



IS434
SOCIAL ANALYTICS
& APPLICATIONS

FINAL REPORT

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1.0 Our Client | Jetstar Asia

Jetstar Asia Airways Pte Ltd (**Jetstar Asia**) is an Australian low-cost budget airline founded in 2004. Its mission is to offer low fares to enable more people to fly to more places, more often¹. Jetstar Asia is one of the four subsidiaries of **Jetstar Group**, a subsidiary of the Australia Qantas full service airline. Other subsidiaries includes Jetstar Airways, Jetstar Pacific (Vietnam) Airlines and Jetstar Japan. This brand architecture is part of Qantas' two brand strategy with Qantas Airways serving the premium full-service market and Jetstar in the low-cost market.

Based in Singapore, the low-cost carrier operates mainly within Southeast Asia, serving 25 popular cities and 14 countries such as Cambodia, Myanmar, Japan, Taiwan, Philippines and Singapore etc. till date. It is managed by Newstar Holdings Pty Ltd, with majority owned by Singapore company Westbrook Investments Pte Ltd (51 per cent) and the Qantas Group holding the remaining 49 per cent. Its main competitors within the region are FlyScoot, AirAsia and Malindo Air.

2.0 Business Problem

Social media usage has been on the rise and it has become a platform for consumers to voice their opinions and engage with other consumers and the brand. Companies who are unable to draw analysis on these conversations will be forgoing valuable insights that can potentially improve business decisions. Henceforth, this project has identified and the main problem pertaining to Jetstar's social media capabilities and engagement.

Jetstar's inability to fully capture insights and consumers' sentiments

Although Jetstar has recognised the need to be present on social platforms, the company have yet to fully develop their competency in analysing consumers' feedback from historical posts and gathering insights to improve their service offerings.

3.0 Business Objective

In light of the aforementioned problem, this project seeks to:

1. Provide a deeper understanding of consumers' sentiments on Jetstar Asia and use these insights to improve their marketing strategies and optimise marketing spend on campaigns and influencers.

¹ <http://www.jetstar.com/sg/en/about-us/jetstar-group>

2. To provide Jetstar with competitors' insights and presence on social media

4.0 Data Set and Scope

4.1 Time Period of Analysis

The project is based primarily on the data gathered from the third quarter of 2017, namely July, August and September 2017.

4.2 Data Source and Scope

Due to confidentiality issues, no data set or access rights to social media platforms were provided by Jetstar. Henceforth, all the data used for analysis were gathered and crawled from the Internet and social media platforms. The three main platforms and websites are:

#	Platforms	Description of Data	Format/Count	Content
Primary Platforms				
1	Twitter (@Jetstar_A sia , @flyscoot , @airasia)	<ul style="list-style-type: none"> User generated content, messages and news containing search query "Jetstar" and "Jetstar_Asia" User generated content relating to competitors with search query "AirAsia" and "flyscoot" 	JSON <u>Count (#)</u> 7K - 10K/ mth	<u>Qualitative</u> Tweets text, Re-tweets, Comments, Opinions and News, Users info, Hashtags
				<u>Quantitative</u> Date, # of tweets, User count
2	Instagram (Jetstarasia , flyscoot , airasia)	<ul style="list-style-type: none"> Social media engagement data User generated captions and content 	JSON <u>Count (#)</u> All posts from last 3 months	<u>Qualitative</u> Images, Comments, Hashtags
				<u>Quantitative</u> Likes, Impressions, Followers
3	TripAdvisor (Jetstar Asia , Scoot , Air Asia)	<ul style="list-style-type: none"> Consumers' review and ratings 	HTML <u>Count (#)</u> 500 - 700	<u>Qualitative</u> User reviews, opinion, comment
				<u>Quantitative</u> Overall ratings

5.0 Data Cleaning and Transformation

5.1 Data Files and Databases

```
24 # Specify input file
25 tweets_data_path = 'Twitter_Output_Jetstar700_1015Oct17.txt'
26
27 # Open the file. 'r' means READ.
28 tweets_file = open(tweets_data_path, 'r')
29
30 # This LIST will contain tweet TEXT content.
31 tweets_text_list = []
32
33 # tweet_content
34 tweet_content= ''
```

The input data files used in the preliminary analysis are in a form of a txt file that contains 700 tweets in JSON format pertaining to the respective airlines i.e. Jetstar, FlyScoot and AirAsia. To ensure a consistent and fair analysis, the team created an official dropbox folder to hold all the different data sets and source codes. All the files are unique and clearly named according to their attributes i.e. the source output type (e.g. *Twitter_Output*, *Tripadvisor_Output*), the company (e.g. *Jetstar*, *FlyScoot*), the number of data points (e.g. *700_tweets*), date (e.g. *September 2017*) and format (e.g. *txt*, *xml*, *csv*).

One example of such files used in the analysis is Jetstar's latest 700 tweets between 10 - 15 October 2017 - file name: "[Twitter_Output_Jetstar700_1015Oct17.txt](#)"

5.2 Data Cleaning for Wordcloud, Top 20 Words, and Sentiment analysis

1. Changing Tweets texts into to a String for Tokenizing

```
42 count=0;
43 # Loop every line in data
44 for line in tweets_file:
45     count = count+1
46     if count == 700:
47         break
48     # strip() function removes end-of-line characters at the end
49     # After removing end-of-line characters, see if the line still
50     # contains any data. If it does, len() will be > 0.
51     # If that's the case, let's save this Tweet Object into our LIST.
52     if len(line.strip()) > 0:
53         tweet = json.loads(line) # each line is a JSON object
54         if 'text' in tweet:
55             tweet_content = tweet_content + tweet['text'] + ' '
```

In order to carry out the Tokenize-related functions, the input will need to be in a String format. Upon reading the input files, the text component of each Tweet is extracted and inserted as a string into the variable “`tweet_content`”.

2. Changing text into Lowercase

```

58     print(tweet_content)
59     # word_tokenize() function takes a text blob and breaks it into 'words'.
60     tweet_content_lower = tweet_content.lower()
61     # tokenizer = RegexpTokenizer(r'\w+')
62     tokenizer = RegexpTokenizer(r'\w+|[^\w\s]|\s+')
63     tweet_words = tokenizer.tokenize(tweet_content_lower)
64

```

Next, ‘`tweet_content`’ is changed to a uniform lower case using the `.lower()` method (line60). This allows the system to effectively capture all similar words that were previously in a different format.

3. Removing Stopwords, Numerics, emojis, and hyperlinks

```

36     # Let's load up English corpus from NLTK package.
37     stop_words = stopwords.words('english')
38     stop_words.extend(["dah", "said", "told", "twitter", "com", "http", "fb", "https",
39
40
281    for w in tokens:  # every tweet text in list
282        if w not in stop_words:  # inc removing mentioned names which aren't impt for sentiment scores
283            if re.search('[^A-Za-z]+', w):  # match all strings that contain a non-letter
284                print("Invalid word: " + w)
285            elif re.search('[1-9]+', w):
286                print("Invalid word: " + w)
287            else:
288                non_stopwords.append(wnl.lemmatize(w))
289
290
97     def remove_emoji(text):
98         emoji_pattern = re.compile("["
99             u"\U0001F600-\U0001F64F"  # emoticons
100            u"\U0001F300-\U0001F5FF"  # symbols & pictographs
101            u"\U0001F680-\U0001F6FF"  # transport & map symbols
102            u"\U0001F1E0-\U0001F1FF"  # flags (iOS)
103            "]+", flags=re.UNICODE)
104
105         text_no_emoji = emoji_pattern.sub(r'', text)
106         return text_no_emoji
107
108
109     # remove all links
110     filtered_for_wordcloud = re.sub(r'((www\.[^\s]+)|(\https?:\/\/[^\s]+))', '', filtered_for_wordcloud)
111     print(filtered_for_wordcloud)
112
113

```

The final cleaning removes words, numerics, emoji, and hyperlinks that are not meaningful for analysis. First, using the NLTK English Stopwords corpus, the team removed any words that are present in this corpus. Upon running the first trial wordcloud, the team noticed a handful of redundant words which were not of interest. Hence, an additional step was taken to extend the stopwords corpus (line 38) Afterwhich, using `re.search`, non-letters (line 283), and numerical values

(line 285) were searched and excluded. This allows us to focus solely on words in building the word cloud.

Presence of emoji and hyperlinks in tweets can affect the commonly occurring words and the length of the tweet for sentiment analysis. Thus, they were also removed during our data cleaning process using re.compile and re.sub functions.

5.3 Data Preparation for Top 20 Hashtags, Retweeted Users

Hashtags ('#XXX') Twitter Handles ('@XXX') and Retweets ('RT @XXX :') were not deleted because these three are variables of interest. Codes were developed using the Regular Expression (Regex) to identify, search and filter them out for analysis.

Exclusion of hashtags and twitter handlers of respective companies

As our analysis focuses on finding twitter users who are possible targets and hashtags to use, we excluded the hashtags and handlers such as #jetstar or @jetstar_asia in the top 20 count.

5.4 Data Preparation For Sentiment Analysis

1. Updating of Dictionary and Corpus

To capture more meaningful data and insights, the team saw the importance to improve the Dictionary and Corpus used in the sentiment scoring. Without this, we will not be able to capture as many sentiment-indicating words from text and draw insights from them. Thus, the following was carried out:

- A. English Dictionary and Corpus (refer to Appendix 02)
 - a. First, the team expanded the dictionaries (Dict1/) provided in class with more adjectives that are relevant to the air transport industry such as -- Negative: disgusting, inedible, unfriendly or Positive -- delightful, perfect, amazing etc.
 - b. 2 Corpora was used for sentiment analysis on different platforms - A larger corpus('/dicts hnl') for Twitter, using additional words (>7000) from external (Hu & Liu) corpus, and smaller corpus was used for Tripadvisor ('/dicts 3 levels'). The choice of using a smaller corpus for Tripadvisor was because of the higher number of sentiment-indicating words in the reviews than tweets, which lessens the need for a larger corpus where processing can be time-consuming.

- c. Next, polarities were assigned. For the smaller corpus, instead of having single magnitude ('+1', '0', '-1') for each sentiment, the team ranked and assigned varying strengths ('+/- 1 - 3') to the adjectives in accordance to their severity. However, due to the nature of our external corpus, sentiment words in the larger corpus were assigned a score with magnitude 1.
- d. Upon running a few analysis, the team reviewed the comments/reviews and noted down more words and phrases that are appropriate to be included into the existing corpus.

B. Singlish words and Slangs

- a. Various singlish words and slangs were taken into consideration and added into our corpus for sentiment analysis.

2. Tokenizing and Part-Of-Speech (POS) tagging

The same approach was taken in tokenizing the tweet texts into words. An additional POS tagging step was done to classify the words in accordance to their parts of speech. This allows the team to rightly pick out adjectives ['JJ'], verbs ['VRZ'] and verbs, past tense ['VBD'] for the analysis. This helps us to find out more accurately if the words mentioned in the reviews are sentiment-indicating opinions, or just facts - which increases the accuracy of our sentiment scoring.

3. Lemmatization

The team has noticed problems when stemming words, having missing trailing 'e' for words ending with 'e', or having spelling errors in the base form. Thus, lemmatization was chosen instead, to reduce inflectional and derivationally related forms of a word to a common base form. This reduces the need to introduce multiple forms of a sentiment word in our corpus for accurate analysis.

4. Normalising sentiment scores

Comments or reviews that are of longer length tend to have more sentiment-indicating words and thus may have higher/lower sentiment scores. To have a common basis for comparison between text of different lengths, sentiment scores were normalised by dividing the score by the length of the text excluding stopwords.

5. Translation of tweets

From tweets crawled, we realised that there are a high percentage of foreign languages used, particularly Thai, Indonesian, and Japanese. Thus, we used the python library ‘GoogTrans’ to help translate the tweets in order to gain insights on those sentiments as well.

Challenges faced and Steps taken

1) Sentiment Scores in Tweets

Overall, the results obtained were still unsatisfactory as a large proportion of tweets are still classified as sentiment-neutral, with a score of 0. The team has integrated our existing corpus with an external corpus (Hu & Liu, 2004) to obtain more variance and increase accuracy of sentiment scores on Twitter.

2) Translation API Issues

The python library ‘GoogTrans’ is used to help in translating non-english content to Standard English for analysis. The translation is imperfect which results to incomplete sentences and lack of interpretation of slang such as “ㅋ” which is a short form for “ㅋ”. We have to ignore these parts unfortunately as this is one of the best libraries available for translation purposes. Another issue is the request limit from the API as it may return a null json value after its limit is reached. It can be mitigated by running a timer of 8 minutes to wait for the API to reset its limit.

6.0 Analysing Social Media Platforms

After conducting the necessary data preparation and transformation, data from Twitter, Instagram and Tripadvisor will be analysed to draw relevant and actionable insights.

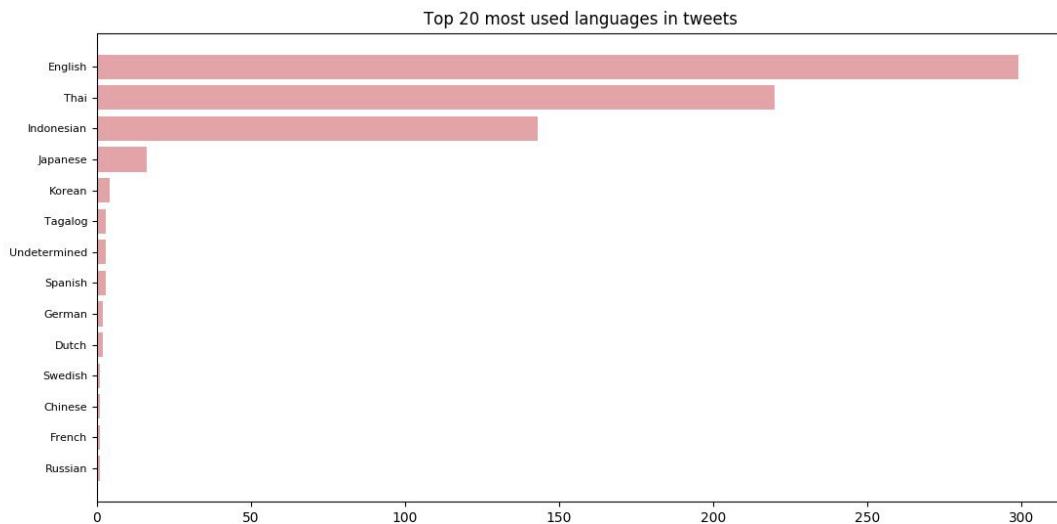
The team first set out to gather general information to get a rough understanding about Jetstar and its Twitter engagement. Some questions and topics of interest identified were — “Who are the tweeters?”, “What’s the level of tweet activity daily?”, “What is the public talking about?”, “Any particular buzz events and what are the consumers’ sentiments”.

Codes were developed to generate the following charts using the small Jetstar data sample ($n = 700$) tweets*. The description and purpose of the charts are listed as follow:

*Note: A tweet that falls within our data sample is defined as posts that contains the a search query of interest, for instance keyword such as “Jetstar”, “AirAsia” and “Flyscoot”.

Charts	Topics of Interest / Analysis
<u>Bar Chart of Tweets by Language</u> X axis - Languages Y Axis - # of Tweets	To find out "Who are the tweeters?" by language/possibly country Which is the most active country?
<u>Bar Chart of Tweets by Date</u> X Axis - Date Y Axis - # of Tweets	"What's the level of tweet activity daily?" How engaged are Jetstar's tweeters Possible comparison to be drawn with competitors
<u>Wordcloud Visualization</u> <u>Top 20 Commonly Used Words</u> X axis - Top 20 common words Y Axis - Frequency per word <u>Top 20 Hashtags</u> X axis - Top 20 hashtags Y Axis - Frequency per word	"What is the public talking?" "Any particular buzz events?" "In the event of buzz activity, how does it involve Jetstar?" Further research to be conducted on Twitter by searching for posts with keywords listed in the Top 20 common words and Wordcloud
<u>Top 20 Most Retweeted User</u>	"Who is a key person?" Potential hub?

6.1 Jetstar Tweets by Language



From the chart above, we gathered that the top 3 languages of Jetstar's tweets are in English, Thai and Indonesian.

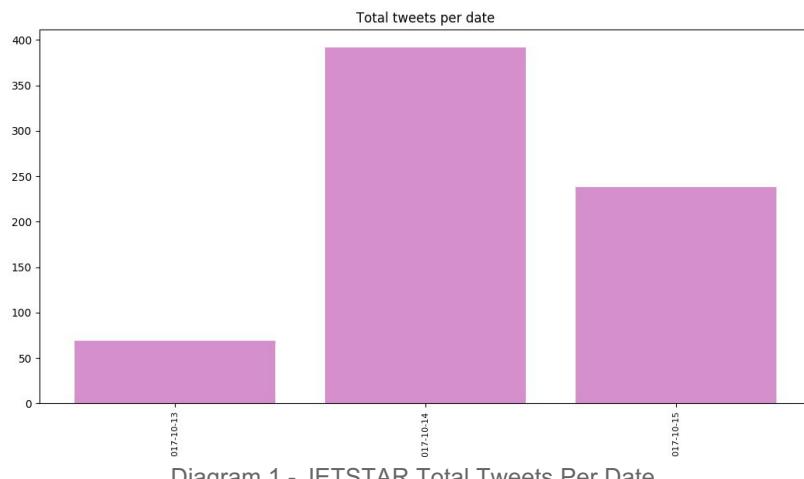
Bahasa Malayu happens to be the third most used language. Hence, there is a possibility that tweeters are from Indonesia/Malaysia. There is also a possibility that Jetstar is more popular and known in Indonesia. However, it appears that there is no official Jetstar_Indonesia account or any official account responding to these tweets. Translation was done for all Jetstar tweets to ensure that every consumer sentiment was captured, regardless of language.

6.2 Jetstar's Engagement by Day

Note: The existing analyses conducted thus far takes into account 700 tweets per company only. Hence, the resulting post dates are limited to 2 - 3 days of tweets. as we find value in analysing the most recent tweets.

Using the Total Tweets by Date code, the team managed to conduct two analyses.

6.1.1 Jetstar's Engagement vs. Scoot & Airasia's Engagement



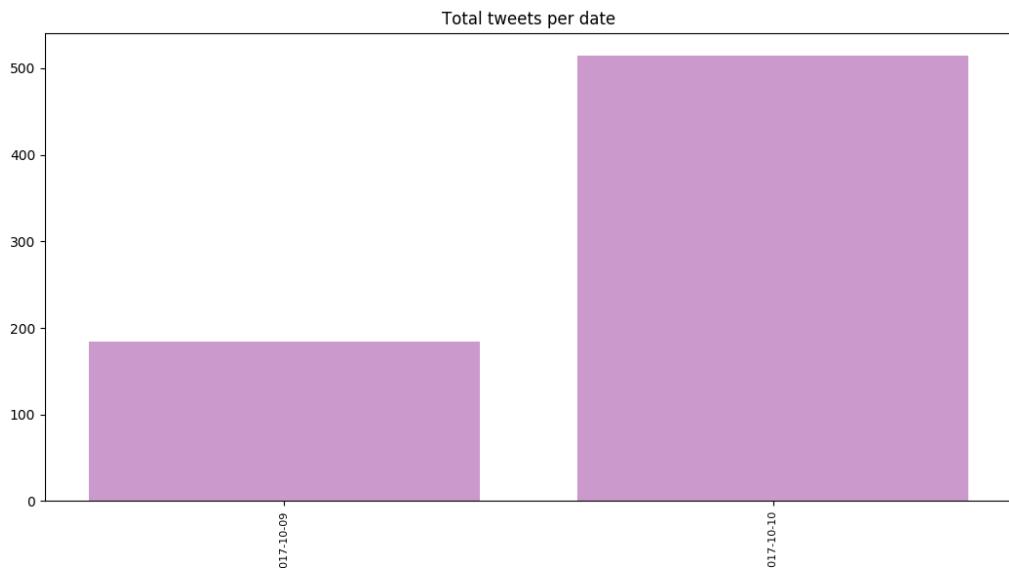


Diagram 2 - FLYSCOOT Total Tweets Per Date

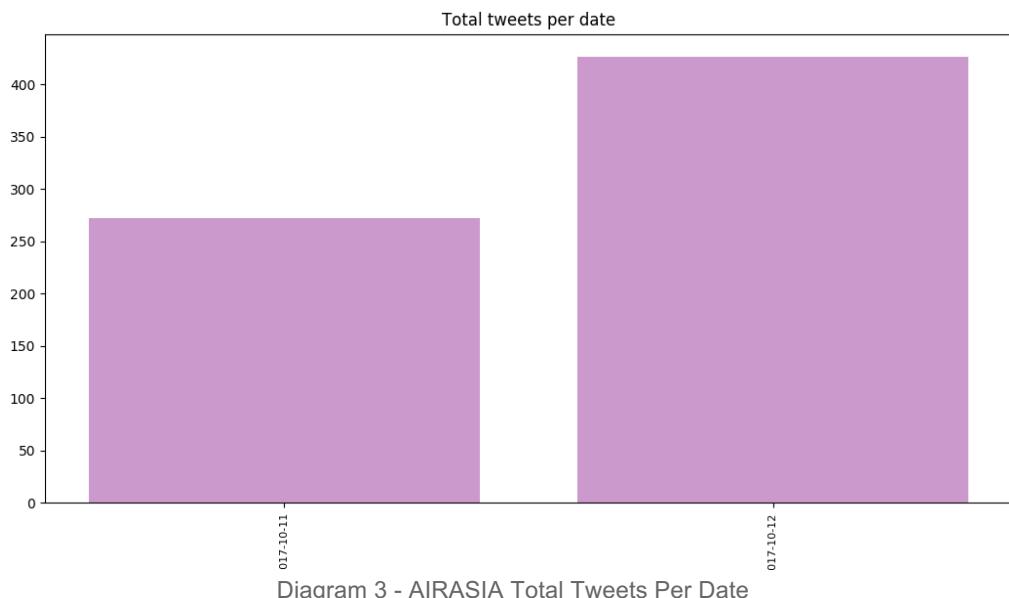


Diagram 3 - AIRASIA Total Tweets Per Date

6.2.2 Jetstar's Spike in Engagement 14 October 2017

According to the Total Tweets Per Date chart, there appear to be a higher level of activity and tweets on 14 October 2017. This increase in activity can be attributed to the baggage handling incident that plagued Jetstar. A baggage handler at Phuket International airport was caught on CCTV cameras rifling through a passenger's luggage from a Jetstar plane. This footage went viral on social media and many news outlets and users tweeted about this scandal.

6.3 Jetstar Wordcloud and Top 20 Commonly Used Words



Diagram 4: JETSTAR Wordcloud visualisation

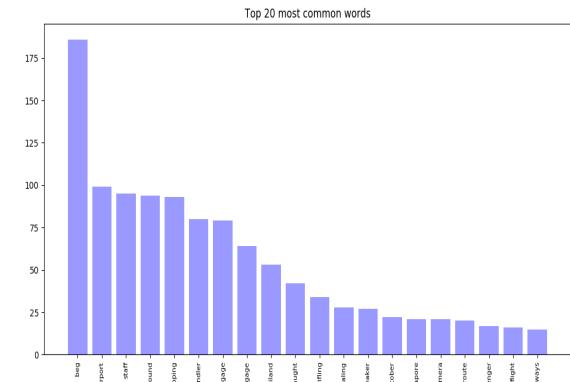


Diagram 5: JETSTAR Barchart Top 20 most common words

The prominent words in the wordcloud visualisation are **beg, airport, staff, ground and baggage**. This is further corroborated by the barchart of most retweeted words in Diagram 5. In Diagram 5, beg is the most common word to appear in tweets containing the search query Jetstar. This is followed by airport, staff, ground, and baggage. All of which have approximately the same frequency. The analysis based on diagram 4 and 5 will be listed below:

1. Beg

Beg is a word that has a negative connotation. There is usually an element of desperation, helplessness and anxiety. From Diagram 5, the frequency of this word is almost twice of the other words and this is especially pertinent. Upon visual inspection, tweets like “Jetstar I beg of you, please don’t delay my flight friday”, “no payment email, I shouldn’t have to beg” and “beg for refund”. This is highly reflective of the consumer’s perception of the service and standard of flights provided by Jetstar.

- a. Consumers have the perception that there is a lack of punctuality of flights offered by Jetstar. This can be inferred from the tweets that are begging for Jetstar to be on time.
 - b. Consumers are dissatisfied with the current level of service provided by Jetstar. This is inferred from the plethora of tweets that mention that they have to beg to attain a refund from a cancelled flight.

2. Staff

This is one of the most frequently mentioned word from tweets regarding jetstar. From social sensing on twitter, we found that many tweets are concerning the manners of the ground handling staff at the baggage counters and in-flight service of cabin crew. Such concerns reflect that consumers still regard service highly despite Jetstar being a budget airline. Thus, Jetstar could consider reviewing their employee-training programs and ensuring the employees' values are aligned with Jetstar's values.

Currently, Jetstar has not replied to most of these tweets. Jetstar would need to provide updates to customers on how they are intending to improve the customer service and prove to customers that they are in fact looking into this, rather than just replying to such tweets. Instilling trust in customers in their staff service seems to be an important factor amongst their customers and needs to be top in their priority to be addressed.

3. Airport, Staff, Baggage, and Ground

These 4 words have approximately the same frequency of appearance. This could be due to the baggage handling scandal that has plagued Jetstar. Hence, the high frequency of words like airport, staff baggage, and ground.

In response to this, Jetstar has been replying to each user that tweeted about it individually but they have not managed to respond to each and every user that tweeted about it. It would be impossible for Jetstar to reply to every user that is tweeting about this incident. A reasonable response would be to issue a public statement regarding the scandal via a tweet and pin this tweet on the top of the Jetstar page. This would be a better way to disseminate information about Jetstar's course of action involving the scandal.

6.4 Jetstar Top 20 Most Retweeted Users

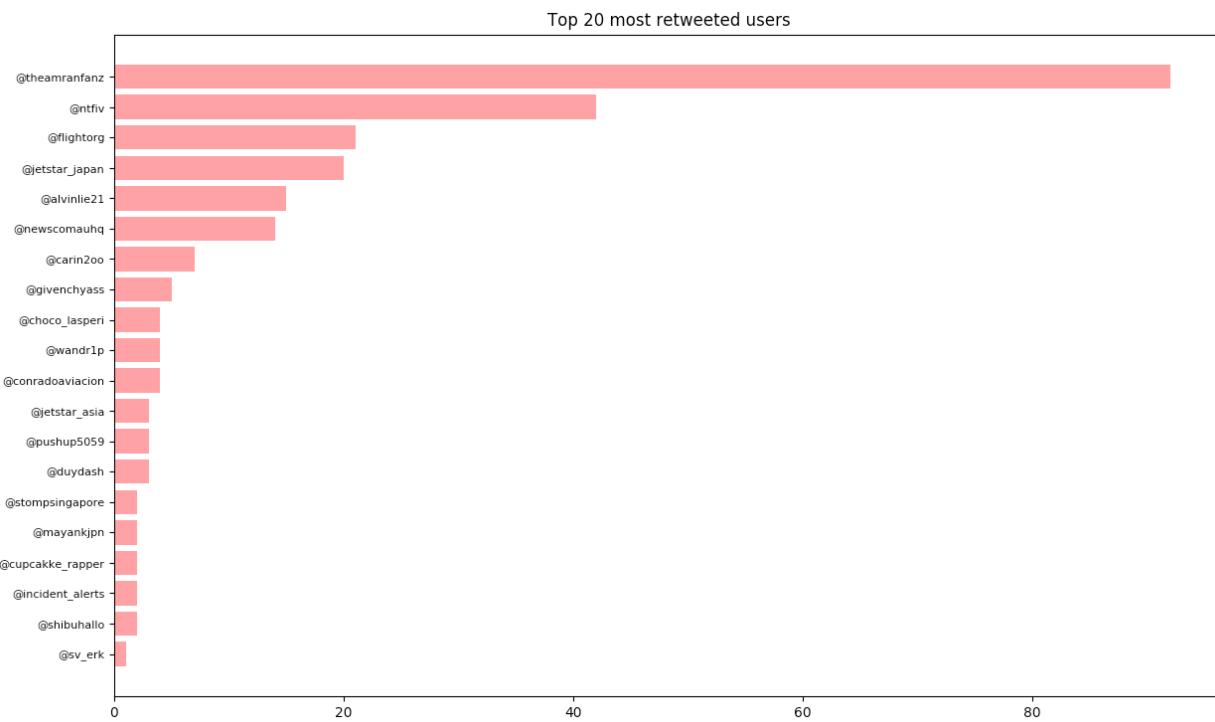


Diagram 6: Top 20 most retweeted users

In Diagram 6, we have the barchart of top 20 most retweeted users. It would be vital to identify the users who possess clout, have high degree centrality, and an interest in the airline/aviation industry. As such, we will be looking at users who have more than 20 retweets. This will indicate influence.

When looking up the top 2 most retweeted users, there was nothing particularly relevant to Jetstar or the aviation industry in their biography. They had appeared on the chart because they had merely shared an opinion regarding an event about Jetstar. Coupled with their followers, those tweets got retweeted beyond 20 times. Moving onto the 3rd most popular user, its twitter handle is @flightorg and it focuses on airline pilots, airline geeks and news. It has a follower count of 29.4k followers.

As for the 4th most popular user, its twitter handle is @alvinlie21 and he has an interest in aviation. He has a follower count of 46.1k followers.

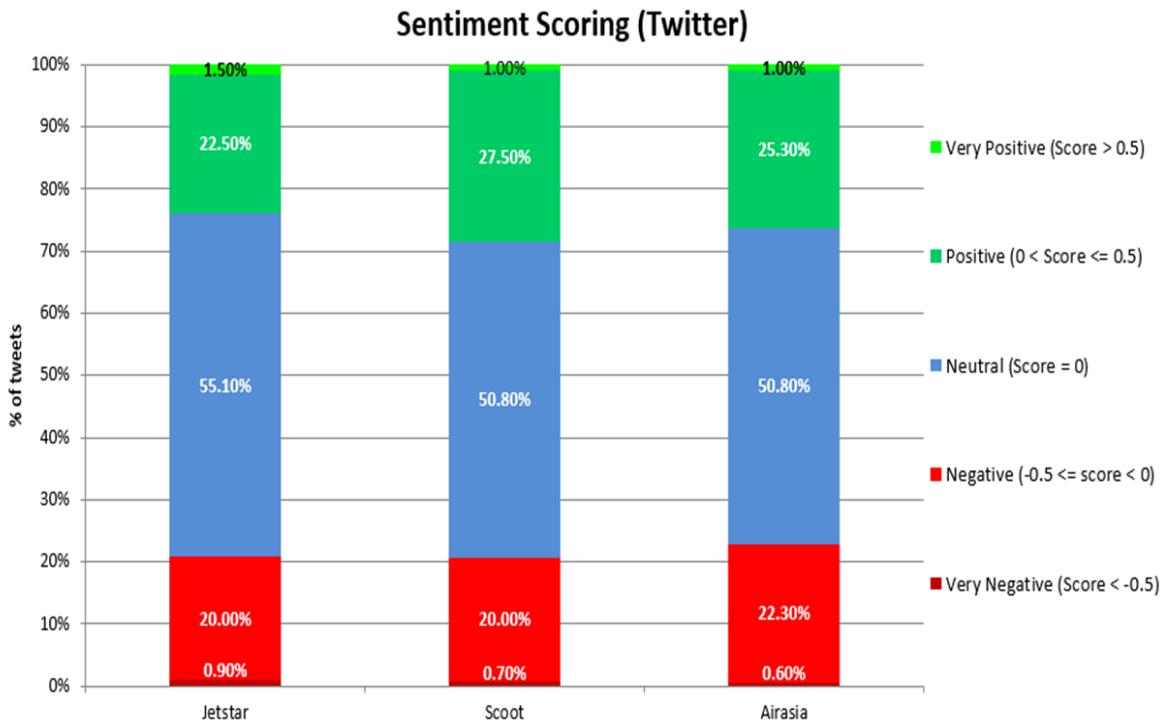
Lastly, @newscomeauhq is a the twitter account for the most popular Australian news site. It has a follower count of 483k.



Based on these 5 users listed, Jetstar should take note of @flightorg, @alvinlie21 and @newscomeauhq. @flightorg and @alvinlie21 are important because of their follower count and their interest in the airline industry. Users with interest in aviation/airlines/travel tend to have higher frequency of tweeting about topics which may be related to Jetstar, and have followers interested in these topics (based on the concept of homophily). Concerning @newcomequhq, it is an Australian brand just like Jetstar.

Jetstar should follow these users and switch on their notifications. This will allow Jetstar to be notified immediately when these users tweet. This is important because these 3 users will certainly tweet about any external events or dissatisfaction pertaining to Jetstar. The quick notification will allow Jetstar to reply to their tweets swiftly. This will increase Jetstar's response rate and allow them to rectify any misunderstandings efficiently, especially given that these individuals have followers who are likely to engage in tweets regarding Jetstar.

6.5 Twitter Sentiment Analysis



Overall sentiment score distribution on Twitter

From our sentiment analysis, we found that Jetstar has the highest percentage of very negative tweets at 0.9%, and neutral tweets at 55.10%. They also have the lowest positive and very positive scores on the whole, at 24.00%.

By assigning scores (-2 to +2) to the five different bins where -2 stands for ‘very negative’ and +2 represents ‘very positive’, a weighted average for each of the 3 airlines was calculated.

Overall sentiments (W.A)		
Jetstar	Airasia	Scoot
3.7	8.1	3.8

Overall weighted sentiment percentages on Twitter

From the scores, it appears that Jetstar is lagging behind their competitors, being 0.1 % below Scoot, and 4.4% below Airasia. Therefore, we undertake various analysis to understand the reasons for their lacklustre performance.

6.6 Popular Hashtags Analysis

Hashtags play a huge role in virality especially on platforms like Twitter, where use of the right hashtags can bring organic traffic and visibility to Jetstar without having to

spend on platform advertisements. In this analysis, we hope to identify popular hashtag categories that Jetstar could use in future through:

- 1) Competitor analysis of different categories of top hashtags and their popularity
- 2) Temporal analysis of top Jetstar hashtags across the 3 months

Popular hashtags

	Jetstar	Airasia	Scoot
Company-related	-	Airasiafamtrip2017, Vacaywithairasia, Airasiaindavao	Scootitude , Scootinmanila
Generic	Lcc, airplane, travel, flightdeal , flight, aviation, airlines	Travel, aviation, flight(s), airlines	Travel, Aviation, Airline, Dreamliner
Trendy	Avgeek, spidey	Daretodream, Avgeek, Bloggergoestosabah	Avgeek, thefutureisyellow , permittedonboard
Airline-related services/ companies	Qantas, flightaware , AGTiket	virgin	Boeing, tigerair, airbus, flightfinder
Flight-specific	A320, 830, 846	-	787, a320, 787 baby, a320bae
Location-specific	Singapore, Australia, Melbourne	Malaysia, kotakinabalu, Sabah, Thailand	Singapore
Event-specific	Ravolution		Danamonrun , Megaapac
Others	9news	News, bbc , biznewsfix	

Diagram 7: Popular hashtags in each category

From the top 20 most popular hashtags on twitter for the 3 companies, we classified the hashtags into 8 categories as shown in the above table 7. For hashtags that were mainly written by other twitter users themselves to promote their own services, they were removed as indicated by the strikethrough.

Category of hashtags	Jetstar	Airasia	Scoot	Normalised popularity score (Average)
Trendy	0.016	0.005	0.018	0.013
Airline-related services/companies	0.002	0.003	0.008	0.0056
Company-related	-	0.004	0.005	0.0048
Flight-specific	0.003	-	0.007	0.0055
Generic	0.004	0.006	0.006	0.0055
Event-specific	0.002	-	0.004	0.0036
Location-specific	0.002	0.003	0.008	0.0032
Others	-	0.004	-	0.0039
Sum	0.03	0.02	0.06	

Diagram 8: Popular score for each kind of hashtag

Each hashtag's occurrence was then divided by the number of tweets we have crawled from that company to normalise the hashtag popularity score and allow us to compare hashtag popularity across companies. Taking an average of the normalised hashtag scores per category give us the overall normalised hashtag category popularity score (Appendix 06). Recognising that different hashtag categories may work differently for different companies, the scores for different companies aside from different categories were also considered.

1) Overall across all 3 companies

From table 8, we find that trendy and airline-related companies' hashtags seem to be the most popular. This shows that many twitter users not only use trendy hashtags, but also compare or associate budget airlines with other airline-related services/companies. Aside from airline-related hashtags, flight-specific, generic, company-specific, and event-specific hashtags are also rather popular.

2) Comparative analysis

Scoot seems to be performing the best amongst the 3 companies in hashtag popularity, topping all categories. Hashtags in others and generic categories are more popular in airasia tweets.

3) Company-level analysis - Jetstar

For Jetstar, trendy hashtags are the most popular, followed by generic hashtags. Therefore, we recommend them to focus on trendy and generic hashtags. Examples of trendy hashtags they can consider include #staycay, #finallyfree, #fly, #escapin, #neverland, and #asiaroadtrip.

From our analysis, we found that Jetstar does not use company-related hashtags. We also discovered that Jetstar rarely uses hashtags in their twitter posts, except occasionally with #FridayFreeFareFrenzy. Learning from Scoot, Jetstar could look towards company-related hashtags, and test how well they perform relative to their other hashtags. Some examples include #funwithjetstar, #dreamjstrip, #jetstaycay, and #jetforgood.

We recognise that except for their partners, Jetstar would probably not gain from associating themselves with other airline-related companies. However, Jetstar could consider mutually beneficial partnerships in future, preferably with renowned brands with complimentary services. For example, they could partner with aggregators like Skyscanner or hotels and car/home rental services such as airbnb and hotels.com to provide their customers with a full travel experience from flight to hotels and car rental services and lift their perceptions of Jetstar above what they would expect of a budget airline - that Jetstar is more than just a flight service provider.

From this mutually beneficial partnership, Jetstar could also introduce joint-hashtags with airline-related companies for their respective campaigns, such as #jetsky, and #jetbnb to leverage on the popularity of airline-related hashtags whilst trying out hashtags related to their company for exposure. These could be used to support joint flight, hotel, and car rental packages offering rewards such as loyalty points for customer retention.

Month(s)	3	Category	2	Category	1	Category
	lcc	Generic	singapore	Location-specific	cheapflights	Generic
	846	Flight-specific			bali	Location-specific
	airplane	Generic	avgeek	Trendy	1	Flight-specific
	travel	Generic	flight	Generic	airlines	Generic
	qantas	Airline-related services/companies	aviation	Generic	7	Flight-specific
					ripoff	Others
					fjallravenkanken	Others
					brand	Generic
					consumerrights	Others
					spidey	Trendy
					medan	Location-specific
					melbourne	Location-specific
					marvel	Others
					17	Flight-specific
					news	Others
					18	Flight-specific
					airline	Generic
					978	Flight-specific
					ausbiz	Others
					830	Flight-specific
					a320	Flight-specific
					ravolution	Event-specific
					afterpay	Others
					japan	Location-specific
					pilot	Generic
					988	Flight-specific

Diagram 9: List of hashtags on Jetstar related tweets over 3 months

Compared to trendy hashtags, we estimate that these hashtags would be longer-lasting which have been proven by past data on airline-related hashtags being present on all 3 months, and hence can create more overall buzz and be used over the long term.

4) Temporal analysis of persistently popular hashtags

From Diagram 9, we found that longer-lasting hashtags present on all 3 months include a mix of airline-related, generic, and flight-specific hashtags. Even though trendy hashtags are the most popular, their viral effects are only temporary, and thus they need to be complemented with airline-related companies' and generic hashtags. Considering how hashtag popularity changes with time, Jetstar should adopt a plan for changing their hashtags regularly, preferably weekly or monthly to prevent consumer fatigue.

6.7 Key Topics from Jetstar, Scoot and AirAsia tweets

Using the respective twitter dataset for each airline, key topics will be identified for each of the airline for July, August, September and overall 3rd quarter. The Airasia, Jetstar and Scoot dataset contains 25k, 8k and 1.5k tweets respectively. The table below highlights the the topics for each airline.

Airlines/Months	Jetstar	Scoot	AirAsia
July	<ul style="list-style-type: none"> cheap, flights, airplanes singapore, flights, hat cheap, narita, time 	<ul style="list-style-type: none"> thefutureisyellow, tigerair, a hi, booking, thank tigerairsg, merger, singapore 	<ul style="list-style-type: none"> asia, hi, booking brisbane, bird, strike, bird, strike, news
August	<ul style="list-style-type: none"> flights, sale, melbourne jet, bit, spider jet, spider, rare 	<ul style="list-style-type: none"> check, take, singapore hi, service, customers please, reply, check 	<ul style="list-style-type: none"> askairasia, hi, booking asia, low, asean asia, flights, iloilo
September	<ul style="list-style-type: none"> travel, narita, sale afterpay, first, flights ticket, cheap, round 	<ul style="list-style-type: none"> please, help, services hi, please, thank singapore, india, flights 	<ul style="list-style-type: none"> asia, service, asean india, new, flights asia, fat, news
3rd Quarter	<ul style="list-style-type: none"> cheap, air, ticket jet, sale, plane jet, star, spider 	<ul style="list-style-type: none"> customer, singapore, hi, flights, new, time hi, please, thank 	<ul style="list-style-type: none"> asia, a, sale india, new, bird kl, fat, asean

When looking at the common topics on a monthly basis, it can be observed that the topics listed in the table are events for that month. For instance, during August, Jetstar Japan collaborated with Spiderman, resulting in the Jet and spider topics occurring and

in September, Jetstar collaborated with after pay which accounts for the topics. This is also seen in the month of July for Scoot where they officially merged with Tigerair and the topics Tigerair, merger and Singapore were listed. Similarly, during July there was the a bird strike on an Airasia plane in Brisbane plane, an announcement that Airasia was flying to iloilo and that there was a new policy pertaining to seating of oversight passengers on Airasia. Thus, it can be deduced that Twitter is used for disseminating new information or generating engagement with such events.

In the last row, there is also a summary of topics for the 3rd quarter. Generally, the topics for both Jetstar and Airasia are focusing on their cheap air tickets and events surrounding the 2 companies. As for Scoot, the topics are vastly different from Airasia and Jetstar. They are “customer, Singapore, Hi”, “Hi, please, thank” and “flights, new time”. These 3 topics relate to the customer service aspect and from the topics, it seems like Scoot is not doing enough to address the customer’s needs on Twitter. In conclusion, both Airasia and Jetstar are faring well in responding to customers needs on Twitter and Scoot is falling behind.

6.8 Analysing Instagram

Currently, all 3 airlines are on Instagram. They utilise Instagram as a marketing tool by posting a myriad of pictures to increase exposure and enhance engagement. The table below summarises key metrics from the Instagram data collected. From this table, a competitor analysis will be done.

No.	Metric	Jetstar (@jetstarasia)	Scoot (@flyscoot)	Airasia(@airasia)
1	Followers	61.6k	61.5k	494k
2	Average like per post (Applause rate)	563	439	3244
3	Average like-to-Follower Ratio	9.14	7.14	6.57
4	Average comment per post (Conversation rate)	10	5	50
5	Average comment-to-Follower ratio	0.16	0.08	0.10

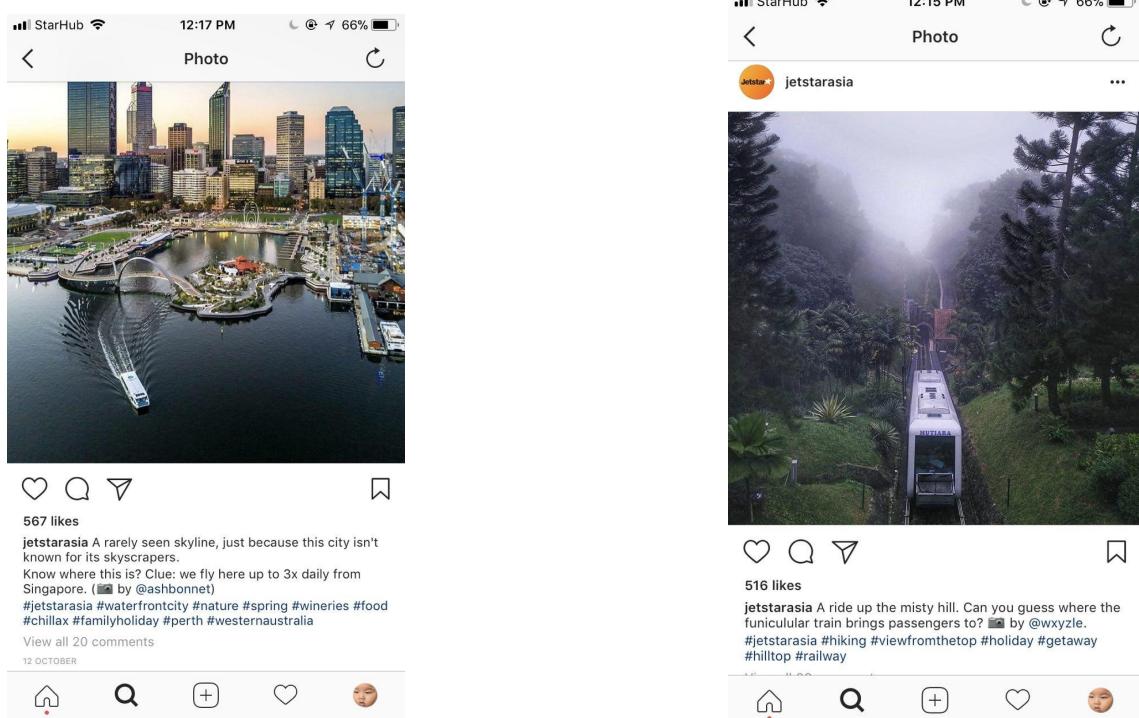
6	Average number of complaints/unfavourable comments per post	0	1	7
7	Number of complaints/unfavourable comments per comment	0	0.05	0.1

The metrics, average like per post(2), average comment per post(5) and average number of complaints/unfavourable comments per post (7) were chosen because they represent the level and type of engagement each airline has with users on Instagram. For (2) and (5), it was further divided by number of followers as using a relative ratio to do a comparison would be more accurate. This is because Airasia has larger number of followers than both Scoot and Jetstar and thus, magnitude of (2) and (5) would also be larger.

Looking at (4), (6) and (8), Jetstar scores the best in all 3 components. Jetstar has the highest average likes: follower ratio and the average comment: follower ratio which implies that Jetstar has the highest engagement with Instagram users. Furthermore, Jetstar has the lowest number of average complaints/unfavourable comment per post and number of complaints/unfavourable comments per post. This means that user engagement is largely positive or neutral. Out of all 3 airlines, it would be reasonable to conclude that Jetstar is utilising their instagram account best as compared to Scoot and Airasia.

6.8.1 Jetstar's Current Strategy

Jetstar has the highest user engagement because of the unique strategy they offer. Jetstar strategically posts pictures of tourist destinations and caption it in a manner that engages users. For instance, the screenshots depicts the strategy that Jetstar utilises.



As seen in both pictures above, Jetstar uses aesthetically pleasing pictures of scenery or tourist destinations and in caption, they ask the users to guess the location of the picture. Subsequently, Jetstar will comment again to reveal where the picture was taken at. From this, it is evident that their strategy is working well as they have scored better than Airasia and Scoot in the metrics listed above.

6.9 Tripadvisor Overall Rating

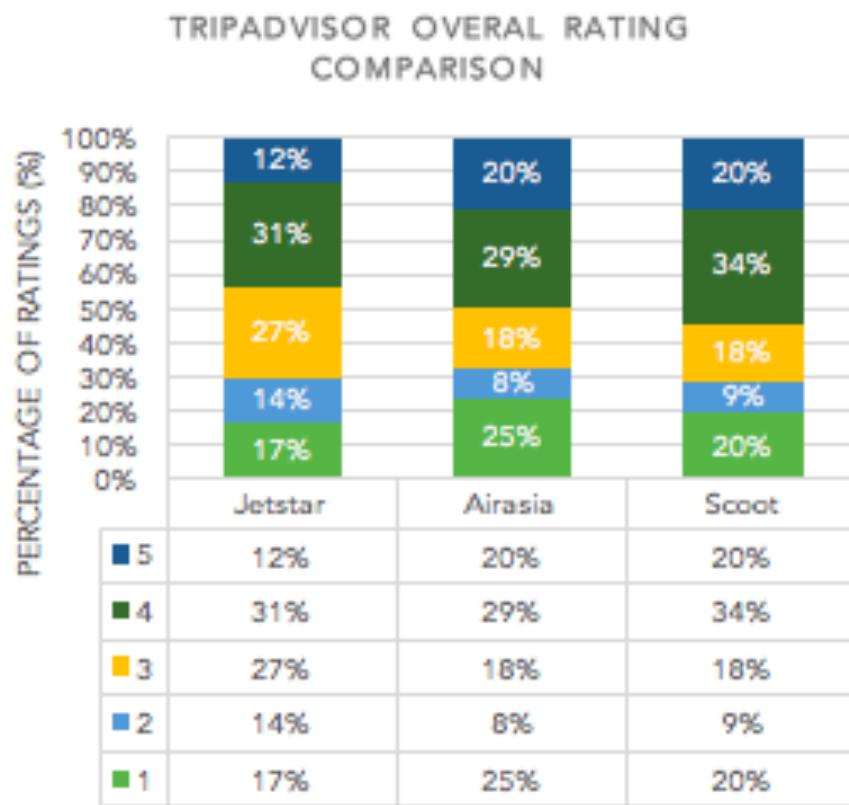


Diagram 10: Tripadvisor Overall Rating

Our team identified Tripadvisor as the most suitable platform to gather consumers' sentiments and input for Topic Modelling. 2 key information that we scraped out from Tripadvisor all for 3 companies are their reviews and respective overall rating ($n = 700$ reviews per company).

From the Tripadvisor Overall Rating table above, overall ratings of the three companies are generally similar, each receiving about 68 – 72% of 3-stars rating and above. However, Jetstar is lacking behind Scoot and Airasia in the 5-star ratings category while performing better in the 3 and 4 stars-rating. To better determine the strongest player in this analysis, we calculated a weighted average using the ratings (where 5-stars = more weightage etc.) and the percentage of ratings (Diagram 11: Tripadvisor Weighted Average)

Weighted Average (%)		
Jetstar	Airasia	Scoot
3.07%	3.12%	3.24%
$=SUMPRODUCT($E$4:$E$8,I4:I8)/100$		

Diagram 11: Tripadvisor Weighted Average

It appears that Scoot is the best performing airline with a score of 3.24% and Jetstar being the worst with a score of 3.07%.

6.10 Tripadvisor Overall Sentiment Scoring (Using Reviews)

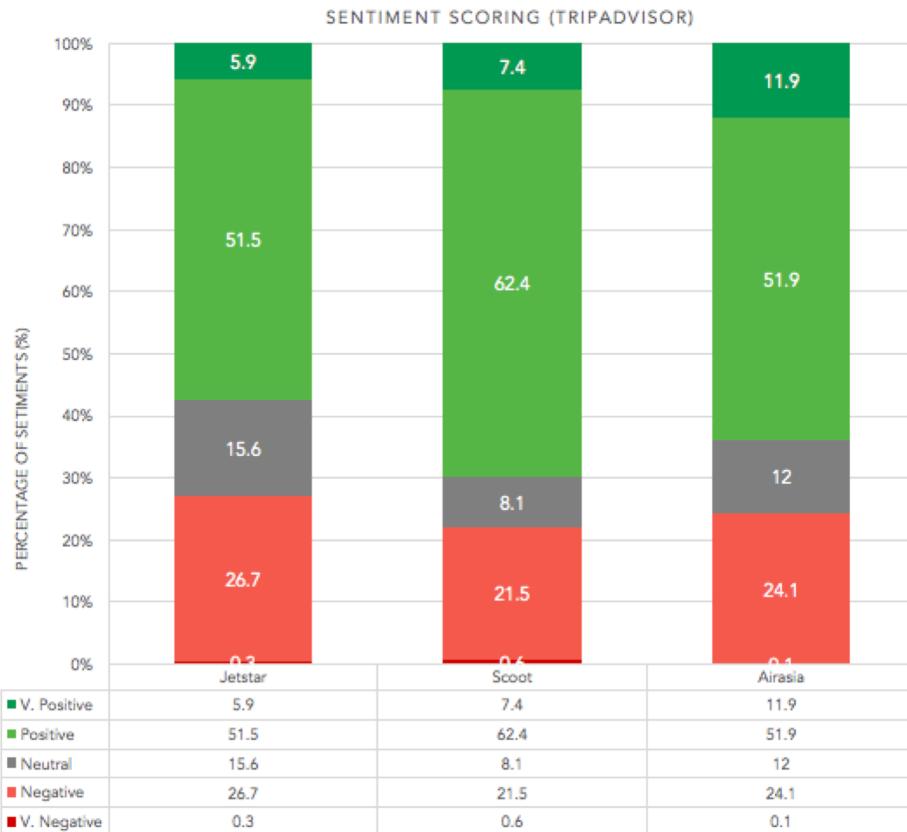


Diagram 12: Tripadvisor Sentiment Scoring Overview

Next, we performed an overall sentiment scoring analysis on the 700 reviews we received for each company. Jetstar does not seem to be performing well as compared to its competitors, where it is seen to have the biggest portion of negative reviews and the least amount of positive and very positive reviews. Once again, to get a more accurate ranking of the three companies, we calculated for another weighted average by assigning scores (-2 to +2) to the five different categories where -2 stands for ‘very negative’ and +2 representing ‘very positive’.

Company	Overall Score
Jetstar	36
Scoot	54.5
Airasia	51.4

Diagram 13: Tripadvisor Sentiment Scoring Overall Score

Once again, Jetstar is the worst performing of the three and similarly, Scoot outshines the others by emerging top with a score of 54.5. It is important to recognize that the score difference in this analysis is fairly large, where Jetstar sees almost a 20-point difference from its competitors. These results are consistent with twitter sentiment analysis, where Jetstar also performed the worst amongst the 3.

6.11 Tripadvisor Topic Modelling

We know now that Jetstar seems to be performing badly as compared to its direct competitors. However, it is unclear to us exactly which area is Jetstar performing poorly in. Hence, we decided to narrow further into 4 main areas that affects customers' experience. This will be done using the Topic-Modelling approach. The following table documents the overall categories and their respective commonly appearing words generated from LDA using Gensim library.

Topic-Modelling Keywords

CATEGORY	JETSTAR (711)	SCOOT (699)	AIRASIA (698)
OVERALL SERVICE	Time, Service, Seat (35)	Time, Service, Seat (50)	Time, Service, Seat (29)
BOARDING TIMELINESS	Check, Time, Bag (52)	Check, In, Time (87)	Time, Seat, Check (29)
IN-FLIGHT FOOD	Food, Flight, Time (50)	Seat, Time, Food (46)	Food, Flight, Time (31)
IN-FLIGHT BAGGAGE SPACE	Cabin, Space, Luggage (17)	Luggage, Flight, Fly (28)	Service, Customer Baggage (9)

Diagram 14: Categories and Words Filter

We extracted reviews containing all the three commonly words for each category and company and performed another sentiment analysis on these reviews. The following chart documents the performance of each company in the 4 categories.



Diagram 15 : Charts by Category

Weighted Average Scores

	Overall Service	Boarding Timeliness	In-Flight Food	In-Flight Baggage Space
Weight	4	3	1.5	1.5
Jetstar	40.1	-38.5	16	-82.3
Scoot	56	29.9	58.7	35.7
Airasia	48.3	55.2	70.9	-22.3

Overall Score

Score
10
-54.55
455.3
431.7

Again, we calculated for an overall score for each category using a weight averaged method and the normalized sentiment scores. The individuals weights were assigned according to a set of results by ISES that documented key factors that drives consumers' perceived quality and experience (Appendix 7).

It appears that Jetstar is the worst performing airline in all the four categories. More importantly, the contributing factors of this poor performance seems to be Jetstar's 'Boarding Timeliness' and 'In-flight Baggage Space' where it scored a very low score of

-38.5 and -82.3 respectively. With reference to Table _ : Charts by Category, we can observe that a huge 88.2% of the reviews of Jetstar's In-Flight Baggage Space were negative reviews. As for it's 'Boarding Timeliness', a fairly high 67.3% of its reviews were also negative.

What about ‘In-Flight Baggage’ and ‘Boarding Timeliness’?

In order to better diagnose and understand consumers' sentiments on Jetstar's 'Inflight Baggage' and 'Boarding Timeliness', we proceeded to build a wordcloud each for all the reviews related to the two topics.

A wordcloud visualization representing feedback on Jetstar's cabin, space, and luggage. The words are categorized by color: red for cabin, blue for space, and green for luggage. The size of each word indicates its frequency or importance in the dataset.

Cabin (Red):

- problem (large, dark red)
- crash (medium, dark red)
- well (medium, light red)
- pretty (large, light red)
- friendly (medium, light red)
- lose (small, light red)
- weird (small, light red)
- ready (small, light red)
- lost (small, light red)
- goodness (small, light red)

Space (Blue):

- space (large, medium blue)
- quiet (medium, medium blue)
- rude (small, medium blue)
- ok (small, medium blue)
- breeze (medium, medium blue)
- handy (small, medium blue)
- fast (small, medium blue)
- regrettably (large, light blue)
- available (medium, light blue)
- chaos (small, light blue)
- definitely (small, light blue)
- unfortunately (medium, light blue)
- free (small, light blue)
- wearily (small, light blue)
- hot (small, light blue)
- wonder (small, light blue)
- waste (small, light blue)

Luggage (Green):

- complaints (large, dark green)
- perfunctory (small, dark green)
- helpful (medium, dark green)
- much (small, dark green)
- unfair (small, dark green)
- cheerful (small, dark green)
- miracle (small, dark green)
- poor (large, medium green)
- appreciate (small, medium green)
- losing (small, medium green)
- slow (small, medium green)
- wondrous (small, medium green)
- stupid (small, medium green)
- shame (medium, light green)
- little (small, light green)
- really (small, light green)

In-Flight Baggage Wordcloud

Boarding Timeliness Wordcloud

Two of the most commonly appearing words for ‘In-Flight Baggage’ are ‘Problems’ and ‘Limited’. Upon screening through their reviews for these two words, it is found that customers are mostly unhappy with the limited cabin space in Jetstar and that it is unfair to those who boarded the flight last. This is a very common phenomenon for budget airlines because consumers who fly Jetstar or other budget airline often carry a hand-carry instead of checking-in their baggages. This may put Jetstar in a good position if it can resolve the issue.



NikiKoh
Singapore
Level Contributor
 93 reviews
 92 helpful votes

"Brisk service, tight seats"

Reviewed 12 September 2017

Price matches quality. Seats have limited leg room but service is cheerful. Good for short flights. Board early if you have cabin luggage as overhead space is very limited due to the fact many do not purchase check in baggage allowance.

Singapore - Ho Chi Minh City

Economy

Southeast Asia

Helpful?

Thank NikiKoh

Report

E.g. of 'In-Flight Baggage' Limited Space Complaint

As for the 'Boarding Timeliness', we looked into reviews that contained the more commonly appearing words 'Delay' and 'Cancel'. Many reviews raised complaints on flight and check-in delays and some leading to cancellation of flights. These incidences can seriously damage the brand's reputation and it is crucial that Jetstar addresses them.



Doreen T
Singapore, Singapore
Level 6 Contributor
 208 reviews
 43 helpful votes

“Flight delayed with no explanation given”

 Reviewed 7 September 2017

Flight Number : 3k 602
Flight time about 2hrs 15 mins
1 hour time difference between Siem Reap, Cambodia and Singapore.

Scheduled departure time : 3:55pm
Departure time flashing on the screen when issuing board pass : 20:00
The most amazing thing was that it was printed on the pass : Please be at the boarding gate before : 1615
Actual departure time : 7:08pm

There's no staffs around to brief about the delay, just the photocopy of the above notice with no reason given. Where's the JetStar team member?

No meal voucher or drink given

When the gate opened for boarding, there's a passenger next to me who complained to the ground staff that he just ordered food at a restaurant.

One could not ask for compensation from travel insurance since the delay was not more than half day nor was it due to natural disasters

Best of all, this happened on the fifteenth day of the seventh month.

Travel Tip: Be prepared to pay an extra of S\$32 more if you decide to sit on the extra legroom seat when it was empty on your flight.

[See more travel tips](#)

E.g. of review related to Boarding Timeliness

7.0 Recommendations

Based on the analysis and competitor landscape done above, the recommendations listed below leverage on the insights derive. These recommendations will allow Jetstar to address lacking areas in their current service and optimizi their social media strategy.

Recommendation 1: Improving customer experience

As mentioned above in the competitor analysis, Jetstar had the lowest score for boarding timeliness and in-flight baggage. These 2 aspects of Jetstar contributed to the overall lowest ranking amongst Scoot and Airasia. This is a pertinent issue and it is imperative for Jetstar to 32ptimizin the abysmal performance in boarding timeliness and baggage space and tackle it.

A. Addressing Boarding Punctuality

Sometimes, budget airlines encounter punctuality issues and Jetstar has performed poorly in this aspect. Numerous flights have been delayed and Jetstar should do a thorough internal investigation. It is vital for Jetstar to look into their internal business operations and stick to the stipulated time. If they are unable to do, they should give an appropriate explanation to the passengers affected by announcing it in the airport, by social media or text message. Enquiries should also be handled in a respectful and timely manner. Lastly, if finances permit, Jetstar can give a give an adequate compensation such as food vouchers to bring about service recovery.

B. Maximising Overhead Cabin Space

More often than not, airlines are unable to accommodate the number of carry on baggage for a fully booked flight. Jetstar has a severe problem with effective baggage management. For fully booked flights, Jetstar should inform all passengers about the maximum flight occupancy and offer to check-in a reasonable number of carry-on luggage at the boarding area for free. This is to ensure that space will be freed up. Also, airline crew should also strictly enforce the 1 carry-on baggage per passenger rule and aid passengers in 32ptimizing the amount of limited space in the overhead cabin.

With these 2 solutions in place, it will certainly address the categories Jetstar is underperforming in. Thus, this will improve the overall customer experience with Jetstar and increase their overall brand equity.

Recommendation 2: Optimising social media usage

Currently, Jetstar uses social media for marketing and engagement with users. However, they are unaware of the effectiveness of their social media strategy as their usage of social media is haphazard and undirected. Below are a list of recommendations for Jetstar to incorporate:

A. Enhance Existing Instagram Strategy

Jetstar should enhance their strategy to leverage on the existing success they have. A recommendation would be to include the price of the flight to that destination when they reveal the location of the picture in the subsequent comment. This a small tweak but it could possibly lead to a monumental change. The price of the flight is extremely crucial and provides information for call to action. Thus, with the addition of the price of flight, it can further engage consumers and convert Instagram viewers to actual paying consumers.

B. Improve usage of twitter hashtags

As mentioned earlier, Jetstar rarely uses hashtags on Twitter, and do not frequently change their hashtags. After analysing Jetstar Japan's past success with the use of #spidey that leveraged on superheroes like spiderman to create buzz, we recommend Jetstar to look into other trendy hashtags such as #staycay, #fly, #escapin for generating organic buzz. The usage of trendy hashtags will be in tandem with sustaining and generating buzz for a particular event on Twitter.

Aside from trendy hashtags, they could experiment with joint-hashtags such as #jetsky and #jetbnb established through mutually-beneficial partnerships with companies providing related/complementary services to improve perceptions of Jetstar and provide their customers with a holistic service experience rather than being simply a flight provider.

C. Using Twitter to Manage External Events

Budget airlines are always plagued with scandals. When scandals like these happens, it creates a buzz on social media. Many users and news outlet will tweet about this incident. Often, the person managing the airline's social media outlet does a poor job of handling the buzz and doing damage control.

Jetstar is no different and it suffers from the same problem.. Based on the insights draw from the above, this is a response framework that Jetstar should utilise in the future to deal with scandal and buzz activity. The response framework is as follows:

1. Issue a public statement about the incident by tweeting immediately.
 1. Pin it on the page so that visitors are aware that Jetstar has acknowledged the issue and is working on it

2. Monitor key and prominent users such as news outlets and person of influence
 1. Work with them on clearing misunderstandings and respond to tweets if needed
 2. Disseminate latest information to these users so that they can update their followers
 3. Respond to users who tweet @Jetstar (if time permits)
 4. Repeat step 1 if there is new information

Conclusion

Based on the analysis did above, we utilized the insights gathered above to paint a the competitive landscape in the budget airline industry and also pushed out recommendations to help further Jetstar. Our recommendations serves to address the lacking areas in Jetstar right now and also help them optimize their social media strategy. This 2 pronged recommendation will enhance Jetstar's current brand equity and enhance the customer experience at every consumer touchpoint.

8.0 Assumptions and Limitations

8.1 Assumptions

The following are some assumptions that hold through this analysis and report:

1. Tweets that were retweeted are reflective of actual sentiments of retweeter
2. This was made as our sentiment analysis includes sentiment scores of retweeted tweets, but retweets may be due to reasons such as informing their followers who might be interested in the tweet.

8.2 Limitations

The team also noted limitations in the current analysis that arose as a result of the assumptions, data set and methods used. They are as follows:

1. The tweets crawled might not be representative of the entire population. Private users who tweet about Jetstar will not be included.
2. Due to confidentiality issues, Jetstar did not give us access to their Facebook account. There is a sizeable amount of comments and interactions on their Facebook page which we did not analyse.
3. Even though non-english tweets on twitter were translated to english for analysis, inaccuracy of translation especially for local slangs could limit the accuracy of the data collected from twitter.

9.0 Technologies and Tools

The following technologies and tools were used in conducting the analysis for this project.

Type	Software/Tool
Integrated Development Environment (IDE)	PyCharm
Language	Python (Ver 2.70 and Ver 3.60)
Python Libraries	Nltk, Numpy, Matplotlib, Json, Wordcloud, Yaml, Collections, Gensim, Selenium, Re, Tweepy, Wordnet, Langid, Time, Pandas, Googletrans, Warnings
Other Reference Libraries	GetOldTweets by Jefferson Henrique
Visualization/Analytics Software	Tableau Microsoft Excel

10.0 Team Contribution

In the earlier phase, all team members were active in brainstorming, researching and formalizing the overall approach of this project. This was a crucial step in ensuring that everyone is clear on the objectives and of the project. The team then took into consideration every member's' expertises in deciding the work allocation and focus to ensure higher efficiency and quality of work.

Members	Primary Role	Contributions
Zed Lau (Team Leader)	Coder / Developer	Generated Codes for: <ul style="list-style-type: none">Instagram CrawlData CleaningFrequency CountWordCloudTopic Modelling Debugging Codes / Advising on code development
Quek Chiew Xia	Coder / Developer	Liaison with Jetstar Research & Analysis Generated Codes for:

		<ul style="list-style-type: none"> • Twitter Crawl • Data Cleaning • TripAdvisor (Selenium) • Sentiment Scoring
Kanchen Kummar	Research and Analysis	<p>Research Report and Presentation Analysis Generated Codes for:</p> <ul style="list-style-type: none"> • Twitter Crawl • Sentiment Scoring
Shawn Pang	Coder / Research and Analysis	<p>Research Report and Presentation Analysis Generated Codes for:</p> <ul style="list-style-type: none"> • Twitter Crawl • TripAdvisor (Selenium) • Sentiment Scoring

X. Appendix

Appendix 01 - ISES CSISG 2017 Survey Overview

How Well Did Companies Satisfy Their Customers? CSISG 2017 Q2 Results Overview



QUALIFIER FOR RESPONDENT

- (1) Recently interacted with companies/brands (Past 3 months for Land Transport, Past 6 months for Airlines & Budget Airlines)
- (2) Each respondent evaluates satisfaction with 1 to 2 companies/brands from different sectors

* Refers to companies/sub-sectors significantly above their sub-sector/sector scores

Note: Responses for Tigerair were captured before the merger with Scoot.

10

Appendix 02 - Dictionary and Corpus

Refer to text file attached

Tripadvisor Reviews on In-Flight Baggage Space and other Baggage Matters

Grace C
Level 4 Contributor
36 reviews
8 helpful votes

“The Worst Budget Airline Ever”

 Reviewed 3 weeks ago via mobile

I got stopped randomly to get my baggage checked and they INSISTED on me checking in and paying an additional \$60 because I was only 1 hour away from flying off.

They insisted I paid by cash however I only had my credit card no ATM card. They still insisted I find a way to get cash. Really?! 1 hour before my flight?!

If that's not okay, when I landed, I found my luggage severely mishandled, my luggage tags were all broken, the stickers were found ripped off and my LUGGAGE LOCK WAS BROKEN AS WELL. I've been travelling more than 15 times this year and this is the first time any airline mishandled my luggage the way I got mine back.

Even if Jetstar Asia is going to be the cheapest airline available, I'm never going to patronise this Budget Flyer ever again.

Travelled October 2017

Seat comfort

 Customer service (e.g. attitude, care, helpfulness)

Legroom

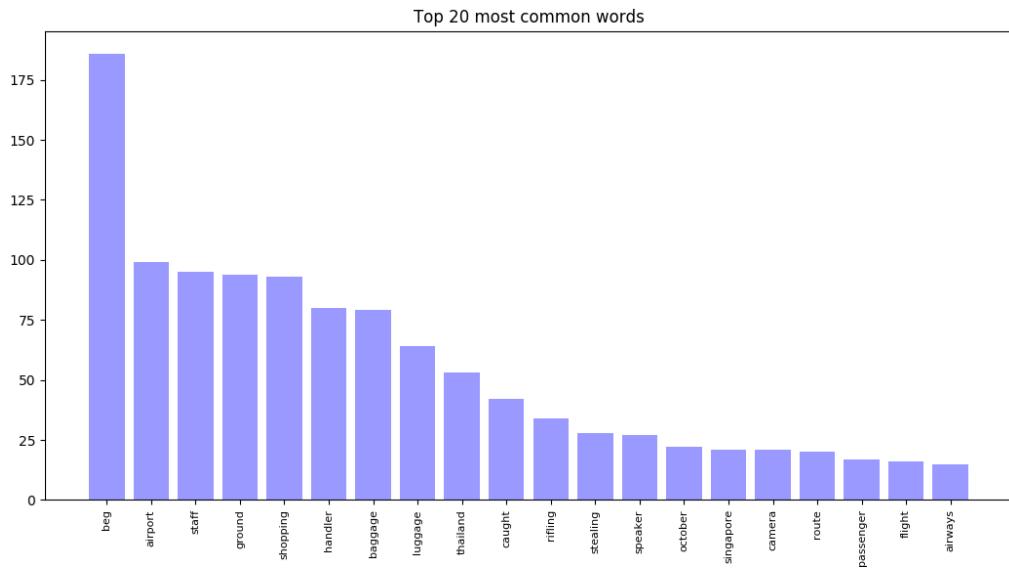
 In-flight entertainment
(WiFi, TV, films)

Appendix 03 - Jetstar

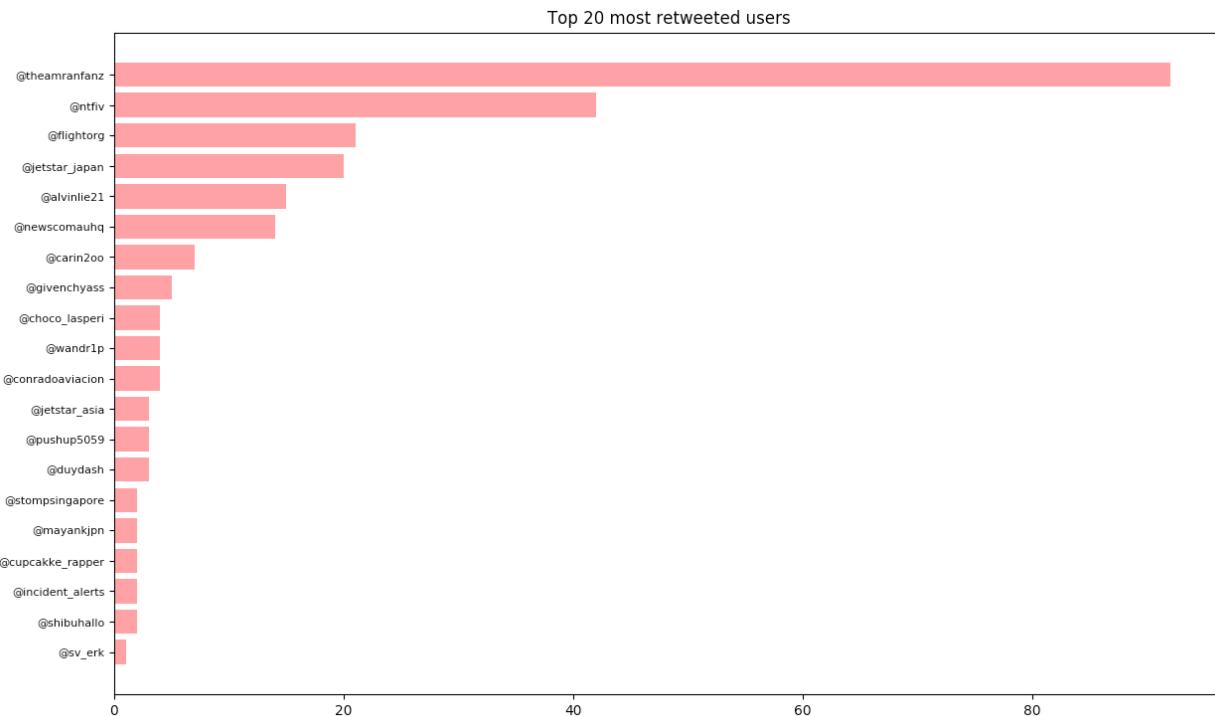
3A - Jetstar Wordcloud



3B - Jetstar Top 20 Words

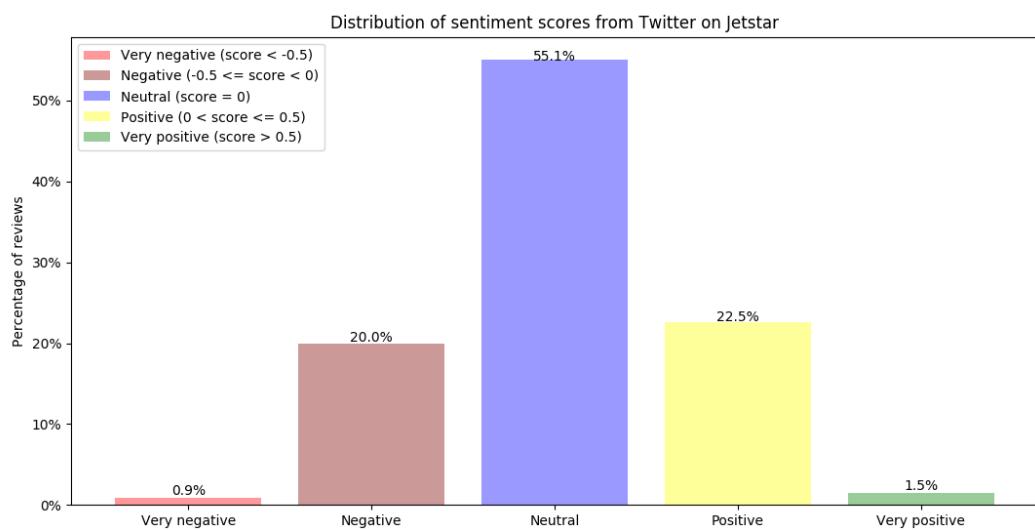
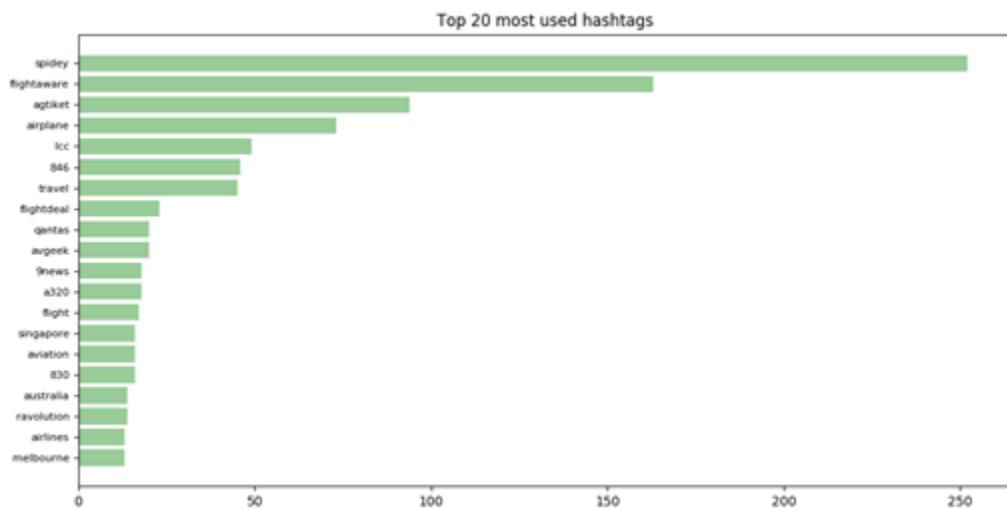


3C - Jetstar Top 20 Retweeters



```
[('@theamranfanz', 92), ('@ntfiv', 42), ('@flightorg', 21), ('@jetstar_japan', 20),  
('@alvinlie21', 15), ('@newscomauhq', 14), ('@carin2oo', 7), ('@givenchyass', 5),  
('@choco_lasperi', 4), ('@wandr1p', 4), ('@conradoaviacion', 4), ('@jetstar_asia', 3),  
('@pushup5059', 3), ('@duydash', 3), ('@stompsingapore', 2), ('@mayankjpn', 2),  
('@cupcakke_rapper', 2), ('@incident_alerts', 2), ('@shibuhallo', 2), ('@sv_erk', 1)]
```

3D - Jetstar Top 20 Hashtags

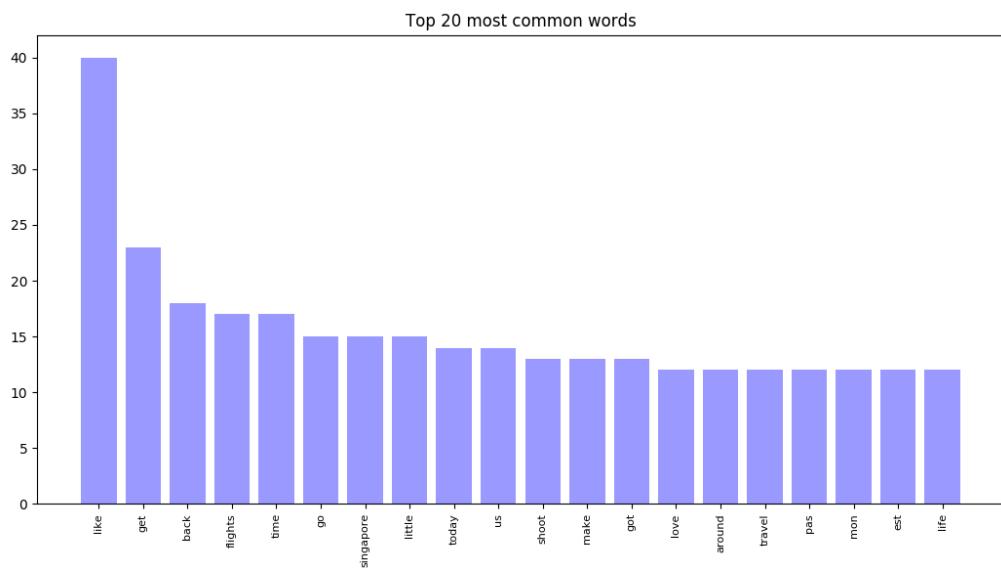


Appendix 04 - FlyScoot

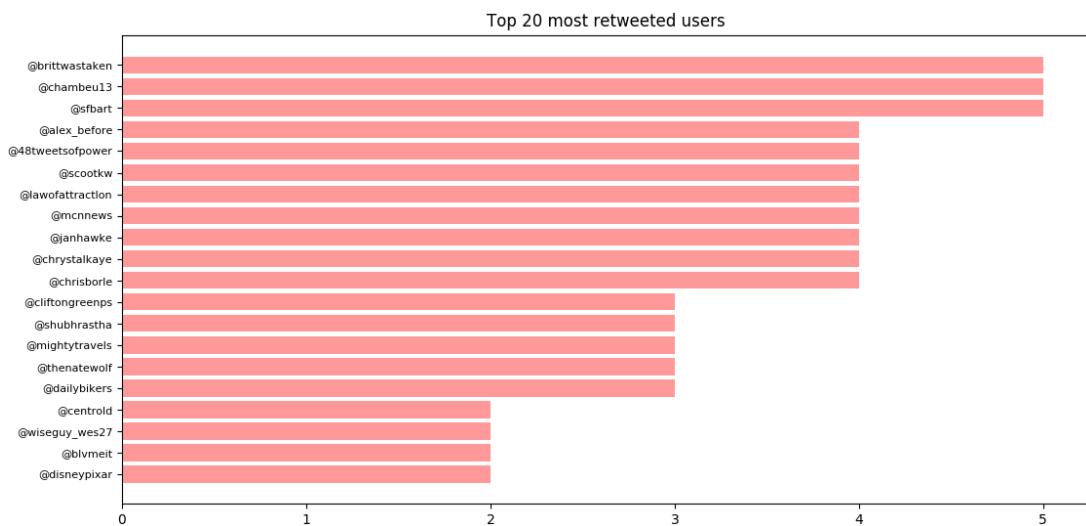
4A - FlyScoot Wordcloud



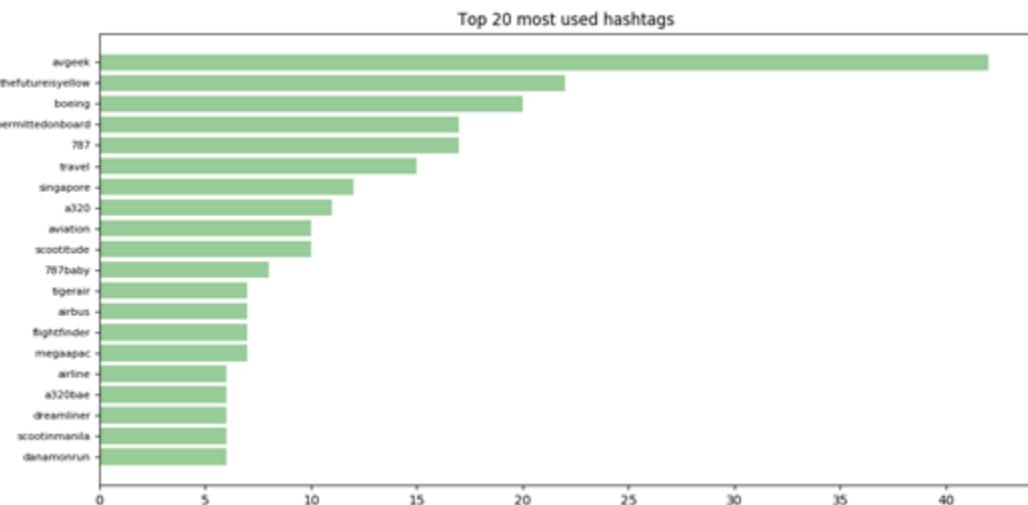
4B - FlyScoot Top 20 Words

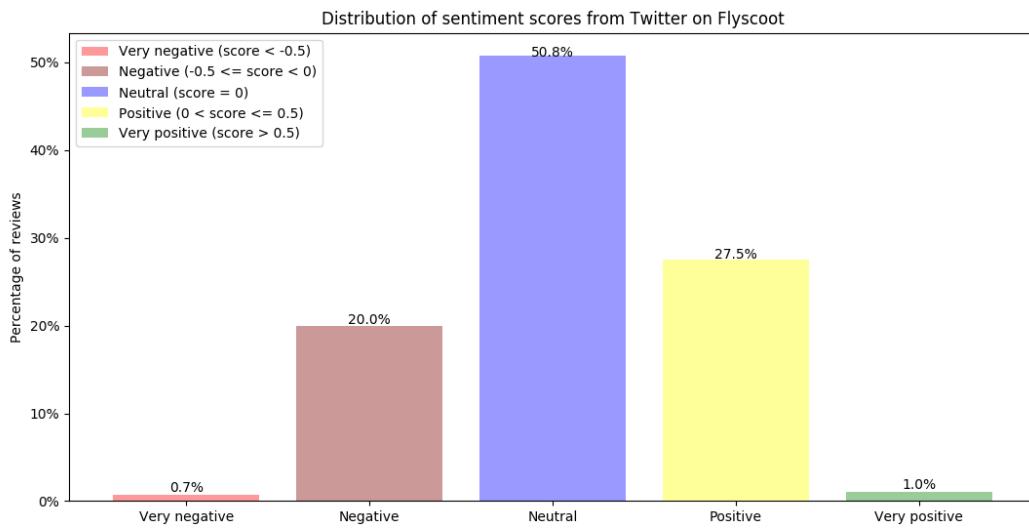


4C - FlyScoot Top 20 Retweeters



4D - FlyScoot Top 20 Hashtags



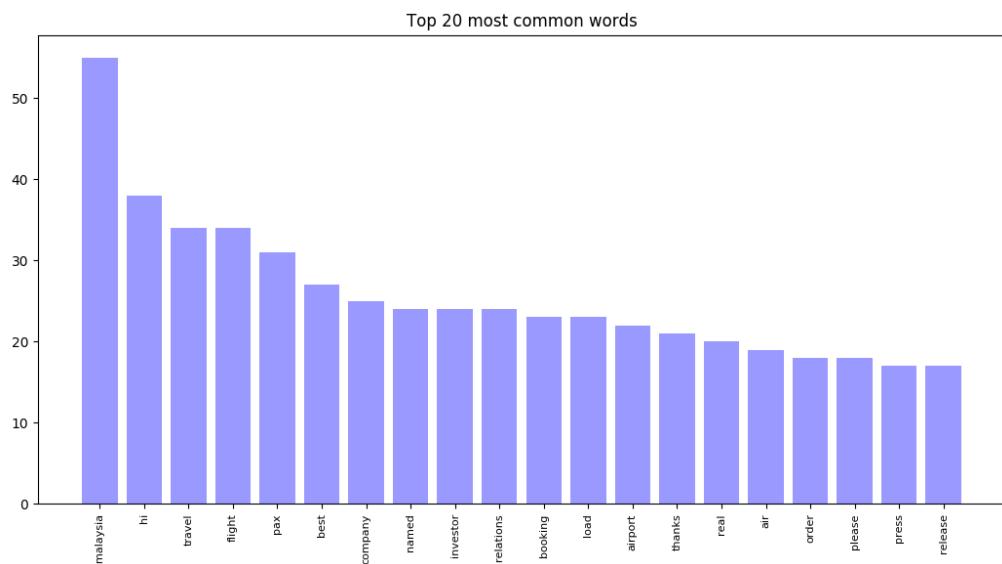


Appendix 05 - AirAsia

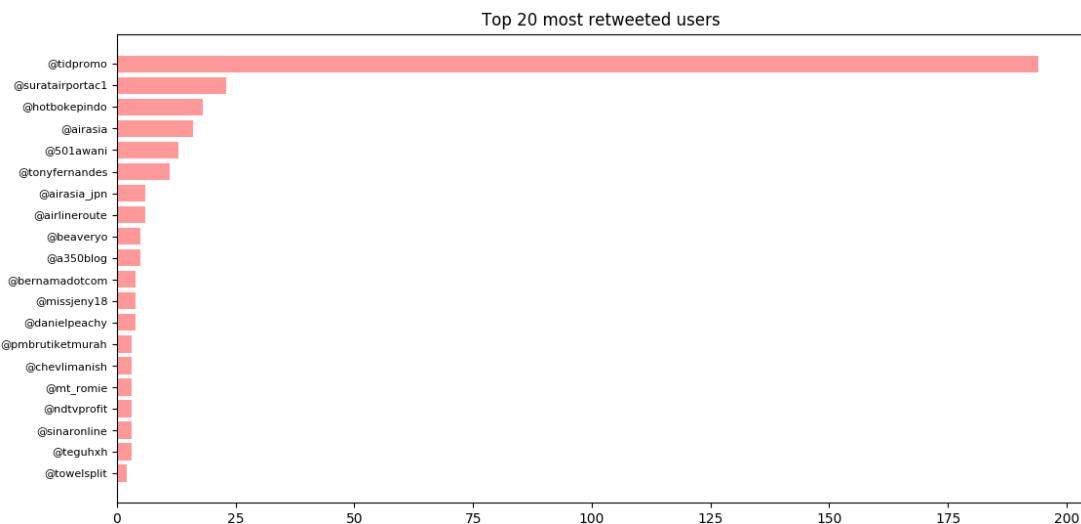
5A - Airasia Wordcloud



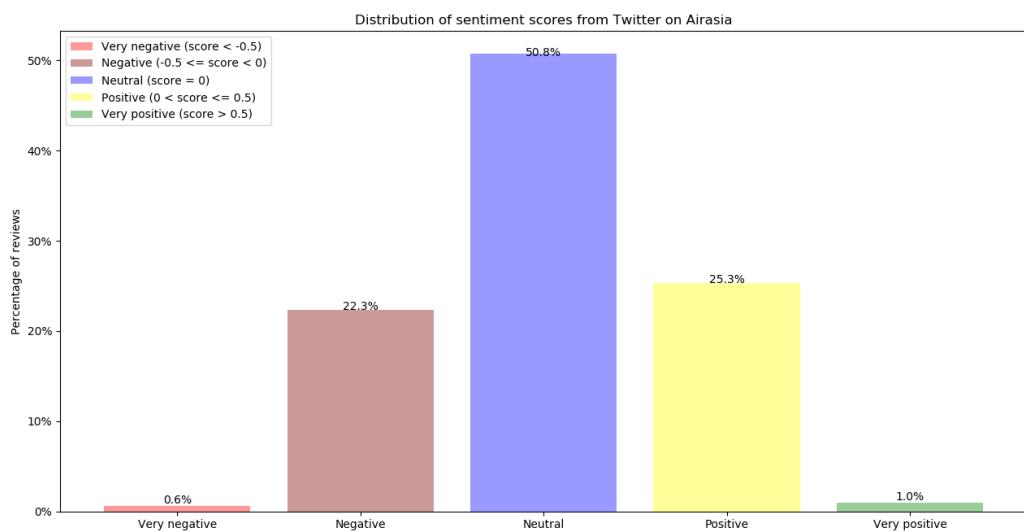
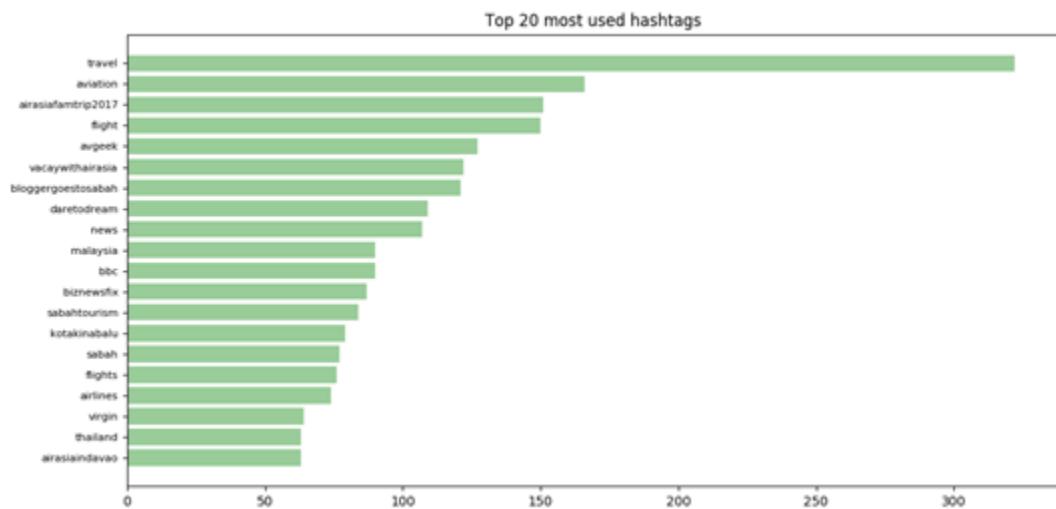
5B - Airasia Top 20 Words



5C - Airasia Top 20 Retweeters



5D - Airasia Top 20 Hashtags

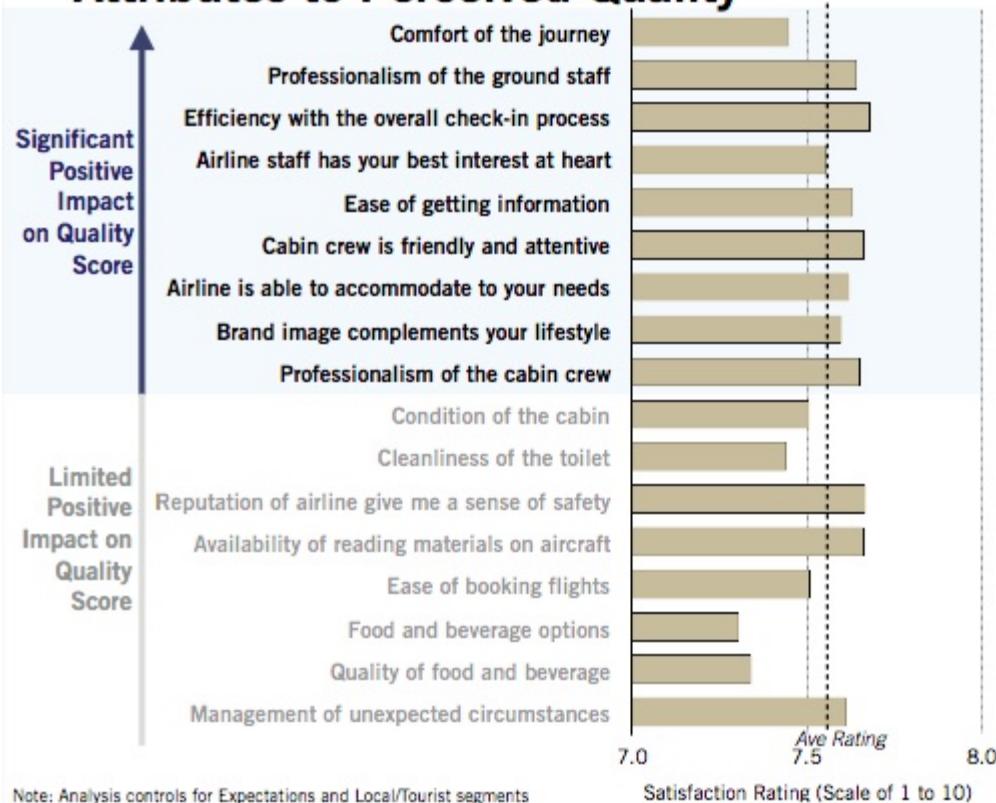


Appendix 06 – Calculation of hashtag popularity scores

Jetstar														
Tweet size 8254														
Company-related	Normalised popularity score	Generic	Normalised popularity score	Trendy	Normalised popularity score	Airline-related services/companies	Normalised popularity score	Flight-specific	Normalised popularity score	Location-specific	Normalised popularity score	Event-specific	Normalised popularity score	Normalised popularity score
	Loc	0.005938516	Avegeek	0.00242068	Ganitas	0.00242368	A320	0.002190761	Singapore	0.00193454	Revolution	0.002059867		
Airplane	0.008844917	Spidey	0.00520652				830	0.002190761	Australia	0.002059867				
Travel	0.005451932						846	0.009573055	Melbourne	0.001574394				
Flight	0.00126517													
Aviation	0.00193454													
Airlines	0.0016714394													
Average	0.000	Average	0.004	Average	0.006	Average	0.002	Average	0.003	Average	0.002	Average	0.002	
Airasia														
Tweet size 25268														
Company-related	Normalised popularity score	Generic	Normalised popularity score	Trendy	Normalised popularity score	Airline-related services/companies	Normalised popularity score	Flight-specific	Normalised popularity score	Location-specific	Normalised popularity score	Event-specific	Normalised popularity score	Normalised popularity score
	Airasiafamtrip2017	Travel	0.01274339	Daretodream	0.004313767	Virgin	0.002532848			Malaysia	0.003563817		News	0.004234605
Vacaywithairasia	0.004828241	Aviation	0.005653574	Avegeek	0.00902812				KotaKinabalu	0.0031243484		bbc	0.003563817	
Airasiaindonesia	0.002493272	Flight	0.005936362	Bloggergoestosabah	0.004788668				Sabah	0.001047333		SabahTourism	0.003324363	
		Flights	0.0003007757						Thailand	0.002493272				
		Airlines	0.002923605											
Average	0.004	Average	0.006	Average	0.005	Average	0.003	Average	0.000	Average	0.003	Average	0.000	
Scoot														
Tweet size 1684														
Company-related	Normalised popularity score	Generic	Normalised popularity score	Trendy	Normalised popularity score	Airline-related services/companies	Normalised popularity score	Flight-specific	Normalised popularity score	Location-specific	Normalised popularity score	Event-specific	Normalised popularity score	Normalised popularity score
	Scootitude	0.006738541	Travel	0.01067817	Avegeek	0.02830887	Boeing	0.03477089	787	0.01455525	Singapore	0.0080825	Danamonrun	0.004043127
Scootinmanila	0.004043271	Aviation	0.007873594	Thefutureisyellow	0.019324738	Tigerair	0.004715881	A320	0.007412393				Megapac	0.004763817
		Airline	0.004043271	Permittonboard	0.011455526	Airbus	0.004715881	A320ceo	0.004043271					
		Dreamliner	0.004043271					787fab	0.005330038					
Average	0.005	Average	0.006	Average	0.018	Average	0.008	Average	0.007	Average	0.008	Average	0.004	
Overall														
Average	0.0048	Average	0.0055	Average	0.003	Average	0.0058	Average	0.0055	Average	0.0032	Average	0.0038	
													0.003	

Appendix 07 – ISES Ranking

Budget Airlines: Comfort of Ride & Staff are Key Attributes to Perceived Quality



Note: Analysis controls for Expectations and Local/Tourist segments

Satisfaction Rating (Scale of 1 to 10)

XI. References

Additional words added to positive and negative corpora for sentiment analysis were taken from the following source:

Minqing Hu and Bing Liu. "Mining and Summarizing Customer Reviews." Proceedings of the ACM SIGKDD International Conference on Knowledge Discovery and Data Mining (KDD-2004), Aug 22-25, 2004, Seattle, Washington, USA,