**Analysis of mobile phone usage**

**Assignment-2**

**MIS770 – Foundation Skills in Data Analysis**

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**MEMORANDUM**

**Date:** 14th April 2018

**To:** Grace Park, Research and Analysis Department

**From:** Michelle Yeoh, Chief Data Analyst

**Subject:** Analysis of Mobile Phone Data

Dear Grace,

The purpose of this memo is to analyse the smartphone usage in Australia.

Your specific questions are answered below:

**Q1. An Overall View of Mobile Phone spend per month**

An average Australian spend around $68 in the monthly bill. If you want more precise figure then it is $64. Therefore,50% of the Australians have the bill of $64 or less monthly bill and 50 % of the Australians have more than $64 or more. I can say that the most common monthly bill is $50. The minimum monthly bill is $11 & the maximum monthly bill is $216. If we imagine a data in terms of some graphical representations then we find that there are relatively few large data values and more smaller values-that is, most of the values are concentrated in the lower portion of the distribution. The tail on the right side is longer or fatter than the left side. In cases where one tail is long but the other tail is fat, the mass of the distribution is concentrated on the left of the figure. We get a flat data with a pointed in the middle. There is a high degree of asymmetry in our data. More insights that I have found in data is 25% of the monthly bill is less than or equal to $49 and on 75% have the monthly bill is greater than $49. More deeply I have found that 75% of the monthly bill is less than or equal to $84 and 25% of is greater than $84. Let us imagine how our values are clustered or distributed or scatter between the average value ($68). Approximately 68% of the monthly bill is lies between these regions $36.42 & $98.78. Most of the times we get the monthly bill within this interval and the majority of the data will cluster around this interval. Approximately 95% of the monthly bill is lies within the interval of $5.27 & $130.014. The middle 50% of our data is within $50 to $84.5. The lower 25% of the data is between $85 and $216, and the upper 25% of the data is between $11 to $49.62. When we estimating the mobile phone spend per month for any user we get the error of +/-2.5% from the true value.

**Q2. Monthly Bill vs Lifestyle Factors**

In general, most of the monthly bill ($) spending in a month by smartphone user from Australia belong to these 4 categories: -

1-Achievers (20%)

2- Suburban Splendour (19%)

3- Independents (17%)

4- Crusaders (16%)

Except this, all other geo-tribe is constituted the proportion in the single digit. They spend in the monthly bill ($) around 2 to 5%. So the telecom company should not focus on these geo-tribes. They more need to focus on these 4 categories. In general, average spending on the monthly bill is around $71 in these 4 categories. Most of the smart-phone users have the monthly bill that falls between $71 and $100 in these 4 categories.

Let’s us further investigate these 4 categories that listed above.

1. Achievers (20%)

I found that 35% of the Achievers have the monthly bill that lies between $71-$100, then followed by 25% have the monthly bill between 41 to 70, and only 17%have the very high monthly bill of between $101 to$130. Even achievers are mostly young and middle age families that have a high level of household & personal income. Telecom companies should target this group if they want to increase revenue.

2- Suburban Splendour (19%)

I found that 51% of the Suburban Splendour have the monthly bill that lies between $71-$100, then followed by 23% have the monthly bill between $41 to $70, and only 12%have the very high monthly bill of between $101 to$130. Even this group belongs to middle-class families that generally have 4 members, that’s why there is high number i.e. 51% have the monthly bill range between $71-$100. So, they are more interested in buying the family plan rather than individual plan. Before designing the plan, one fact that doesn’t need to forget that this category generally has high debt because there is a lot of commitment towards other things.

3- Independents (17%)

I found that 42% of the Independents have the monthly bill that lies between $71-$100, then followed by 34% have the monthly bill between $41 to $70, and 20%have the very high monthly bill of between $101 to$130. Although these categories are dominated by the younger people, but we need to take care one thing that they don’t have stable earning. The plan shouldn’t be too high or too low. So, one suggestion is that the telecom company should design something like student plan/young plan with some extra benefits like getting free data, or free concert tickets etc.

4- Crusaders (16%)

I found that 32% of the Crusader has the monthly bill that lies between $71-$100 and 41-70, then followed by 34% have the monthly bill between $41 to $70, and 28%have the very high monthly bill of between $101 to$130. The best part of this category is that they have a high earned income and they are young.

If we talked any telecom company that needs to design a telecom plan for these 4 categories should need to focus more on the achievers and crusaders because both have a high level of the income & can buy the expensive plan from the company that in turn get a high profit. Then after that, we need to focus on suburban splendour & Independents. If the company wanted to sell highest monthly bill plan that in the range of ($101-$130) then they need to focus on the independents followed by the Achievers. I put the independents at the last because there is a high chance of defaulters in the payment. Even one interesting thing that these independents also buyer cheaper monthly plan ($41-$70) as it constitutes about 40%. If the company wanted to sell the average or mid-plan then they need to focus more on Suburban splendour.

**Q3. Mobile Phone Affordability**

3a) I am 95% confident that the average monthly bill for all smartphone owners in Australia is between $62.66 and $72.64. In other words, I have found that the average monthly bill for all smartphone owners in Australia is $68 with the margin of error is +/-5%.95 percent of the time the data would match this results.

3b*)* Out of 150 consumers only 114 users used their phone as the payment device. I am 95% confident that thepercentage (proportion) of all smartphone owners in Australia that use their phone as a payment device is between 69.17% and 82.83%. In other words, I have found that thepercentage of all smartphone owners in Australia that use their phone as a payment device is 76% with the margin of error is +/-6.83%.95 percent of the time the data would match this results.

3c) From the analysis, I found that out of 79 females only 57 of them uses a smartphone as their payment device. Moreover, I am 95% confident that thepercentage (proportion) of all women’s smartphone owners in Australia that use their phone as a Payment device is between 62.27% and 82.04%. In other words, I have found that thepercentage of all smartphone owners in Australia that use their phone as a payment device is 72.155% with the margin of error is +/-9.88%.95 percent of the time the data would match this results.

From the analysis, I found that out of 71 males only 57 of them uses a smartphone as their payment device. Moreover, I am 95% confident that thepercentage (proportion) of all men’s smartphone owners in Australia that use their phone as a payment device is between 71.03% and 89.54%. In other words, I have found that thepercentage of all smartphone owners in Australia that use their phone as a payment device is 80.285% with the margin of error is +/-9.25%.95 percent of the time the data would match this results.

In conclusion, I can say that comparatively, males are much active on smart-phone when it comes to using it as a payment device than females.

**Q4. Mobile Phone Usage**

4a) your colleague's claim wasright*.* Ihave found enough evidencethat the proportion of smartphone owners in Australia who use their smartphone for work‐related activities is more than 75%.

4b) I am not able to collect enough evidence to challenge my business rival statement that the “average number of phone calls made by Australian smartphone owners last month was at least 27 calls”. I challenged the rival by that other than call there are many ways in which communication can occur like Internet-based tools such as VoIP, Video conferencing, instant messaging and many more. Although our average number of calls was, in fact, smaller than 27(Actually 26), it wasn’t quite enough to suggest that this is true for the entire Australia smartphone user’s population. But, I am unable to find enough evidence/alternatives to prove my claim. I conclude that the average of these at least 27 calls made by the company is not overstated.

**Q5. Relationships**

The relationship that we studying between monthly phone bill vs. Number of calls, monthly phone bill vs. SMS’s and monthly phone bill vs. data allowance, all are having a positive linear relationship.

5a) having a positive linear pattern means that **as the number of calls increases, the monthly bill ($) also increases.** The strength of the relationship or association between these two variables is a weak positive linear pattern between these two variables. This implied that data are more scattered and not all the data points are in the straight line. There is 42% association between these two variables if you wanted to get a number.

5b) having a positive linear pattern means that **as the number of SMS’s increases, the monthly bill ($) also increases.** The strength of the relationship or association between these two variables is a weak positive linear pattern between these two variables. This implied that data are more scattered and not all the data points are in the straight line. If you wanted to talk in number, then there is 32% association between these two variables. So, there is very slight tendency that our small values of a number of SMS’s will be paired with the smaller values of the monthly bill ($).

5c) having a positive linear pattern means that **as the number of data allowance (GB) increases, the monthly bill ($) also increases.** The strength of the relationship or association between these two variables is a strong positive linear pattern between these two variables. There is 72% association between these two variables. This generally means if we take small values of data allowance (GB) tend to be paired with the small values of the Monthly bill ($), and the large values of the data allowance(GB) to be paired with large values of the Monthly bill ($).

In general, if we get the association more than 60% then we say two variables have some relationship between them. I think the most important factor between that we need to consider is data allowance (GB) vs. Monthly bill ($). So, telecommunication company wanted to increase their revenue then they should focus on the data allowance(GB). One such scheme should be like that they can charge data Allowance(GB) and allow the call and SMS’s to be free.

**Q6. Appropriate Sample Size**

6a) Therefore, you need a sample size of 266 smartphone users in Australia for the next year to estimate the population proportion that has purchased an item online within the “margin of error:6%” with 95% confidence.

6b) forthe 95% confident that the percentage ofaccurately estimating the average monthly bill to within $4 we need a sample size of 234 smartphone users in Australia for the next year would be recommended to provide an accurate result.

Determining the proper sample size is a complicated procedure, as it subject to the various constraints like the amount of acceptable error, time & many more. A sample size of 266 smartphone users for the next year would be recommended to satisfy bothof these requirements that are mentioned in part 6.a and part 6.b to provide an accurate result.

Regards,

Michelle