A QUALITY LOSS APPROACH FOR AIRLINE SERVICE FAILURE ANALYSIS

Pao-Tiao Chuang, National University of Kaohsiung, Taiwan.
ptchuang@nuk.edu.tw

ABSTRACT

This paper proposes an approach that performs airline service failure analysis from the perspective of quality loss. In the paper, the quality requirements and the potential failure modes of airline service are first generated. Then, service quality evaluation is performed and the quality loss for each quality requirement is computed. Finally, the consolidated quality loss for each failure mode is computed according to a correlation matrix that relates each failure mode to the corresponding service quality requirement. The severity of each failure mode can be identified based on the consolidated quality loss. Empirical data are collected through questionnaire surveys of airline customers in Taiwan. Results show that the seven most severe failure modes include: cabin crew failures, disregard of cultural differences of passengers, managerial failures, poor ability to deal with contingencies, insufficient expertise of and/or inappropriate attitude from flight attendants, passengers adversely affecting each other, and inadequate number of cabin crew. This provides the airline companies the directions for taking either preventive action that eliminate the occurrence of these failures or recovery action that compensate and alleviate the effects of these failures to enhance airline service quality.

Keywords: Airline Service; Service Quality; Service Failure; Quality Loss.

INTRODUCTION

Service quality is defined as the extent to which the delivered service level matches customer expectations (Grönroos, 1982; Lewis and Booms, 1983). Delivering quality service means conforming to customer expectations on a consistent basis. Thus, only the customer can truly define service quality in the airline industry, and passenger perceptions of service quality play a key role in the success of an airline (Butler and Keller, 1992). In terms of airline service quality, the SERVQUAL proposed by Parasuraman et al. (1988) is believed to be one of the best models for evaluating customer expectations and perceptions (Pakdil and Aydin, 2007). It has also been adopted as a valid and reliable instrument for measuring airline service quality (Gilbert and Wong, 2003; Park et al., 2004; Gursoy et al., 2005; Liou and Tzeng, 2007; Pakdil and Aydin, 2007; Lu and Ling, 2008).

Many airline companies are looking toward service quality to distinguish their product and thus achieve a competitive edge, because the competitive advantage of these companies lies in their service quality as perceived by customers (Liou and Tzeng, 2007; Netjasov and Janic, 2008). Literatures have also suggested that airline service quality is one of the most critical factors that influence a passenger’s selection of airlines. Significant relationships exist among reputation, service, and customer retention (Ostrowski et al., 1993; Truitt and Haynes, 1994; Tieman et al., 2008). Therefore, providing high-quality service to passengers is important for many airlines, because it maintains customer patronage, market share and, ultimately,
Despite its importance and advantage in measuring airline service quality and setting up zero-defect as the desired objective for most of the airline companies, service failures still happen occasionally. Similar to service quality and satisfaction, it is the customers’ perception that determines whether a service failure has occurred (Goldstein et al., 2002; Weber and Sparks, 2004). Thus, a service company must understand what the customers really need and then delivered its service accordingly. Nevertheless, Halstead et al. [1996] have mentioned that nothing is better than performing a service to satisfy customers the first time, while nothing is worse than failing to detect a problem or obtain information from an unsatisfied customer. Therefore, a systematic approach, that can identify and prioritize the critical service failure modes with the corresponding risks as well as required preventive or recovery actions, is essential to enhance the service quality.

This paper aims to perform the airline service failure analysis from the perspective of service quality loss. In the paper, the quality requirements of airline service are first generated by synthesizing related literature and interviewing airline customers. The service quality evaluation that measures the discrepancy between customer perceptions and customer expectations of each service quality requirement is performed. The quantitative quality loss for each quality requirement is computed when customer perceptions of that requirement are lower than customer expectations. In addition, potential failure modes are determined by analyzing airline service blueprints. Then, a correlation matrix, that identifies the adverse effects of each failure mode to the corresponding service quality requirement, is constructed. Finally, the consolidated quality loss for each service failure mode is computed according to this correlation matrix. The most severe failure modes can be identified based on the consolidated quality loss.

AIRLINE SERVICE QUALITY

Service quality is defined as the extent to which the delivered service level matches customer expectations (Grönroos, 1982; Lewis and Booms, 1983). Delivering a quality service means conforming to customer expectations on a consistent basis. Perceived service quality can be evaluated as the degree and direction of discrepancy between consumer perceptions and customer expectations regarding a particular service provided by the service company. Thus, only the customer can truly define service quality in the airline industry, and so passenger perceptions of service quality play a key role in the success of an airline (Butler and Keller, 1992).

In airline service, the SERVQUAL proposed by Parasuraman et al. (1988) is adopted as the best model for evaluating customer expectations and perceptions (Pakdil and Aydin, 2007). Moreover, it has been proven as a valid and reliable instrument for measuring airline service quality (Gilbert and Wong, 2003; Park et al., 2004; Gursoy et al., 2005; Liou and Tzeng, 2007; Pakdil and Aydin, 2007; Lu and Ling, 2008). By synthesizing these various studies and interviewing airline customers in Taiwan, this study identifies 26 quality requirements of airline service. As illustrated in the lists below, these quality requirements cover all processes of airline service, including ticketing and booking, check-in, boarding and on-board service, and arrival, as well as core service requirements.
Ticketing and Booking:
Q1. Convenient flight schedules;
Q2. Attitudes of ticketing servers;
Q3. Concise procedures and correctness of booking;
Q4. Reasonable airfare;
Q5. Clear description for discount or premium ticket.

Check-in:
Q6. Well-dressed and neat appearance of ground servers;
Q7. Convenient baggage check-in;
Q8. Indeed passing the baggage receipts to customers;

Boarding and On-Board Service:
Q10. Safety;
Q11. On-time schedule;
Q12. Cleanliness of cabin;
Q13. Comfortable seats;
Q14. Newspaper, magazines and entertainment facilities;
Q15. In-flight food and drink;
Q16. Modernized or computerized equipment;
Q17. Well-informed and well-dressed flight attendants;
Q18. Personal attention to passengers and prompt response to passenger requests;
Q19. Real-time reporting of flying information to passengers.

Arrival:
Q20. Convenient baggage claim protocol;
Q21. Actions on baggage loss.

Core Service:
Q22. The airline company is dependable;
Q23. The airline company gives passengers individual attention, understands passenger needs, and has the best interests of passengers at heart;
Q24. The airline company truly carries out what it promises to passengers;
Q25. Responsible recovery actions are taken based on passenger complaints;
Q26. All services are accurate and prompt.

QUALITY LOSS COMPUTATION

Service quality is a function of customer satisfaction. If customers are not satisfied with a service, they tend to evaluate service quality negatively. In this situation, perceptions are lower than expectations for that service quality requirement, thus potentially signifying quality loss. A larger discrepancy between perceptions and expectations indicates greater quality loss.

To evaluate airline service quality, a quality loss function for each quality requirement is used, as shown in Equation (1).
\[ L(y_j) = \begin{cases} 
   k_j \cdot (y_j - m_j)^2 & \text{for } y_j < m_j \\
   0 & \text{for } y_j \geq m_j 
\end{cases} \]  

(1)

where,
\( L(y_j) \) = Quality loss incurred due to customer dissatisfaction with the \( j \)th service quality requirement; \( j = 1, 2, \ldots, 26 \).
\( k_j \) = Coefficient of quality loss for the \( j \)th service quality requirement; \( j = 1, 2, \ldots, 26 \).

Note that, to acquire \( k_j \), this paper uses a questionnaire to investigate the extent of customer loss when customers are not satisfied the \( j \)th service quality requirement.

\( y_j \) = The aggregate customer perception of the \( j \)th service quality requirement; \( j = 1, 2, \ldots, 26 \).
\( m_j \) = The aggregate customer expectation of the \( j \)th service quality requirement; \( j = 1, 2, \ldots, 26 \).

\( (y_j < m_j) \) represents the extent to which customer perceptions are lower than customer expectations for the \( j \)th service quality requirement.

To collect data for service quality evaluation and compute quality loss, a questionnaire was designed using a seven-point Likert scale to investigate customer perceptions and expectations, as well as the probability of customer loss when customers are not satisfied with each of the service quality requirements. In the survey, 1 represents a very low perception or expectation, while 7 represents a very high service quality evaluation. In addition, 1 indicates that the probability of customer loss is very low, while 7 represents that this probability is very high. The survey was conducted in October 2007 at Taoyuan International, Taipei Songshan, and Kaohsiung International Airports in Taiwan. Overall, 310 of 500 questionnaires were collected. After discarding those identified as incomplete or non-random, 284 were usable for the purposes of this study.

Using Equation (1), the quality loss \( L(y_j) \) incurred from each quality requirement can be computed and the results are shown in Table 1. According to Table 1, the top seven quality requirements having the highest quality losses in descending order are: “Q21.Actions on baggage loss”, “Q13.Comfortable seats”, “Q25. Responsible recovery actions are taken based on passenger complaints”, “Q15.In-flight food and drink”, “Q20.Convenient baggage claim”, “Q23.The airline company gives passengers individual attention, understands passenger needs, and has the best interests of passengers at heart”, and “Q4.Reasonable airfare,” respectively. This means that the incurred quality loss with regard to these quality requirements could grow to be larger if these requirements are not perceived by customers as satisfied. Thus, airline companies should invest more resources in these requirements in order to improve customer perceptions and, through this, to increase customer satisfaction and decrease quality loss.
Table 1. Results of Quality Loss Analysis

<table>
<thead>
<tr>
<th>Service Process</th>
<th>Service Quality Requirement</th>
<th>Expectation ($y_j$)</th>
<th>Perception ($y_j - m_j$)</th>
<th>Discrepancy ($k_j$)</th>
<th>Coefficient of Quality Loss ($L(y_j)$)</th>
<th>Quality Loss</th>
<th>Order of Quality Loss</th>
</tr>
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<tbody>
<tr>
<td>Ticketing and Booking</td>
<td>Q1.Convenient flight schedules</td>
<td>4.950</td>
<td>4.475</td>
<td>-0.475</td>
<td>4.596</td>
<td>1.037</td>
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<td></td>
<td>Q2.Attitudes of ticketing servers</td>
<td>5.171</td>
<td>4.852</td>
<td>-0.319</td>
<td>4.655</td>
<td>0.474</td>
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<td>Q3.Concise procedures and correctness of booking</td>
<td>5.135</td>
<td>4.743</td>
<td>-0.392</td>
<td>4.656</td>
<td>0.715</td>
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<td>Q4.Reasonable airfare</td>
<td>4.601</td>
<td>4.059</td>
<td>-0.542</td>
<td>4.926</td>
<td>1.447</td>
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<td>Q5.Clear description for discount or premium ticket</td>
<td>4.727</td>
<td>4.270</td>
<td>-0.457</td>
<td>4.480</td>
<td>0.937</td>
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<td>Check-in</td>
<td>Q6.Well-dressed ground servers</td>
<td>5.123</td>
<td>4.791</td>
<td>-0.332</td>
<td>4.368</td>
<td>0.481</td>
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<td>Q7.Convenient baggage check-in</td>
<td>5.091</td>
<td>4.728</td>
<td>-0.364</td>
<td>4.583</td>
<td>0.607</td>
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<td>Q8.Indeed passing the baggage receipts to customers</td>
<td>5.015</td>
<td>4.882</td>
<td>-0.133</td>
<td>4.496</td>
<td>0.079</td>
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<td>Q9.Fast check-in</td>
<td>5.051</td>
<td>4.551</td>
<td>-0.500</td>
<td>4.754</td>
<td>1.190</td>
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<tr>
<td>Boarding and On-Board Service</td>
<td>Q10.Safety</td>
<td>5.508</td>
<td>5.055</td>
<td>-0.453</td>
<td>5.287</td>
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<td>Q11.On-time schedule</td>
<td>5.386</td>
<td>4.932</td>
<td>-0.454</td>
<td>4.874</td>
<td>1.004</td>
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<td>Q12.Cleanliness of cabin</td>
<td>5.435</td>
<td>4.968</td>
<td>-0.467</td>
<td>4.866</td>
<td>1.062</td>
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<td>Q13.Comfortable seats</td>
<td>5.282</td>
<td>4.584</td>
<td>-0.698</td>
<td>4.867</td>
<td>2.370</td>
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<tr>
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<td>Q14.Newspaper, magazines and entertainment facilities</td>
<td>4.822</td>
<td>4.491</td>
<td>-0.332</td>
<td>4.211</td>
<td>0.463</td>
<td>25</td>
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<td>Q15.In-flight food and drink</td>
<td>5.027</td>
<td>4.388</td>
<td>-0.639</td>
<td>4.486</td>
<td>1.832</td>
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<td>Q16.Modernized or computerized equipment</td>
<td>4.959</td>
<td>4.477</td>
<td>-0.482</td>
<td>4.331</td>
<td>1.006</td>
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<td>Q17.Well-informed and well-dressed flight attendants</td>
<td>5.271</td>
<td>4.850</td>
<td>-0.421</td>
<td>4.543</td>
<td>0.804</td>
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<td>Q18.Personal attention to passenger and prompt responses to passenger requests</td>
<td>5.246</td>
<td>4.753</td>
<td>-0.493</td>
<td>4.794</td>
<td>1.164</td>
<td>9</td>
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<tr>
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<td>Q19.Real-time reporting of flying information to passengers</td>
<td>5.228</td>
<td>4.897</td>
<td>-0.331</td>
<td>4.687</td>
<td>0.514</td>
<td>22</td>
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<tr>
<td></td>
<td>Q21.Actions on baggage loss</td>
<td>5.177</td>
<td>4.472</td>
<td>-0.705</td>
<td>5.065</td>
<td>2.520</td>
<td>1</td>
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<tr>
<td>Core Service</td>
<td>Q22.The airline company is dependable</td>
<td>5.239</td>
<td>4.760</td>
<td>-0.479</td>
<td>4.944</td>
<td>1.133</td>
<td>10</td>
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<td>Q23.The airline company gives passengers individual attention, understands passenger needs, and has the best interests of passengers at heart</td>
<td>5.238</td>
<td>4.674</td>
<td>-0.564</td>
<td>4.787</td>
<td>1.524</td>
<td>6</td>
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<td>Q24.The airline company carries out what it promises to passengers</td>
<td>5.196</td>
<td>4.746</td>
<td>-0.450</td>
<td>4.913</td>
<td>0.995</td>
<td>17</td>
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<tr>
<td></td>
<td>Q25.Responsible recovery actions are taken based on passenger complaints</td>
<td>5.188</td>
<td>4.523</td>
<td>-0.665</td>
<td>5.064</td>
<td>2.241</td>
<td>3</td>
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<tr>
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<td>Q26.All services are accurate and prompt</td>
<td>5.243</td>
<td>4.767</td>
<td>-0.475</td>
<td>4.958</td>
<td>1.121</td>
<td>11</td>
</tr>
</tbody>
</table>
A service failure occurs when customers’ expectations are not met [Mueller et al., 2003; Weber and Sparks, 2004]. Service failures have negative impacts on service quality and customer satisfaction. That is, when customers are not satisfied with the service, there must be discrepancies resulting from the occurrence of some particular service failures. Besides, if customers are not satisfied, they are likely to complain about the service quality. Major complaining issues in airline service involve flight problem, over-booking, reservation/ticketing/boarding, fares, refund, baggage, on-board service, disability, and advertising complaints (Gursoy et al., 2005). As long as the passengers are satisfied with the service quality, they are less likely to have any intention to complain.

Based on analysis of service blueprints and observations of airline practices, 23 potential failure modes of airline service are listed below. These potential failure modes cover all processes of airline service, including ticketing and booking, check-in, boarding and on-board service, and arrival, as well as core service requirements.

**Ticketing and Booking:**
- F1. Inappropriate attitudes from ticketing servers;
- F2. Inconvenient online booking process;
- F3. Over-booking;
- F4. Insufficient capacity (e.g., flight schedules, number of seats).

**Check-in:**
- F5. Check-in service failures (e.g., seating, baggage tag);
- F6. Passenger personal preferences are not satisfied;
- F7. Check-in flow is slow or frustrating.

**Boarding and On-Board Service:**
- F8. Passengers not boarded on-time;
- F9. Disregard of cultural differences of passengers;
- F10. Cabin crew failures;
- F11. Inadequate number of cabin crew;
- F12. Insufficient supply of food and drink;
- F13. Poor cabin facilities (e.g., entertainment);
- F14. Passengers adversely affecting each other;
- F15. Insufficient expertise of and/or inappropriate attitude from flight attendants;
- F16. Passenger needs not satisfied (e.g., food, drink, magazine, entertainment).

**Arrival:**
- F17. Insufficient flight transfer information;
- F18. Inefficient baggage claim;

**Core Service:**
- F20. Maintenance or repair failures;
- F21. Poor ability to deal with contingencies;
- F22. Poor actions regarding customer complaints;
- F23. Managerial failures (e.g., air route planning, pricing, flight scheduling).
IDENTIFYING SEVERE FAILURE MODES

When customers are not satisfied with the service quality, there must be some particular service failures occurred in certain segment of the service processes or core service. To identify how each service failure mode impacts the quality requirement, a correlation matrix that show the relationship between each failure mode and the corresponding quality requirement is constructed as Table 2. Note that in each cell of the matrix, “1” represents that the failure mode and the corresponding quality requirement are correlated, while a blank entry represents no correlation.

To quantitatively identify the risk of particular types of failure, the consolidated quality loss for each potential failure mode is computed using Equation (2); the results are shown in the right-most column of Table 2.

\[
TL_i = \sum_{j=1}^{26} r_{ij} \cdot L(y_j),
\]

where,

- \(TL_i\) = The consolidated quality loss for the \(i\)th potential failure mode; \(i = 1, 2, \ldots, 23\).
- \(r_{ij}\) =The relationship between the \(i\)th potential failure mode and the \(j\)th quality requirement.
  - \(r_{ij} = 1\) if a correlation exists; \(r_{ij} = 0\) if the correlation doesn’t exist, where \(i = 1, 2, \ldots, 23\), and \(j = 1, 2, \ldots, 26\).

From Table 2, the seven most severe failure modes based on the consolidated quality losses in descending order are: “F10. Cabin crew failures”, “F9. Disregard of cultural differences of passengers”, “F23. Managerial failures (e.g., air route planning, pricing, flight scheduling)”, “F21. Poor ability to deal with contingencies”, “F15. Insufficient expertise of and/or inappropriate attitude from flight attendants”, “F14. Passenger adversely affecting each other”, and “F11. Inadequate number of cabin crew.” This indicates there could be higher losses with more severe effects if any one or more of these service failures occur. Thus, either preventive action that eliminate the occurrence of these severe failures or recovery action that compensate and alleviate the effects of these failures need be taken in real time to enhance the quality assurance of airline service.

CONCLUSIONS

Airline service quality is one of the most critical factors that influence passenger decisions regarding airline selection. Providing high-quality service to passengers is important for many airlines, because it helps to maintain customer patronage, market share and, ultimately, profitability. Though airline companies look toward service quality as an opportunity to achieve a competitive edge, service failures do happen occasionally. Therefore, a systematic approach that can identify and prioritize more severe service failures with corresponding risks is essential to enhance the quality assurance of airline service.

This paper performed the airline service failure analysis from the perspective of service quality loss. Based on this, the most severe failure modes can be identified for taking required action in real time to enhance quality assurance. Results show that the seven most severe failure modes include: cabin crew failures, disregard of cultural differences of passengers, managerial failures (e.g., air route planning, pricing, flight scheduling), poor
<table>
<thead>
<tr>
<th>Service Failure Mode</th>
<th>Q1</th>
<th>Q2</th>
<th>Q3</th>
<th>Q4</th>
<th>Q5</th>
<th>Q6</th>
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<th>Q21</th>
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(Note: In each cell, “1” represents the failure mode and the corresponding quality requirement has correlation, while blank represents no correlation.)
ability to deal with contingencies, insufficient expertise of and/or inappropriate attitude from flight attendants, passengers adversely affecting each other, and inadequate number of cabin crew. This indicates that there could be higher losses and more severe effects if any of these failure modes occur.

Various service industries, such as retailing, railway service, distribution center, and banking service, can also use the proposed approach to identify the severity of each failure mode and pursue quality assurance. Future research may adopt a fault-tree analysis to exploit the root causes of severe failures and thus take the actions necessary to enhance preventive service quality.

ACKNOWLEDGMENTS

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REFERENCES


