

Feasibility of a Railway Link Complementing Bandaranaike International Airport Stage Two Development

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1. Introduction

A rail-air link is a service providing passenger rail transport from an airport to a nearby city. It is identified that trips to and from airports should be treated as a separate category in regional travel models [1].

Bandaranaike International Airport (BIA) shows a continuous growth in passenger volume, exceeding its current design capacity of 6 million per annum. The passenger movement by the end of year 2016 exceeded 9.5 million. The stage two development plan of BIA aims to supply services for a capacity of 15 million passengers per annum.

The development plan comprises a new terminal building segregating departures and arrivals to two levels and a link bridge connecting to a railway terminal with a covered platform served by double tracks situated 150m away from the airport terminal; such that the current distance of over 650m to the Airport Station which currently handles mostly fuel trains will be significantly reduced.

Through literature review different attributes affecting the operational success of a rail-air connection such as individuals' concern about travel time, cost and other concerns such as luggage, flexibility of departure time and time of the current and return trips can be identified [2]. These attributes provide a background for evaluating the necessary transportation system improvements.

The objective of this research is to determine the feasibility of providing a rail link to BIA based on passenger perception about using the proposed rail link as a new mode of connectivity, particularly to inland destinations to which the railway network provides connectivity.

2. Methodology

Survey data were collected from a sample of 110 BIA users based on random sampling. Data were analysed to obtain passenger perception and demand for the rail link. Further a data sample of 1,820 responses was obtained from the air passenger origin-destination (OD) interviews under cordon line surveys (CLS) of the CoM Trans Study [3]. It was used to ascertain the hinterland passenger origins of BIA users. Questionnaires with unbiased survey questions including the Likert scale and open-ended questions have been used for both surveys.

Statistical and qualitative data on 30 world rail-air operations (15 from high income countries and other 15 from middle income countries) obtained as secondary data were used to develop the fare model [4]. Excel tools were used to create a database and the analytical tools, correlation and regression were used in the development of passenger forecasts. Data analysis was performed through a model calibration. Rail-air fare per passenger was obtained from the railway sites in specific countries. In case this was not available, they were obtained from city travel guide sites.

3. Results

3.1. Passenger origin and availability of railway network

Figure 1 shows the map of demand for 9.5 million annual passengers for BIA from different areas of Sri Lanka based on the CLS air passenger OD interviews data. It is seen that the districts of Colombo, Kandy and Gampaha report the highest demand while the Colombo district with the highest demand can be further categorized in to different railway corridors namely; Nugegoda/KV Line, Wellawatta/Coastal Line and other non-railway areas.

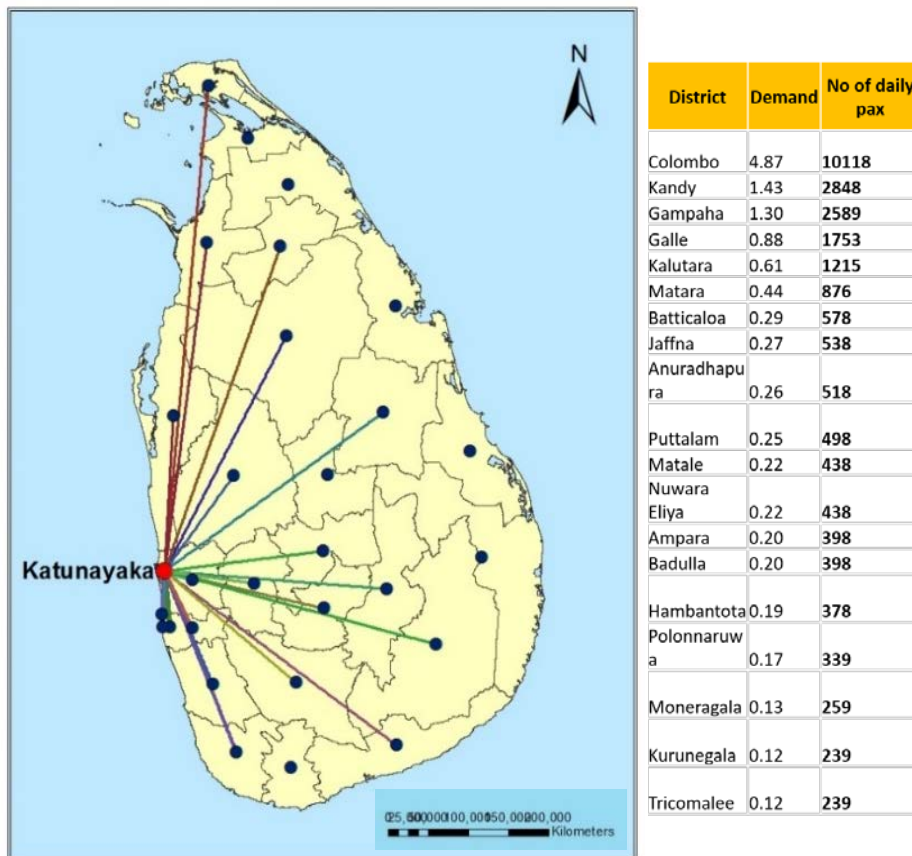


Figure 1: Desire Lines for Hinterland Passenger Origins for BIA

Source: Sri Lanka Railway Department

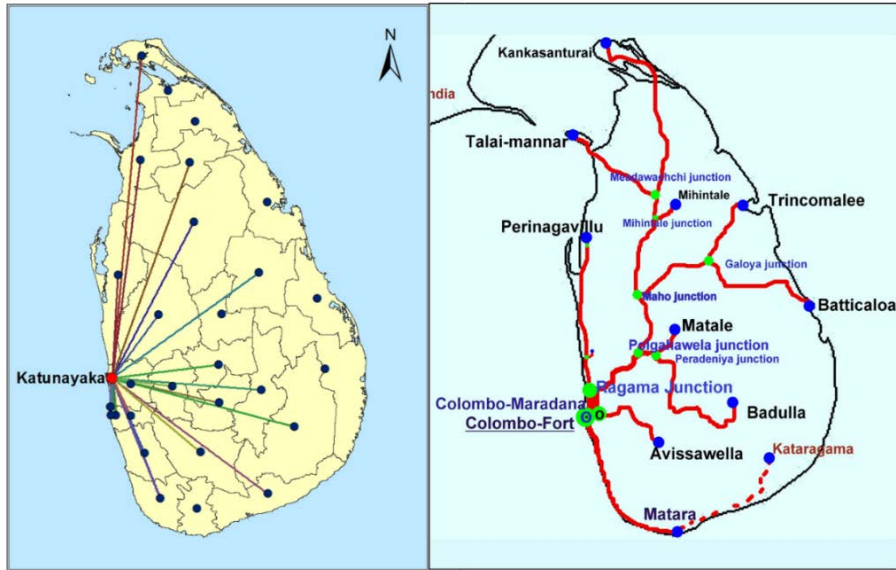


Figure 2: Travel Demand on the Network Diagram of Sri Lanka Railway

Figure 2 shows that most of the areas with demand for BIA across Sri Lanka are covered by the railway network.

3.2. Passenger perception and demand for rail link

Based on primary data collected from an unbiased sample of BIA departure passengers representing different age groups, countries of residence and trip purposes, it could be seen that 87.5% of the passenger responded positively to use a rail link: provided it met their service expectations as analysed in Figure 3.

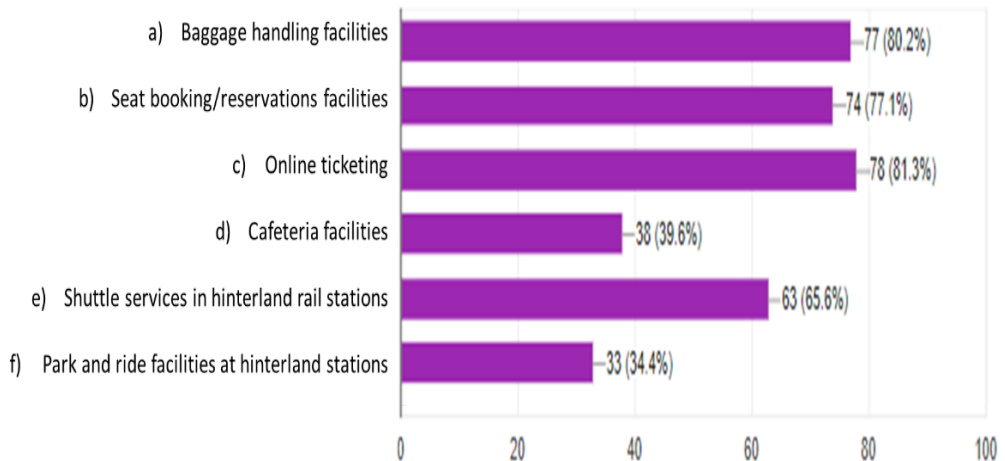


Figure 3: Passenger Expectations from the Air-Rail Link

Based on the analysis, the most commonly services expected from the rail link in order of interest is as follows:

- Online ticketing
- Baggage handling facilities
- Train seat booking/reservations facilities

When analysing passenger objectives for using the railway, time saving was found to be the primary reason followed by reducing the cost of travelling and expecting a higher level of comfort.

3.3. Fare model

Since the fare that could be levied for an air-rail link would have international comparisons, a regression was carried out using fare levels from other airports rail links to obtain a suitable fare for the rail link.

But an acceptable model for dependent variable “railway fare” was not generated such that a model was developed with the dependent variable “fare per km”. Yet the applicability of the model is questionable based on the R Square (0.4021) and p values (0.0023 for Per capita income) obtained. However, the most acceptable model developed was as follows:

$$y = 0.8745 - 0.0324 x_1 + 0.000017 x_2$$

Parameters:

- Fare per km (y) (PPP Dollars/km)
- Distance (x1) (km)
- Per capita income (x2) = 11,970 PPP Dollar

For purposes of analysis the currencies of all countries have been converted to PPP Dollars.

The resulting fare per km (PPP \$/km) for the travel leg from Colombo Fort to BIA is estimated at LKR 263.23. This compares favourably with the cost of travel for other most prominent modes of transport used: namely, automobile at LKR 1,652.70 and E03 expressway bus at LKR 120.00.

4. Conclusion and Recommendations

Based on the comparison of demand by passengers arriving to BIA from different areas of Sri Lanka it can be concluded that although the railway network is available in most areas generating high demand, the limitations of the current railway service could become a hindrance in attracting passengers to the improved rail connection which is part of the proposed Stage 2 development of BIA. Yet this research shows that many of these limitations can be avoided by better design and marketing of the railway services.

Further research can be carried to analyse the feasibility of the rail link in commercial aspect and the level of service provided in comparison to the currently existing modes of connecting to BIA.

References

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Keywords: *Rail-Air Links, Passenger Perception, Fare Model, Service Expectations, Feasibility*