

BizResearch Pte Ltd

# Market Research Analytical Study on M1 Limited



Prepared by:

Brandon Chua A0139447W

Lim Wen Qing A0142254N

Nicholas Foo A0139715Y

Thng Kai Ting Brenda A0143035U

Vu Duc Nam A0144772B

Yong Zhun Hung A0138922B

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# 1. Executive Summary

This report provides an analysis and evaluation of M1's current position in Singapore's telecommunication industry based on consumer insights. The report seeks to provide key recommendations in 3 areas of focus: User Satisfaction, Customer Acquisition, and Marketing Strategy. Data was collected from various sources including Social Media platforms (i.e. Facebook, Twitter, Instagram and YouTube), the online forum SGForum, and geospatial data from OpenStreetMap, an open source platform. Methods of analysis include sentiment analysis, consumer demographics, geospatial analysis, as well as the analysis of key trends on Social Media. All methods of data mining and analysis can be found in the appendices.

In terms of User Satisfaction, this report finds that M1's current mobile application, My M1, is catching up with its competitors' in terms of app ratings. It can be improved further by addressing concerns of its login function and several errors within the app. M1 can also introduce features such as a bill summary or functions for M1's prepaid users, to make the app more complete. In general, consumer sentiments from Twitter and SGForum are positive, and consumers seem to prefer "free" offerings.

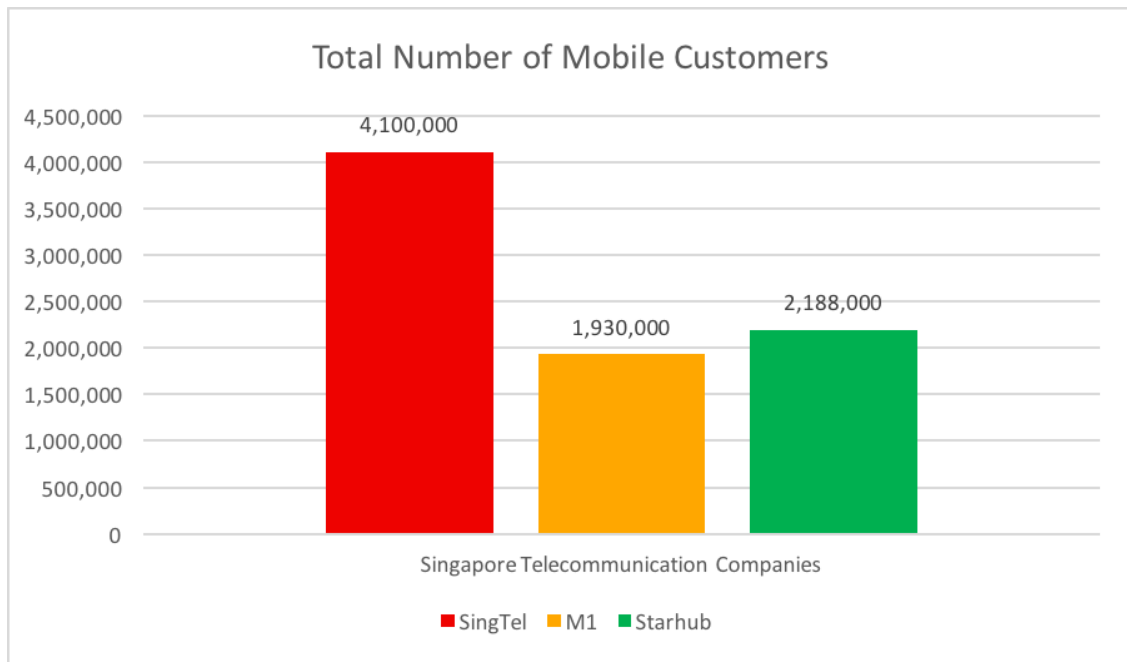
This report finds that Customer Acquisition is key for M1 to increase its market share. Based on social media demographics, M1's should target social media users aged 16-39, which translates to 2 main target groups: Youths (aged 16-24) and Young working adults (aged 25-39). Using detailed geospatial analysis, the report proposes a plot in Tampines as an optimum location for M1's future road shows.

Finally, this report finds that current social media marketing strategies can be more effective. The various features that make a post well-received on various social media platforms are presented in Section 6. Also, "free" offers are presented once more as a common topic on social media, which M1 can take advantage of. Furthermore, M1 can consider making use of Twitter and Instagram as additional marketing platforms to widen their reach on social media.

The findings in this report are limited by the data available, and its recommendations may pose a challenge to M1 in terms of its budget. Additional data could be provided for more accurate analysis, and to widen the range of the recommendations.

## 2. Company Profile

M1 (Initially called Mobile 1 Pte Ltd) is one of the 3 major telecommunication companies in Singapore, with the other 2 being SingTel and StarHub. As of 2016, M1 has 1.93 million mobile customers (M1 Singapore, 2016) (62% of which are postpaid customers similar to StarHub's mobile customer mix of 61% postpaid (StarHub Singapore, 2016)), which pales in comparison to Singtel and StarHub as seen from Figure 2.1 below.



*Figure 2.1 Column Chart showing the total number of mobile users per company, as of year 2016*

Despite being the second oldest telecommunication company (founded in 1994) just behind SingTel (1879), M1 has lost a significant amount of customers and market share to StarHub, which has made its way to becoming the second most popular telco in Singapore behind Singtel. The dwindling M1 market share is definitely a cause for concern and is one that would be further examined in the contents of our market report.

Furthermore, in recent years, the telecommunication market has seen new entrants, MyRepublic as well as CirclesLife as they vie for a share of the increasingly competitive market. As a result, this has led to M1's shares being under threat, seeing a 8.5% drop in their shares.

With Singtel already taking 50% of the market share (Singtel, 2016) within Singapore, it is a competitive race for the remaining 50% of market share between StarHub and M1. In order to stay competitive within the market, M1 strives to stay relevant and to keep up with the 2 leading telcos i.e Singtel and StarHub. Evidently from Figure 2.2 below, it shows that M1's LTE speed is lacking in comparison to that of Singtel and StarHub, signifying major ground to cover for M1 in its overall service.

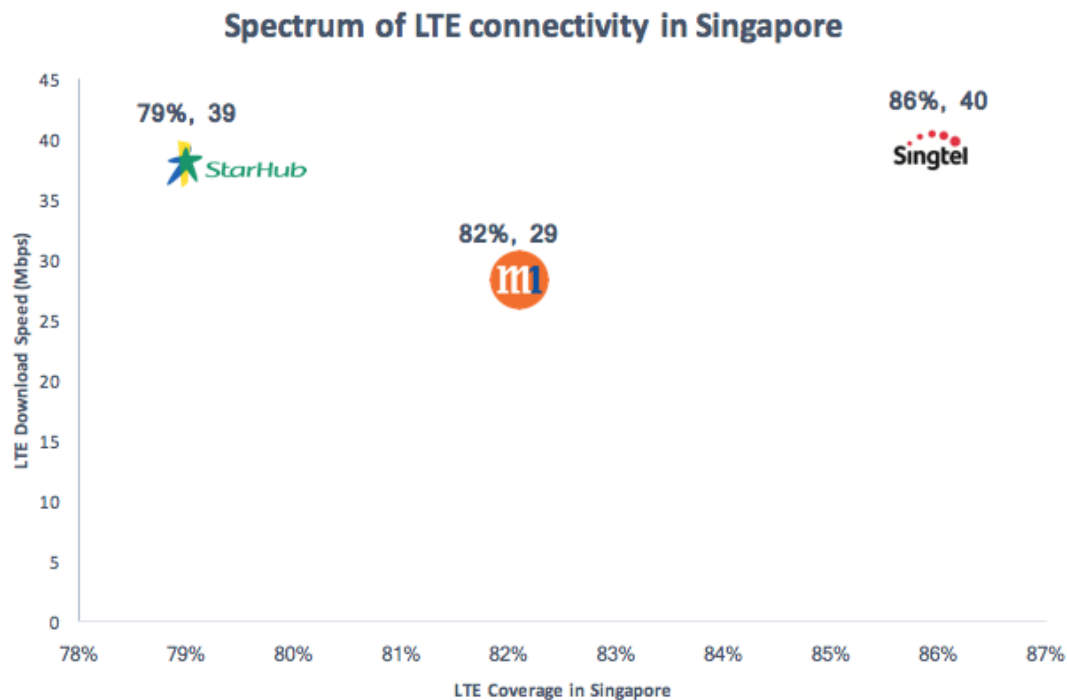


Figure 2.2 the spectrum of LTE connectivity in Singapore ("Telecommunications", 2016)

### 3. Industry Analysis

The Michael Porter's 5 Forces framework aids us in making a qualitative evaluation of the firm's strategic position. M1 can use this framework to assess their position and ability to increase their market share and make a sustained profit in this industry.

As globalisation enters a new phase in our life, connectivity has been more important than ever. As such, the telecommunication industry is increasing in intensity like never before. With an increase in mobile data usage (Figure 2.3) over the past 4 years coupled with a steadily increasing mobile penetration rate (Figure 2.4), new entrants (i.e. Circles.Life and MyRepublic) as well as established telecommunication companies attempt to capitalise on this growing trend.

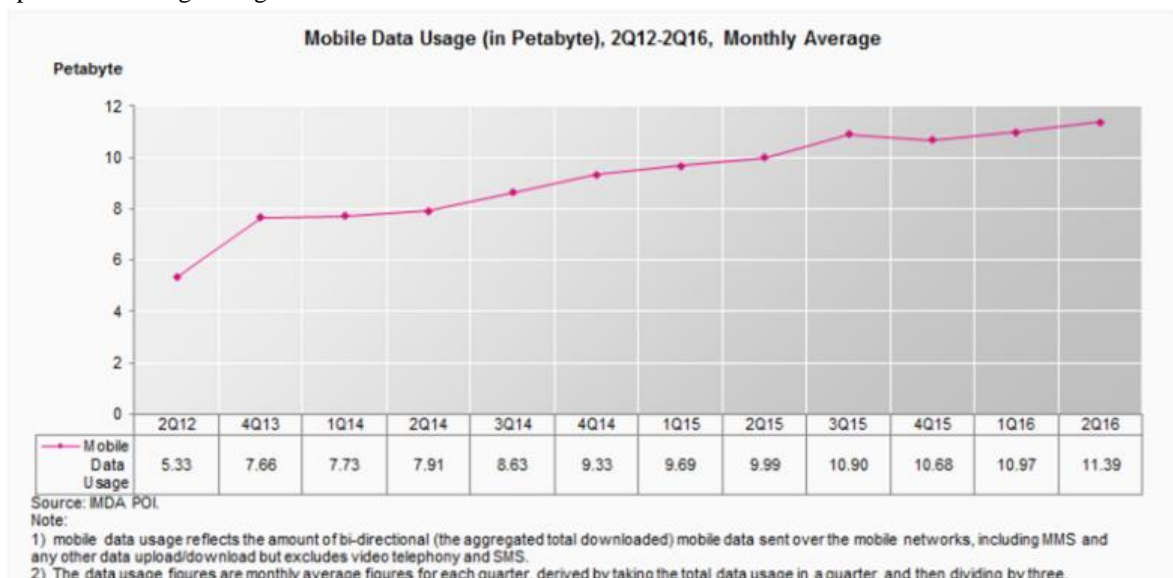


Figure 2.3 Graph on mobile data usage from 2012 - 2016 in Singapore ("Telecommunications", 2016)

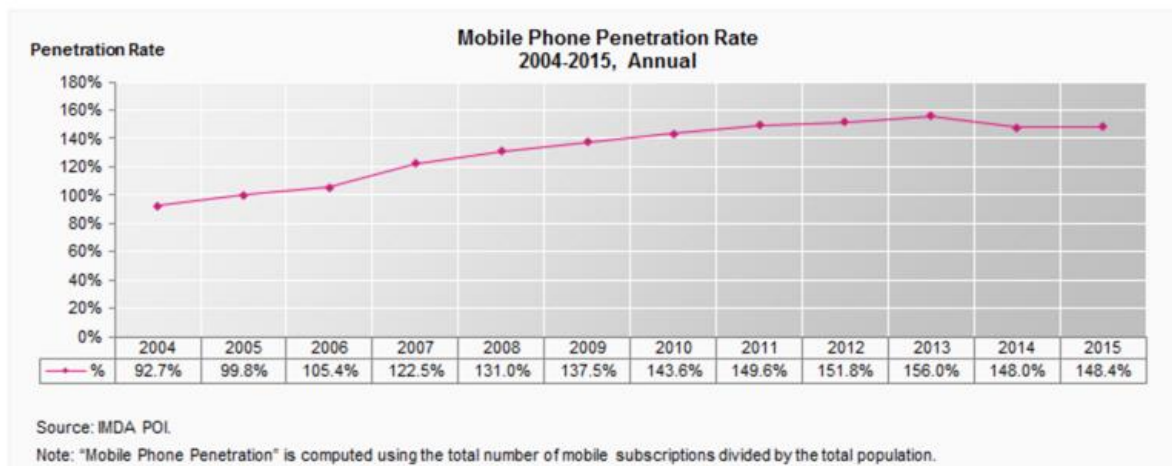


Figure 2.4 Graph of mobile phone penetration rate from 2004 - 2015 in Singapore ("Telecommunications", 2016)

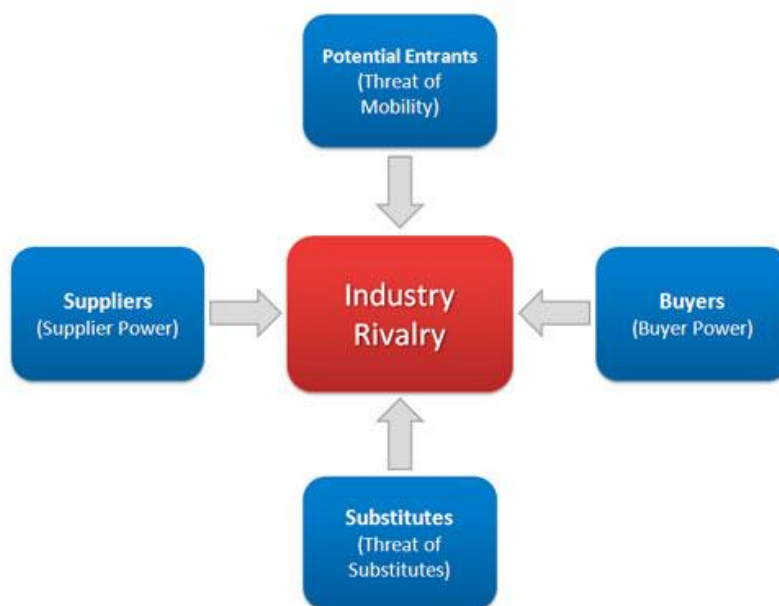


Figure 3.1 Michael Porter's 5 Forces Framework

### 3.1 Bargaining Power of Suppliers (Moderately High)

Suppliers in the telecommunication market are mostly hardware suppliers supplying phones and routers. Bargaining power of suppliers can be considered moderately high due to the fact that telco companies would try their best to bring in the latest phones as soon as possible so as to capture market demand for these new phones Eg. iPhone7.

### 3.2 Bargaining Power of Customers (High)

With StarHub, Singtel and M1 being the major players in an over saturated telecommunication market, customers have a strong bargaining power as the switching cost between mobile carriers is also relatively low. Telecommunication services are getting increasingly replaceable due to the rise of over-the-top (OTT) services like Whatsapp and Telegram which render SMS and calls useless due their messaging and call functions. Furthermore, there is stiff competition among telecommunication companies to provide the best services possible as customers seek the best quality and the most bang for buck contract prices. Knowing this, the three

telecommunication companies provide perks and benefits so as to retain their customer share during their re contract term. As a result, the bargaining power of customers is high.

### 3.3 Threat of New Entry (Moderate)

The threat of new entry in the telecommunication industry in Singapore is moderate due to the the nature of the industry. High infrastructure costs and economies of scale that bigger companies enjoy serves as high barriers of entry for new entrants. As such, this will place great stress on new entrants financial means, and even if they possess the financial capacity, they may not be able to compete with larger companies.

However, there have been movements recently by the government that could potentially increase this threat level. With the government rolling out the Next Generation Nationwide Broadband Network (NGNBN) ("IDA | Next Gen NBN | Broadband Telecommunication", 2016), it has significantly lowered the barriers for new entrants into the local telco market. Examples of new entrants would be Circles.life and MyRepublic. The Infocomm Development Authority (IDA) recently offered the possible newcomer 60MHz worth of mobile frequencies at an even lower reserve price of \$35 million (Tham & Hermesauto, 2016). This helps to lighten the initial costs that new entrants will have to bare in order to enter the market. Thus, increasing the threat of new entry in the industry.

This increases the number of competitors in the market, giving customers a greater choice in selecting what suits their needs the most. This heightens the competition in the industry which will stimulate more investments in the industry and an increase in innovative deals to their customers (MyPaper, 2016). This will result in lower prices, increase in quality of goods and services and new innovative plans.

However, despite the support by IDA to lower entry costs, it is insufficient and initial costs still pose a significant barrier to new entrants. Although IDA offered a lower price of \$35 million to new entrants which led to several new companies expressing interest, it is thus likely that a bidding process will take place which would result in an increase in the price. Despite this, additional costs to get their network in operational condition could be as high as \$700 million and is mostly upfront (MyPaper, 2016).

Further elaborating the grave threat of new entrants, back in 2014, MyRepublic rolled out a 1Gbps fibre broadband plan priced at S\$49.99 a month which was significantly cheaper than M1 and StarHub plans. Following suit, both M1 and StarHub went on to slash their prices so as to match the prices of MyRepublic. Thus illustrating to us the strength of new entrants in changing up the market as such, threat of new entries may be low but are still potent and significant.

Acknowledging this threat, it is understood that M1 is predicted to suffer the most in the case of a new entrant (Loh, NewsAsia, & Kwang, 2016). One reason is because M1 engages in almost purely mobile business only, 78.3% of their service revenue, which will likely be targeted by new entrants. On top of that, M1's customer base is less resilient and more likely to be won over by mobile competitors (TELECOM & Reporter, 2016). Secondly, aggressive price promotion would result in loss of market share (Loh, NewsAsia, & Kwang, 2016). Furthermore, M1 will lose a huge chunk of its spectrum allocation especially if the new telco takes up its full reserve.

### 3.4 Rivalry Among Existing Competitors (High)

The ongoing battle between the 3 biggest telco companies in Singapore in which telcos compete with each other to gain the upper hand over one another by increasing their market share and influence over the market. All so to increase their net profits. Competition is intense due their undifferentiated products and the high bargaining power of customers. As such, in order to achieve their objectives, they engage in multiple strategies such as subsidies to lower prices, value-added plans to improve the quality of their services hoping to differentiate their products and services from each other.

Recently, the 3 telco companies have engaged in a price war in order to retain their customers and also to attract other potential customers. This is due to the possible entrance of MyRepublic where they announced their unlimited data plan for \$80. Singtel reacted just hours after MyRepublic's announcements, and doubled their data plans. StarHub and M1 announced their reduction in their pricing plans as well a day after (Yap, 2016). The quick-responses shows high competitive levels in the industry where the companies immediately responded to potential threats in order to retain their market share.

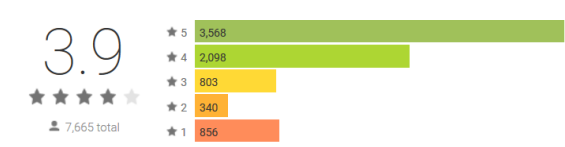
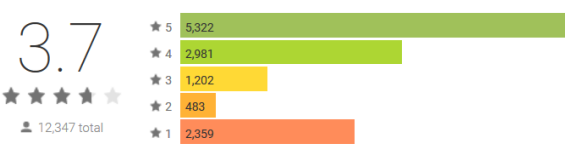
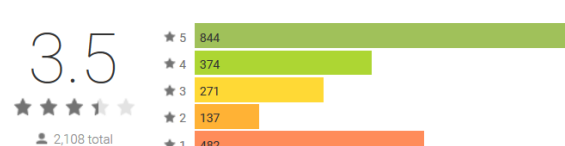
After engaging in a continuous cycle of price wars, they found that there are other important factors and ways that would attract and retain customers. Companies have been competing by providing excellent customer service and customer value with product and service innovations in order to differentiate their products (Tan, 2014). For instance, they offered mobile plans with larger data bundles and established a more reliable mobile network. In order to do so, the companies have invested large sum of money into developing their products and coming up with innovations.

## 4. User Satisfaction

To start off, we explore the current user satisfaction of M1 as well as the two competitors, Singtel and Starhub so that we can explore where M1 looks like to its customers. User satisfaction is a key component of the telecommunications industry. Being a service provider means that M1 needs to ensure that users are satisfied and that their feedback is valued and taken into consideration. In order for M1 to retain and increase its market share, M1 needs to understand its customer's sentiments and constantly aim to improve on it.



## 4.1 Mobile Application

Company	Google Play Store
StarHub	<p>REVIEWS</p>  <p>Number of downloads (as of 16 October 2016): 7,664</p>
Singtel	<p>REVIEWS</p>  <p>Number of downloads (as of 16 October 2016): 12,347</p>
M1	<p>REVIEWS</p>  <p>Number of downloads (as of 16 October 2016): 2,108</p>

The popularity of app stores today make mobile apps a key aspect that telco operators can choose to develop at. According to a research paper by Booz & Company in 2010 (Péladeau, Friedrich, Toumi, & Acker, 2016), telco operators can increase their revenue with mobile apps by linking their services through the app and also gain customer loyalty. The ratings of the mobile apps for the 3 different telco operators in Singapore are presented in the table above. We gathered these screenshots from the Google Play Store. We can observe that all 3 operators have almost similar ratings, with StarHub being the highest and M1 being the lowest. M1 also has significantly less downloads than its competitors.

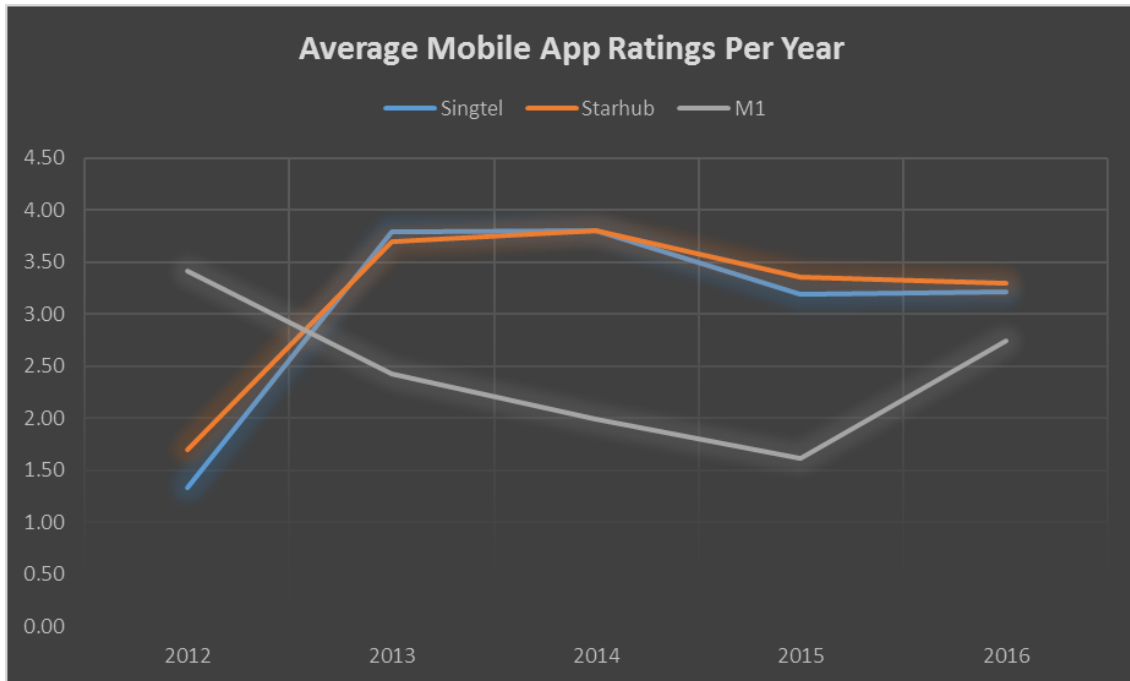


Figure 4.1.1 Line Chart showing the average mobile app ratings per year for the 3 companies

From Figure 4.1.1, we observe that while M1's mobile app ratings started off significantly better than its competitors, the average ratings for M1 are consistently below that of Singtel and StarHub. While M1's app was well-received in comparison to its competitors', Singtel and StarHub improved on their mobile app significantly, exceeding M1's app. In contrast, M1's app worsened in ratings in the same period. However, M1 has recently narrowed the difference in ratings in 2016, showing a large improvement in its app. More can still be done to put it on par to or even exceed the apps of its competitors. If M1 can continue its mobile app improvement progress as in 2016, its app ratings are expected to continue to increase.

Apart from app ratings, we also analyzed the app reviews found on Google Play store.

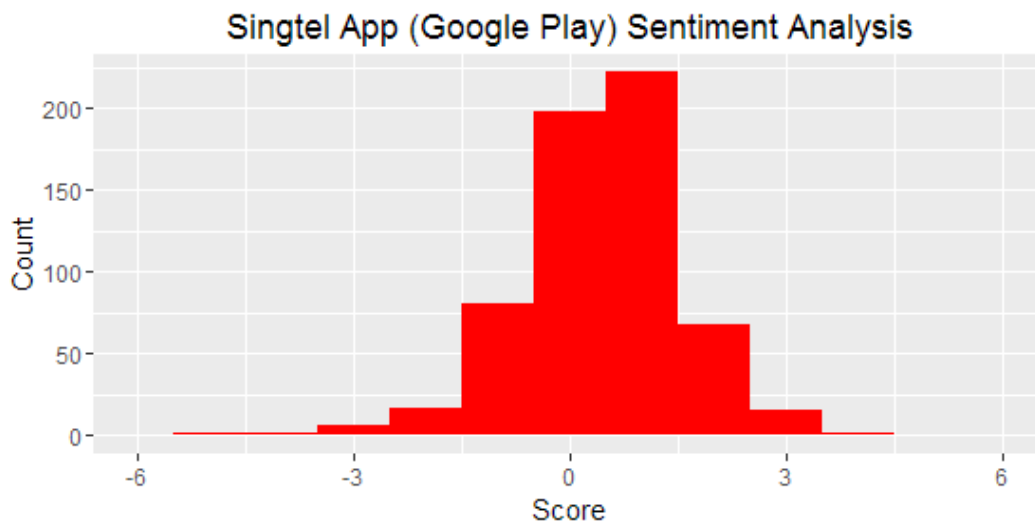


Figure 4.1.2 Histogram displaying sentiment analysis results of the reviews of the Singtel App

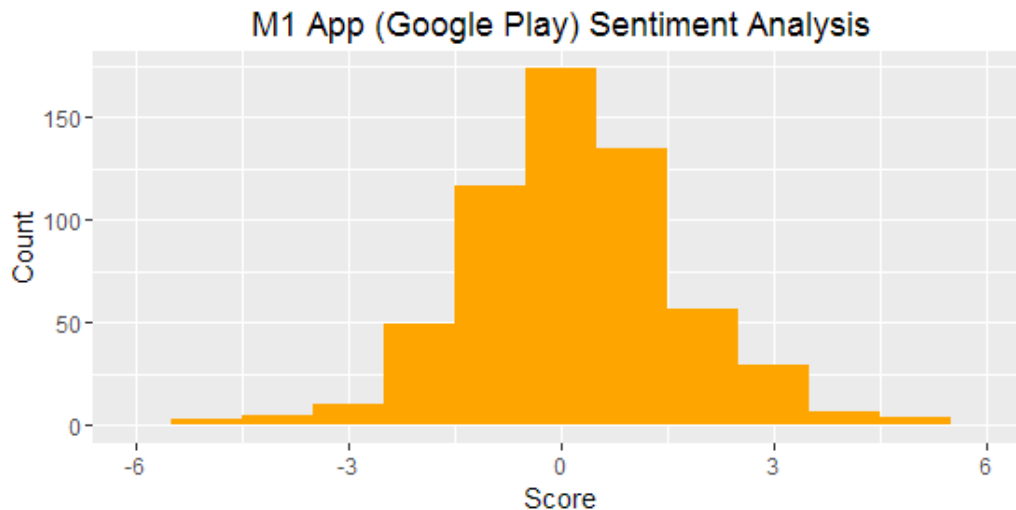


Figure 4.1.3 Histogram displaying sentiment analysis results of the reviews of the M1 App

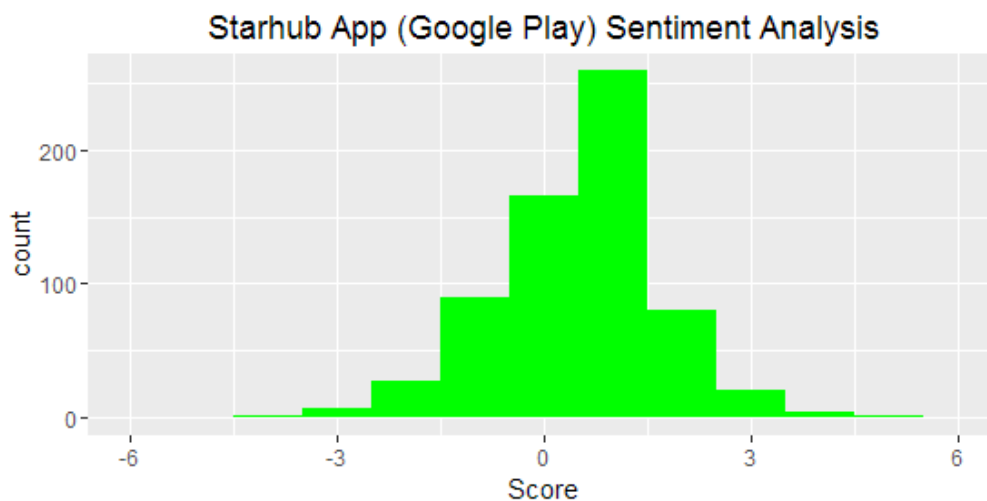


Figure 4.1.4 Histogram displaying sentiment analysis results of the reviews of the StarHub App

The histograms above plots sentiment analysis by giving a score to each review found on the Google Play store. A higher positive value corresponds to a more positive review, and vice versa for negative values. The 3 histograms above shows the sentiment analysis for the 3 different mobile apps in the year 2016. We have chosen to focus only on reviews made in the year 2016 as they have been multiple updates and changes made to the mobile app over the years. The reviews found in 2016 would be most representative of the current app. As we can observe from the graph, M1 fared the worst in comparison to Singtel and StarHub. While the number of positive and negative reviews for M1 is almost the same, with the histogram showing a somewhat symmetrical bell shape, it is obvious from the StarHub's and Singtel's histogram that they have more positive reviews than negative reviews.

Drawing back to Figure 4.1.1, which means that even with the significant improvement in M1's app ratings, app users are still dissatisfied with the mobile app. Based on the content of the reviews, we observe that this could be due to several issues such as problems with login, or several errors that occur throughout the use of the app. We define negative sentiments to be sentiments that receive a score of less than 1. There are a total of 137 negative sentiments from M1's app from the year 2016. We then categorized them into a few groups, namely "Forced to update", "Functionality", "Inaccurate" and "Login", "Error". Of the 137 negative sentiments, 32 cannot be classified and hence we removed them for comparison purposes. From Figure 4.1.5, we can see that login is a

major issue, where users are unable to login. A detailed look at the reviews shows that most users do not know how to resolve the login issue. Also, many have expressed unhappiness in the functionality of the app, where it is unable to perform functions such as the checking of bills. Inaccuracy of the data presented is also another major concern. For example, the number of actual outgoing minutes or data usage is reflected wrongly on the app. This happens because M1 is unable to provide accurate real time data. This results in dissatisfied customers as they are unable to track their data usage.

Classification of Negative Sentiment for M1 App (2016)

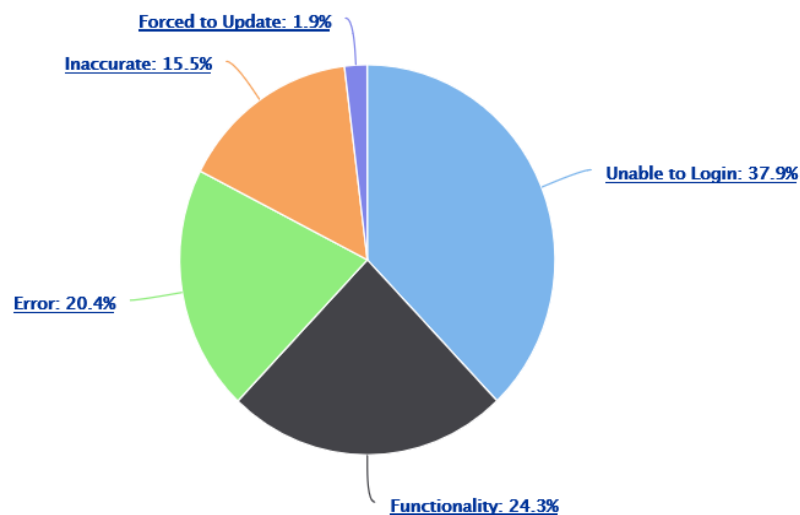


Figure 4.1.5 Piechart showing us the classification of the negative sentiments for M1's App (2016)

Hence for the mobile app, we recommend that M1 will improve on:

1. Create a smooth user interface (prevent errors messages)
2. Provide more help at the login page to assist customers when they encounter problems with login
3. Include more functions in its app such as:
  - a. Allow customers to check their bills
  - b. App should not be restricted to M1 Mobile customers only. Allow prepaid customers to access the app as well.









Figure 4.2.1.5 Screenshot of Singtel's Customer Support Twitter account as of 28 October 2016

Furthermore, Singtel also offers personal customer service on Twitter, where a team of social media officers (as shown in Figure 4.2.1.5) are constantly on the lookout for feedback about Singtel on Twitter. M1 is missing out on customer relationship opportunities on Twitter, and should look towards offering customer service on Twitter. It could even take customer service one step ahead of Singtel and StarHub by following some of its customers to find out their preferences and the current trends among their customers.

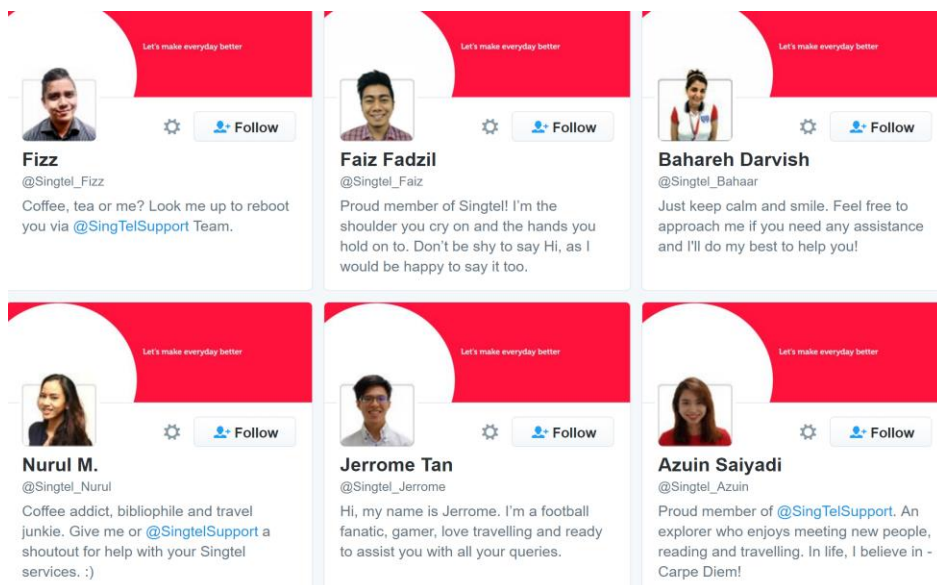


Figure 4.2.1.6 Screenshot of Singtel's Customer Support Crew's Twitter accounts

## 4.2.2 Forums

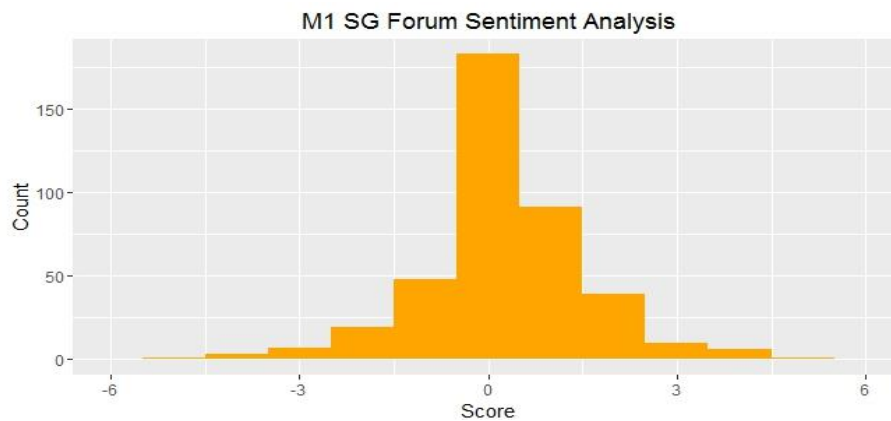


Figure 4.2.2.1 Histogram displaying sentiment analysis results of posts about M1 on SGForum from January 2011 to 16 September 2016

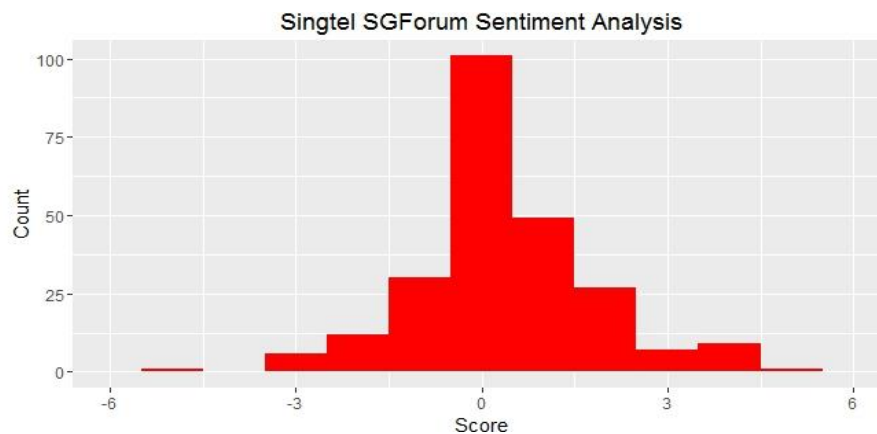


Figure 4.2.2.2 Histogram displaying sentiment analysis results of posts about Singtel on SGForum from January 2011 to 16 September 2016

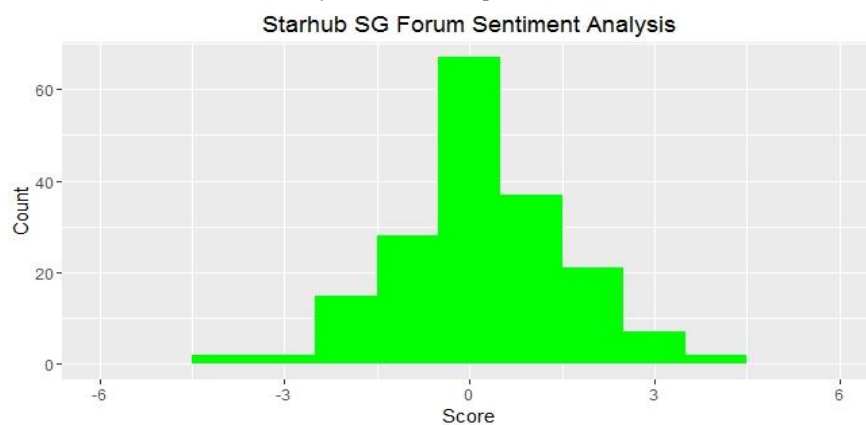


Figure 4.2.2.3 Histogram displaying sentiment analysis results of posts about StarHub on SGForum from January 2011 to 16 September 2016

Based on Forum posts on SGForum from December 2011 to September 2016, we observe that M1 has the most posts among its competitors, suggesting that M1 is more discussed and mentioned on forums. While posts about all three telecommunication companies present a generally positive sentiment, Singtel boasts the largest proportion of extremely positive posts (i.e. posts with a score of 3 and above). M1 has the next best proportion of positive posts, although it still has more extremely negative posts as compared to StarHub.





break away from the constant comparison, M1 can look towards new features which are unheard of in the Singapore telecommunications industry.

M1's new subscription-based elderly activity monitoring service is a step forward in moving its business model away from just being dependent on traditional telecom. Combining its consumer's preference for "free" promotions and M1's huge dependence on its mobile business (from section 3.3), M1 could partner leading mobile applications such as Snapchat ("Viacom, Snapchat firm up content, ad deal", 2016), Uber, or Lazada ("Globe Telecom signs partnership with Rocket Internet's Lazada", 2016), who have other partnerships with foreign telecom firms. M1 can offer data-free usage of the popular data-draining mobile applications, or follow the footsteps of foreign telcos, such as America Movil's partnership ("Uber Is Teaming Up With Carlos Slim's Massive Telecom Company In Latin America", 2016) with Uber to offer a free ride for its customers and special data packages for Uber drivers.

## 5. Customer Acquisition

In order to increase its market share, M1 needs to attract new customers to subscribe to their products. They can do so in 2 dimensions: physically and virtually. Physically attracting customers would concern M1's physical stores, service centres, and cell towers, whereas the virtual dimension would comprise of potential customers on social media.

### 5.1. Competitors' social media customer demographic

This section's aim is to give M1 a view into the customer demographic on Twitter of its competitors (They can actually mine their own on Facebook Analysis but not its competitors'). Since M1 has yet to populate its Twitter account with more posts and acquire more followers, the demographic composition of its two biggest competitors would give an idea of which sector of Twitter users M1 can target in order to gain the most followers. In the end, it has been shown that people who follow a page on Twitter specifically and any social media generally are more interested in the product and will be more exposed to the promotions and events. If M1 can acquire followers who are already following Singtel or StarHub, then this signifies that the customer will have a high tendency to switch to M1.

The following charts are created by doing a face analysis of the profile pictures of followers on twitter. In some cases, it can be assumed that the user will use someone else's picture such as his family members or his idol. Thus, it is not exact but rather give a general idea of who are interested in Singtel and StarHub.

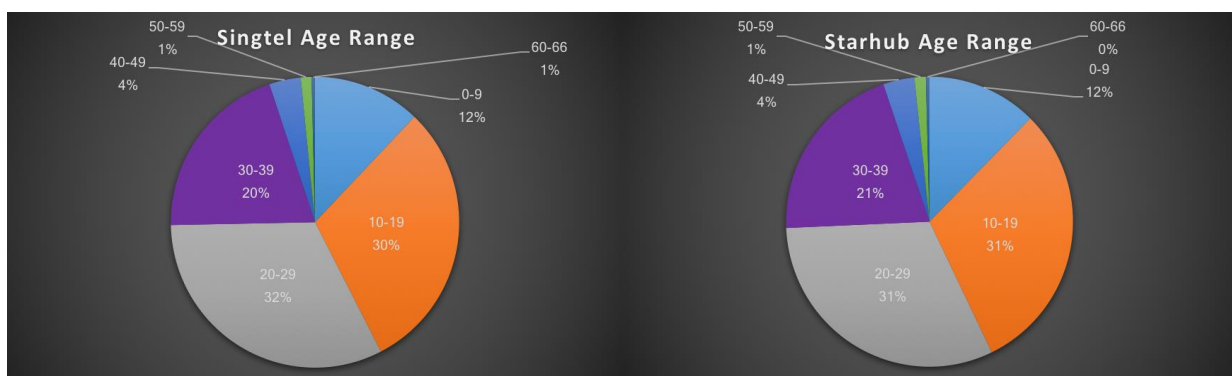
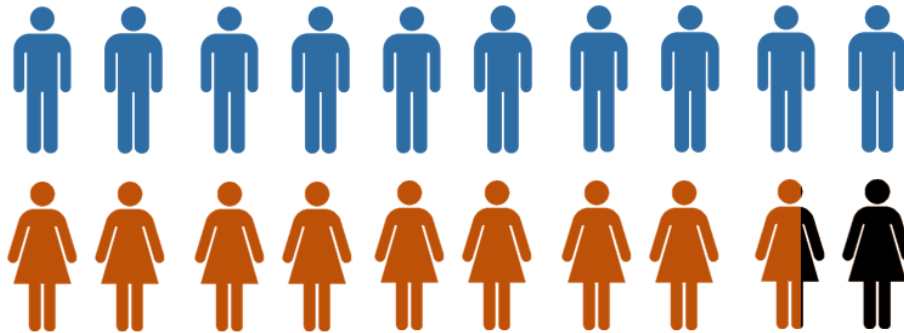


Figure 5.2.1. Singtel and StarHub Age Range

From the charts above, we can see that most of followers of Singtel are in the range 20-29 (32%), followed by people from 10-19 (30%) and 30-39 (20%). While it is understandable that a large of the followers are in the range of 20-29 and 30-39, the statistics in the 10-19 is a bit misleading. This might be caused by the trend of taking

one's children photo as a profile picture or a family picture. By doing a manual check on a 200 entries sample, we found out that around half of the pictures labeled 10-19 are family pictures or the children which caused the inflation in the percentage of followers in this age range. Furthermore, more people identified are actually distributed from 15 and above. The same trend also holds for StarHub with the same reason as the one for Singtel. Thus from these two charts we conclude that most followers on Twitter of Telcos are from 15-39 years old. This is the first factor that M1 should consider in its marketing strategies that will be explored in section 6.

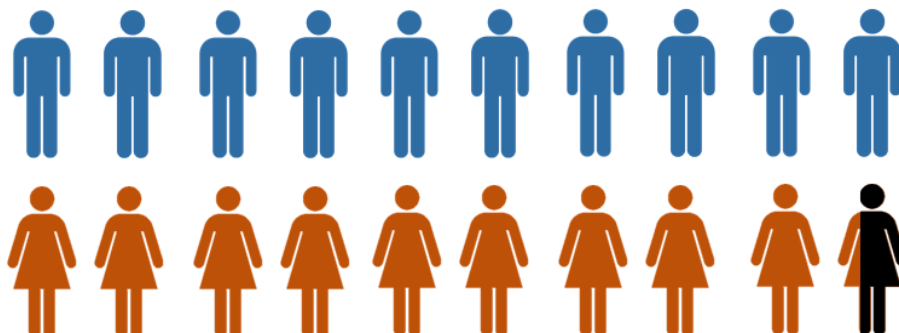
For every 10 males,



There are 8.87 females.

*Figure 5.2.2. Singtel gender distribution*

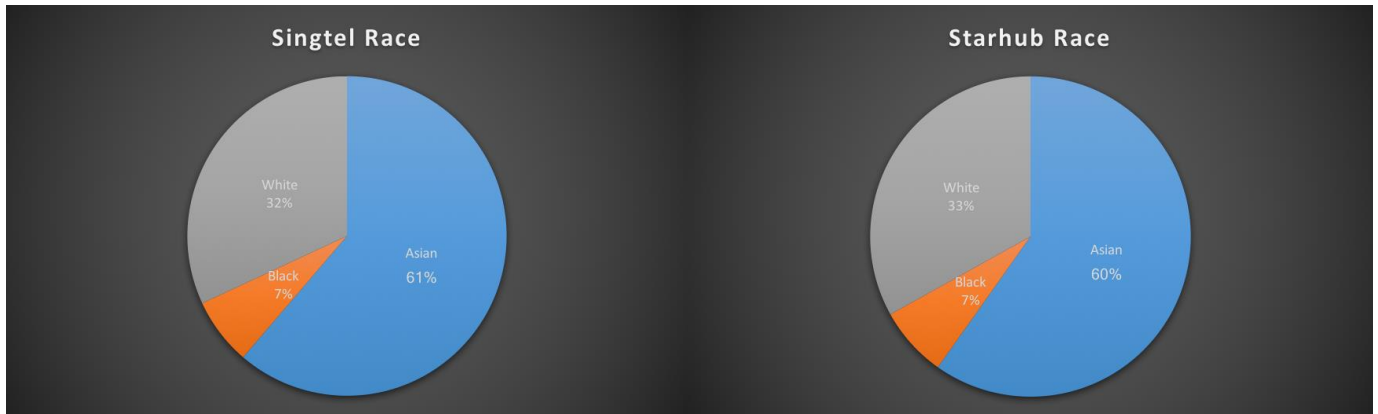
For every 10 males,



There are 9.23 females.

*Figure 5.2.3. StarHub gender distribution*

Although in general, it is reported that female users are more active on social media than their counterparts ("Men vs. Women: Who Is More Active on Social Media?", 2016), from this chart in can be seen that male users are more interested in telco (10:8.87 - Singtel and 10:9.23 - StarHub), which is likely a result of their higher ownership of smartphone ("Smartphone Users Around the World - Statistics and Facts [Infographic]", 2016) of male in general (we could not find any statistics related to smartphone penetration by gender in Singapore, but given the fact that both Singtel and StarHub operates in many other countries, a global statistics can be used to claim this point).



*Figure 5.3.4. Singtel and StarHub racial demographics*

This chart is expected as most people who would be interested in Singtel would be Asian (from Singapore, Thailand, Indonesia or Philippines. Followed by Asian is White, some of whom might come from Singtel's operation of OptusYes in Australia (Singtel, 2016) as well as the fact that it is sometimes difficult to distinguish between Asian and White from face recognition. The black population corresponds mostly to Indian and might include some Africans who are interested in the telcos. The distribution is also similar for the race statistics of Singtel and StarHub which means a strong media presence among Asian and White people.

## 5.2. Using Geospatial Analysis to select the best location for roadshows

As majority of a telecommunications company's customer base are aged 15 to 39 (which will be shown how it is determined in Social Media Demographics 5.2), M1 should place more promotional and advertising efforts to this target group. This target group can be further split into aged 15 to 24 and aged 25 to 39. Customers aged 15 to 24 are mostly students whereas customers aged 25 to 39 are mostly working adults. In this section, we will be using geospatial analysis to help M1 decide where will be a good location to organise a roadshow to increase brand awareness and product knowledge, specifically for customers aged 15 to 24. Our main focus will only be on customers aged 15 to 24 as customers in this age group are easily influenced by their environment and more prone to impulsive behavior (Bradley Ruder, 2016).

## Analysis of customers aged 15-24

We will first identify the planning areas with large population of residents aged 15-24.

### Location of residents aged 15-24

Age 15-24

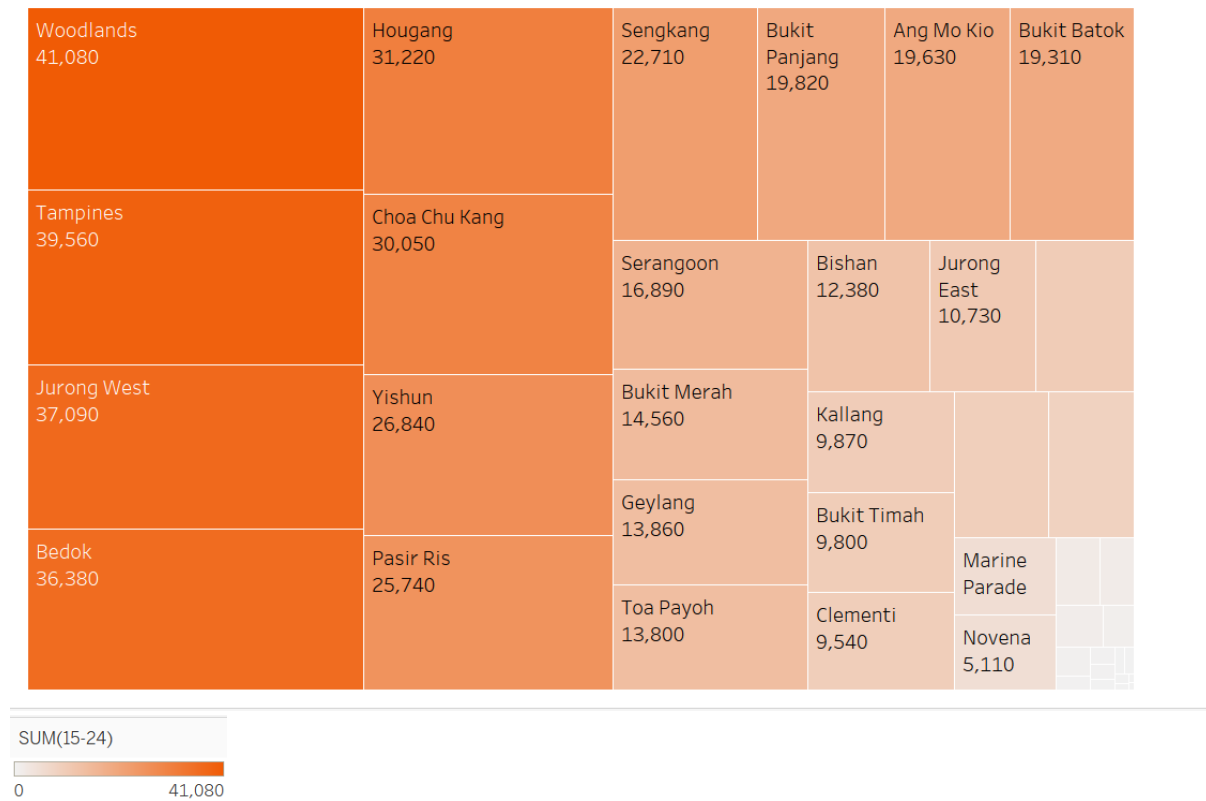


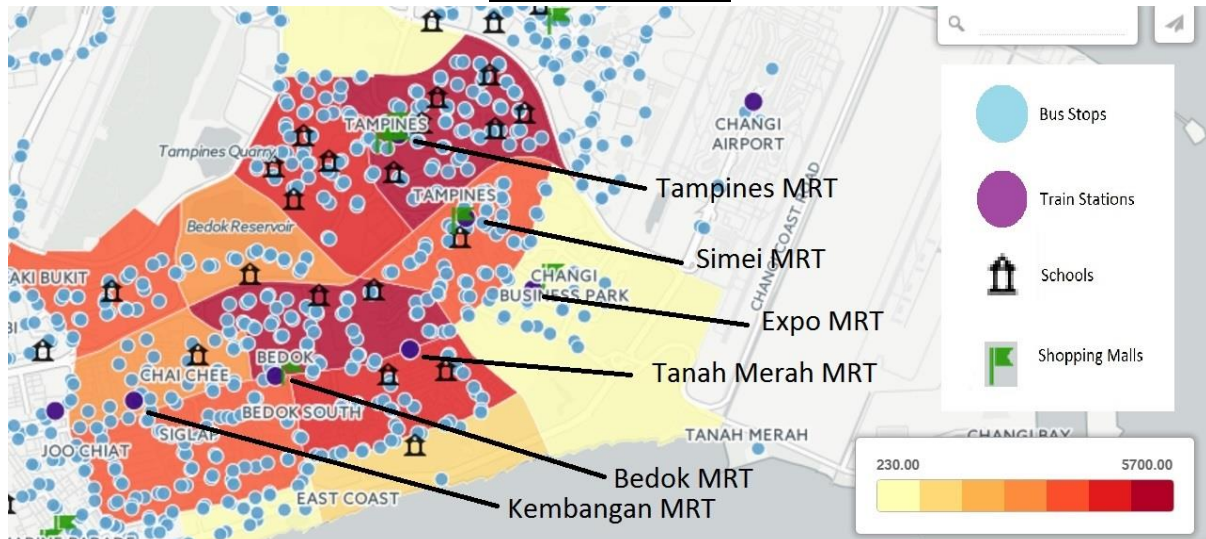
Figure 5.1.1 Most densely populated areas with residents aged 15-24

From this visualisation, we observe that there are 4 planning areas with at least 35,000 residents aged 16-24. Thus, we will be narrowing down specifically to Woodlands (41,080), Tampines (39,560), Jurong West (37,090) and Bedok (36,380).

Next, we use the locations of bus stops, train stations, secondary schools, pre-universities, shopping malls and population of residents aged 15 to 24 to help us better understand which planning areas have a larger traffic of our target audience. The locations of bus stops and train stations will determine the level of accessibility; the locations of schools will indicate an increase in traffic of our target group and the location of shopping malls will also indicate an increase in traffic in general. Also, shopping malls could be potential hang out spots for students studying in schools nearby. Therefore, these factors will help us narrow down to one planning area which will help maximise the reach of a roadshow targeted at customers aged 15 to 24.



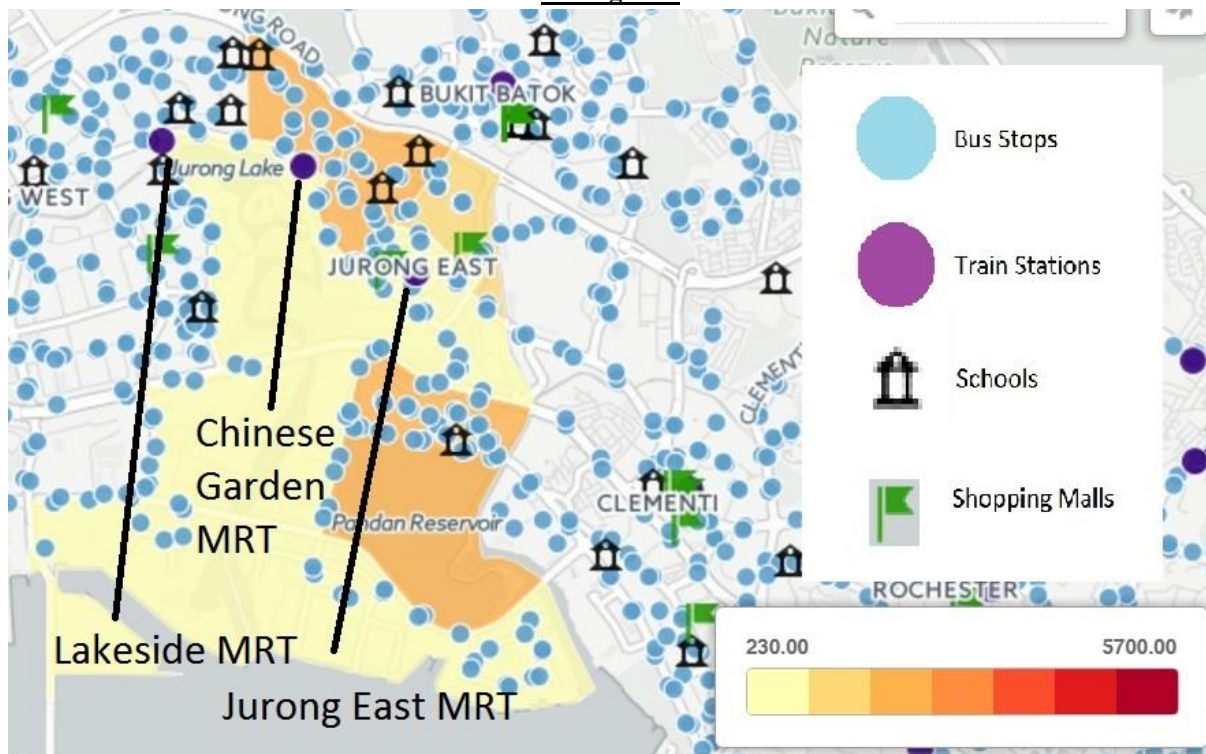
### Tampines and Bedok



*Figure 5.1.2 Geospatial analysis of Tampines and Bedok*

We observe that the Tampines and Bedok planning area have a large number of bus stops spread across both planning areas, indicating that most of the areas are accessible. Tampines has 11 schools while Bedok has 8 schools. The schools in Bedok planning area are rather spread out as compared to the schools in Tampines planning area. Also, there is only 1 shopping mall in Bedok planning area whereas there are 5 in Tampines planning area. On a closer look, Tampines MRT has 3 shopping malls within walking distance, several schools nearby, dense population of residents aged 15 to 24 indicated by the shade of dark red and abundance of bus stops. Thus, Tampines will be a better planning area as compared to Bedok.

### Jurong East



*Figure 5.1.3 Geospatial analysis of Jurong East*

From this visualisation, we can observe that the population of residents aged 15-24 are quite spread out as seen

by the intensity of shading. There are 3 schools, 2 of which are situated in between Chinese Garden MRT and Jurong East MRT. The 2 shopping malls are located near Jurong East MRT and the bus stops are generally located from the north to central east of Jurong East planning area. Hence, Jurong East planning area may not be as ideal as compared to Tampines.

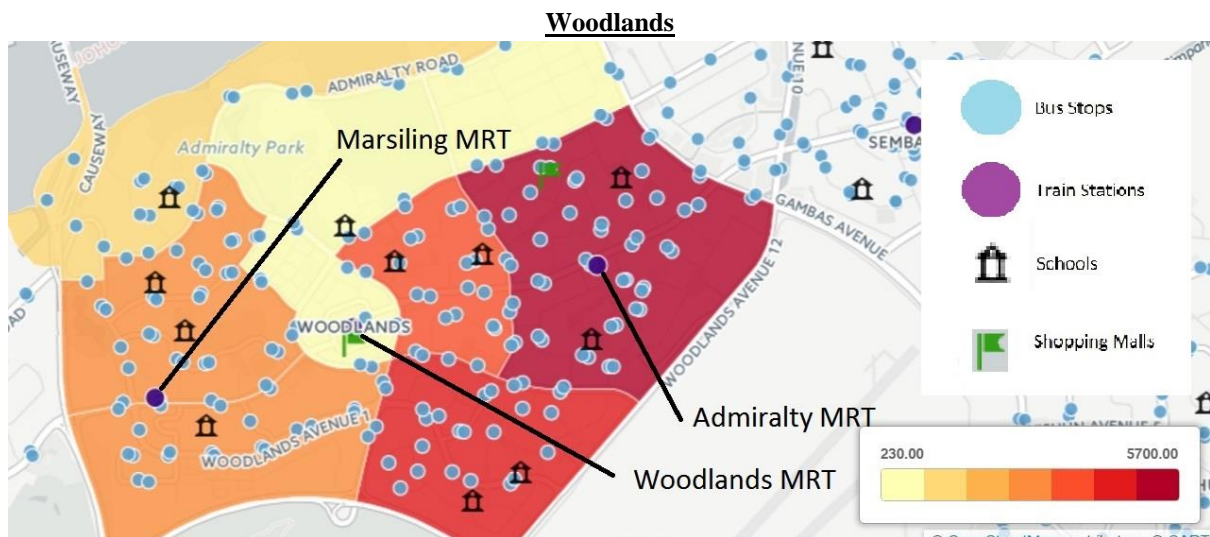


Figure 5.1.4 Geospatial analysis of Woodlands

Bus stops in Woodlands planning area are well spread out, ensuring accessibility and convenience. There are 3 train stations in Woodlands Planning area, Marsiling MRT, Woodlands MRT and Admiralty MRT. The population around Admiralty MRT is more dense as compared to that of Woodlands MRT and Marsiling MRT. However, the schools are closer to Marsiling MRT as compared to Admiralty MRT and Woodlands MRT. Hence, Woodlands planning area may not be as ideal as Tampines planning area. This is because there is no MRT with all 3 factors, i.e a shopping mall nearby, dense population of target residents and close proximity of schools.

Therefore, based on our analysis, we will be using Tampines planning area out of the 4 to determine the most suitable location for a roadshow, specifically the area near Tampines MRT. In order to identify a location with the highest traffic in Tampines for a roadshow, we first plotted a 200m radius for the 3 shopping malls, Tampines One, Tampines Mall and Century Square.

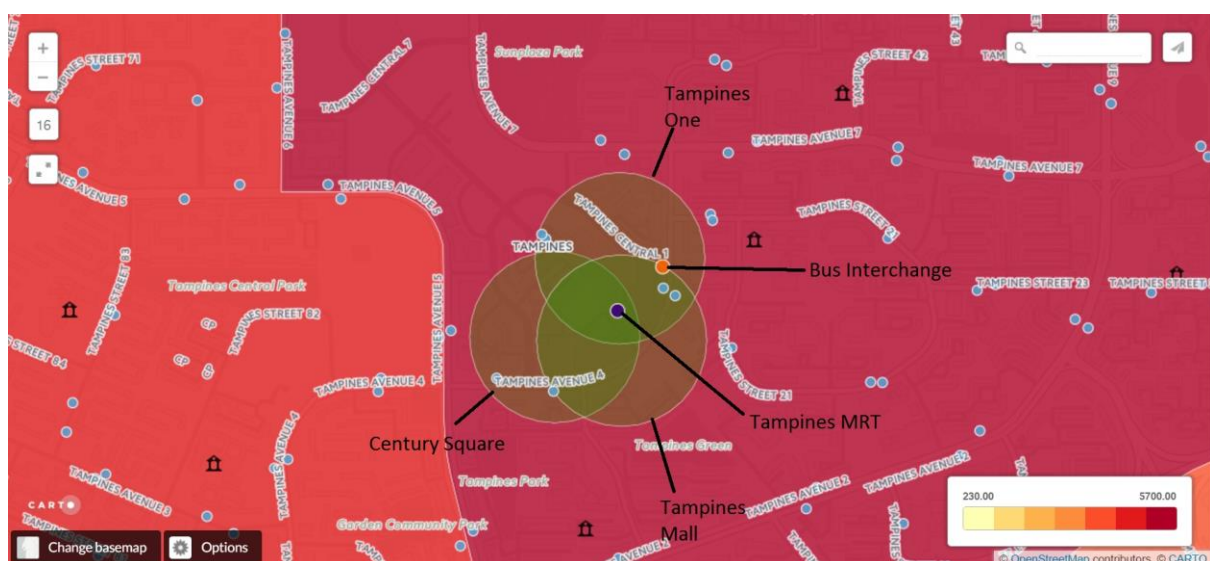


Figure 5.1.5 Triangulation of Tampines One, Tampines Mall and Century Square



Next, we plotted a 100m radius for Tampines Bus Interchange and Tampines MRT to determine the intersection between this 5 Point of Interests. By isolating the intersection, we were able to narrow down to two possible locations, Exit A and Exit C of Tampines MRT.

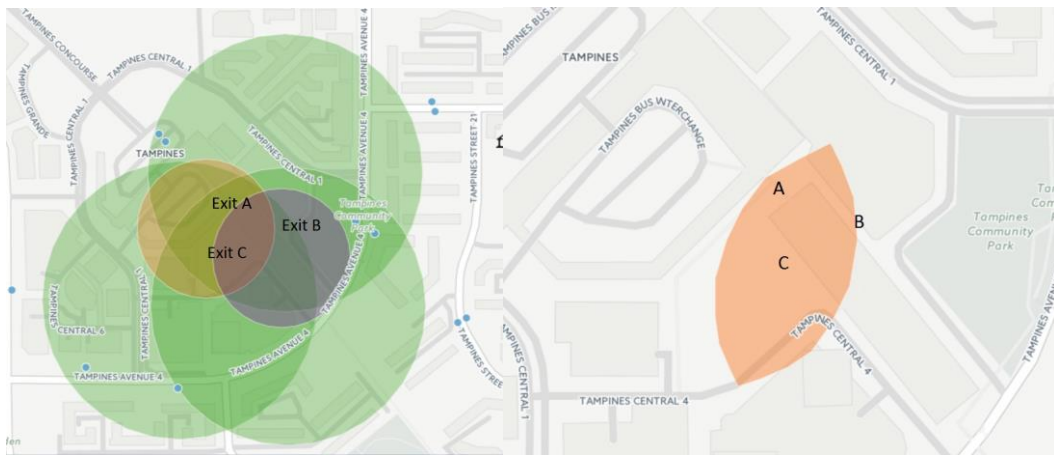


Figure 5.1.6 Intersections marked within the specified area

Due to lack of open space for a roadshow in Exit A, we can conclude that Exit C of Tampines MRT will be the most suitable location to organise a roadshow targeting customers aged 16 to 24. To further illustrate our point, a photograph from Google Maps of the suggested location is shown below.

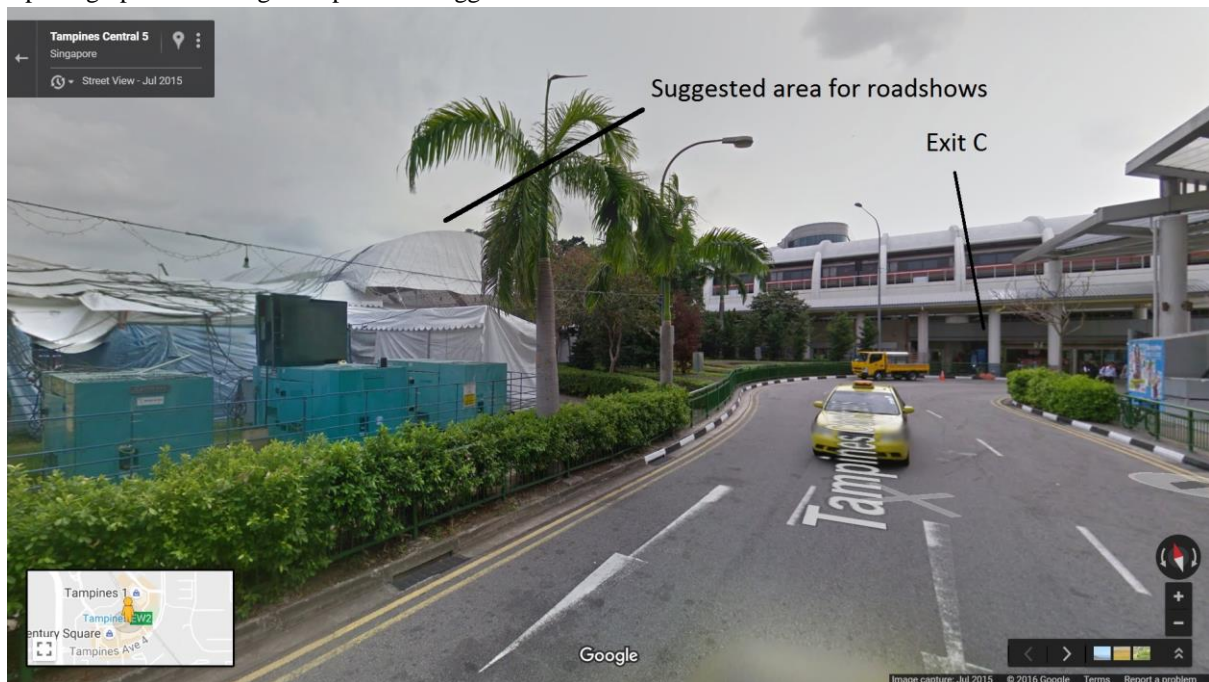


Figure 5.1.7 Site review of Exit C

Hence, M1 can set up a roadshow in this specific location during after school hours on weekdays and normal hours on weekends to get a better traffic of customers aged 15 to 24. We have to take into consideration that our target group are often not the ones purchasing mobile plans, instead, their guardian or parents are the ones with the purchasing power. Thus, the purpose of the roadshow can be to help students better understand what student privileges are they eligible for and the types of data plans suited to their needs before they can make an informed discussion with their parents or guardian.

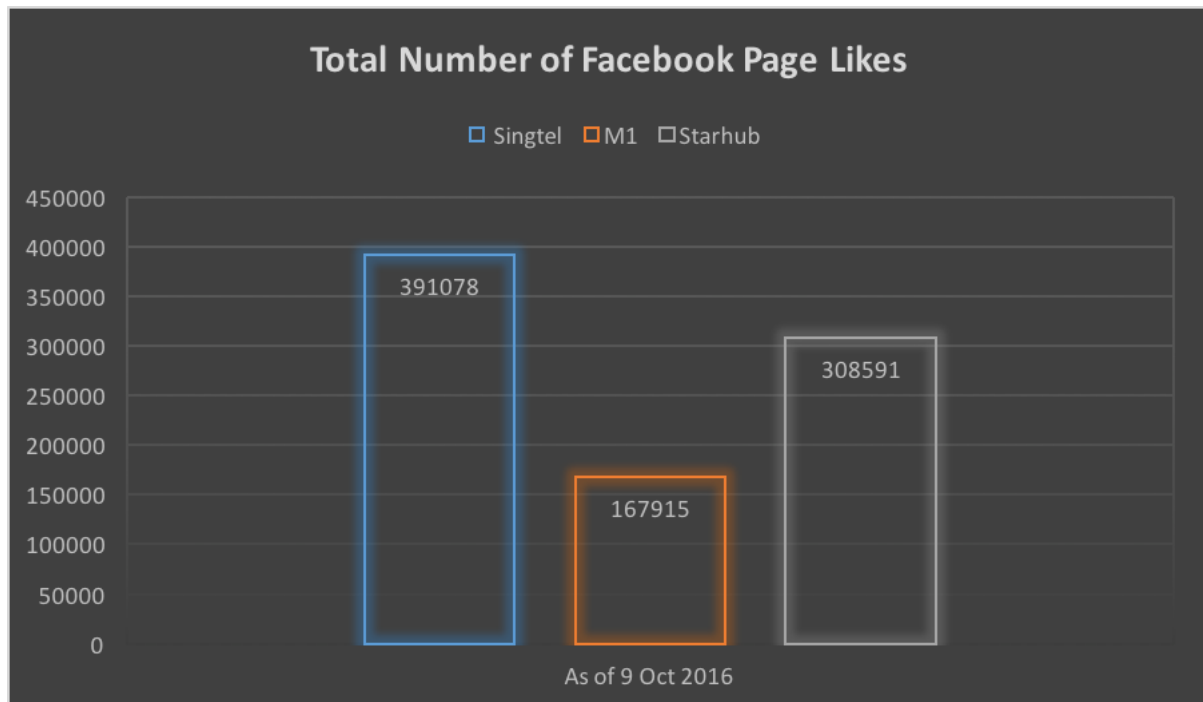


## 6. Marketing Strategy

In a largely competitive Oligopolistic industry, M1 must make their presence known in order to stand out among its competitors. Marketing is a key component of its business model as it presents the company's image as a whole. This could also help M1 to acquire more potential customers, or to improve current customer satisfaction.

### 6.1. Social Media Marketing

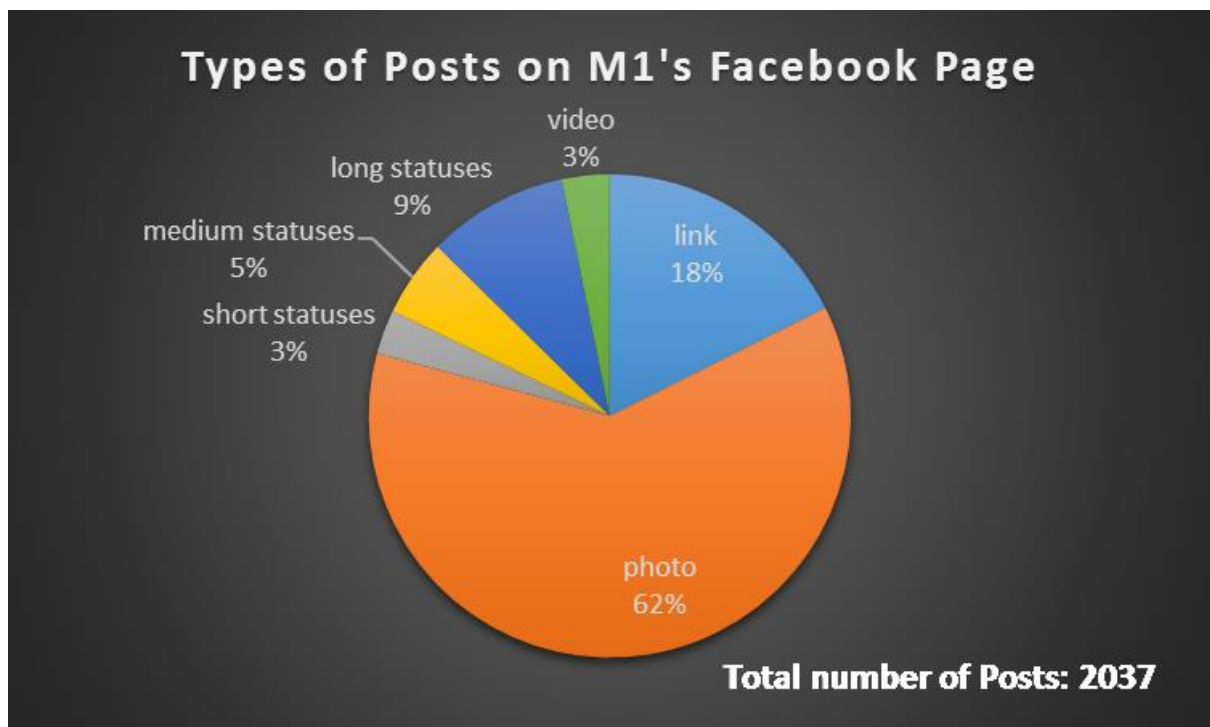
#### 6.1.1 Facebook



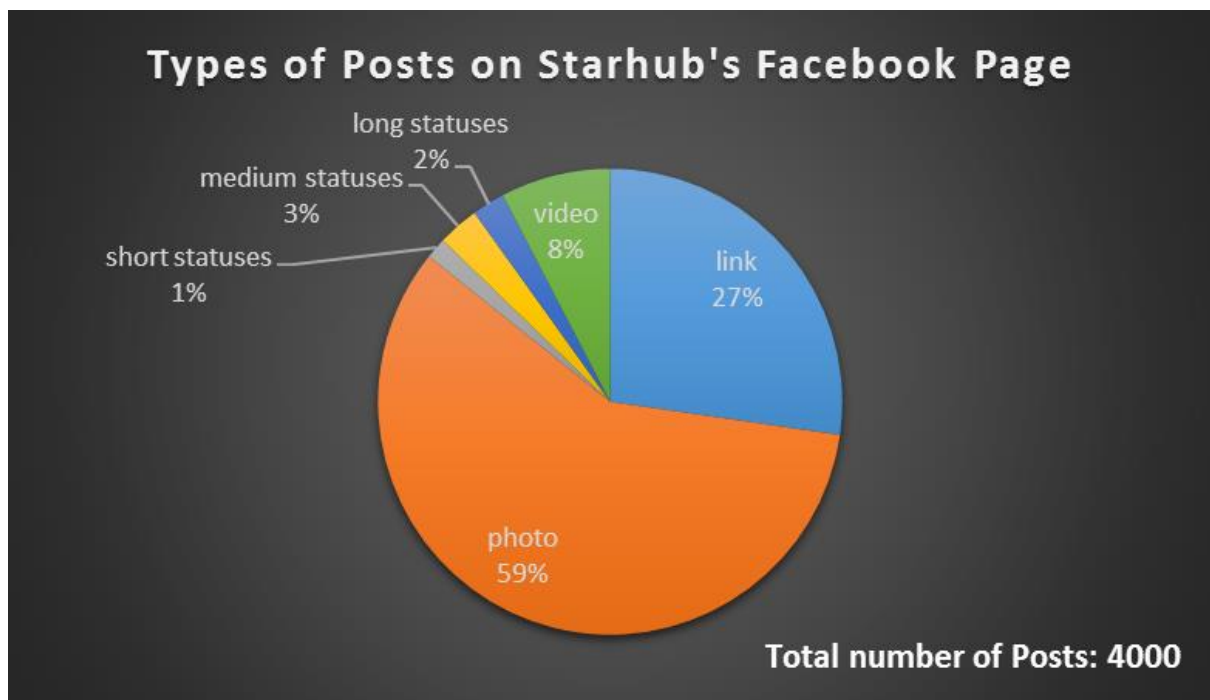
*Figure 6.1.1.1 Column Chart showing number of Facebook Page Likes for each telco, as of 9th Oct 2016*

A brief observation of the total number of Facebook page likes for the 3 different telco companies shows that Singtel is the most popular, followed by StarHub and then M1. M1 has a significantly smaller number of Facebook likes, more than half of that of Singtel.

### Types of Facebook Post



*Figure 6.1.1.2 Piechart showing types of post on M1's facebook page*



*Figure 6.1.1.3 Piechart showing types of post on StarHub's facebook page*

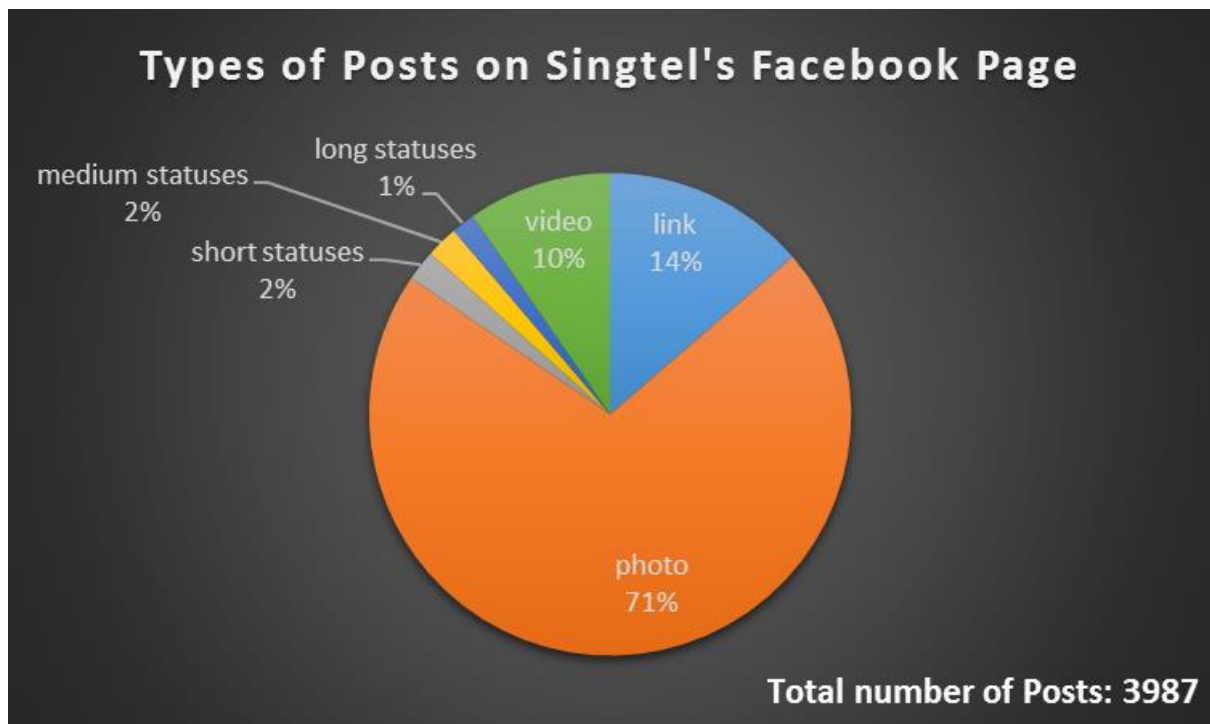


Figure 6.1.1.4 Piechart showing types of post on Singtel's facebook page

\*Short status refer to status under 141 characters.

\*Medium status refer to status between 140 to 300 characters.

\*Long status refer to status above 300 characters.

The 3 pie charts above classify the different types of posts on the Facebook pages of the 3 different telco groups. Our observations are as follows:

- 1) Looking at the absolute numbers alone, M1 posted less compared to its competitors. M1 posted 51.1% of the number of posts Singtel made, and 50.1% of the number of posts StarHub made.
- 2) Photos are the most popular type of post for all 3 telco groups, making up at least 59% of the posts.
- 3) Singtel and StarHub post more videos than M1. Videos are in 3% of M1's posts, while they are in 8% and 10% of StarHub's and Singtel's respectively.
- 4) Singtel and StarHub also post less statuses than M1. 17% of M1's posts are statuses, while StarHub's and Singtel's are at 6% and 5% respectively.
- 5) We can also observe that the M1 tend to post more long statuses relative to StarHub and Singtel.

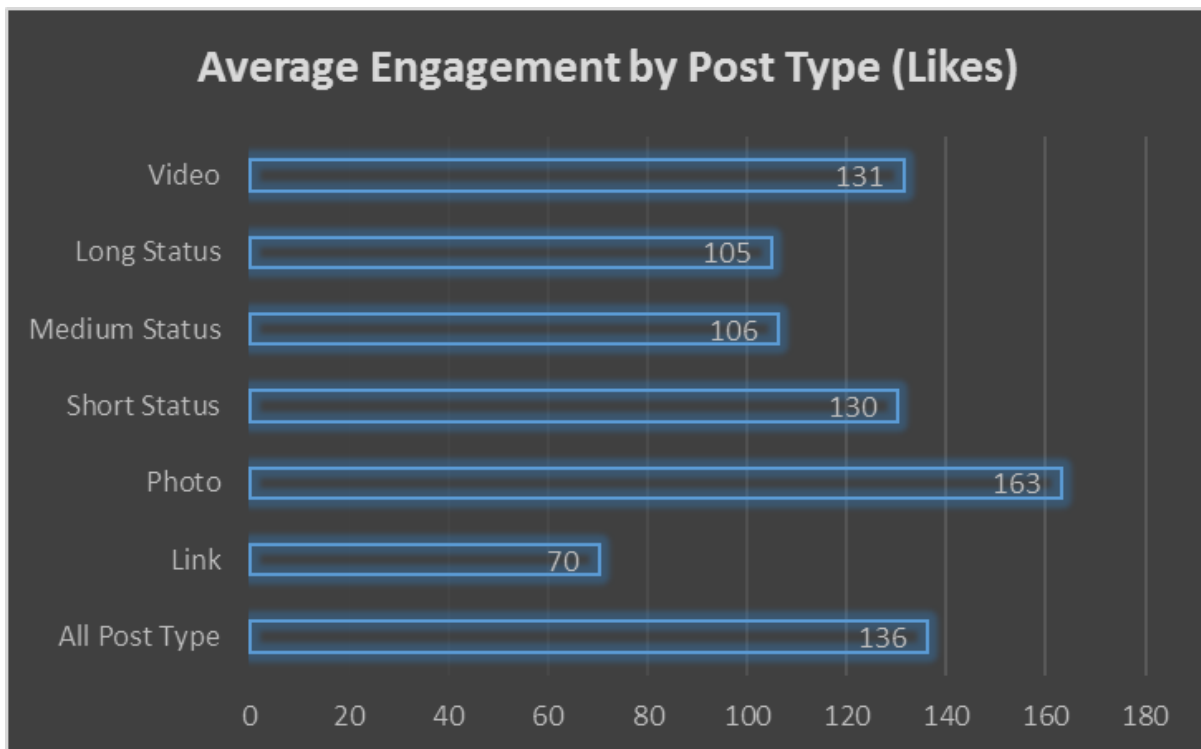


Figure 6.1.1.5 Clustered bar chart showing average likes per post type for M1's Facebook posts

In Figure 6.1.1.5, we have calculated the average likes for each type of post for the M1 company. We used average likes to correlate to the average engagement. We observe that photos and videos are the most well-received by their audience. On the other hand, links are the least well-received. This is contrary to the results found in Figure 6.1.1.2, where links are the second most popular types of post posted by M1. M1 can consider focusing more on posting videos. We also attribute the low number of video posted due to the increased effort required to make a video compared to a link.

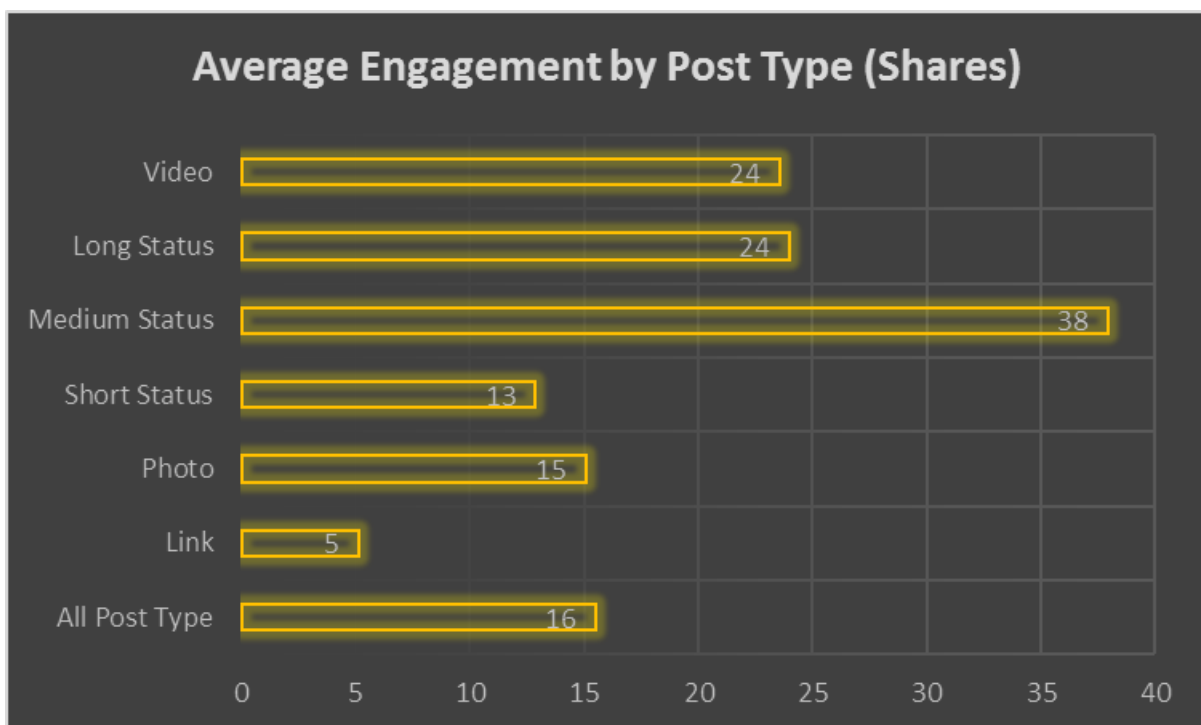


Figure 6.1.1.6 Clustered bar chart showing average shares per post type for M1's Facebook posts

From Figure 6.1.1.6, we can find out which are the most commonly shared types of posts. We have noticed that the statuses posted are usually announcements (refer to Figure 6.1.1.7 below), and hence we choose to ignore the average share for the status in this chart. We observe that videos are more commonly shared as opposed to photos and links, with an average of 24 shares per video. Videos are effective more effective for M1 to spread the word and expand its outreach.

Examples of Statuses Posted
Some of our customers may be experiencing difficulties sending text messages or making voice calls. We are currently rectifying the issue and apologise for the inconvenience.
Dear customers, We are aware of recent news reports regarding the Samsung Galaxy Note 7. Samsung is expected to make an announcement on this issue shortly and we will share updates accordingly. 4:30pm update: In line with Samsung's global Note 7 sales halt, M1 has stopped sales of the handset. Please visit: <a href="http://www.straitstimes.com/tech/smartphones/samsung-says-to-halt-galaxy-note-7-sales-on-battery-problem">http://www.straitstimes.com/tech/smartphones/samsung-says-to-halt-galaxy-note-7-sales-on-battery-problem</a> for more information on this development. 6:14pm update: For more information on this issue and the recall, please see Samsung's statement here: <a href="https://www.facebook.com/SamsungMobileSingapore/posts/10154588665757625">https://www.facebook.com/SamsungMobileSingapore/posts/10154588665757625</a>
Thursday 9th October 4:45pm update Please be advised that the following M1 Shop outlets have stopped accepting walk-in customers for the day: Compass Point, West Mall, Bugis Junction, Paragon, Causeway
All variants of the iPhone 7 Plus are currently out of stock for pre-order. For updates on stock availability, please stay tuned to our Facebook page.

Figure 6.1.1.7 Table displaying examples of some of the statuses posted on M1's Facebook page

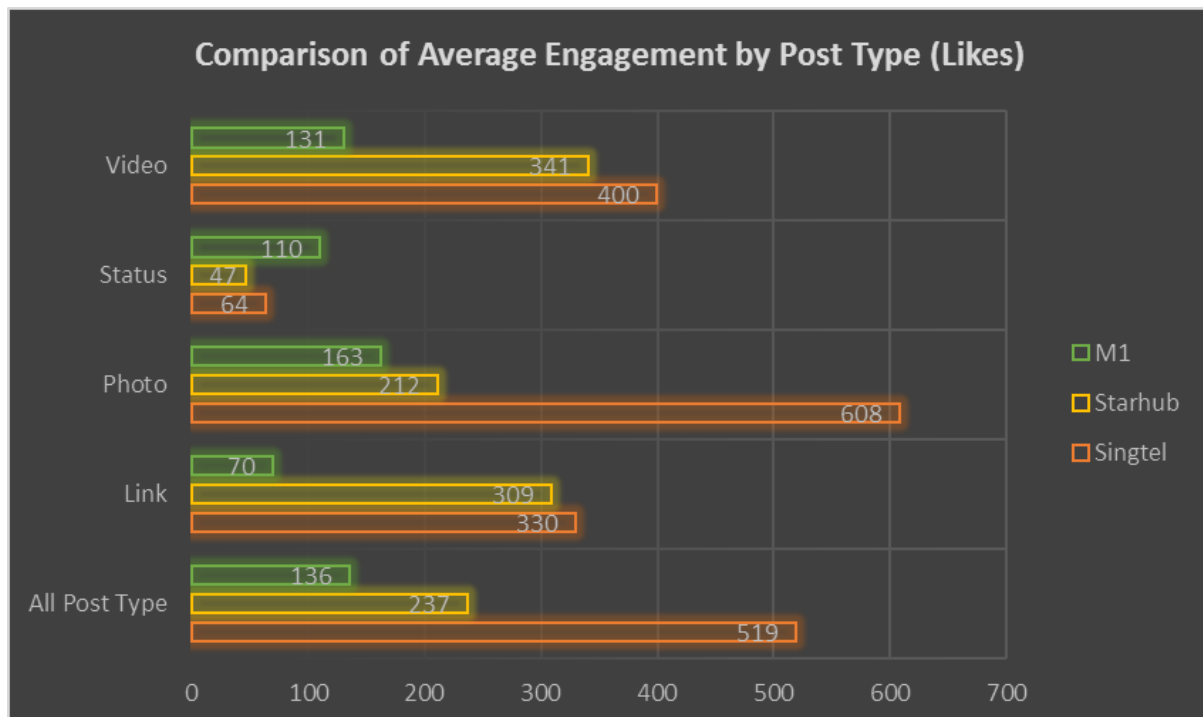


Figure 6.1.1.8 Clustered column showing a comparison for the average number of likes per post type for M1, StarHub and Singtel's Facebook posts

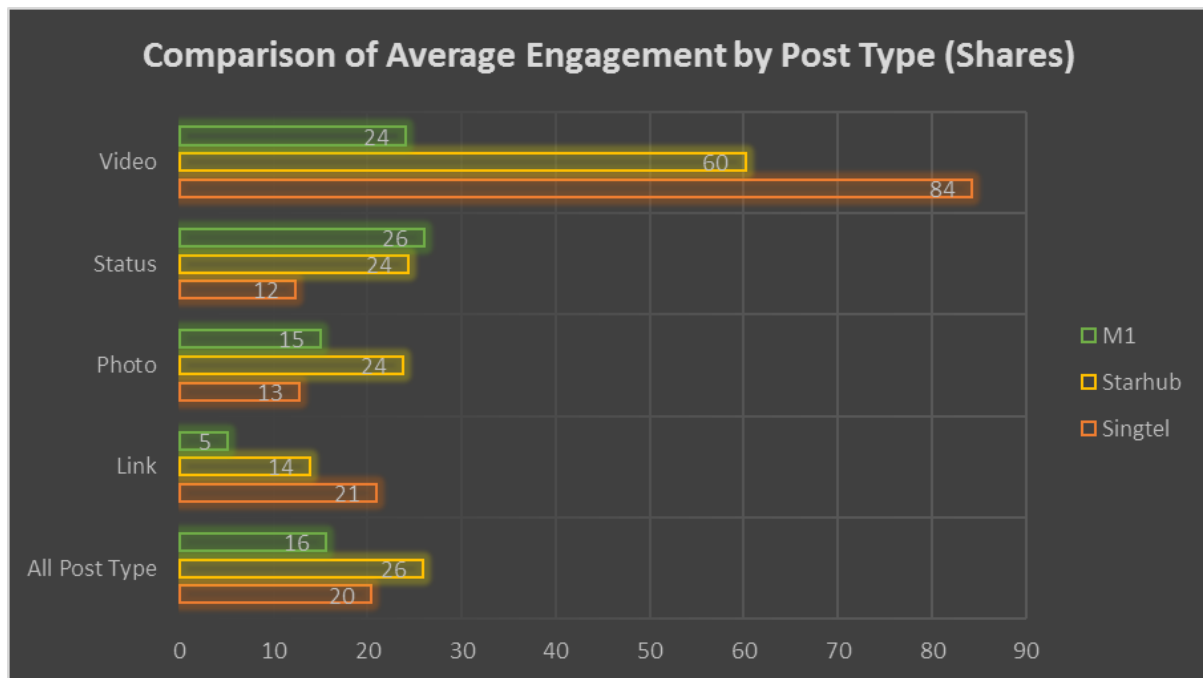


Figure 6.1.1.9 Clustered column showing a comparison for the average number of likes per post type for M1, StarHub and Singtel's Facebook posts

We also compared the average engagement of different companies and observed a few interesting insights:

With reference to Figure 6.1.1.8,

- 1) Singtel has outperformed the rest with an average of 519 likes per post, compared to 136 and 237 for M1 and Singtel respectively.
- 2) Singtel's photos are very well-received
- 3) StarHub's and Singtel's videos are well-received

With reference to Figure 6.1.1.9,

- 1) Most of the shares for Singtel and StarHub comes from the posts with videos

All the data seems to suggest that photos receive the most likes and videos receive the most shares. M1 can use this insight to determine the type of post they want to use depending on the type of outreach they want.

## Facebook Like Counts, Comment Counts and Share Counts

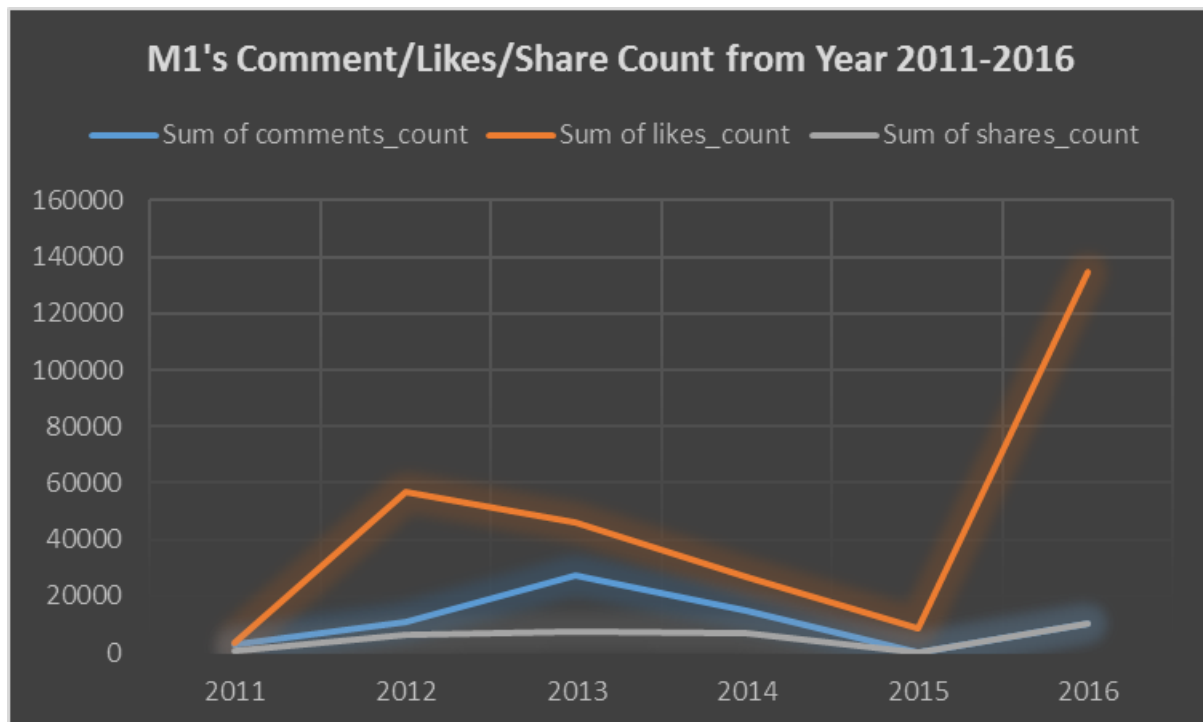


Figure 6.1.1.10 Line graph showing the number of likes, shares and comments on M1's Facebook page

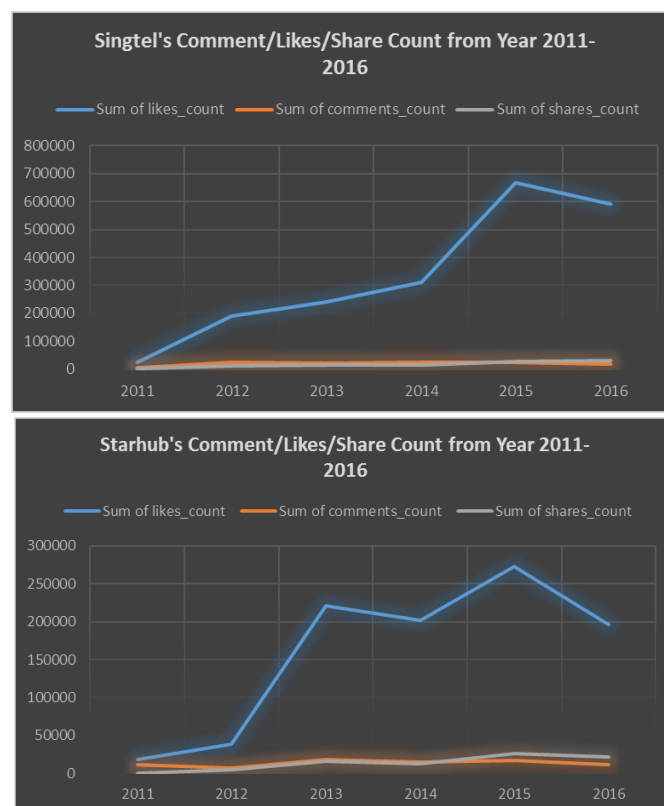


Figure 6.1.1.11 Line graphs showing number of likes, shares and comments on Singtel's (top) and StarHub's (bottom) Facebook page

From Figure 6.1.1.10, we observe that there is a sharp increase in M1's Facebook likes from the year 2015 to 2016. This observation is not seen in that of Singtel's and StarHub's. This might be because Singtel and StarHub already have a saturated number of likes.

### **Common Themes in Facebook posts**

Using an online text analyzer ("Text Analyzer - Text analysis Tool - Counts Frequencies of Words, Characters, Sentences and Syllables", 2016) to do a simple run on the message on each Facebook post, we have identified a few themes that often appear.

Operator	Top Phrases	Top Words
M1	sign up or re contract (51) 2 year mobile plan (47) <b>m1 fibre broadband</b> (32) <b>chance to win</b> (32) <b>m1 fibre sports bundle</b> (19)	fibre (113) broadband (107) <b>win</b> (100) free (88) sports (47) iphone (44) samsung (36) family (16)
Singtel	<b>chance to win</b> (186) we are giving away (89) win a pair of (86)	free (768) <b>win</b> (695) exclusive (339) samsung (315) iphone (245) fibre (211) family (141) sports (28)
StarHub	<b>chance to win</b> (215) win a pair of (66) <b>2 year 4g 4 plan</b> (47) ac dual band router (38) <b>football channel ch 22</b> (29)	<b>win</b> (732) free (695) happy (357) samsung (281) family (175) fibre (166) iphone (157) sports (91)

*Figure 6.1.1.12 Table that shows the top phrases and keywords that appears in the Facebook pages*

It can be observed that M1 and StarHub tend to publicise and market certain unique plan offerings that is provided by their company. The observed top phrases of M1 and StarHub includes specific plans such as "*m1 fibre sports bundle*" and "*2 year 4g 4 plan*". On the other hand, Singtel does not have its own special plan offering. We note that freebies are a marketing strategy that all 3 companies utilize as phrases such as "chance to win" is present in all of the top phrases used by the companies.

We notice that M1 does not offer freebies as much as Singtel and StarHub. "Chance to win" is the top phrase for both StarHub and Singtel, while it is only the third ranked phrase for M1. We feel that it is important for M1 to step up on its social media presence and increase their brand awareness. Hence M1 can consider increasing their freebies offers to increase their social media presence.



Next, we categorize the Facebook posts of Singtel and M1 (we did not include StarHub in this report since it is very similar to the one of Singtel) based on the keywords above. Based on the number of occurrences of keywords in the facebook posts, the top 5 categories for Singtel are: FREE, WIN, EXCLUSIVE, SAMSUNG and IPHONE. For M1, the categories are WIN, SPORTS, FREE, SAMSUNG and IPHONE. These categories are among the most common ones posted by Singtel and M1 respectively and thus will be used to discover customer reaction to Facebook posts.

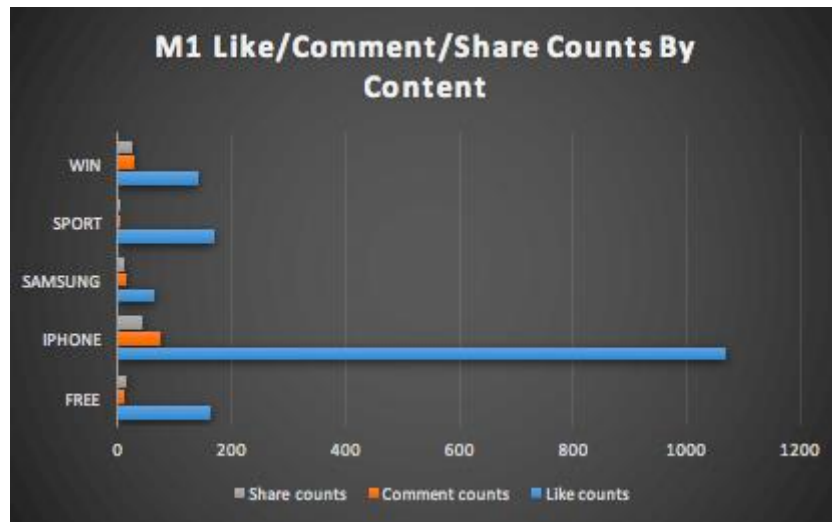


Figure 6.1.1.13 Clustered column chart that shows the classified posts of M1

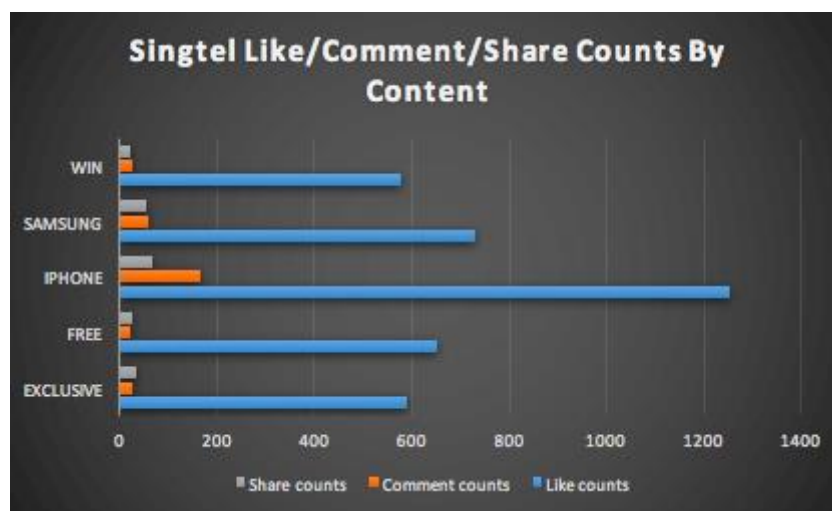


Figure 6.1.1.14 Clustered column chart that shows the classified posts of Singtel

Firstly, we look at the average like/comment/share counts of each particular type of posts for both M1 and Singtel. We discovered that the average likes/comment/share counts of posts regarding the iPhone are much higher than other posts for both M1 and Singtel. However, M1's posts on Samsung does not receive as much interaction as Singtel's posts on Samsung. This is with regards to the recent Samsung Galaxy Note 7 incident where all Note 7s were to be exchanged, and more people turned to Singtel on Facebook since the page is very responsive.

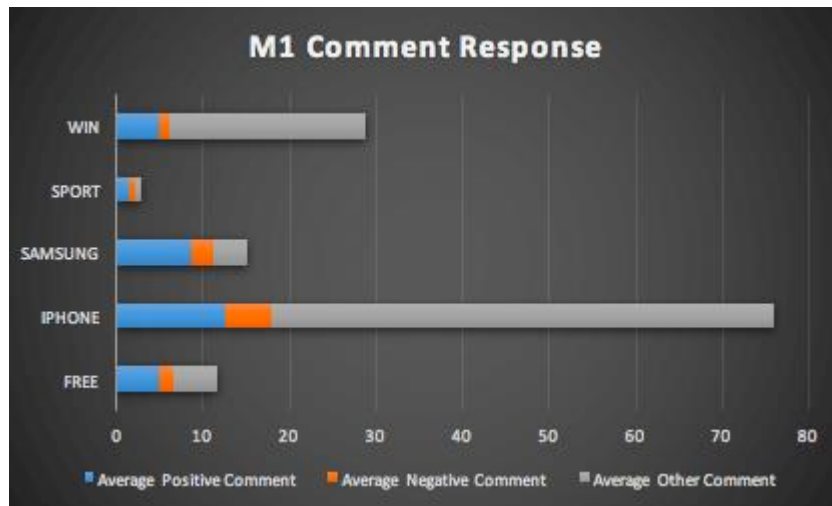


Figure 6.1.1.15 Clustered column chart that shows classified comment post of M1 according to sentiment

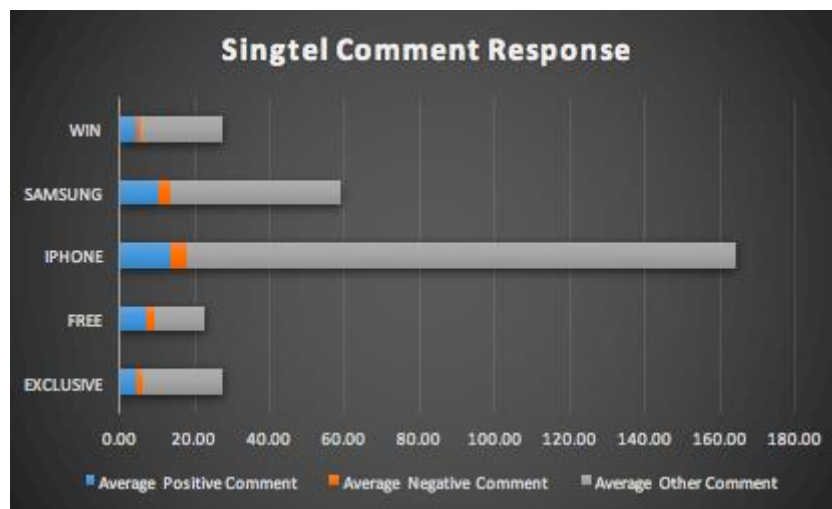


Figure 6.1.1.16 Clustered column chart that shows classified comment post of Singtel according to sentiment

We also looked at what type of comments the users made on the posts to see whether the comments are positive or negative. From Figure 6.1.1.15, it can be observed that M1 posts regarding iPhone has a large portion of negative comments (around half the amount of positive comments). By checking manually, we found out that this is caused by M1's lack of stock of iPhone 7. We also saw a very small number of response in posts relating to Sports by M1 although these posts make up a significant portion of M1's post.

With these points in mind, we can see that as compared to its Twitter page, M1's Facebook page is doing quite well in making regular posts and receiving likes, comments and shares of its posts. All the popular categories also yield more positive comments than negative comments and the negative comments mostly come from problems with stocks but not customer service. Based on our analysis, the Sports section of M1 receive very negligible interactions as compared to other posts and although this is a good chance for M1 to advertise its TV or fibre broadband, we feel that the posts about Sports can be removed without any harm to the follower interaction rate.

## 6.1.2 YouTube

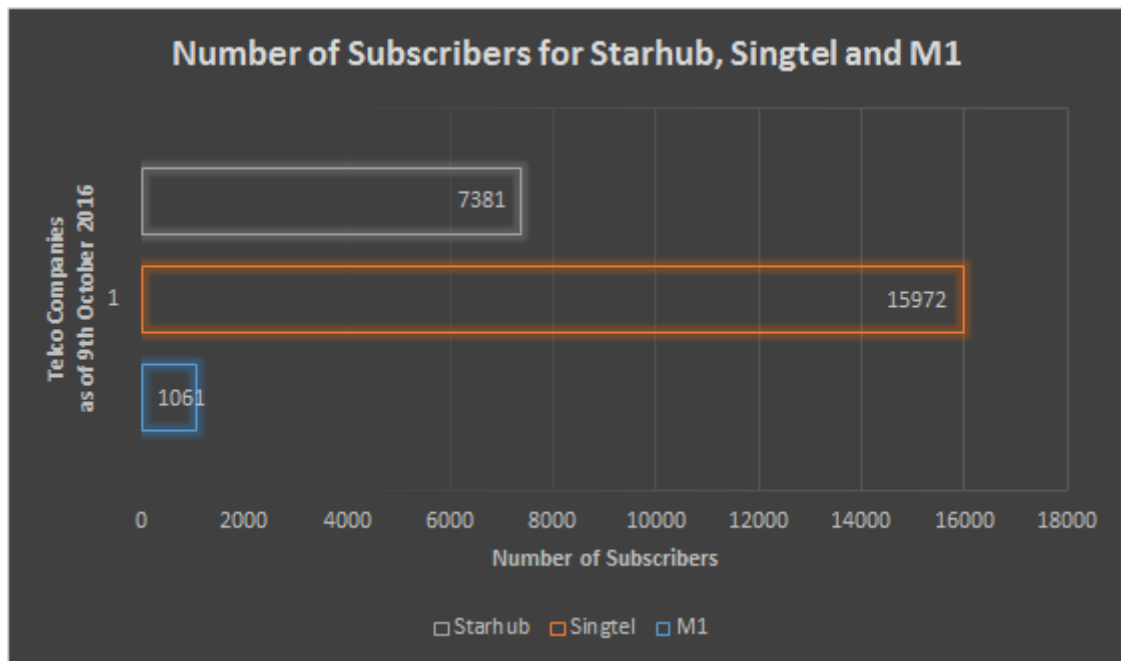


Figure 6.1.2.1 Bar chart illustrating the number of YouTube subscribers for M1, StarHub and Singtel

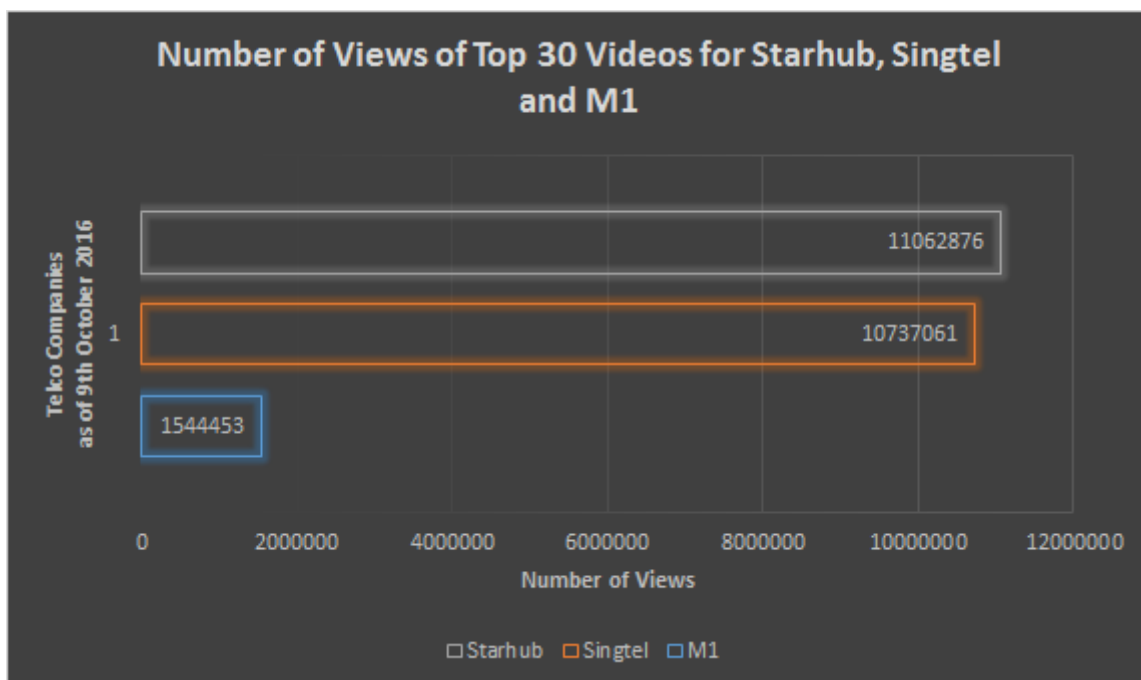


Figure 6.1.2.2 Bar chart illustrating the number of views for the top 30 videos of M1, StarHub and Singtel

The 2 charts above show the number of subscribers and number of views for the top 30 videos for M1, StarHub and Singtel. Our observations are:

1. M1 has a much lower number of subscribers as compared to StarHub and Singtel. M1 has merely 6.64% of Singtel's number of subscribers and 14.37% of StarHub's number of subscribers.

2. M1 has a much lower number of views as compared to StarHub and Singtel. M1 has 14.38% of Singtel's number of views and 13.96% of StarHub's number of views.
3. Although StarHub has approximately half of Singtel's number of subscribers, they have slightly more total number of views than Singtel.

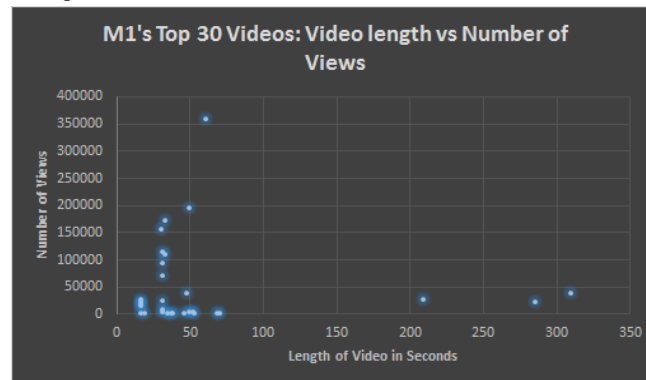


Figure 6.1.2.3 Scatter plot illustrating M1's Top 30 Videos: Video length vs Number of Views

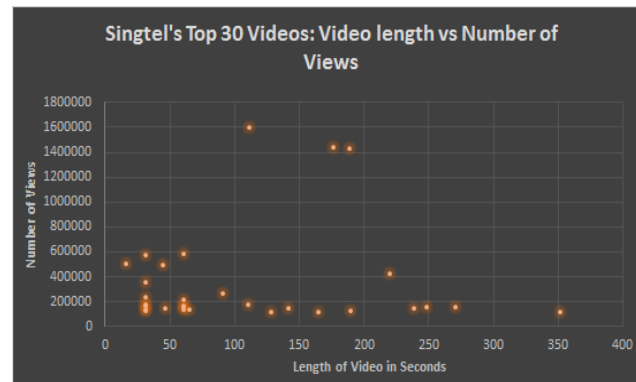


Figure 6.1.2.4 Scatter plot illustrating Singtel's Top 30 Videos: Video length vs Number of Views

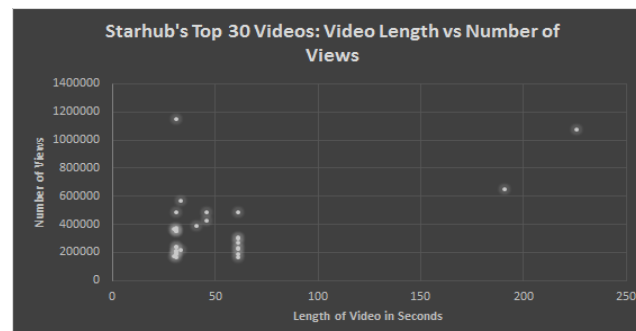


Figure 6.1.2.5 Scatter plot illustrating StarHub's Top 30 Videos: Video length vs Number of Views

The 3 scatter plots above show the relationship between video length and number of views for M1, Singtel and StarHub. Our observations are:

1. Most of the videos of all 3 companies are below 250 seconds. Both M1 and StarHub generally have most of their videos below a minute while Singtel have a wider range of video length.
2. For all 3 companies, the video with the highest number of views are from relatively shorter videos.

From this, we propose that M1 should continue posting short and concise videos. This is because viewers are likely to skip long videos and are unwilling to spend anything more than 3 minutes on an advertisement. However, from StarHub's and Singtel's graphs, we deduce that there isn't a specific range where videos are more successful

Figure 6.1.2.6 shows M1's top 30 most popular videos. Based on the title of each video and their content, we found out that most of their top few videos are promotional videos that promotes the experiences of using M1. Although they were more successful as compared to the other videos they had, they received several negative comments as shown above. Furthermore, most of their views came from unavoidable advertisements viewers have to go through before every video they watch.

Unlike M1, Singtel's and StarHub's top videos are more interesting and specific. Singtel includes videos regarding fun facts and include famous figures in Singapore such as Joseph Schooling and Gordon Ramsey which makes their videos more interesting. This attracts more viewers. StarHub includes videos that are related to what's happening in Singapore, such as Chinese New Year and National Day, and videos that triggers viewers' emotions. StarHub also involves local Youtube stars such as Eden Ang to attract more viewers.

As such content have proven to be successful for Singtel and StarHub, M1 should create videos that would spark the interest of their viewers. For example, they can make use of activities that are happening or topics that currently trending in Singapore. Viewers will be able to relate better to such content and be more willing to watch the videos.

### 6.1.3 Twitter

A study by the Singapore Polytechnic in 2015 found that an estimated 57.6% ("News Releases | Singapore Polytechnic", 2016) of Singaporeans between the age of 15-35 years used Twitter. Despite this, M1 does not use Twitter for Social Media Marketing. While M1 has its own Twitter account (@m1\_sg), it is inactive and does not have any Tweets. However, its competitors make use of several Twitter accounts to reach out to their customers with a main account (@StarHub and @Singtel), and a customer support account (@StarHubCares and @SingtelSupport). Singtel has a total of 25.3 thousand followers, while StarHub has a total of 14.2 thousand followers. It is difficult to obtain data about M1 on Twitter. Less than 300 Tweets could be found about M1, in comparison to over 3000 tweets about each of its competitors. This is partly due to the nature of the name 'M1', which could refer to any possible irrelevant tweets.

In order for M1 to reach out to its customers and obtain customer feedback and information through Twitter, M1 should look towards being active on Twitter so that its customers can be assured that their tweets will be read, and can tag M1 in their tweets, allowing for more efficient data collection.

Using Twitter, M1 can improve on its customer service (as mentioned in Section 4.2.1), as well as its presence on social media. M1 also needs to optimize its use of Twitter in order to market itself effectively.

The features of Tweets make a difference to the reception by customers. Based on the Tweets of Singtel and StarHub, it is evident that the length of tweet, the presence of an image or video, the presence of hashtags, and the originality of the tweets are factors that affect the reception of the Tweet by its followers.

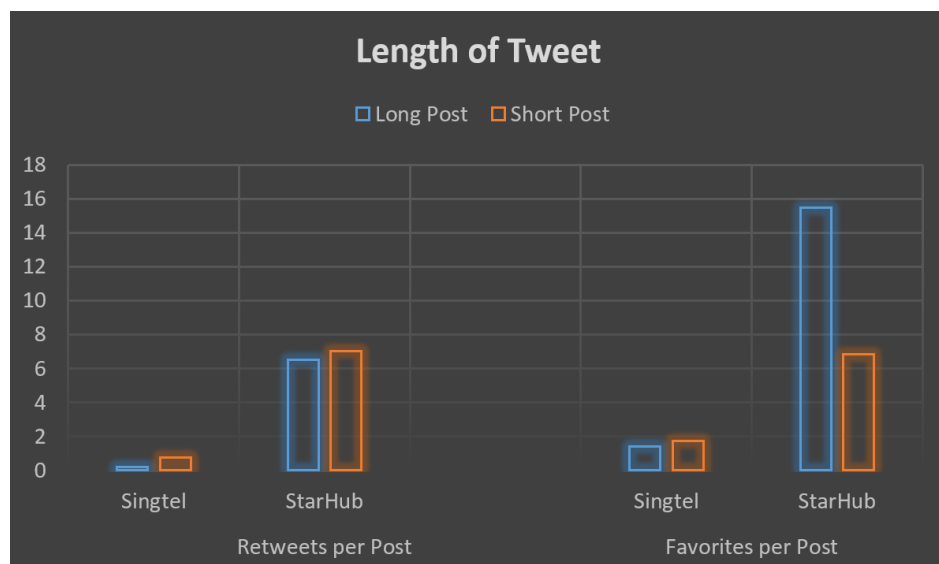


Figure 6.1.3.1 Clustered Column chart of the number of retweets and favorites per post by the length of Tweet for Singtel and StarHub from 8 September 2016 to 27 October 2016

From figure 6.1.3.1 above, it is evident that the longer the post, the more Favorites. However, shorter posts (posts with 128 characters and above) do have slightly more Retweets.



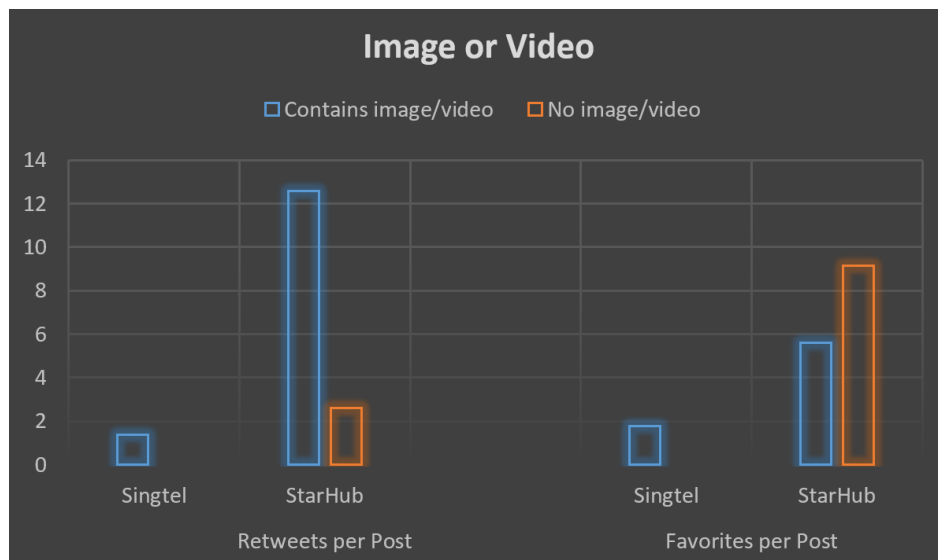


Figure 6.1.3.2 Clustered Column chart of the number of retweets and favorites per post by the presence of image or video for Singtel and StarHub from 8 September 2016 to 27 October 2016

All of Singtel's Tweets contained images or videos. From Figure 6.1.3.2, Tweets with an image or a video also garner more retweets, whereas Tweets without might gather more favorites. While this observation may seem less intuitive, it could perhaps be explained that images or videos are eye-catching, and hence it would attract more retweets.



Figure 6.1.3.3 Screenshot of an example of a Tweet with Marketing banner image on 14 October 2016

However, Tweets without images or videos are probably announcements or an opinion instead of a marketing poster or banner. These would attract more favorites since people favorite it to express agreement when the content of the Tweet resonates with them.

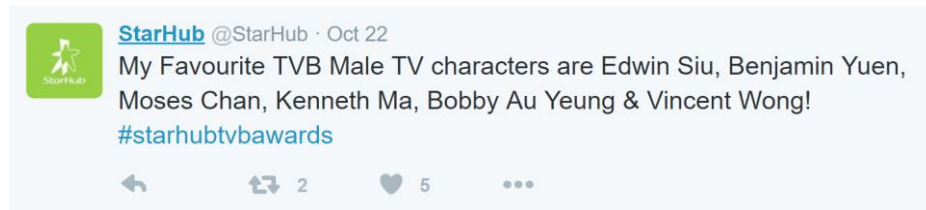


Figure 6.1.3.4 Screenshot of an example of an opinionated Tweet without an image or video on 22 October 2016

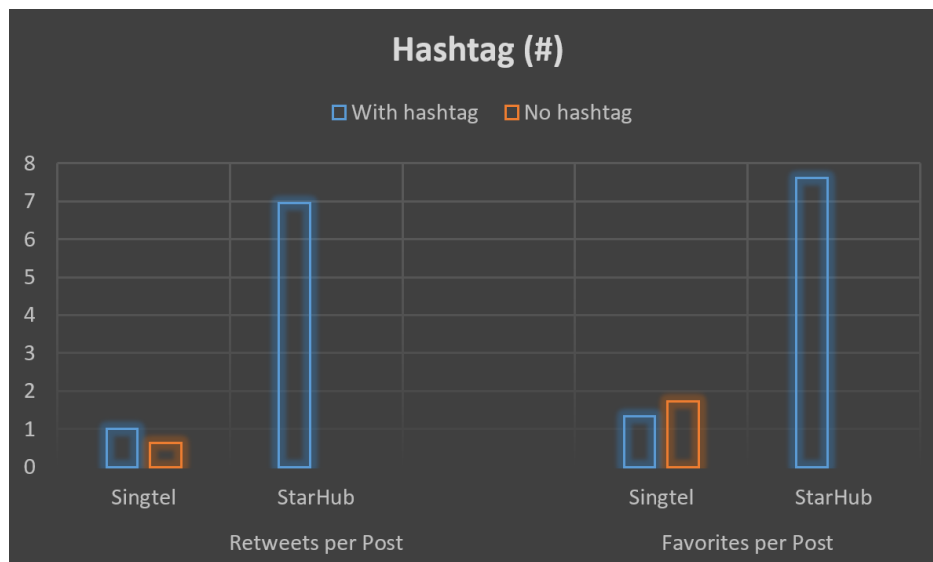


Figure 6.1.3.5 Clustered Column chart of the number of retweets and favorites per post by the presence of Hashtag(#) for Singtel and StarHub from 8 September 2016 to 27 October 2016

All of StarHub's Tweets contained hashtags. Tweets containing hashtags will get more Retweets, while Tweets without hashtags get slightly more Favorites.

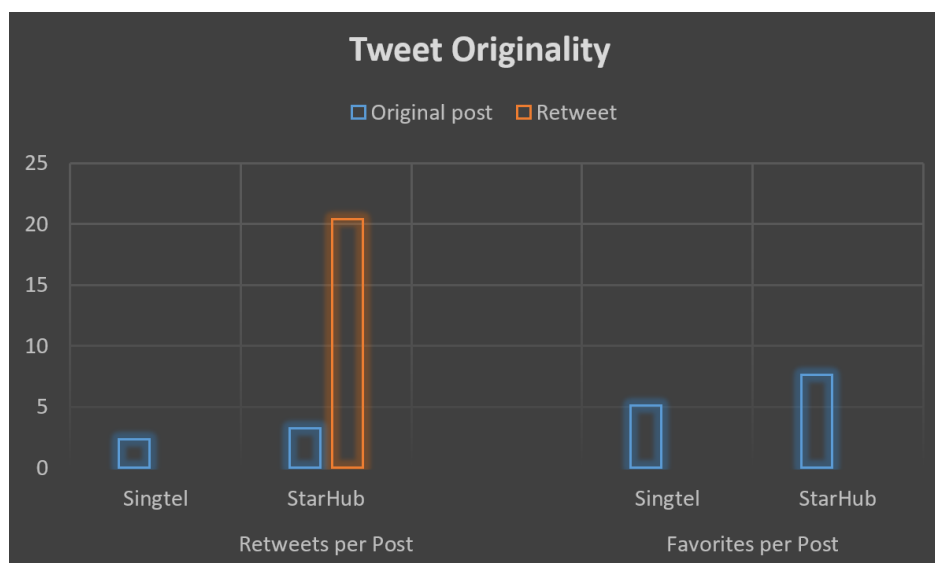


Figure 6.1.3.6 Clustered Column chart of the number of retweets and favorites per post by the originality of Tweet for Singtel and StarHub from 8 September 2016 to 27 October 2016



All of Singtel's posts were original posts. From StarHub's Tweets, it is evident that original posts get more Retweets as compared to posts that were Retweeted from other Twitter accounts.

All 4 factors seem to show a contrast between Favorites and Retweets. Choosing one option might increase the count of one and decrease the count of the other. However, on Twitter, Retweets means that the Tweet will be shared on other's Twitter feed, which translates to a larger audience reach. On the other hand, Favorites mean that the Tweet is well-received by followers. While it is ideal for a Tweet to score high in both components, in the context of M1's marketing strategy, Retweets would be more beneficial to M1 than collecting Favorites.

In addition, based on the customer demographic of Singtel's and StarHub's Twitter followers above, for a quick, budget and impactful start, M1 would also want to specifically target some demographic with its marketing strategies. Specifically, its campaign should focus on two group of customers: from 16-24 and from 25-39. The first group are those who are more active on social media and also have more people following Twitter's account as compared to the ones from 25-39 but are more sensitive to prices. Thus, words such as FREE and WIN will attract more customers within this category. Meanwhile, people from 25-39 are less sensitive to price and are more concerned about the quality of the service/product and words such as FIBRE, IPHONE or SAMSUNG may be used.

On the other hand, the gender distribution although slightly favors male, most message regarding telcos are not gender specific. In addition, M1 Facebook has posted a lot about SPORTS (more male inclined) but the response rate is not high as seen above and thus its effect can be doubted. In terms of race, since a lot of followers are Asian and are from Singapore, posts can be made regarding Asian cultures, Singapore food or similar things.

Hence, it is recommended that M1's Twitter marketing strategy could make use of the following to increase the number of Retweets:

1. Shorter Length of Post
2. Include pictures or videos
3. Contain Hashtags
4. Original Post
5. Focus based on age group

### 6.1.4 Instagram

Instagram is another popular and fast-growing social media platform that many Singaporeans use. Many companies are now commonly using social media to promote their brands and to maintain a friendly relationship with their customers (Saravanakumar & Lakshmi, 2012). Its use of visuals in the forms of pictures to convey messages is also an effective way to grab the attention of viewers. While we have been unable to gather much raw data of the Instagram pages of the telco companies, we observe that StarHub and Singtel have a much more established Instagram page than M1. In fact, M1 does not have an official Instagram page.

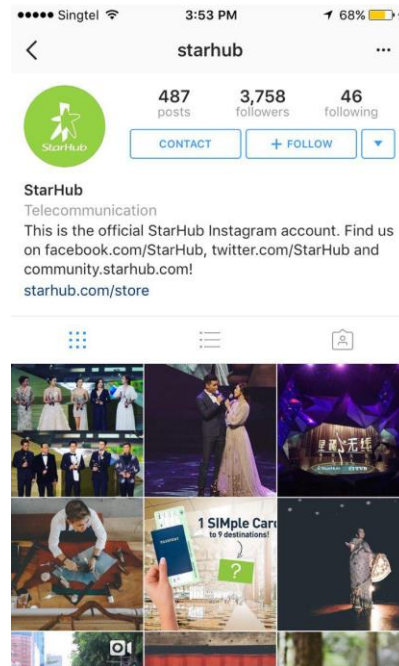


Figure 6.1.4.1 Screenshot of StarHub's Instagram page as of 28 Oct 2016



Figure 6.1.4.2 Screenshot of Singtel's Instagram page as of 28 Oct 2016

Instagram is a good marketing and publicity tool. Singtel and StarHub uses celebrities and interesting, eye-catching pictures on their Instagram. According to a Pew Research Study conducted in 2015, 55% of Instagram

users are aged 18-29. This means majority of Instagram users are youths, which ties with the target group that we recommend M1 to look at. M1 can consider starting an official Instagram page by using her competitors as a guide. It helps to improve the brand image of the company.

We also found an Instagram page tagged on M1's Facebook page. It brings us to @m1totem, which was a circus event TOTEM that was sponsored by M1 in 2015.



*Figure 6.1.4.3 Screenshot of M1 TOTEM's Instagram page as of 28 Oct 2016*

We observe that although there were many photos posted on this account, there are not many followers. M1 could have better publicised the event using social media to promote their brand image.

## 7. Conclusion and Recommendations

### 7.1 Summary of Recommendations

Based on our data analysis, we want to recommend a comprehensive business strategy that M1 can take to improve their branding and marketing strategy. We have categorized our recommendations into 3 broad categories according to their purpose:

- 1) User Satisfaction
- 2) Customer Acquisition
- 3) Marketing Strategy

## User Satisfaction

In this section, we want to focus on product differentiation and customer service to help M1 be on par and/or stand out from her competitors.

Mobile App	Twitter Customer Service
<ol style="list-style-type: none"> <li>Functionality               <ol style="list-style-type: none"> <li>Address login error</li> <li>Allow customers to check bills</li> <li>Cater to prepaid customers</li> </ol> </li> <li>Correct real-time data accuracy               <ol style="list-style-type: none"> <li>Provide accurate real-time data usage and outgoing minutes used</li> </ol> </li> </ol>	<ol style="list-style-type: none"> <li>Create a Twitter Customer Service account               <ol style="list-style-type: none"> <li>Twitter is fast and simple to use</li> <li>Customer service account should be responsive and helpful</li> </ol> </li> </ol>

Special Offerings
<p>New features to break away from competitor's comparison</p> <ol style="list-style-type: none"> <li>"Free" promotions               <ol style="list-style-type: none"> <li>Increase "chance to win" type of posts</li> <li>Include attractive freebies such as movie tickets that is suitable for our target group</li> </ol> </li> <li>Partnership with popular data-draining mobile apps               <ol style="list-style-type: none"> <li>Provide unlimited data for the use of partnered apps</li> <li>And/or pre-download partnered apps</li> <li>E.g. Snapchat, Uber, Lazada, Spotify</li> </ol> </li> </ol>

## Customer Acquisition

This section seeks to explain how to increase the consumer base of M1.

Recommended Planning Location	Recommended Target Age Group
<p>Possible locations for future roadshows based on factors such as population density, accessibility and age group</p> <ol style="list-style-type: none"> <li>4 focused locations               <ol style="list-style-type: none"> <li>Bedok</li> <li>Jurong West</li> <li><b>Tampines</b> (best based on triangulation technique)                   <ol style="list-style-type: none"> <li><b>Exit C of Tampines MRT</b></li> </ol> </li> <li>Woodlands</li> </ol> </li> </ol>	<p>Based on our demographic analysis, it is recommended that M1 focus on 2 main target audience.</p> <ol style="list-style-type: none"> <li>Youths and Young Adults age 15-24</li> <li>Working Adults 25-39</li> </ol>

# Marketing Strategy

Social media will play a big part in M1's marketing strategy.

Facebook	
1.	Purpose of post correlates to recommended types of post <ul style="list-style-type: none"> <li>I. To show popularity               <ul style="list-style-type: none"> <li>I. Use <i>photos</i> to garner the most likes</li> </ul> </li> <li>II. Spread message               <ul style="list-style-type: none"> <li>I. Use <i>videos</i> to garner the most shares</li> </ul> </li> </ul>
2.	Content of Posts <ul style="list-style-type: none"> <li>I. Offer "free" or "chance to win" promotion as these are most well-received by viewers</li> </ul>

Twitter	
1.	Post regularly on official Twitter account <i>@m1_sg</i> <ul style="list-style-type: none"> <li>I. Improves their brand image</li> <li>II. Shows professionalism</li> </ul>
2.	Content of Tweets <ul style="list-style-type: none"> <li>I. Post original tweets</li> <li>II. Post tweets with photos/videos will garner more retweets</li> <li>III. Focus based on age group</li> <li>IV. Short Length of Post</li> <li>V. Contain Hashtags</li> </ul>

YouTube	
1.	Post short and concise videos for more views
2.	Video content can be focused on: <ul style="list-style-type: none"> <li>I. Celebrities</li> <li>II. Interesting and trivial facts or events</li> </ul>

Instagram	
1.	Create an official M1 Instagram page <ul style="list-style-type: none"> <li>I. Improves brand image and shows professionalism</li> <li>II. Post regularly</li> <li>III. Be responsive on Instagram's direct message               <ul style="list-style-type: none"> <li>I. Can be used as a customer service platform as well</li> </ul> </li> </ul>

## 7.2 Limitations and Challenges of Recommendations

There are a few key limitations in our recommendations:

1. Some of our recommendations can be costly, especially those relating to social media. It will be expensive to be able to constantly update their social media with new, interesting and original content. In order to remain exclusive, M1 may have to get exclusive interviews/photoshoots with celebrities which will add up to the costs as well.
2. Our recommendations are limited to the data we have managed to obtain. Additional data gathered on consumer behaviours can be integrated into our analysis to provide a wider perspective. For example, information about the customer app usage can help determine other areas of improvement for the mobile

app. Also, information about previous M1 road-show turn ups, sales, and sentiments will help us make more accurate recommendations about future road-shows.

### 7.3 Possible Future Directions

The areas listed above in 7. *Summary of Recommendations* are the areas we feel that M1 should look into in order to strengthen their brand position and prevent its market share from being taken away, especially by the new competitors in the industry. M1 can also consider strategizing future directions. M1 can choose to expand beyond the mobile market. Its competitors Singtel and StarHub have expanded into the cable-tv business. In order to differentiate from her competitors, M1 can look at other key trends such as video streaming, Internet of Things (IoT) and mobile payments. M1 can also look onto the “smart nation” trend today, and increase partnerships with other companies.

## 9. Appendix

### 9.1 Methodology for Sentiment Analysis

#### 9.1.1 Extraction of Data

##### Facebook Data from Rfacebook package

```
M1_page <- getPage(page="mobile1", token=my_oauth,n=4000)
starhub_page <- getPage(page="StarHub", token=my_oauth,n=4000)
singtel_page <- getPage(page="Singtel", token=my_oauth,n=4000)
#to remove \n\n in the extracted data
starhub_page <- as.data.frame(lapply(starhub_page, function(x) gsub("\n"," ",x)))
singtel_page <- as.data.frame(lapply(singtel_page, function(x) gsub("\n"," ",x)))
m1_page <- as.data.frame(lapply(fb_page, function(x) gsub("\n"," ",x)))
write.csv(starhub_page,"starhub_fbpage.csv")
write.csv(singtel_page,"singtel_fbpage.csv")
write.csv(m1_page,"m1_fbpage.csv")
```

##### Tweets from TwitteR package on R

```
library(twitteR)
library(ROAuth)

#Set up Twitter
setup_twitter_oauth(consumerKey, consumerSecret, accessToken,accessSecret)

#tweets containing the word M1, Singtel or Starhub
singtel.list <- searchTwitter("singtel", n=1000)
starhub.list <- searchTwitter("starhub", n=1000)
m1.list <- searchTwitter("m1 Singapore OR @m1Singapore OR to:m1singapore", n=1000)

#tweets by Singtel or StarHub official accounts
starhub.list <-searchTwitter("from:StarHub", n=1000)
singtel.list <-searchTwitter("from:Singtel", n=1000)

#Create data frame
singtel.df <- twListToDF(singtel.list)
starhub.df <- twListToDF(starhub.list)
m1.df <- twListToDF(m1.list)

#Write CSV File
write.csv(singtel.df, file="twitter_singtel.csv", row.names=F)
write.csv(starhub.df, file="twitter_starhub.csv", row.names=F)
write.csv(m1.df, file="twitter_m1.csv", row.names=F)
```

#### 9.1.2 Sentiment Analysis Process

##### Sentiment Analysis for Mobile App Review

```
library("plyr")
library("stringr")

score.sentiment = function(sentences, pos.words, neg.words, .progress='none')
{
```

```

require(plyr)
require(stringr)

# we got a vector of sentences. plyr will handle a list
# or a vector as an "l" for us
# we want a simple array ("a") of scores back, so we use
# "l" + "a" + "ply" = "lapply":
scores = lapply(sentences, function(sentence, pos.words, neg.words) {

  # clean up sentences with R's regex-driven global substitute, gsub():
  sentence = gsub("[[:punct:]]", "", sentence)
  sentence = gsub("[[:cntrl:]]", "", sentence)
  sentence = gsub("\\d+", "", sentence)
  # and convert to lower case:
  sentence = tolower(sentence)

  # split into words. str_split is in the stringr package
  word.list = str_split(sentence, "\\s+")
  # sometimes a list() is one level of hierarchy too much
  words = unlist(word.list)

  # compare our words to the dictionaries of positive & negative terms
  pos.matches = match(words, pos.words)
  neg.matches = match(words, neg.words)

  # match() returns the position of the matched term or NA
  # we just want a TRUE/FALSE:
  pos.matches = !is.na(pos.matches)
  neg.matches = !is.na(neg.matches)

  # and conveniently enough, TRUE/FALSE will be treated as 1/0 by sum():
  score = sum(pos.matches) - sum(neg.matches)

  return(score)
}, pos.words, neg.words, .progress=.progress )

scores.df = data.frame(score=scores, text=sentences)
return(scores.df)
}

poswords <- scan("D:/OneDrive - National University of Singapore/Year 2/BT2101/Tutorial/opinion-lexicon-English/positive-words.txt", what="character", comment.char = ";")
negwords <- scan("D:/OneDrive - National University of Singapore/Year 2/BT2101/Tutorial/opinion-lexicon-English/negative-words.txt", what="character", comment.char = ";")

m1app <- read.csv2("D:/OneDrive - National University of Singapore/Year 2/BT2101/Project/Mobile App Data/com.m1.mym1.csv")
singtelapp <- read.csv2("D:/OneDrive - National University of Singapore/Year 2/BT2101/Project/Mobile App Data/com.singtel.mysingtel.csv")
starhubapp <- read.csv2("D:/OneDrive - National University of Singapore/Year 2/BT2101/Project/Mobile App Data/com.starhub.csselfhelp.csv")

m1.sentiment <- score.sentiment(m1app$review, poswords, negwords)
m12016.sentiment <- subset(m1.sentiment, year=2016)

singtel.sentiment <- score.sentiment(singtelapp$review, poswords, negwords)
singtel2016.sentiment <- singtel.sentiment[1:611,]

```



```
starhub.sentiment <- score.sentiment(starhubapp$review, poswords, negwords)
starhub2016.sentiment<-starhub.sentiment[1:661,]
```

### Sentiment analysis for Tweets

Only the method for M1's Tweets are shown below as the same method is used for Tweets about the other companies (Singtel and StarHub)

```
library(twitteR)
library(sentiment)
library(plyr)
library(tm)

#Read CSV Files
m1.txt<-read.csv("twitter_m1ALL.csv")

#Process Data
m1.txt = m1.txt$text

#remove @tags, urls, and emojis
m1.txt <-gsub("@\\w+ *", "", m1.txt)
m1.txt <- gsub("(f|ht)(tp)(s?):\\/\\/.*)[.\\/](.*)", "", m1.txt)
m1.txt <- iconv(m1.txt, 'UTF-8', 'ASCII')

#Remove stopwords
rm_words <- function(string, words) {
  stopifnot(is.character(string), is.character(words))
  splitted <- strsplit(string, " ", fixed = TRUE) # fixed = TRUE for speedup
  vapply(splitted, function(x) paste(x[!tolower(x) %in% words], collapse = " "), character(1))
}
m1.txt <- rm_words(m1.txt, tm::stopwords("en"))

#taken from: http://jeffreybreen.wordpress.com/page/2/
score.sentiment = function(sentences, pos.words, neg.words, .progress='none')
{
  require(plyr)
  require(stringr)

  scores = laply(sentences, function(sentence, pos.words, neg.words) {

    # clean up sentences with R's regex-driven global substitute, gsub():
    sentence = gsub("[[:punct:]]", "", sentence)
    sentence = gsub("[[:cntrl:]]", "", sentence)
    sentence = gsub("\\d+", "", sentence)
    sentence = tolower(sentence)
    sentence = gsub('m1', "", sentence)

    # split into words
    word.list = str_split(sentence, "\\s+")
    words = unlist(word.list)

    # compare our words to the dictionaries of positive & negative terms
    pos.matches = match(words, pos.words)
    neg.matches = match(words, neg.words)

    # Check for matches (TRUE/FALSE)
    pos.matches = !is.na(pos.matches)
```

```

neg.matches = !is.na(neg.matches)

# Obtain score since TRUE/FALSE is treated as 1/0 by sum function
score = sum(pos.matches) - sum(neg.matches)

return(score)
}, pos.words, neg.words, .progress=.progress )

scores.df = data.frame(score=scores, text=sentences)
return(scores.df)
}

#Lexicon taken from https://www.cs.uic.edu/~liub/FBS/sentiment-analysis.html
poswords <- scan("positive-words.txt", what="character", comment.char=";")
negwords <- scan("negative-words.txt", what="character", comment.char=";")

#Run Sentiment score classifier on Data
m1.sentiment<-score.sentiment(m1.txt, poswords, negwords)
m1.sentiment[m1.sentiment=="NA"]<- NA
m1.sentiment<-na.omit(m1.sentiment)

#Count Sentiment Score
neutral <- length(which(m1.sentiment$score == 0))
positive <- length(which(m1.sentiment$score > 0))
negative <- length(which(m1.sentiment$score < 0))
Sentiment <- c("Negative","Neutral","Positive")
Count <- c(negative,neutral,positive)
output <- as.data.frame(Sentiment,Count)

```

### Sentiment Analysis for SGForum Posts

Only the method for M1's SGForum posts are presented as the same method is used for the other 2 companies (Singtel and StarHub).

```

library(twitteR)
library(sentiment)
library(plyr)
library(tm)

#Read CSV Files
m1.txt<-read.csv("sgforum_m1.csv", header=T)
m1.txt$X_input=NULL
m1.txt<-na.omit(m1.txt)

#Process Data
m1.txt=m1.txt$forum_post
m1.txt <- gsub("Originally posted by", "", m1.txt)
m1.txt<-gsub("M1", "", m1.txt)

#Remove stopwords
rm_words <- function(string, words) {
  stopifnot(is.character(string), is.character(words))
  spltted <- strsplit(string, " ", fixed = TRUE) # fixed = TRUE for speedup
  vapply(spltted, function(x) paste(x[!tolower(x) %in% words], collapse = " "), character(1))
}
m1.txt <- rm_words(m1.txt, tm::stopwords("en"))

```

```

#taken from: http://jeffreybreen.wordpress.com/page/2/
score.sentiment = function(sentences, pos.words, neg.words, .progress='none')
{
  require(plyr)
  require(stringr)

  scores = laply(sentences, function(sentence, pos.words, neg.words) {

    # clean up sentences with R's regex-driven global substitute, gsub():
    sentence = gsub("[[:punct:]]", "", sentence)
    sentence = gsub("[[:cntrl:]]", "", sentence)
    sentence = gsub("\\d+", "", sentence)
    sentence = tolower(sentence)
    sentence = gsub('m1', "", sentence)

    # split into words
    word.list = str_split(sentence, "\\s+")
    words = unlist(word.list)

    # compare our words to the dictionaries of positive & negative terms
    pos.matches = match(words, pos.words)
    neg.matches = match(words, neg.words)

    # Check for matches (TRUE/FALSE)
    pos.matches = !is.na(pos.matches)
    neg.matches = !is.na(neg.matches)

    # Obtain score since TRUE/FALSE is treated as 1/0 by sum function
    score = sum(pos.matches) - sum(neg.matches)

    return(score)
  }, pos.words, neg.words, .progress=.progress )

  scores.df = data.frame(score=scores, text=sentences)
  return(scores.df)
}

#Lexicon taken from https://www.cs.uic.edu/~liub/FBS/sentiment-analysis.html
poswords <- scan("positive-words.txt", what="character", comment.char=";")
negwords <- scan("negative-words.txt", what="character", comment.char=";")

#Run Sentiment score classifier on Data
m1.sentiment<-score.sentiment(m1.txt, poswords, negwords)
m1.sentiment[m1.sentiment=="NA"]<- NA
m1.sentiment<-na.omit(m1.sentiment)

#Count Sentiment Score
neutral <- length(which(m1.sentiment$score == 0))
positive <- length(which(m1.sentiment$score > 0))
negative <- length(which(m1.sentiment$score < 0))
Sentiment <- c("Negative","Neutral","Positive")
Count <- c(negative,neutral,positive)
output <- as.data.frame(Sentiment,Count)

```

## Posts type for Facebook

```

// Data training
predictTest <- function(test_text, mat, classifier){

```

```

train_mat = mat[1:2,]
train_mat[,1:ncol(train_mat)] = 0

test_matrix = create_matrix(test_text, language="english", removeStopwords=T, removeNumbers=T, stemWords=T,
toLower=T, removePunctuation=T)
test_mat <- as.matrix(test_matrix)

for(col in colnames(test_mat)){
  if(col %in% colnames(train_mat))
  {
    train_mat[2,col] = test_mat[1,col];
  }
}

#test_mat = as.matrix(t(test_mat))
row.names(train_mat)[1] = ""
row.names(train_mat)[2] = test_text
p <- predict(classifier, train_mat[1:2,])
as.character(p[2])
}

pos <- readText("positive.txt")
pos_class <- rep("positive", length(pos))
pos_data <- cbind(pos, pos_class)

neg <- readText("negative.txt")
neg_class <- rep("negative", length(neg))
neg_data <- cbind(neg, neg_class)

#training_data <- rbind(pos_data, neg_data)

#using a smaller set of training data (large memory requirements)
training_data1 <- rbind(pos_data[1:1000,], neg_data[1:1000,])
matrix <- create_matrix(training_data1[,1], language="english", removeStopwords=T, removeNumbers=T, stemWords=T,
toLower=T, removePunctuation=T, removeSparseTerms=0.998)
mat = as.matrix(matrix)

Then we classified posts based on the word it contained and do a positive/negative/neutral analysis on the posts'
comments.

```

### 9.1.3 Histogram Plots of Sentiments

#### Histogram Plots for Mobile App Sentiments

```

library("ggplot2")

qplot(m1.sentiment$score,
      geom="histogram",
      binwidth = 1,
      main = "M1 SG Forum Sentiment Analysis",
      xlim = c(-6, 6),
      xlab = "Score",
      ylab = "Count",
      fill=l("orange"))

qplot(singtel.sentiment$score,
      geom="histogram",
      binwidth = 1,
      main = "Singtel SG Forum Sentiment Analysis",

```

```

xlim = c(-6, 6),
xlab = "Score",
ylab = "Count",
fill=l("red"))

qplot(starhub.sentiment$score,
      geom="histogram",
      binwidth = 1,
      main = "StarHub SG Forum Sentiment Analysis",
      xlim = c(-6, 6),
      xlab = "Score",
      ylab = "Count",
      fill=l("green"))

```

### Histogram for SGForum Sentiments

```

library("ggplot2")

qplot(m1.sentiment$score,
      geom="histogram",
      binwidth = 1,
      main = "M1 SG Forum Sentiment Analysis",
      xlim = c(-6, 6),
      xlab = "Score",
      ylab = "Count",
      fill=l("orange"))

qplot(singtel.sentiment$score,
      geom="histogram",
      binwidth = 1,
      main = "Singtel SG Forum Sentiment Analysis",
      xlim = c(-6, 6),
      xlab = "Score",
      ylab = "Count",
      fill=l("red"))

qplot(starhub.sentiment$score,
      geom="histogram",
      binwidth = 1,
      main = "StarHub SG Forum Sentiment Analysis",
      xlim = c(-6, 6),
      xlab = "Score",
      ylab = "Count",
      fill=l("green"))

```

## 9.1.4 Word Cloud for Sentiment Analysis

### Word Cloud for Twitter Sentiment

```

library(tm)
library(wordcloud)
library(RColorBrewer)

#Read CSV File
m1<-read.csv("twitter_m12016.csv", header=T)

#remove all user tags and urls for Twitter
vs <-gsub("@\\w+ *", "", m1$tweet)
vs <- gsub("(f|ht)(tp)(s?)(:/|)(.*)"[/|/](.*)", "", vs)

```

```

#create Corpus
corpus <- Corpus(VectorSource(vs))

#Create term doc matrix
tdm <- TermDocumentMatrix(corpus, control=list(removePunctuation = TRUE,
                                                stopwords = c("the", "this", "m1", "m1sg", "singapore", "amp",
                                                            stopwords('english')),
                                                removeNumbers=TRUE, tolower=TRUE))

m<-as.matrix(tdm)

#Calculate word frequencies
word_freqs = sort(rowSums(m), decreasing = TRUE)
dm= data.frame(word=names(word_freqs), freq=word_freqs)

#Remove more nonsense words
dm=dm[rownames(dm) != "eduaubdedubu", ]

#generate wordcloud
wordcloud(dm$word, dm$freq, max.words = 100, random.order = FALSE, colors=brewer.pal(8, "Dark2"))

```

### Word Cloud for SGForum Sentiment

```

library(tm)
library(wordcloud)
library(RColorBrewer)

#Read CSV File
m1<-read.csv("sgforum_m1.csv")

#create Corpus
m1.corpus <- Corpus(VectorSource(m1$forum_post))

#create term doc matrix
tdm <- TermDocumentMatrix(m1.corpus, control=list(removePunctuation = TRUE,
                                                stopwords = c("the", "this", "m1", "posted", "originally", "use", "still", "sbs", "just", "now", "can",
                                                            'will', 'said', 'get', 'also', 'got', 'nil', 'dont', stopwords('english')),
                                                removeNumbers=TRUE, tolower=TRUE))

m<-as.matrix(tdm)

#Calculate word frequencies
word_freqs = sort(rowSums(m), decreasing = TRUE)
dm= data.frame(word=names(word_freqs), freq=word_freqs)

#generate wordcloud
wordcloud(dm$word, dm$freq, max.words = 100, random.order = FALSE, colors=brewer.pal(8, "Dark2"))

```

## 9.2 Methodology for Geospatial Analysis

We made use of CartoDB and geospatial data to conduct our geospatial analysis of our target group, i.e customers aged 15 to 24. Specific data such as population by planning area by age group and schools in Singapore were retrieved from data.gov.sg, whereas data such as location of bus stops and train stations were retrieved from mytransport.sg Data Mall. Other data such as location of shopping malls was retrieved using Google search,



followed by converting postal code into longitude and latitude. Each data set is then used as a layer on each map to provide insights and help us narrow down a specific location for a road show.

## 9.3 Methodology for Demographic Analysis

Since M1, StarHub doesn't disclose their actual demographic composition, we had to turn to social networks to obtain these information. However, the problem got more tricky as Facebook Analysis only reveals follower's demographics to the page admin and Twitter doesn't record demographic data. Thus, we resorted to do a face analysis of Singtel and StarHub's Twitter follower's profile picture. Since M1's doesn't use Twitter and we believe that they can obtain their own social media demographic information from their own Facebook page, the demographic of competitors of M1 is sufficient.

Firstly, we get the followers through R.

```
# Singtel followers
singtel <- getUser("singtel")
singtel_followers <- singtel$getFollowers(retryOnRateLimit=180)

if (!require("data.table")) {
  install.packages("data.table", repos="http://cran.rstudio.com/")
  library("data.table")
}
singtel_followers_df = rbindlist(lapply(followers,as.data.frame))

write.csv(singtel_followers_df, file="singtel.csv", row.names=F)

# Starhub followers
starhub <- getUser("starhub")
starhub_followers <- starhub$getFollowers(retryOnRateLimit=180)

starhub_followers_df = rbindlist(lapply(starhub_followers,as.data.frame))

write.csv(starhub_followers_df, file="starhub.csv", row.names=F)
```

This will return all followers with the avatar link.

Then we used Python and Faceplusplus (Face++) to pass in each link for face analysis and finally tabulate the results.

```
def face_detect(f) :
    results = {}
    rows = read_csv('singtel_face.csv')
    count = 0
    print("# images: ", len(rows))
    print("Processing images...")
    for row in rows[1:]:
        try:
            value = api.detection.detect(url=row[1])
            results[row[0]] = value
            count+=1
            print(count)
        except APIError:
            continue
    print("Finished.")
    return results
```

```
def run():  
    #orig_stdout = sys.stdout  
    f = open('result_starhub.txt', 'w')  
    #sys.stdout = f  
    res = face_detect(f)  
    print(res,file=f)  
  
    #sys.stdout = orig_stdout  
    f.close()
```

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