to forecast the actual itinerary market share demand. The scale difference in RP and SP data, and unobserved taste heterogeneity due to fare of itinerary and elapsed time is investigated. The joint RP-SP model also considers individual-specific error component to capture preference consistency across alternatives, and the dependence of stated choices on revealed choices and its heterogeneity across flyers to help refine the understanding of itinerary choice behavior of passengers.

The passenger preferences regarding airline itinerary choices are examined by investigating the trade-offs considered by flyers, among key flight service attributes such as total elapsed time, number of connections, and fare. One of the critical backend procedures to provide uninterrupted and efficient air travel for passengers is the provision of minimum connection time (MCT) at an airport for an itinerary with a connection. This study thereby investigates the connections at an intermediate airport which come with a range of difficulties to flyers, such as the chances of missing a flight, and losing or delaying of checked-in baggage. Further, the evaluation of the willingness to pay for various ancillary services like legroom, seat width, on time performance, and free meals based on the type of itinerary is evaluated. While the presence of heterogeneity may impact the value of travel time savings and the willingness to pay for the service attributes, this thesis

accounts for systematic (considering the interaction between demographics and itinerary attributes) and random preference heterogeneities in various itinerary attributes like fare, connection time and elapsed time. In addition, the effects of latent attitudes and passenger's demographic profile on itinerary choice behavior uncover the distinct patterns of unobserved preference heterogeneity among flyers.

The results reveal a significant influence of trip purpose (business, leisure and visiting friends and relatives), booking method, time of day, route category etc., on airline itinerary choice of passengers. Based on the zonal demographics of the country, flyers residing in the 'South zone' opt mostly for direct and connected itineraries, 'North and East zone' flyers prefer nonstop itineraries, and 'Central zone' flyers prefer more connected itineraries among the available itinerary types. In addition, the effects of route category indicate that flyers traveling on Category 1 and 2 routes are more likely to opt for nonstop and direct itineraries, while route 'Category 2A' flyers prefer nonstop itineraries and flyers traveling on 'Category 3' routes are less likely to choose a nonstop itinerary. Further, the amount of time spent on a connection highlight that there is a positive influence of connection time on utilities up to 120 minutes for connected itineraries. The connection time duration of 90 to 120 minutes for connected itineraries is found to provide maximum utility to flyers, balancing the need for sufficient time to navigate transitions such as security checks and gate changes, while minimizing the inconvenience of extended waiting periods. For direct itineraries a connection time beyond 35 minutes is found to reduce the utility substantially on direct itineraries.

The willingness to pay (WTP) for each additional minute on a connection is highlighted. The findings using the revealed preference data states that flyers are willing to pay 0.16 USD per minute up to 90 minutes and 0.36 USD per minute for reductions beyond 120 minutes for connected itineraries. In contrast, for direct itineraries, passengers are willing to pay 0.03 USD per minute for layovers up to 35 minutes and 0.77 USD per minute for reductions beyond 35 minutes. On the contrary, the joint modeling results reveal the willingness to pay to reduce the connection time by one minute as 0.37 USD for direct itineraries and 0.14 USD for connected itineraries. In addition, significant heterogeneity in passenger preferences regarding connection time and fare is reported. While some passengers prefer nonstop itineraries despite higher fares, others are willing to accept longer connections in exchange for cost savings. The willingness to pay for the service attributes report that for extra legroom, respondents are willing to pay between 10 USD to 13 USD;

for wider seats between 9 USD to 13 USD; and for free meals, 7 USD to 20 USD. This study also highlights the importance of OTP in itineraries involving a layover and a plane change (connected itineraries). The WTP for an improvement from 60% to 90% OTP on connected itineraries is reported as 16 USD to 21 USD respectively.

Moreover, this study reveals two distinct flyer segments, each exhibiting different sensitivities to airline itinerary attributes and itinerary types. The first segment (Class 1) is positively associated with comfort and hygiene consciousness, in-flight service seeking, and time and punctuality orientated preferences, reflecting a strong emphasis on service quality, schedule adherence, and physical comfort compared to the second segment (Class 2). Also, the first segment displays high preference for reduction in connection time and elapsed time while the second segment reflects greater sensitivity to service quality (legroom and meals). Class 1 flyers show strong inclination to nonstop itineraries while Class 2 flyers show increased reception for connected itineraries provided improved service attributes. Further, the integration of RP-SP data reports an unobserved preference consistency which reflects a tendency to make similar itinerary choices across repeated scenarios. In addition, regardless of variations in itinerary attributes a significant effect of state dependence on passengers' air itinerary choice, is reported.

This thesis also investigates the elasticities for fare, and connection time using SP data analysis, joint RP-SP analysis and from the class allocation perspective. The analysis reveals a strong substitution effect in direct itineraries, compared to nonstop and connected itineraries, due to fare and connection time. From class allocation analysis, Class 1 passengers are found to exhibit a strong aversion to extended connection times on direct itineraries, and a fare increase on direct flights leads to a 2.33% shift in preference toward nonstop options. Finally, the market share analysis using the pooled model determine a demand of 63% for nonstop itineraries, 24% for direct itineraries and 13% for connected itineraries. The insights provided by this study might be utilized by airlines and airport operators for policy implications regarding efficient scheduling of connections, service differentiation, and pricing of the airline itineraries.

Keywords: Airline itinerary choice, Connection time, Ancillary services, Willingness to pay, India