20120723 - Prediction of Skytrax airline rankings, short formula (2011) (2e)

[Data] [<Normal page] [**PEREZGONZALEZ Jose D (2011).** *Prediction of Skytrax airline rankings, short formula (2011) (2e)*[4]. Journal of Knowledge Advancement & Integration (ISSN 1177-4576), 2012, pages 209-218.]

Prediction of airline rankings

Fold

Table of Contents

Perezgonzalez continued a previous study by Perezgonzalez and Gilbey *(2010*[3]*)*, attempting to predict Skytrax's 2011 Official World Airline Star rankings from average ratings that passengers had given to those airlines, independently, on Skytrax's website. The regression formula was based on a single variable, the average 'Customer review scoring', which is a cumulative average of past ratings, including those given during 2011.

The short regression formula for predicting Skytrax's 2011 ranking was:

Predicted Skytrax Ranking = 1.634 + (0.289 * Customer review scoring)
($F = 109.047$, $p = 0.00$; $R = 0.673$; $R^2 = 0.452$; Adj.R = 0.669; Adj.$R^2 = 0.448$)

Table 1 shows the actual ranking given by Skytrax, the predicted 'ranking' obtained from above formula, the customer average rating used as predictor and the same customer average rating adjusted to a scale ranging between 1 and 5 in order to facilitate comparisons with the other scores. Overall, 67% of the research airlines could be ranked in approximately the same hierarchy than the one provided by Skytrax. Furthermore, it may be possible to also rank correctly 67% of the remaining airlines not ranked by Skytrax (adj.R).

Table 1. Predicted and actual scores

Airline	Customer	Customer (adj)	Predicted	Skytrax
Qatar Airways	9.10	4.64	4.26	5.00
Hainan Airlines	8.90	4.56	4.21	5.00
Singapore Airlines	8.70	4.48	4.15	5.00
Bangkok Airways	8.60	4.44	4.12	4.00
Asiana Airlines	8.50	4.40	4.09	5.00
Kingfisher Airlines	8.50	4.40	4.09	5.00
Garuda Indonesia	8.50	4.40	4.09	4.00
Aegean Airlines	8.40	4.36	4.06	3.00
NIKI	8.20	4.28	4.00	3.00
Silk Air	8.10	4.24	3.97	4.00
Pacific Blue	8.00	4.20	3.95	4.00
Southwest Airlines	8.00	4.20	3.95	3.00

Oman Air	7.80	4.12	3.89	4.00
Porter Airlines	7.80	4.12	3.89	4.00
Virgin Australia	7.70	4.08	3.86	4.00
ANA	7.60	4.04	3.83	4.00
JetBlue Airways	7.60	4.04	3.83	4.00
Air Asia X	7.50	4.00	3.80	3.00
Qantas Airways	7.40	3.96	3.77	4.00
Dragonair	7.30	3.92	3.74	4.00
Japan Airlines	7.30	3.92	3.74	4.00
Malaysia Airlines	7.20	3.88	3.71	5.00
Swiss Int'l Air Lines	7.20	3.88	3.71	4.00
TACA International	7.20	3.88	3.71	3.00
Olympic Air	7.10	3.84	3.69	3.00
Cathay Pacific	7.00	3.80	3.66	5.00
Thai Airways	6.90	3.76	3.63	4.00
EVA Air	6.80	3.72	3.60	4.00
Aer Lingus	6.80	3.72	3.60	3.00
Air Asia	6.80	3.72	3.60	3.00
Air Astana	6.80	3.72	3.60	3.00
Air New Zealand	6.70	3.68	3.57	4.00
Finnair	6.70	3.68	3.57	4.00
China Airlines	6.60	3.64	3.54	4.00
Air Austral	6.50	3.60	3.51	3.00
Korean Air	6.40	3.56	3.48	4.00
South African Airways	6.40	3.56	3.48	4.00
Austrian Airlines	6.30	3.52	3.45	4.00
EasyJet	6.30	3.52	3.45	3.00
Royal Brunei Airlines	6.30	3.52	3.45	3.00
WestJet	6.30	3.52	3.45	3.00
Air Berlin	6.20	3.48	3.43	3.00
PIA Pakistan International	6.10	3.44	3.40	3.00
Lufthansa	6.00	3.40	3.37	4.00
Turkish Airlines	6.00	3.40	3.37	4.00
Croatia Airlines	6.00	3.40	3.37	3.00
KLM	6.00	3.40	3.37	3.00
LAN Airlines	6.00	3.40	3.37	3.00
Malev Hungarian Airlines	6.00	3.40	3.37	3.00
Air Malta	5.90	3.36	3.34	3.00
Brussels Airlines	5.90	3.36	3.34	3.00

Germanwings	5.90	3.36	3.34	3.00
Onur Air	5.90	3.36	3.34	2.00
British Airways	5.80	3.32	3.31	4.00
Norwegian	5.80	3.32	3.31	3.00
Philipines Airlines	5.80	3.32	3.31	3.00
Ukraine International Airlines	5.80	3.32	3.31	2.00
Alaska Airlines	5.70	3.28	3.28	3.00
Jetstar Asia	5.70	3.28	3.28	3.00
SriLankan Airlines	5.70	3.28	3.28	3.00
Emirates Airlines	5.60	3.24	3.25	4.00
Air Transat	5.60	3.24	3.25	3.00
AirTran Airways	5.60	3.24	3.25	3.00
JetStar Airways	5.60	3.24	3.25	3.00
Vietnam Airlines	5.60	3.24	3.25	3.00
Air Canada	5.50	3.20	3.22	3.00
LOT Polish Airlines	5.50	3.20	3.22	3.00
Royal Jordanian Airlines	5.50	3.20	3.22	3.00
Air France	5.40	3.16	3.19	4.00
Cebu Air	5.40	3.16	3.19	3.00
Hawaiian Airlines	5.40	3.16	3.19	3.00
Thomson Airways	5.40	3.16	3.19	3.00
Allegiant Air	5.30	3.12	3.17	3.00
bmi British Midland	5.30	3.12	3.17	3.00
Cyprus Airways	5.30	3.12	3.17	3.00
Jet2.com	5.30	3.12	3.17	3.00
Etihad Airways	5.20	3.08	3.14	4.00
Avianca	5.20	3.08	3.14	3.00
Copa Airlines	5.20	3.08	3.14	3.00
CSA Czech Airlines	5.20	3.08	3.14	3.00
Frontier Airlines	5.20	3.08	3.14	3.00
Air China	5.10	3.04	3.11	4.00
Icelandair	5.10	3.04	3.11	3.00
Shanghai Airlines	5.10	3.04	3.11	3.00
Bulgaria Air	5.10	3.04	3.11	2.00
Continental Airlines	5.00	3.00	3.08	3.00
Jet Airways	5.00	3.00	3.08	3.00
SAS Scandinavian Airlines	5.00	3.00	3.08	3.00
Vueling Airlines	5.00	3.00	3.08	3.00
Alitalia	4.70	2.88	2.99	3.00

Transaero Airlines	4.70	2.88	2.99	3.00
Aeroflot	4.60	2.84	2.96	3.00
Air Baltic	4.60	2.84	2.96	3.00
Air Pacific	4.60	2.84	2.96	3.00
China Eastern Airlines	4.60	2.84	2.96	3.00
Condor Airlines	4.60	2.84	2.96	3.00
Uzbekistan Airways	4.60	2.84	2.96	2.00
China Southern Airlines	4.50	2.80	2.93	4.00
Air Mauritius	4.50	2.80	2.93	3.00
El Al Israel Airlines	4.40	2.76	2.91	3.00
Gulf Air	4.40	2.76	2.91	3.00
TAP Air Portugal	4.40	2.76	2.91	3.00
Pegasus Airlines	4.40	2.76	2.91	2.00
Meridiana	4.30	2.72	2.88	3.00
Monarch Airlines	4.30	2.72	2.88	3.00
Wizz Air	4.30	2.72	2.88	2.00
Aerolineas Argentinas	4.20	2.68	2.85	3.00
TAM Airlines	4.20	2.68	2.85	3.00
Air India	4.10	2.64	2.82	3.00
Egyptair	4.10	2.64	2.82	3.00
United Airlines	4.10	2.64	2.82	3.00
Ethiopian Airlines	4.00	2.60	2.79	3.00
Kuwait Airways	4.00	2.60	2.79	3.00
Saudi Arabian Airlines	4.00	2.60	2.79	3.00
Aeromexico	3.90	2.56	2.76	3.00
Virgin Atlantic	3.90	2.56	2.76	3.00
Delta Airlines	3.80	2.52	2.73	3.00
Spanair	3.80	2.52	2.73	3.00
Tiger Airways	3.70	2.48	2.70	3.00
Air Europa	3.60	2.44	2.67	3.00
Air Seychelles	3.60	2.44	2.67	3.00
Cubana Airlines	3.60	2.44	2.67	2.00
Kenya Airways	3.50	2.40	2.65	3.00
American Airlines	3.40	2.36	2.62	3.00
Iberia	3.30	2.32	2.59	3.00
US Airways	3.30	2.32	2.59	3.00
Spirit Airlines	3.10	2.24	2.53	3.00
flyBe	3.00	2.20	2.50	3.00
Ryanair	2.90	2.16	2.47	2.00

Thomas Cook Airlines	2.40	1.96	2.33	3.00
bmibaby	2.40	1.96	2.33	2.00
Aerosvit Airlines	2.00	1.80	2.21	2.00
Royal Air Maroc	1.90	1.76	2.18	2.00
Iceland Express	1.70	1.68	2.13	2.00

(The 'Customer (adj)' column shows customer scores on a 1-5 scale, thus facilitating comparisons with the other variables)

The regression formula obtained in this study is relatively similar to that obtained in 2010. In order to ascertain how fit these formulas may be for predicting future Skytrax airline rankings, a simulation was carried out in order to predict the 2011 ranking using the 2010 formula. A good correlation between the results of the simulation and the 2011 prediction could then be taken as evidence in support of such fit. A low correlation could be taken as evidence against such fit.

Table 2 collates the predictions made for 2010 (using the 2010 formula, *see Perezgonzalez, 2010* [1]), for 2011 (using the 2011 formula), and the results of the simulation predicting 2011 ranking using the 2010 formula. The correlation between the 2010 ranking and the simulation ranking was 92% (r=0.92), while there was a perfect positive correlation between the 2011 ranking and the simulation ranking (r=1.00).

Table 2. Predicted scores for 2010, 2011 using 2010 formula, and 2011

Airline	2010 prediction	Simulation	2011 prediction
Qatar Airways	4.24	4.32	4.26
Hainan Airlines	4.18	4.26	4.21
Singapore Airlines	4.06	4.21	4.15
Bangkok Airways	4.15	4.18	4.12
Asiana Airlines	4.29	4.15	4.09
Kingfisher Airlines	4.12	4.15	4.09
Garuda Indonesia	4.03	4.15	4.09
Aegean Airlines	4.15	4.12	4.06
NIKI	---	4.06	4.00
Silk Air	4.00	4.03	3.97
Pacific Blue	---	4.00	3.95
Southwest Airlines	4.06	4.00	3.95
Oman Air	3.68	3.94	3.89
Porter Airlines	4.00	3.94	3.89
Virgin Australia	---	3.92	3.86
ANA	3.89	3.89	3.83
JetBlue Airways	3.86	3.89	3.83
Air Asia X	3.42	3.86	3.80
Qantas Airways	4.12	3.83	3.77
Dragonair	3.77	3.80	3.74
Japan Airlines	3.57	3.80	3.74
Malaysia Airlines	3.77	3.77	3.71

Swiss Int'l Air Lines	3.57	3.77	3.71
TACA International	3.86	3.77	3.71
Olympic Air	---	3.74	3.69
Cathay Pacific	3.65	3.71	3.66
Thai Airways	3.80	3.68	3.63
EVA Air	3.65	3.65	3.60
Aer Lingus	3.68	3.65	3.60
Air Asia	3.42	3.65	3.60
Air Astana	---	3.65	3.60
Air New Zealand	3.92	3.62	3.57
Finnair	3.33	3.62	3.57
China Airlines	3.68	3.60	3.54
Air Austral	---	3.57	3.51
Korean Air	3.45	3.54	3.48
South African Airways	3.57	3.54	3.48
Austrian Airlines	3.62	3.51	3.45
EasyJet	2.58	3.51	3.45
Royal Brunei Airlines	3.45	3.51	3.45
WestJet	---	3.51	3.45
Air Berlin	3.71	3.48	3.43
PIA Pakistan International	---	3.45	3.40
Lufthansa	3.60	3.42	3.37
Turkish Airlines	3.48	3.42	3.37
Croatia Airlines	---	3.42	3.37
KLM	3.25	3.42	3.37
LAN Airlines	3.62	3.42	3.37
Malev Hungarian Airlines	3.42	3.42	3.37
Air Malta	---	3.39	3.34
Brussels Airlines	3.28	3.39	3.34
Germanwings	---	3.39	3.34
Onur Air	3.36	3.39	3.34
British Airways	3.68	3.36	3.31
Norwegian	---	3.36	3.31
Philipines Airlines	3.54	3.36	3.31
Ukraine International Airlines	---	3.36	3.31
Alaska Airlines	3.57	3.33	3.28
Jetstar Asia	---	3.33	3.28
SriLankan Airlines	3.19	3.33	3.28
Emirates Airlines	3.04	3.30	3.25

Air Transat	---	3.30	3.25
AirTran Airways	---	3.30	3.25
JetStar Airways	---	3.30	3.25
Vietnam Airlines	3.28	3.30	3.25
Air Canada	3.33	3.28	3.22
LOT Polish Airlines	3.28	3.28	3.22
Royal Jordanian Airlines	3.19	3.28	3.22
Air France	3.57	3.25	3.19
Cebu Air	---	3.25	3.19
Hawaiian Airlines	---	3.25	3.19
Thomson Airways	3.57	3.25	3.19
Allegiant Air	---	3.22	3.17
bmi British Midland	3.51	3.22	3.17
Cyprus Airways	---	3.22	3.17
Jet2.com	---	3.22	3.17
Etihad Airways	3.30	3.19	3.14
Avianca	3.57	3.19	3.14
Copa Airlines	---	3.19	3.14
CSA Czech Airlines	3.16	3.19	3.14
Frontier Airlines	3.39	3.19	3.14
Air China	2.98	3.16	3.11
Icelandair	3.28	3.16	3.11
Shanghai Airlines	---	3.16	3.11
Bulgaria Air	---	3.16	3.11
Continental Airlines	3.16	3.13	3.08
Jet Airways	---	3.13	3.08
SAS Scandinavian Airlines	3.16	3.13	3.08
Vueling Airlines	---	3.13	3.08
Alitalia	2.81	3.04	2.99
Transaero Airlines	---	3.04	2.99
Aeroflot	3.10	3.01	2.96
Air Baltic	---	3.01	2.96
Air Pacific	---	3.01	2.96
China Eastern Airlines	2.78	3.01	2.96
Condor Airlines	---	3.01	2.96
Uzbekistan Airways	---	3.01	2.96
China Southern Airlines	3.01	2.98	2.93
Air Mauritius	2.98	2.98	2.93
El Al Israel Airlines	3.04	2.96	2.91

Gulf Air	2.84	2.96	2.91
TAP Air Portugal	3.13	2.96	2.91
Pegasus Airlines	3.07	2.96	2.91
Meridiana	3.01	2.93	2.88
Monarch Airlines	---	2.93	2.88
Wizz Air	---	2.93	2.88
Aerolineas Argentinas	2.75	2.90	2.85
TAM Airlines	2.98	2.90	2.85
Air India	3.01	2.87	2.82
Egyptair	2.96	2.87	2.82
United Airlines	3.01	2.87	2.82
Ethiopian Airlines	2.84	2.84	2.79
Kuwait Airways	2.84	2.84	2.79
Saudi Arabian Airlines	2.81	2.84	2.79
Aeromexico	---	2.81	2.76
Virgin Atlantic	3.16	2.81	2.76
Delta Airlines	2.87	2.78	2.73
Spanair	2.98	2.78	2.73
Tiger Airways	2.87	2.75	2.70
Air Europa	2.72	2.72	2.67
Air Seychelles	2.61	2.72	2.67
Cubana Airlines	2.72	2.72	2.67
Kenya Airways	2.78	2.69	2.65
American Airlines	2.78	2.66	2.62
Iberia	2.84	2.64	2.59
US Airways	2.66	2.64	2.59
Spirit Airlines	2.81	2.58	2.53
flyBe	2.81	2.55	2.50
Ryanair	2.26	2.52	2.47
Thomas Cook Airlines	---	2.37	2.33
bmibaby	---	2.37	2.33
Aerosvit Airlines	2.69	2.26	2.21
Royal Air Maroc	2.23	2.23	2.18
Iceland Express	---	2.17	2.13
(The simulation column shows the predicted ranking for 2011 when using the 2010 formula)			

Methods

Research approach

Partly exploratory and partly replication. The exploratory end of the study was to predict Skytrax's 2011 airline ranking using the same approach than Perezgonzalez and Gilbey *(2010[3])* did. That is, a 'short' regression formula which uses a readily available average as single predictor.

The replication end of the study attempted to seek support (or otherwise) for the usability of such formula to predict Skytrax airline ranking in the future.

Population

The 134 airlines which obtained a Skytrax ranking in 2011 and had received a minimum of ten customer reviews during the year.

Variables

Criterion (dependent) variable: Skytrax's Official World Airline Star ranking.

- 'Official' rankings are given by Skytrax after auditing airlines that pertain to the Star ranking program. Because of the need for airlines to join the program, the auditing involved, and other variables, Skytrax rankings are applied to a rather limited number of, possibly, self-selected airlines (ie, those that can afford the costs, value Skytrax's ranking system, and expect a good ranking).
- This variable is measured on an ordinal scale ranging from 1 star (very poor quality performance) to 5 stars (highest quality standards).

Predictor (independent) variable: average 'Customer review scoring'.

- The average customer review scoring is calculated by Skytrax, possibly based on averaging customer ratings given by passengers when independently reviewing those airlines on Skytrax's website on an ad-hoc basis. This variable may, in principle, be of low reliability as a source of information, as passengers are self-selected (ie, reviews are given by those passengers who know about the website and are motivated to provide a review), it is not known whether Skytrax 'filters' reviews, and the average rating seems to cover all reviews, not just those of discrete years. Notwithstanding this, Skytrax assures on its website that customer reviews are not used for and are independent of 'star rankings'. In any case, the variable did not show any non-normal tendency towards negative or positive values, extreme responses or other statistical biases.
- This variable is measured on an interval scale ranging from 0 to 10 points, a higher value representing a greater level of customer overall satisfaction with the airline over the years (thus, not limited to 2011).

Procedure

The corresponding data was mined from information readily available online on Skytrax's website at the end of 2011.

Data analysis

The data matrix was assessed as per normality and linearity. The predictor variable was normal, while the criterion variable had a positive skewness departing significantly from normality (sig<0.05). Linearity between both variables was adequate.

Given that only one variable had a non-normal skewness but that linearity was adequate, and that the previous research also used parametric tools, a parametric approach was also adopted for this study.

The main analysis carried out was a regression analysis with its corresponding statistical significance assessed following (Fisher-Perez's approach) with threshold at sig ≤ 0.05 (ie, results with 5% or more extreme probabilities), 2-tailed.

Generalization potential

Airlines with independent customer reviews on Skytrax's website but not "officially" ranked by it. It is estimated that 67% of those airlines (adj.R) could be ranked correctly (thus, implying that the remaining 33% of airlines would be erroneously ranked).

References

1. **PEREZGONZALEZ Jose D (2010).** *Prediction of Skytrax airline rankings, short formula.* Journal of Knowledge Advancement & Integration (ISSN 1177-4576), 2011, pages 154-159.
2. **PEREZGONZALEZ Jose D (2011).** *Prediction of Skytrax airline rankings, short formula (2011).* Journal of Knowledge Advancement & Integration (ISSN 1177-4576), 2012, pages 162-171.
3. **PEREZGONZALEZ Jose D & Andrew GILBEY (2010).** *Predicting Skytrax's Official Airline Star ratings from customer reviews.* Aviation Education and Research Proceedings (ISSN 1176-0729), 2011, pages 48-50.

+++ **Notes** +++

4. This second edition updates the previous edition[2] by re-editing both tables and making them more reader-friendly.

Want to know more?

Skytrax's website
: Skytrax offers the latest rankings for airports and airlines, as well as independent reviews of those by passengers.

Wiki of Science - Skytrax's 2010 airline rankings
: Perezgonzalez et al's (2010) article expanded with actual data and predicted scores per airline.

Wiki of Science - Prediction of Skytrax airport rankings
: Wiki of Science offers access to both 2010's and 2011's predictions for airports.

Outdated versions

PEREZGONZALEZ Jose D (2011). *Prediction of Skytrax airline rankings, short formula (2011).* Journal of Knowledge Advancement & Integration (ISSN 1177-4576), 2012, pages 162-171.

Author

Jose D PEREZGONZALEZ (2012). Massey University, Turitea Campus, Private Bag 11-222, Palmerston North 4442, New Zealand. (JDPerezgonzalez).

Peer-reviewers

Nicholas ASHLEY (2012). School of Aviation, Massey University, New Zealand (NickAshley).
