THE CAPABILITY EVALUATION OF AIRLINES IN THAILAND AND EAST ASIA COUNTRIES

Varattaya Jangkrajarng
Department of Management, Faculty of Business Administration, Chiang Mai University, THAILAND

Ekkaphon Jaiyen
Department of Industrial Engineering, Faculty of Engineering and Excellence Center in Logistics and Supply Chain Management, Chiang Mai University, THAILAND

1. Introduction

The Asean Economic Community or AEC is a collaboration of South East Asian countries. The purpose is to unite the market and manufacturing of every country into a single unit, allowing Asean countries to be more competitive in the global economy. The AEC lists the first 12 leading industries as open market, as shown in Figure 1, which includes agricultural, fisheries, rubber manufacturing, textile and apparel, automotive, wood products, electronics, information technology, healthcare, tourism, airline industry, and logistic.

The air transportation industry is one of the 12 open market industries for Asean countries, and is under the coordination responsibility of Thailand. Now, the air transportation industry is vital to the world economy, moving people and goods from one place to another either for business, work, education or tourism. In addition, the air transportation industry is also tightly related to the tourism industry.

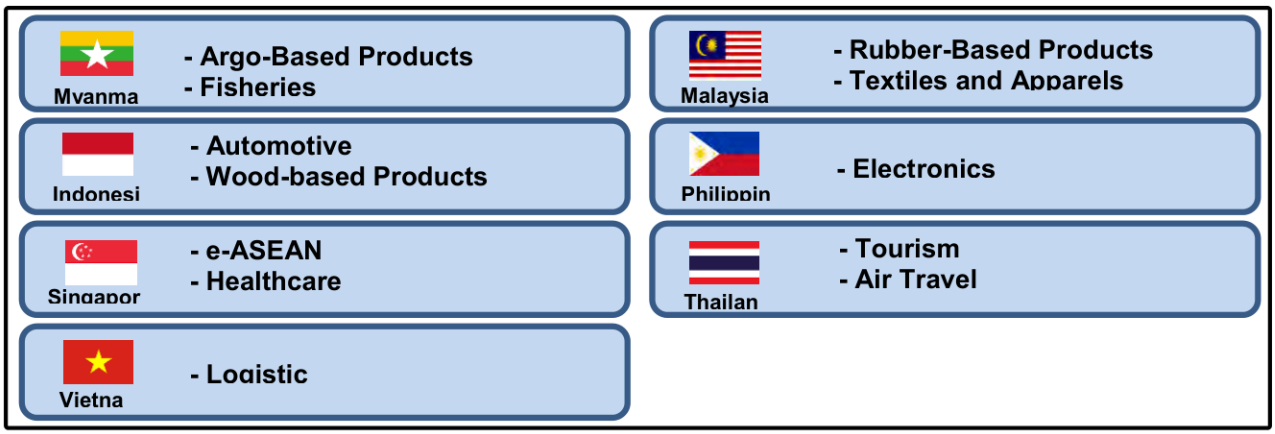


Figure 1: Industries that are under an open market policy within AEC
Source: Department of Trade Negotiations in Thailand, 2013

The air transportation industry in South East Asian region enjoyed a rapid growth recently, mainly resulted from the expansion of Low Cost Airlines. The Center for Aviation (CAPA) reported that the Low Cost Airlines currently have more than 50% of the market share in this region. Out of 5 new airlines launched in South East Asia, 3 are Low Cost Airlines – Air Asia Philippines, Singapore Scoot Airline, and Indonesia Mandala Airline, which was converted down from the Full Service Carrier. In Thailand, Thai Smile Airline was introduced. And in Laos, Laos Central Airline was competed in the market. Nevertheless, there is still a large market expansion opportunity for the Low Cost Airlines, especially in Myanmar and Vietnam. Currently, the airline business in Thailand is very competitive. Between 2009 and 2013, total revenue of all Thailand airlines increased on an average of 9%. Of those, the majority was from the Low Cost Airlines at 31.5%, while the Full Service Airlines only gained 6.9% (SCB Economic Intelligence Center 2014).

Based on the rapid growth of the airline business in the past and the potential of a large expansion in the future, we are interested in a research of which factors are relevant to the decision of passengers toward selecting their flights, and the evaluation of airline potential.

This research can help airlines to improve their popularity and to provide better services to their customers.

2. Theories and Literature Reviews

2.1 The Multi-attribute Decision Making or MADM

The MADM method is a decision making method where all possible results are evaluated based on selection criteria and are then ranked accordingly (Gunhawan 2008). This is one of the best ranking method and can be carried out with various techniques. For example,

1. A Simple Additive Weighting or SAW is the least complex method. This method compares compound weights from each possible solution, where the weight is a summation of multiplication of each criteria weight and its significant factor.
2. An Analytic Hierarchy Process or AHP is a very famous and accurate method. This method is suitable for a complex problem and can be applied for both quantitative and qualitative applications.
3. A Technique for Order Preference by Similarity to an Ideal or TOPSIS is an excellent numerical analytic tool. This method calculates positive ideal and negative ideal values and figures out how far each solution is from both values.
4. An Elimination and Choice Translating Reality or ELECTRE examines the correlation and non-correlation factors of the evaluation criteria, and then groups the relativeness of those factors for the analysis.

There have been several researches evaluating airline efficiency that uses the MADM method. For example, Chuang et al., 2001, evaluated the service quality of domestic airlines with the Fuzzy TOPSIS method. Or Tsaur et al., 2002, evaluated the service quality of Taiwan airlines with a multi factor selection method applying the AHP method for the weight calculation and the TOPSIS method for the airline ranking.

2.2 Factors in airline efficiency determination

The past research regarding factors that passengers consider when choosing airlines can be found at a World Best Airline 2013 result, published by SKYTRAX - a worldwide airline ranking agency, based on a survey and scores of 182 million people in 150 countries around the world. The study considered many factors, such as wait-time in various situations, comfort, seat quality, food and beverage, service attendants, etc. It found that the first three important aspects were Cabin Staff Service, Cabin Seat, and Onboard Catering, respectively. In addition, Zhang et al. 2008 proposed a model for Low Cost Airline evaluation based on 10 attributes, namely – Fares, Distribution, In-flight, Flight Frequency, Punctuality, Aircraft, Sectors, Airports, Growth, and Staff. There are also other researches on this matter, which can be summarized in the following Table 1.

NO.	Factor	Researcher
1	Fare	(Chuang et al., 2001) (Zhang et al., 2008) (Anton, 2012) (Praphasri, 2009) (Tanasubsin et al., 2010) (Pipatchaisiri, 2012)
2	Flight Frequency	(Chuang et al. 2001) (Zhang et al., 2008) (Yokklin, 2009)
3	Easiness in Ticket Purchasing	(Tsaur et al., 2002) (Chuang et al., 2001) (Feng et al., 2005) (Zhang et al.,2008) (Kankaew, 2012) (Yokklin, 2009) (Tanasubsin et al., 2010) (Pipatchaisiri, 2012)
4	Service and Amenities on Board	(Feng et al., 2005) (Tanasubsin et al., 2010) (Kankaew, 2012)
5	Punctuality	(Tsaur et al., 2002) (Chuang et al., 2001) (Feng et al., 2005) (Zhang et al., 2008) (Tanasubsin et al., 2010) (Anton, 2012) (Kankaew, 2012) (Pipatchaisiri, 2012)
6	Availability of Flight Connections	(Zhang et al., 2008)
7	Service of Flight Attendants	(Tsaur et al., 2002) (Chuang et al., 2001) (Feng et al., 2005) (Zhang et al., 2008) (Kankaew, 2012) (Yokklin, 2009) (Tanasubsin et al., 2010) (Pipatchaisiri, 2012)
8	Easiness in Check-In Process	(Pipatchaisiri, 2012) (Kankaew, 2012)
9	Luggage Services	(Feng et al., 2005) (Anton, 2012) (Pipatchaisiri, 2012)
10	Frequent Flier	(Chuang et al.., 2001) (Tanasubsin et al., 2010) (Anton, 2012)

NO.	Factor	Researcher
	Program	
11	Classes of Services	(Tanasubsin et al., 2010)
12	Safety	(Tsaur et al., 2002) (Chuang et al., 2001) (Feng et al., 2005) (Anton, 2012) (Kankaew, 2012) (Yokklin, 2009) (Tanasubsin et al., 2010) (Pipatchaisiri, 2012)

Table 1: Summary of factors in airline efficiency evaluation

Here is a procedure for ranking airlines efficiency, based on the Technique for Order Preference by Similarity to an Ideal Solution or TOPSIS, depicted in the following Figure 2.

First step

The first step includes a study and a literature review of factors in airline selection. This step studies and collects secondary data of the factors and airline efficiency from researches and institutes (shown in the Section 2).

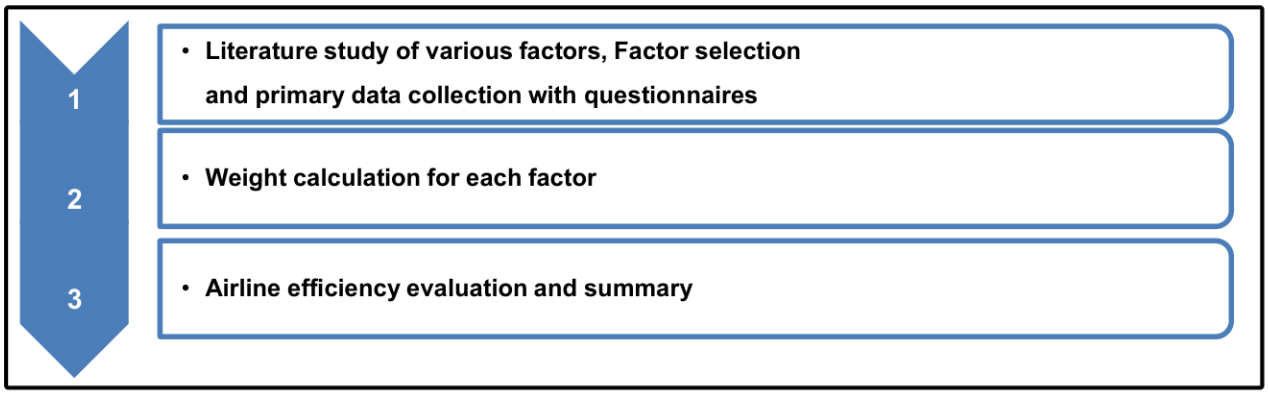


Figure 2: Research Procedure

Next, listing factors that affects a choosing of Full Service and Low Cost Airlines. Then, a survey is developed to collect primary data, which comprises of two parts. The first part is to collect basic information, including country of residence, nationality, occupation, age range, travel frequency, past destination countries, purpose of travel, and travel experience. The second part is to collect factors that affecting the airline selection, based on a 5 level rating scale.

Second step

The second step involves calculating weights for each factor collected from the second step. The weights are calculated by these following steps (Sopadang 2009).

1. Obtain average relevant coefficients for each factor.
2. Rank the coefficients from the highest value to the lowest value.
3. Use the ranking for a weight determination with formula (1)

$$w_j = \frac{\frac{1}{L_j}}{\sum_{j=1}^{M} \frac{1}{R_j}} \quad (1)$$

where w_j is weight for each factor $j = 1, 2, \ldots, M$
and R_j is ranking for each factor $j = 1, 2, \ldots, M$

Third step

The third step involves airline efficiency evaluations by the Technique for Order Preference by Similarity to an Ideal Solution or TOPSIS. The calculation is performed as follow.

1. Data size adjustment by Vector Normalization method based on Equation (2) and (3).
   - For factors that are of Benefit Criteria

$$r_{ij} = \frac{A_{ij}}{\sqrt{\sum_{i=1}^{N} {A_{ij}}^2}} \quad (2)$$

- For factors that are of Cost Criteria

$$r_{ij} = \frac{\frac{1}{A_{ij}}}{\sqrt{\sum_{i=1}^{N} (\frac{1}{{A_{ij}}^2})}} \quad (3)$$

where r_{ij} is a normalized data for each selection $i = 1, 2, \dots, N$ and criteria $j = 1, 2, \dots, M$

and A_{ij} is a primary data for each selection $i = 1, 2, \dots, N$ and criteria $j = 1, 2, \dots, M$

2. The weight for each factor is multiplied with the normalized data from the previous step in Equation (4).

$$V_{ij} = W_j * r_{ij} \quad (4)$$

3. The maximum and minimum values for each factor $j = 1, 2, \dots, M$ are located by Equation (5) and (6).

$$V_j^* = Max\,(r_{1j}, r_{2j}, \dots., r_{Nj}) \quad (5)$$
$$V_j^- = Min\,(r_{1j}, r_{2j}, \dots., r_{Nj}) \quad (6)$$

4. The summation of Positive Ideal Value and Negative Ideal Value for each factor is then calculated from Equation (7) and (8).

$$S_i^* = \sqrt{\sum_{j=1}^{M} (V_{ij} - V_j^*)^2} \quad (7)$$
$$S_i^- = \sqrt{\sum_{j=1}^{M} (V_{ij} - V_j^-)^2} \quad (8)$$

5. The efficiency evaluation can be performed by ranking the result from the 4th step above as following
   - From S_i^*, the values are ranked from the smallest to the largest values.
   - From S_i^-, the values are ranked from the largest to the smallest values.

   From the ranking of $S_i^*$and S_i^-, if both rankings are analogous, we can conclude here. Or we can also analyze the result furthermore in the next step.

6. The analysis ranking can also be found from the Equation (9) by listing the factors with the smallest to largest values.

$$C_i^* = \frac{S_i^-}{S_i^* + S_i^-} \quad (9)$$

The efficiency evaluation can be performed by ranking the S_i^* , S_i^- and C_i^* from Equation (7) to (9), whose results can be interpreted if
- An airline with the largest S_i^* value means it has the best efficiency.
- An airline with the smallest S_i^- value means it has the best efficiency.

But if the result from S_i^* and S_i^- are not analogous, the value $C_i^*$is then used, where airlines with the largest C_i^* value means it has the best efficiency.

On our analysis, we divided airlines into 3 groups. Group 1 consists of Thailand Low Cost Airlines, including Nok Air, Thai Lion Air and Thai Airasia. Group 2 consists of Thailand Full Service Airlines, including Bangkok Airways and Thai Airways. Group 3 consists of Full

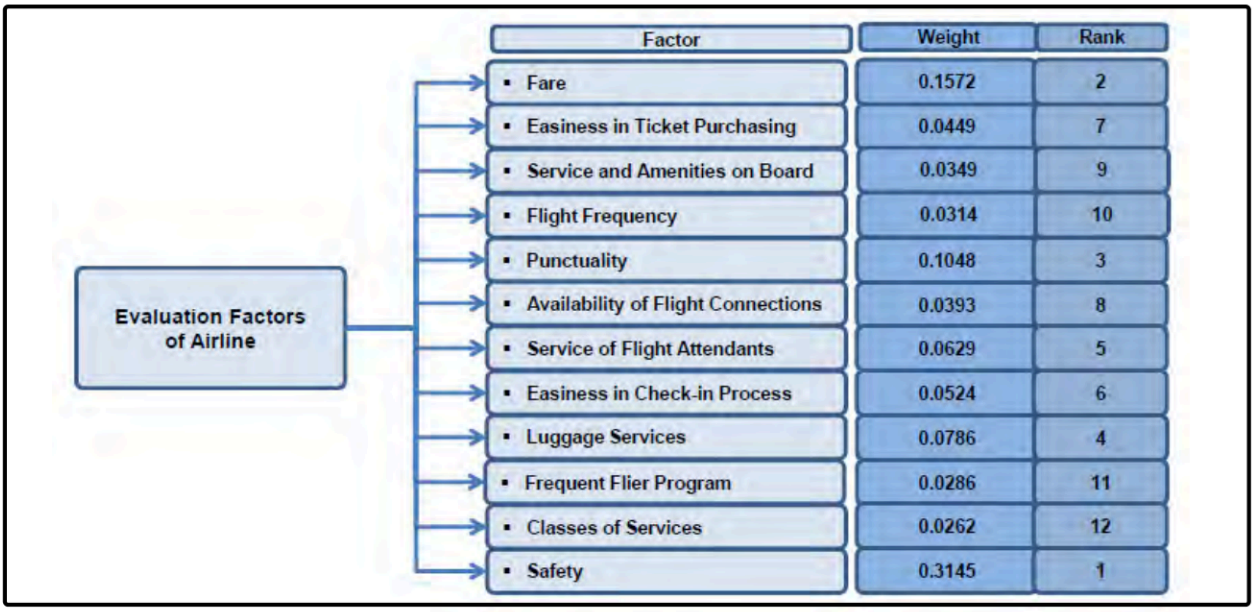
Service Airlines in Thailand and abroad, including Singapore Airline, Cathay Pacific Airline, Korean Air and Thai Airways. This is shown in Figure 3.

Figure 3: Airlines that are part of our study and research

4. Results

4.1 Results of factor selection and their weights

Factors that are important for airline business were first assembled from past research studies, and were further refined from interviews with several airlines. We found 12 factors that were relevant to airline business. Those included fare, easiness in ticket purchasing, service and amenities on board, flight frequency, punctuality, availability of flight connections, service of flight attendants, easiness in check-in process, luggage services, frequent flier program, classes of services, and safety. And from the surveys of airline professionals and 352 passengers, each factor weight was calculated from the Equation (1). Here, we found that passengers ranked safety as their highest priority at 31%, following by fares, punctuality, and luggage services, at 16%, 11% and 8% respectively. The full result is shown in Figure 4.



Factor	Weight	Rank
Fare	0.1572	2
Easiness in Ticket Purchasing	0.0449	7
Service and Amenities on Board	0.0349	9
Flight Frequency	0.0314	10
Punctuality	0.1048	3
Availability of Flight Connections	0.0393	8
Service of Flight Attendants	0.0629	5
Easiness in Check-in Process	0.0524	6
Luggage Services	0.0786	4
Frequent Flier Program	0.0286	11
Classes of Services	0.0262	12
Safety	0.3145	1

Figure 4: Factors and their weights in the airline efficiency evaluation

4.2 Results of airline efficiency evaluation

The primary data from airlines and the weights of each factor from the Section 4.1 were employed in the efficiency evaluation with the Technique for Order Preference by Similarity to Ideal Solution or TOPSIS, in order to gain insights of how airlines can improve on their competitiveness. The data size adjustment result from the Vector Normalization in Equation (2) is shown in Table 2 and Figure 5. The airline efficiency evaluation result calculated from Equation (4) to (9) is shown in Table 3.

5. Conclusion

The airline ranking result in the Section 4 concluded that, for the Group 1, Thai Airasia ranked first, Nok Air ranked second, and Thai Lion Air ranked third. The result showed that Thai

Airasia ranked first on almost every factors, except fares and luggage service, while the weakness of Thai Lion Air were on their frequent flier program and flight frequency since it only started operating in 2014. In Group 2, Thai Airways was strong in every factors, except their flight frequency was less than Bangkok Airways, resulting in Thai Airways ranking first and Bangkok Airways ranking second. In Group 3, Thai Airways had the cheapest airfare, following by Cathay Pacific Airline and Singapore Airlines, while Korean Air had the most expensive airfare. Singapore Airline allowed the most luggage weight without any extra fee, as well as the best service quality and availability of flight connection. This resulted in Singapore Airline ranking first, Thai Airways ranking second, Cathay Pacific Airline ranking third, and Korean Air ranking fourth.

NO.	Factor	Low Cost Service (THA)			Full Service (THA)		Full Service (INT)			
		Nok Air	Thai Lion Air	Thai Airasia	BKK Airways	Thai Airways	Thai Airways	Korean Air	Cathay Pacific	Singapore Airline
F1	Fare	0.5965	0.5755	0.5594	0.6218	0.7832	0.6668	0.5162	0.3088	0.4400
F2	Easiness in Ticket Purchasing	0.5145	0.5145	0.6860	0.7071	0.7071	0.5000	0.5000	0.5000	0.5000
F3	Service and Amenities on Board	0.5971	0.4938	0.6322	0.6842	0.7293	0.4840	0.5031	0.4528	0.5546
F4	Flight Frequency	0.5221	0.1149	0.8451	0.7277	0.6859	0.4337	0.4394	0.6792	0.3969
F5	Punctuality	0.6247	0.4685	0.6247	0.6585	0.7526	0.5000	0.5000	0.5000	0.5000
F6	Availability of Flight Connections	0.6047	0.5183	0.6047	0.6644	0.7474	0.5207	0.4628	0.4243	0.5785
F7	Service of Flight Attendants	0.5145	0.5145	0.6860	0.7071	0.7071	0.4811	0.4510	0.4510	0.6014
F8	Easiness in Check-In Process	0.4264	0.6396	0.6396	0.6247	0.7809	0.5522	0.4417	0.4417	0.5522
F9	luggage services	0.7071	0.7071	0.0000	0.7071	0.7071	0.4236	0.4236	0.4872	0.6354
F10	Frequent Flier Program	0.4472	0.0000	0.8944	0.6000	0.8000	0.6963	0.3482	0.5222	0.3482
F11	Classes of Services	0.3333	0.6667	0.6667	0.5547	0.8321	0.5000	0.5000	0.5000	0.5000
F12	Safety	0.6047	0.5183	0.6047	0.7071	0.7071	0.5000	0.5000	0.5000	0.5000

Table 2: Based Size Data using the Vector Normalization Method

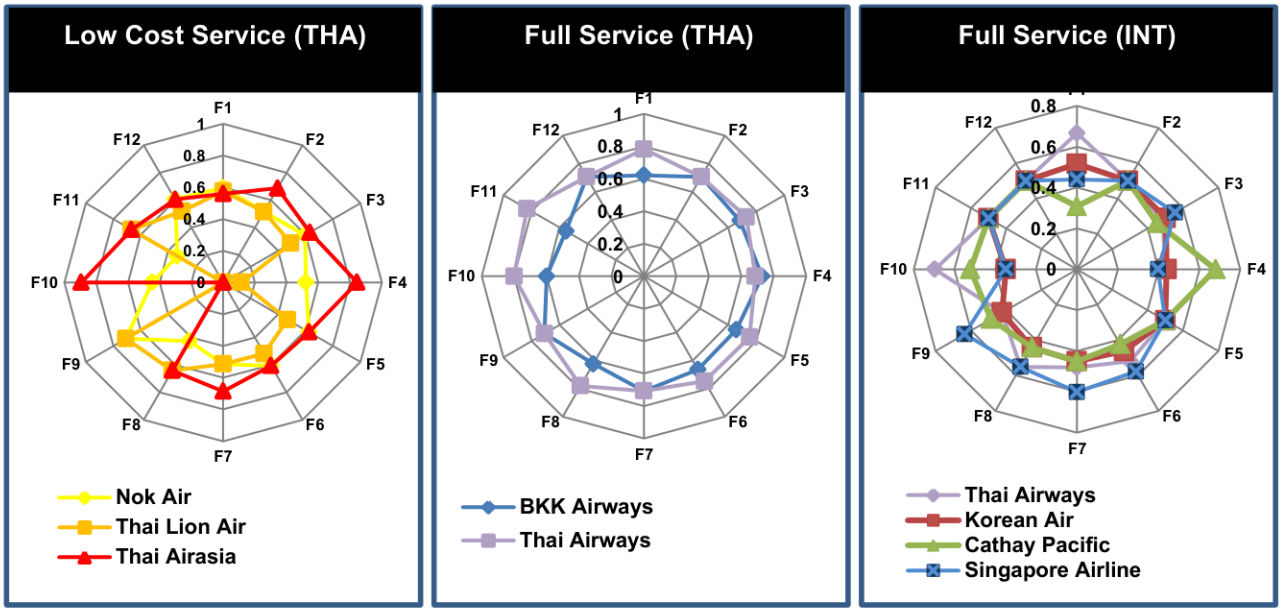


Figure 5: Based Size Data using the Vector Normalization Method on Radar Chart

Type	Airline	S_i^*	Rank	S_i^-	Rank	C_i^*	Rank
Low Cost Service (THA)	Thai Airasia	0.2478	1	0.3743	1	0.6016	1
	Nok Air	0.2508	2	0.3723	2	0.5974	2
	Thai Lion Air	0.3514	3	0.2793	3	0.4429	3
Full Service	Thai Airways	0.0362	1	0.2366	1	0.8673	1

(THA)	Bangkok Airways	0.2366	2	0.0362	2	0.1327	2
Full Service (INT)	Singapore Airline	0.1933	1	0.2755	1	0.5876	1
	Thai Airways	0.2239	2	0.2513	2	0.5288	2
	Cathay Pacific Airline	0.2749	3	0.1942	3	0.4140	3
	Korean Air	0.3063	4	0.1396	4	0.3130	4

Table 3: Ranking result of the airline evaluation

Comparing Thailand's airlines with the foreign airlines in the study, Thai Airways strength was in their fare, while their weakness was in service and amenities on board, service quality of flight attendants, and luggage allowances. However, Thai Airways were able to increase their fare, providing they increased their service quality to meet the upper level customer's needs.

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