Statistical Report for Operations in UK by June - 2019

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Abstract

In this competitive world it won't be sane to start operating and investing for a business without any research. A rigorous research has become a part of protocol for every new establishment. This not only includes a literature review but also a statistical analysis and deep insights for efficient planning and maximum profit. In this report I'm going to point some essential sectors to focus on for high brand impact and high revenue of the company. With the help of statistical concepts and tools like R, it is possible to analyze, predict and understand subtle issues which cannot be seen or discussed empirically.

Introduction

Before we plan to extend our reach in a completely new area. It is important for the company to analyse the existing system and possible outcomes of our entry completely to get planned results. The report below summarises an overview of the trend with respect to Internet users in UK. Also based on it, solutions to increase the profit and minimze cost. An attempt to maximize the crowd experience and brand impact, similarly, can be made.

Before we begin let's have an overview of UK internet growth. Fig (A) below shows the number of active internet users in last 8 years in UK. And the most positive thing over here is the increase rate is sky rocketing, with the average approximation of 1 million users every year.

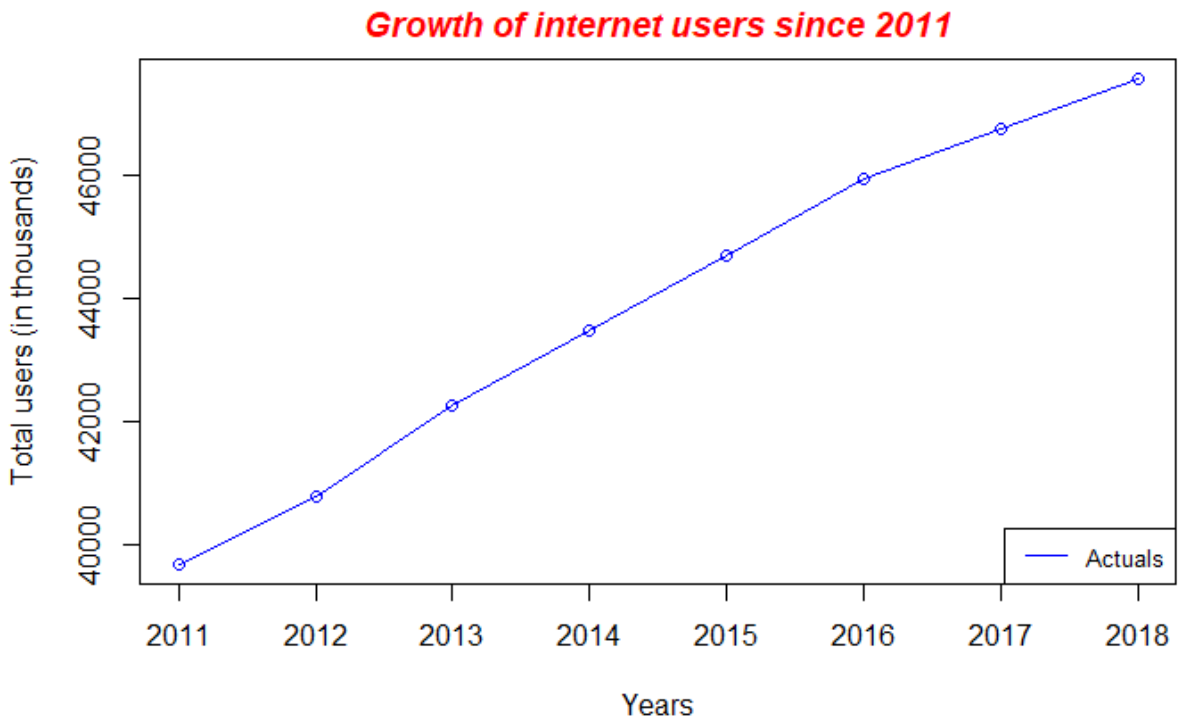


Fig A: Growth of Internet users in UK between 2011-2018

The report has been ordered from simple to complex form, considering generalized topics and then later with specific front to validate all the possible doors:

- Total internet users by age.
- Male: Female users by age
- Equality Act status
- Usage among ethnic groups

Total internet users by age.

Graph (1.1) shows the number of Internet users in UK for last 8 years. They have been classified by age, which helps us to narrow our focus only the speicific age group. The X-axis shows the number of users in thousands while the y-axis specifies the years. Heat-color is used to differentiate between the age-groups.

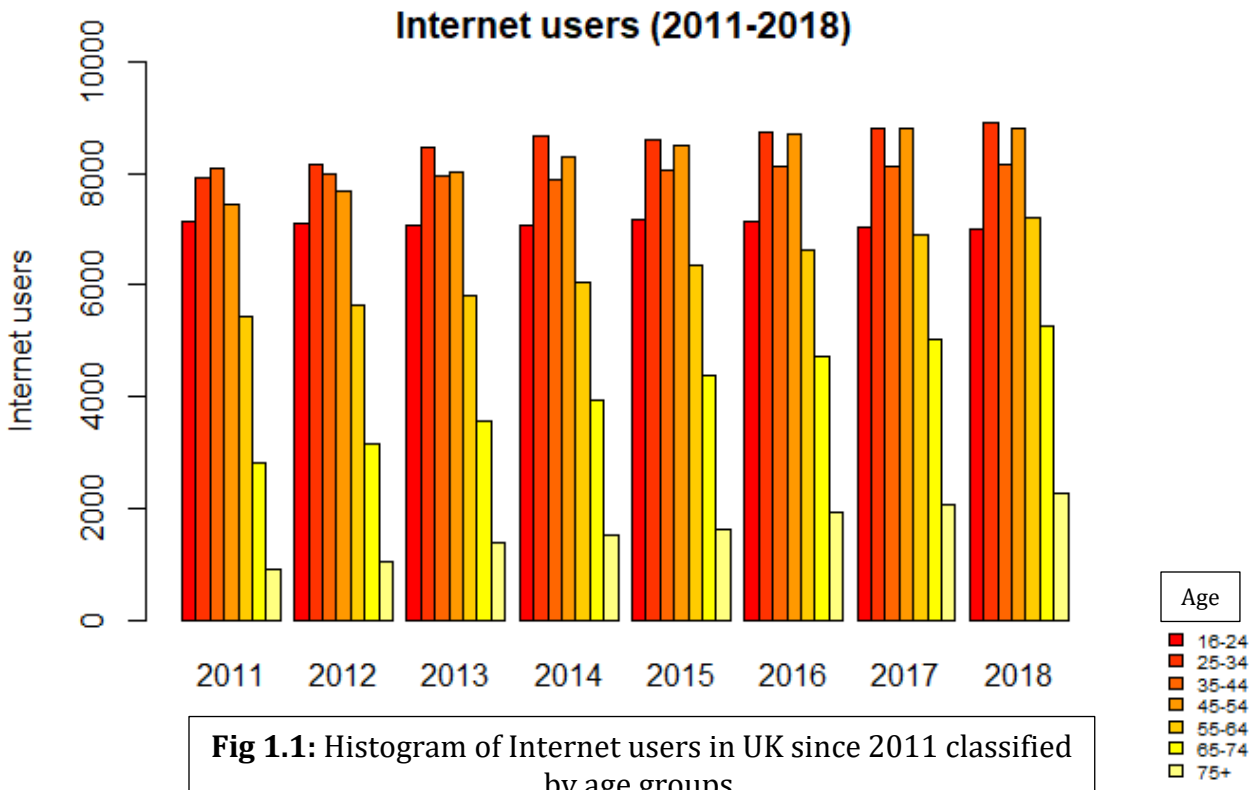
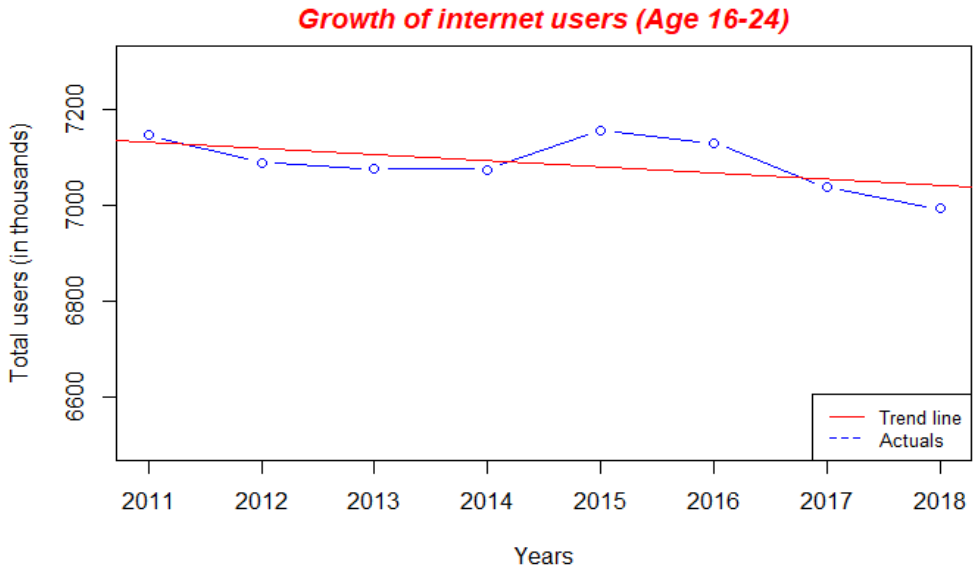


Fig 1.1: Histogram of Internet users in UK since 2011 classified by age groups.

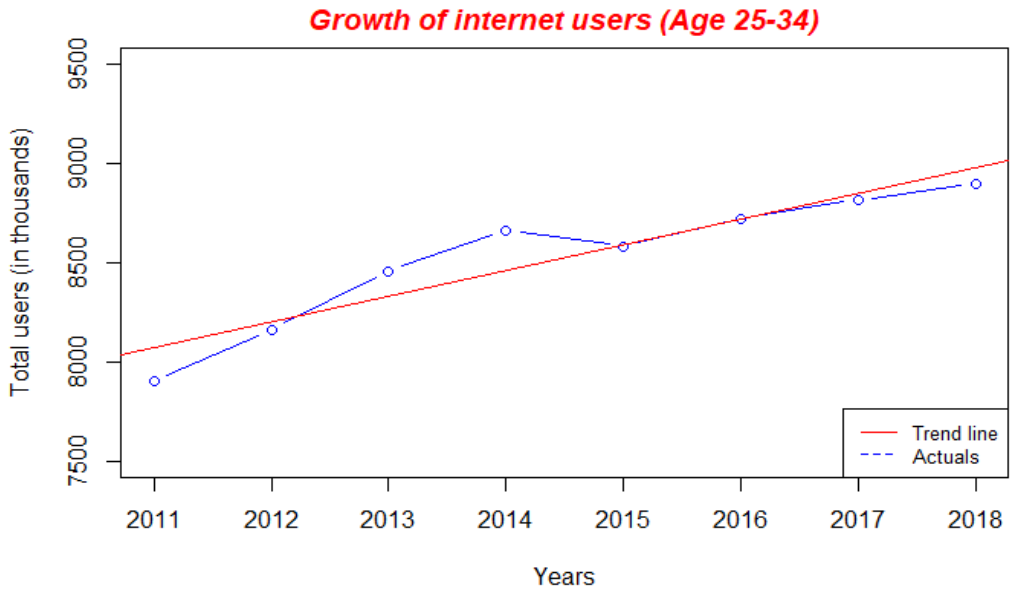
Let's see the case for each age group.

➔ Age group 16-24



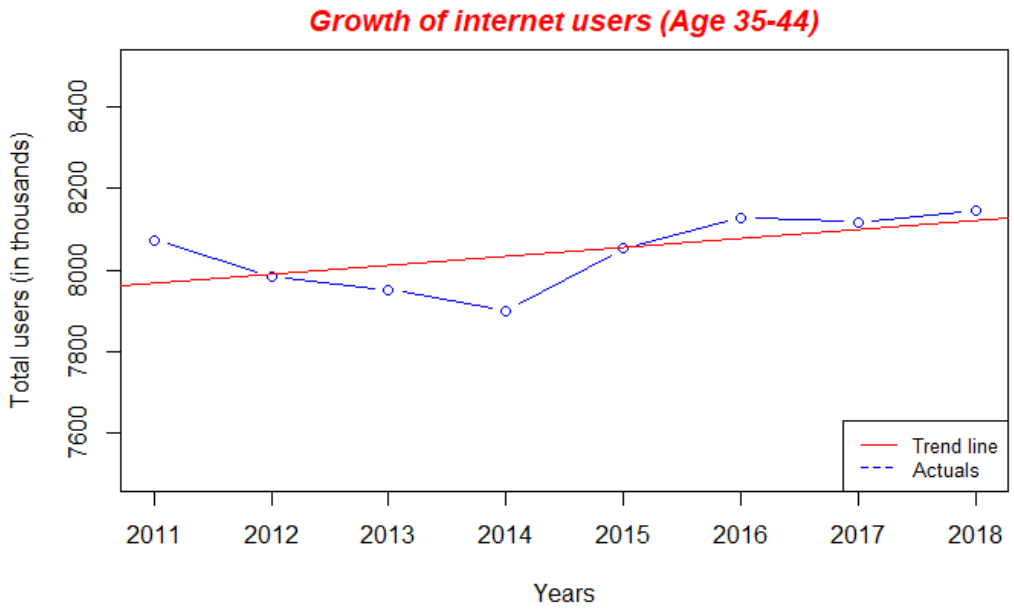
As we can see in the graph above, the amount of internet users are decreasing. Also, the trend line shows negative fashion, so it's not worthwhile focusing on them. Even though our company has won "Best Student Broadband Provider Award", it will be not be a good idea on focusing on them for the current period.

➔ Age group 25-34



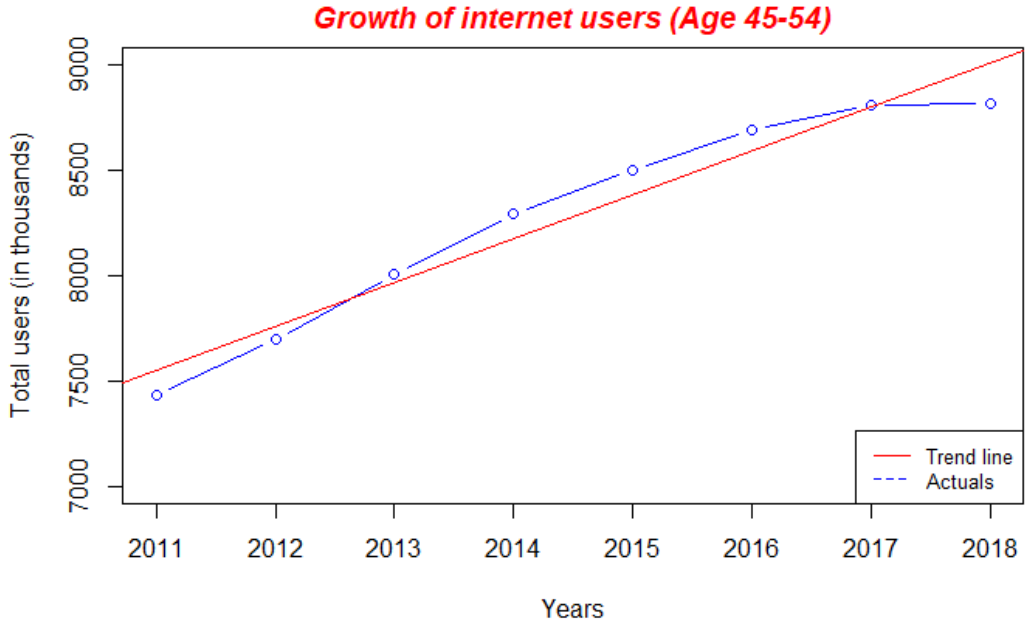
A positive trend line can be seen, which makes it as an open market to target on. Also this criteria falls under the working population, which is subtle that they are willing to pay for better services. A most can be made out of this particular age group.

➔ Age group 35-44



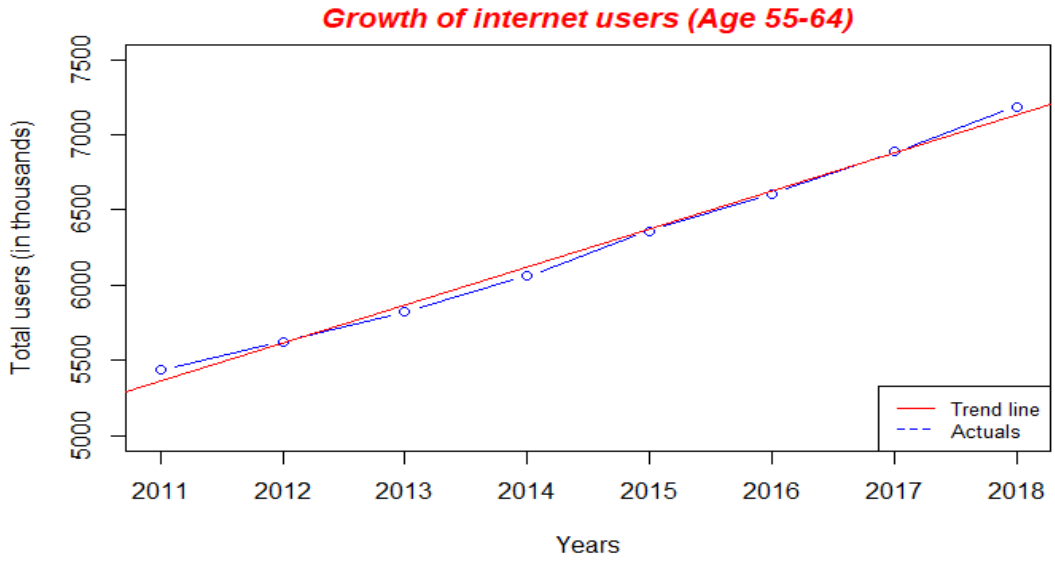
Positive. It can be seen that it is following a linear trend which means it's going to grow. Though the growth rate is not very strong, but it's still growing. We must try to cover this group of people as well.

➔ Age group 45- 54



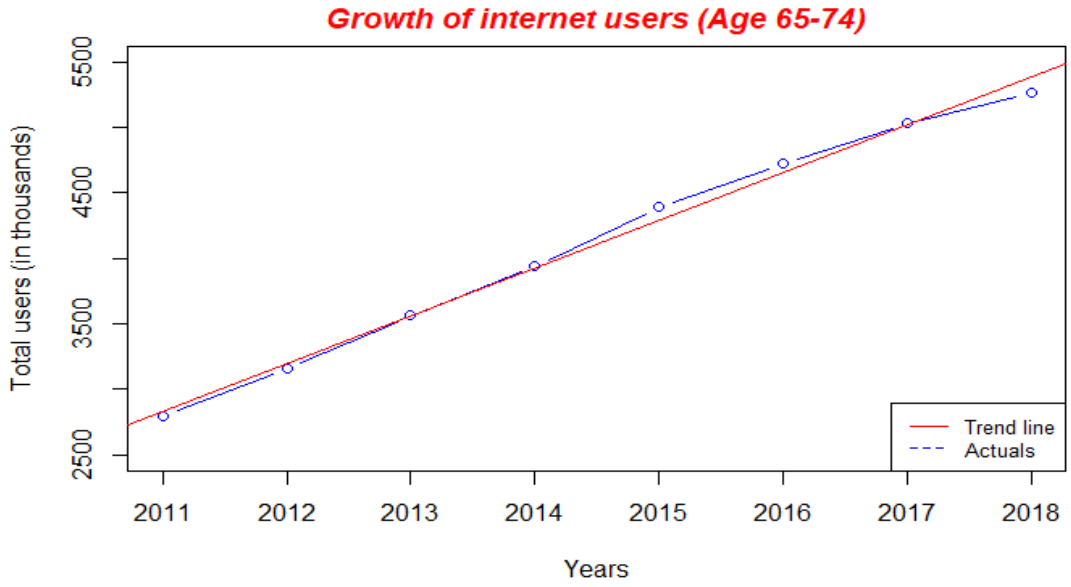
Very positive growth. As can be seen from the graph, this age group is accepting internet services rapidly every year. This age group should be kept as one of the primary markets in our mind based on the rate of increase.

➔ Age group 55-64



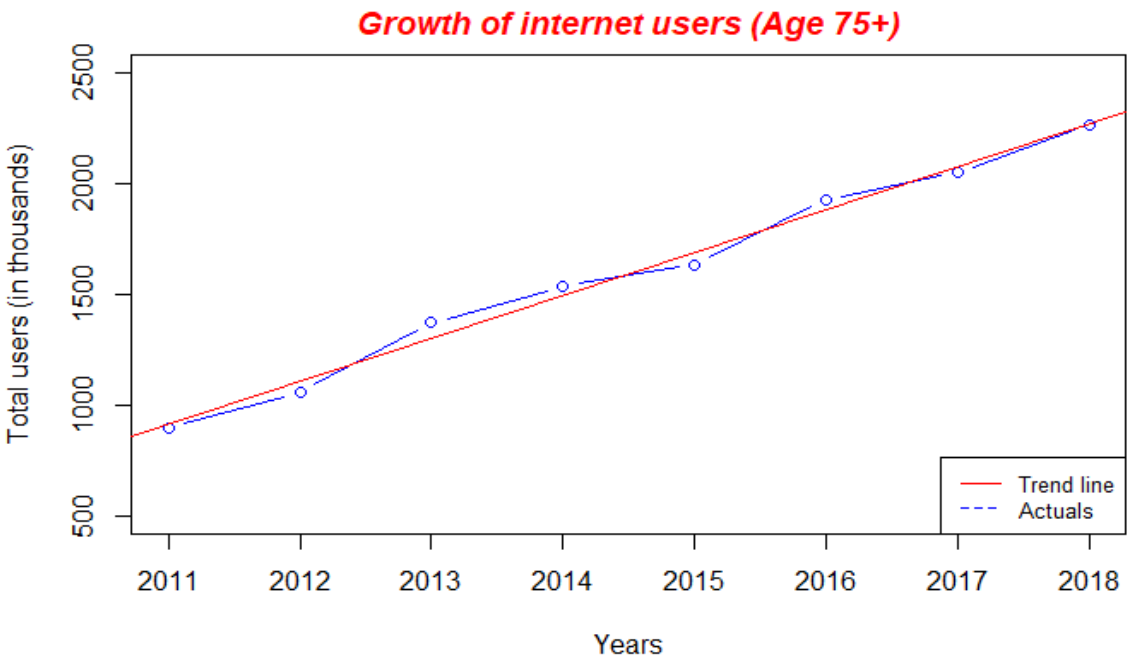
Very positive. Another set of age group which requires exactly the same amount of attention. The growth rate is steady and increasing consistently. It follows the linear trend very strictly which means, it should one of the primary age group to target on, it has minimum risk.

➔ Age group 65–74



Another positive age group, open for market. Steady increase year after year. Must be considered as customers for good profit. Most of the people at this age will be retired. Thus, it makes sense that most of them usually remains idle and use the internet services most of the time.

➔ Age group 75+



Steady growth every year. Although, it is wise to consider that the growth of this age group starts to saturate very soon since limitation of human lifespan. With the help of populaiton data of UK it can be estimated the threshold capacity of internet users in this age group. With the best case of accepting that all the population in age group 75+ uses internet services.

Comparison Table

Let's compare all the data we have seen head to head in a table. Also, I've marked critical observations to ease the readability and easy understanding of decision-making factors.

Here, steady column shows the value of R^2**.** Which means, how linear the data points are. In our case how steady the trend of growth increase/decrease is? (0 -> No linearity, 1-> Perfect). All the values are in thousands.

Age group	2011	2018	Difference?	~ % Growth	Steady? (R^2)
16-24	7145	6992	-153	-2.14%	0.3248
25-34	7903	8894	991	12.54	0.8828
35-44	8074	8145	71	0.89	0.3574
45-54	7430	8814	1384	18.07	0.9514
55-64	5434	7189	1755	32.3	0.9945
65-74	2799	5264	2465	88.07	0.9943
75+	898	2262	1364	151.89	0.9906

Table 1: Comparison of Internet users by age group in UK.

It is important that we observe not only the '% growth' but also the values. The reason is, even though as we can see the age group 75+ has 152% growth, it does not make it the most favorable group to focus on. Since, the number of users is still less than the other age groups between 45 – 75.

Also, it is important to keep an eye on R^2 values, which here acts as possibility of same thing happening next ahead years as well.

Thus, the table gives us a good overview of age-group to focus on, which is

65-74	55-64	75+	45-54

in the order of preference. Age group 65-75 shows all time high potential which is followed by other age groups.

MALE: FEMALE effect.

- Does number of male/female users affect the growth?
- Is there any male dominance?
- Does the year affect growth in men/women?

These were some of the questions needed to be addressed to find if any possible gap or pattern for market and profit.

The graph below shows the growth rate of male and female users in last 8 years.

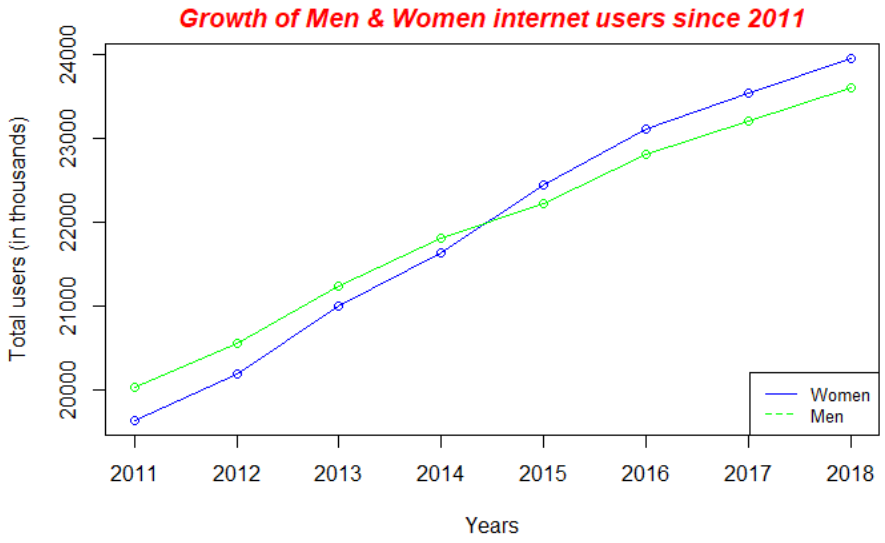


Fig 2.1: Growth rate of male and female internet users (2011-18)

As can be seen for the graph, the growth rate of male – female internet users are steady but not parallel. This can empirically suggest that no particular dominant relation exists between any. Also increase or decrease of one, does not affect any other. Thus, they are independent.

Let's prove statistically that years does not affect the growth of male-female internet users with the help of contingency table:

	2011	2012	2013	2014	2015	2016	2017	2018	Total
Men	20,039	20,564	21,242	21,814	22,229	22,812	23,200	23,606	**175,506**
Women	19,645	20,200	21,001	21,643	22,442	23,105	23,542	23,954	**175,532**
Total	**39,684**	**40,764**	**42,243**	**43,457**	**44,671**	**45,917**	**46,742**	**47,560**	**351,038**

Table 2: Contingency table for Male-Female internet users (2011-2018)

	2011	2012	2013	2014	2015	2016	2017	2018	Total
Men	20,039	20,564	21,242	21,814	22,229	22,812	23,200	23,606	**175,506**
Dominance? Expected	19,841	20,380	21,120	21,727	22,334	22,957	23,369	23,778	0.499% of 351,038
Women	19,645	20,200	21,001	21,643	22,442	23,105	23,542	23,954	**175,532**
Expected	19,843	20,384	21,123	21,730	22,337	22,960	23,373	23,782	0.5001%
Total	**39,684**	**40,764**	**42,243**	**43,457**	**44,671**	**45,917**	**46,742**	**47,560**	**351,038**

Table 3: Chi-square calculation with contingency table.

<u>Using chi-square test</u>: We assume, let

H_0 : Gender is completely independent of the years.

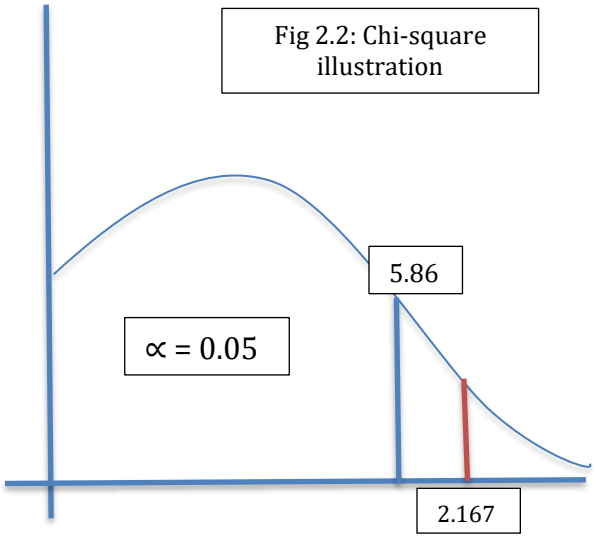
H_1 : They are dependent every year.

Level of significance: 5%

Therefore, critical value: 2.167

Degree of freedom: (2 -1)(8 –1) = 7

Test statistic: 5.86



Hence, we cannot reject null hypothesis and say that the number of male-female internet users are independent of the years.

Equality Act Disabled?

From discussion 1, we now know, that the point of interest is on the age group 65-74, 55-64, 75+ and 45-54. Taking the top two favorable age groups, let's see how much we can dig in to more specific criteria to learn more about its pattern.

➔ Age group 65-74

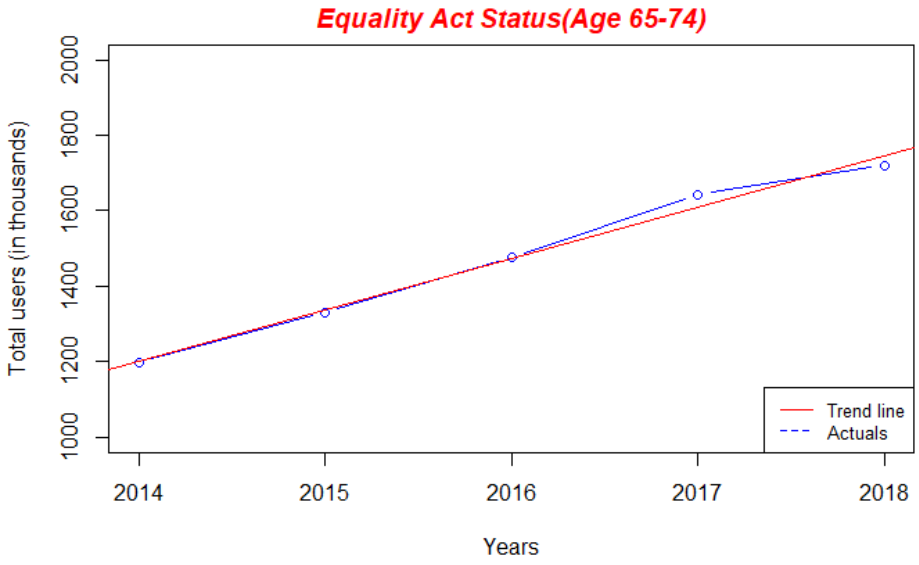


Fig 3.1: Equality act disabled by the age group 65-74

➔ Age group 55-64

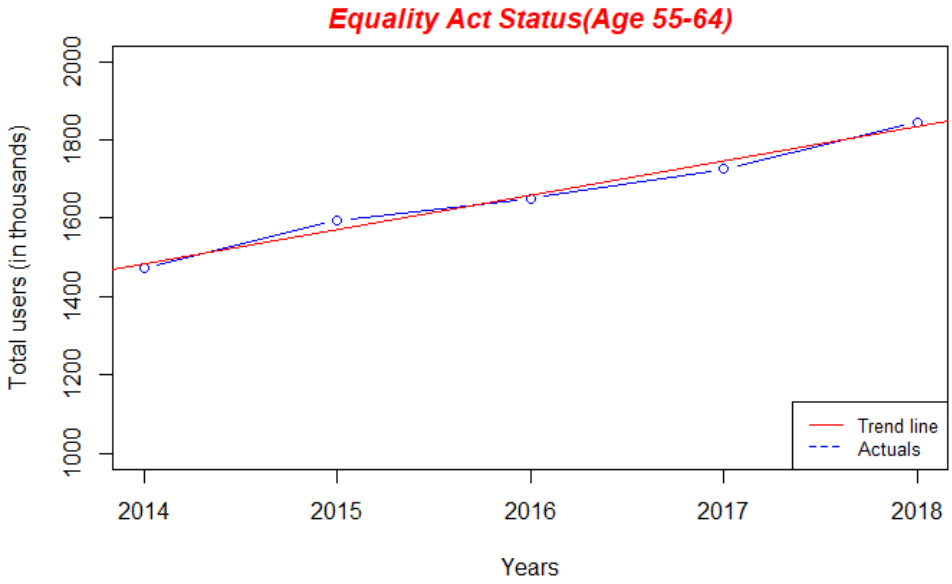


Fig 3.2: Equality act disabled by the age group 55-64

As we can see in the above graphs, the regression line fits perfectly which almost no error (i.e. $R^2 \sim 0.9$) which means a similar trend can be expected in the next few years with almost no saturation any soon. This makes it favorable to consider this part of scheme i.e. 'Equality Act' scheme to be considered as an addon for making more profit and attract customers by making offers and schemes on that. Launching plans which favors Equality Act can help to attract more customers within the Age group we are targeting to market upon.

As we now look to dig more into the age group we have decided to work upon, we can study on certain specific things to make our business more profitable by studying and then working on them.

Ethnic Groups

It is obvious that the White people will be the majority in UK since their native. While accepting that fact, an interesting study can be made on other ethnic groups at the same time.

Below is the pie chart which shows the distribution of all other non-white ethnic groups in UK.

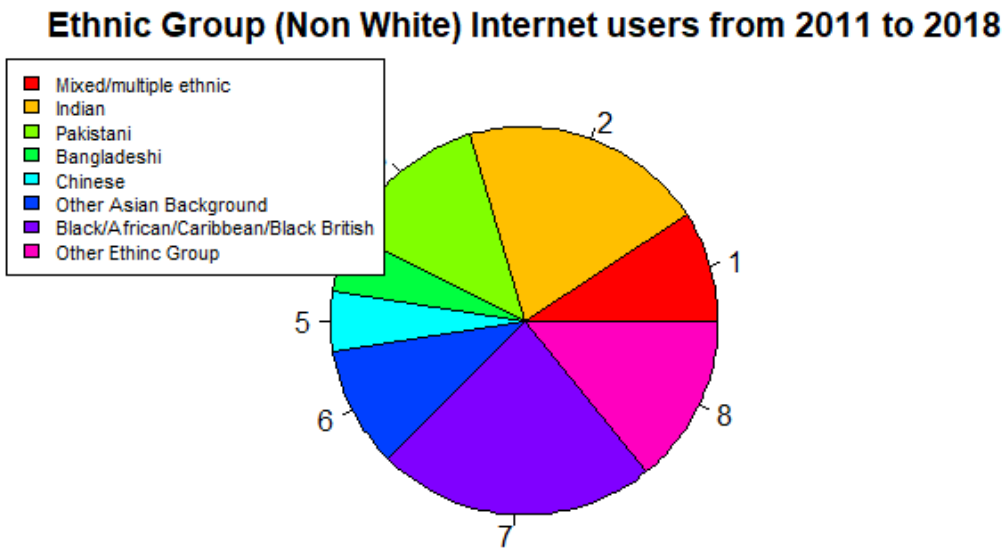


Fig 4.1: Pie chart of non-white ethnic groups in UK

While a Pie chart is easy to read, it also helps us to empirically understand the dominance of any minority dominance in UK. As we can see the majority of UK is shared by Black African/Caribbean/British communities, which allows us to open our thought towards their market. Similarly, a set of such majorities can be taken in consideration and we can make certain moves which common for all of them, which will allow us to maximize profits and subtly, spread our brand awareness.

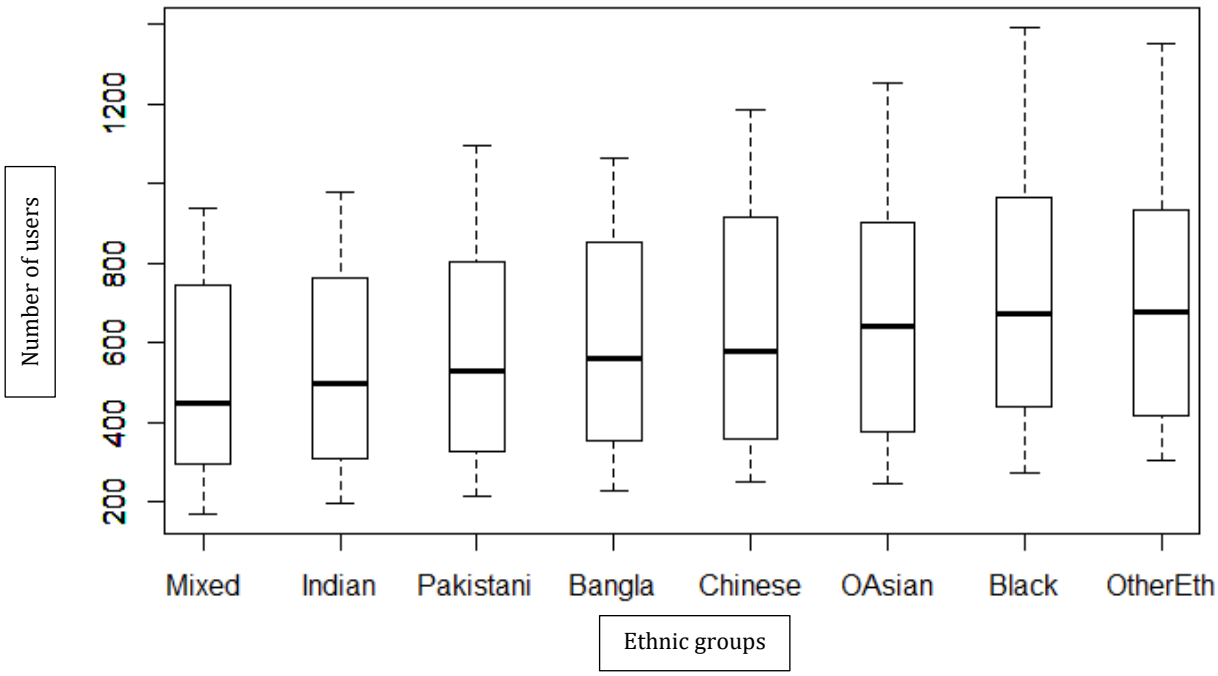


Fig 4.2: Box plot for number of (nonwhite) Ethnic group users

Figure 4.2 shows box plot of the same distribution we discussed above. From box plot, we can have look at the distribution of the internet users based on their ethnicity and the data (in numbers) at the same time. This helps us to create a clear image of the distribution along with the numbers, which helps us to make same empirical decisions more accurate. As can be seen from the image, the median of Black and Other Ethnic groups are much higher than the other groups; not only that, but also their spread is much wider which makes it easy for us to choose the particular set of ethnic group to focus on.

Conclusion

Total number of internet users in last 8 years helps us understand whether it is a good idea to start its operations in UK or not. From the data we can make out that the growth is showing a general steady increase, which is a first 'YES' sign.

While we dig more into it and start to analyze pattern for this growth classified by age group, we can see some surprising facts. It can be easily seen that there is a decrease in the number of active users in that age group. While saying that, it is important that we shift our focus on the elder aged groups, right from 45+. Age group 65-74 shows really high potential for market, followed by age group 55-64, 75+ and last but not the least age group 45-54.

This gives us a clear sign of starting operations with a focus on late adults as market customers rather than students.

Add-on facts:

- Data from Equality Act also confirms the increase potential in post-adult age groups. Thus, supporting the same as our first analysis.
- With the help of distribution of ethnic groups on box plot, it allows us to think for the majority rather than minorities. Making changes in favor of minorities won't allow us earn significant profit compared to majority (White) and dominant minority (Black and other ethnic) groups.
- Small changes and new schemes in accordance of Equality and Ethnic groups insights, can be implemented to maximize profit.
- Majority ads and investments can be made for the same.
- It is also statically proved that growth rate of internet users is independent of the years. Which subtly shows a green flag of more growth ahead.

Further discussion

The ideas of this report can be made more robust by practicing it with extra data sources. With the help of extra data (for e.g. Population of UK by age), we can create a mathematical model which can help us predict saturation points and other decay positions which can't be judged empirically.

For e.g. there must be definitely a period when the growth of internet users stops and saturates, in any age group. For now, we can see a saturation in the youth age group (16-24) but sooner or later a similar trend will happen in all the other age-groups as well. Thus, with the help of mathematical models, investment and planning can be more efficient and prone-free to loss.

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