Assignment 1 Data Visualisation

Excel & Tableau

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8/27/24

Data Visualisation

Contents

Introduction

This report aims to highlight the training material that has been covered during week's 1 to 3 of the data technician bootcamp programme. The report is made up of three main tasks. The first task will discuss the policies and procedures when working with data and their importance as a data analyst. The second task will show the process of working with 'The Wealth of nations' data in Microsoft Excel. The third task will showcase the progression from importing data from Excel into Tableau. With the data finally imported, visualisations will be created in the form of charts and maps according to the client's requirements. Finally, a reflection will be discussed on how the overall data visualisation assignment went.

First Task

Policies and Procedures

When working with data, it is absolutely essential that you adhere to data protection policies and procedures. They provide you and your business with the necessary rules and standard bench marks when working with data within your business. In today's digital age, data protection and privacy are concerns for all businesses and individuals. In the UK, these concerns have been addressed by legislations, with two prominent frameworks, The Data Protection Act 2018 and the UK General Data Protection Regulation (GDPR). Data protection is essential as it helps businesses protect their customer's data and prevents it from being used for malicious purposes (The Knowledge Academy, 2024).

The **Data Protection Act 2018** and the **UK General Data Protection Regulation (GDPR)** regulations are both connected.

The Data Protection Act (2018)

The Data Protection Act (2018) controls how personal information is used by organisations, businesses or the government. It is the UK's implementation of the General Data Protection Regulation (GDPR). Everyone responsible for using personal data, has to follow strict rules called 'data protection principles' (Gov UK, 2024). This act offers a robust legal protection for special category data like health, criminal offences, employment and financial. As this act was introduced to protect personal data, it also gives individuals the right to be informed about how their data is being used and also be able to request for their data to be updated, erased and restricted.

UK General Data Protection Regulation (GDPR)

The UK GDPR is the data privacy regulation that governs the processing of the personal data of residents in the United Kingdom. In simple terms, it is the UK's versional of the EU GDPR (CookieYes, 2024).

The GDPR sets out seven key principles, which are:

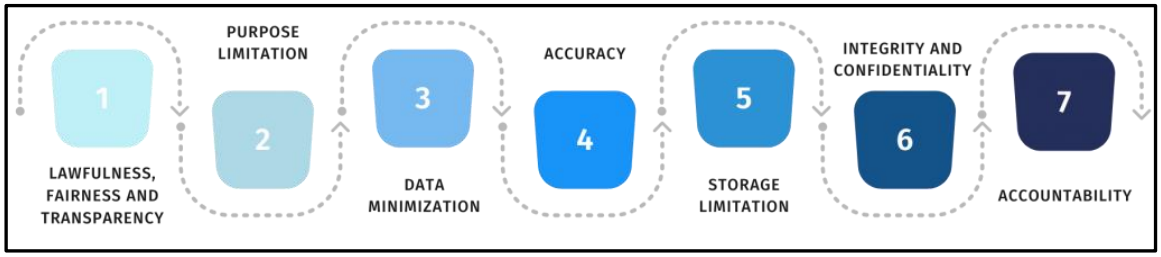


Figure 1 (Data Privacy Manager, 2024)

- **Lawfulness, fairness and transparency**

  Personal data must be processed lawfully, fairly and transparently.
- **Purpose limitation**

  The personal data obtained must be limited to what the data subject is consented to.
- **Data minimisation**

  The collection of personal data should be relevant and limited to what is needed for a company to fulfil its service
- **Accuracy**

  Records of personal data should be accurate and up-to-date and inaccurate data must be corrected or deleted
- **Storage limitation**

  Personal data should not be stored for longer than necessary
- **Integrity and confidentiality**

  Appropriate security measures must be in place to prevent "unauthorised or unlawful processing and against accidental loss, destruction or damage, using appropriate technical or organisational measures
- **Accountability**

  Organisations must confirm and prove they're compliant with GDPR. Adhering to the accountability principle can include:
    - Carrying out data privacy assessments to determine your compliance and risks such as a DPIA (Data Protection Impact Assessment)

- Creating and documenting a data map
- Keep a record that shows your GDPR compliance to regulators

Under EU and UK data protection law, businesses need to make sure they have the appropriate technical and organisational measures in place to protect personal data. As companies rely on data to drive their operations and improve their services and products these regulations play an important part in safe guarding the data used in the process.

As a data analyst, it is a critical aspect of your role to implement the data protection policies, in order to safeguard and protect the data you are working with. Just a few things to consider when working with data, will be, to identify what information needs to be protected, the measures you need to put in place to protect data, how data will be destructed and also critical data backups in case of system crashes. This is only a few of the many tasks involved when working with data. Data has to always be monitored in order to ensure that sensitive information is kept secure at all times. Remember, data is a valuable asset and needs to be protected at all times.

Second Task

Microsoft Excel

In this assignment we will be working with '**The Wealth of nations**' Excel file.

The worksheets in '**The Wealth of nations**' Excel file are:

- *GDP*
- *Life Expectancy*
- *Smartphones*

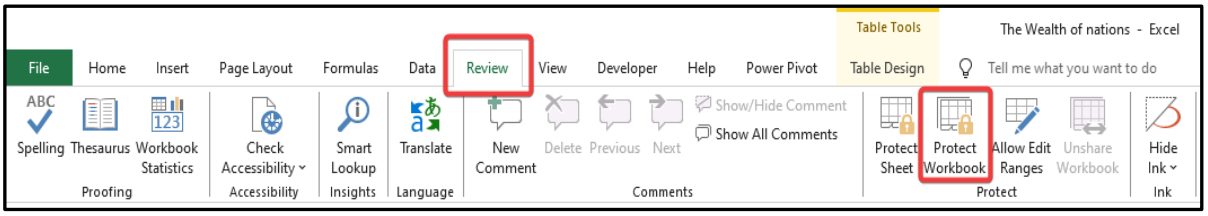
For the Excel part of this assignment, we will only be using the data in the GDP worksheet.

GDP Tasks

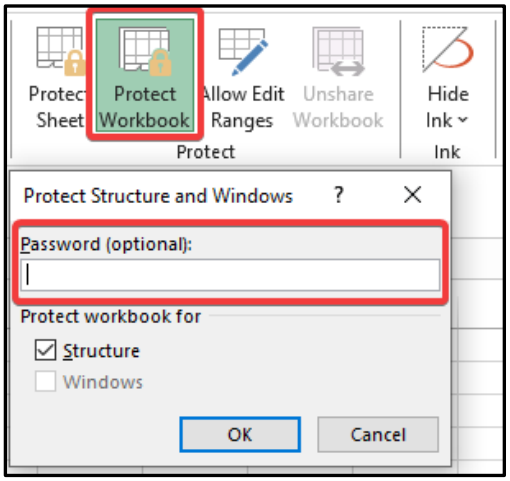
For each of the tasks, annotated screenshots will be provided showing how each of the task were completed from start-to-finish.

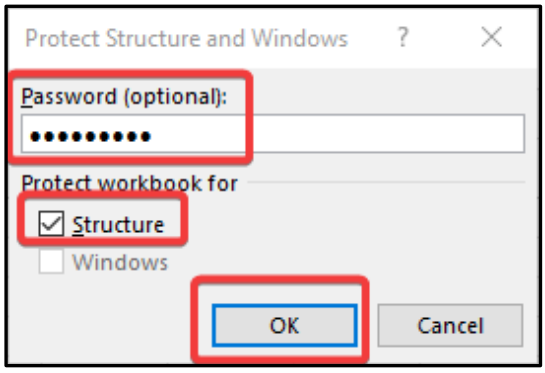
1. Set a password to protect the workbook

- In order to password protect an Excel workbook, first open the workbook that you want to protect and navigate to the **Review** tab and then click on **Protect Workbook**.

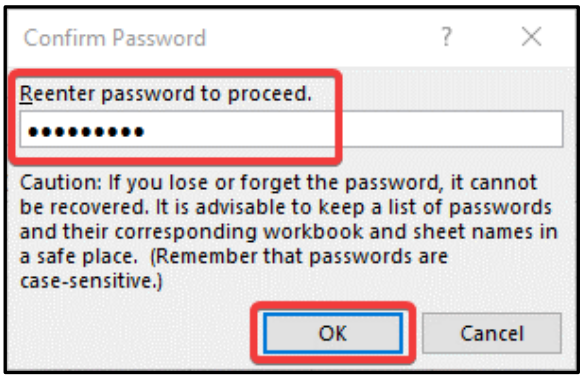


- Once, you have clicked on **Protect Workbook** a small window will appear prompting you to enter a **Password**. A Password has now been entered and confirmed by clicking on **OK**.





- The final step is to **Re-enter** the **Password** and to click on OK. The workbook is now protected. Note: Password set is to (**Wealth123**).

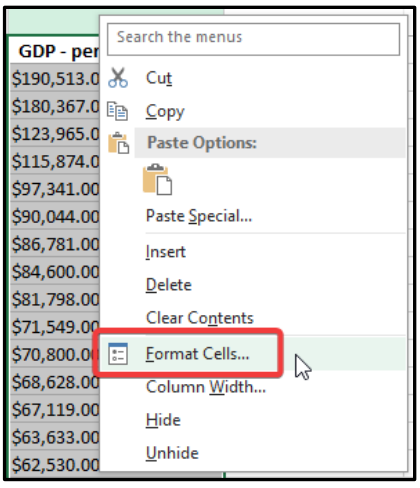


2. Highlight column C and change the data to display in British Pound symbol

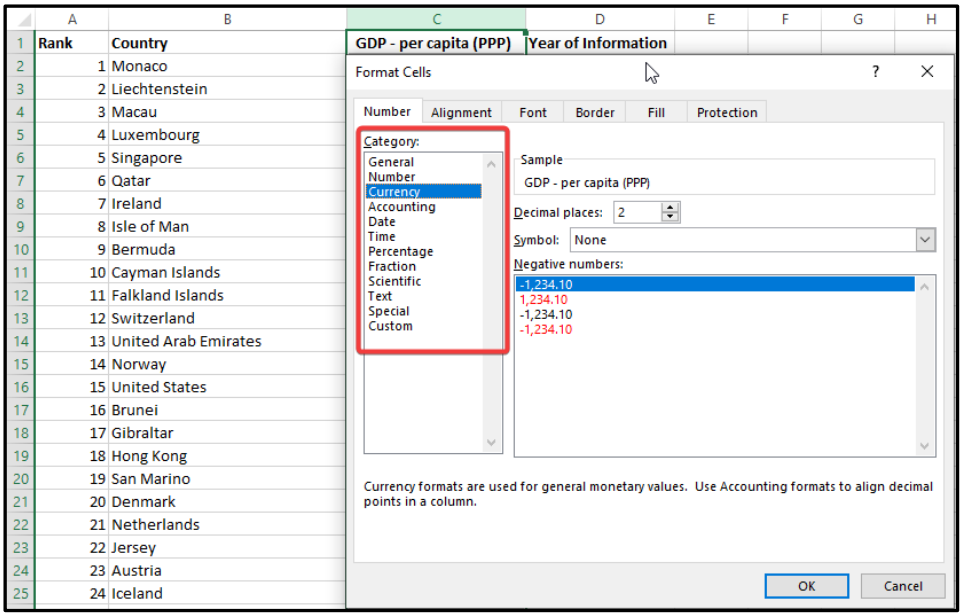
- Select **Column C** by clicking on the letter area and this will highlight the entire column.

	A	B	C	D
1	Rank	Country	GDP - per capita (PPP)	Year of Information
2	1	Monaco	$190,513.00	2019
3	2	Liechtenstein	$180,367.00	2018
4	3	Macau	$123,965.00	2019
5	4	Luxembourg	$115,874.00	2020
6	5	Singapore	$97,341.00	2019
7	6	Qatar	$90,044.00	2019
8	7	Ireland	$86,781.00	2019
9	8	Isle of Man	$84,600.00	2014
10	9	Bermuda	$81,798.00	2019
11	10	Cayman Islands	$71,549.00	2018
12	11	Falkland Islands	$70,800.00	2015
13	12	Switzerland	$68,628.00	2019
14	13	United Arab Emirates	$67,119.00	2019
15	14	Norway	$63,633.00	2019
16	15	United States	$62,530.00	2019

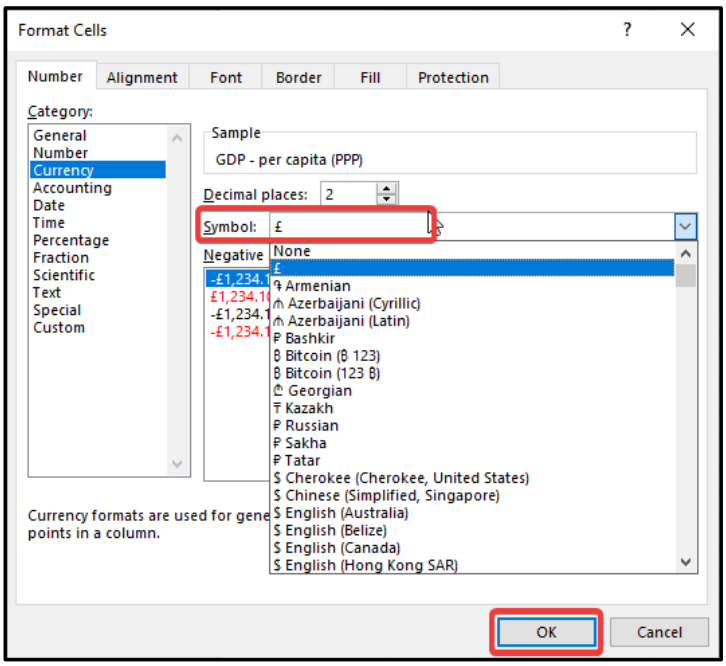
- To change the data format. You can either right click on the column or use the tool bar options. In this case, I used the **Format Cells…** option as shown highlighted in the screenshot below.

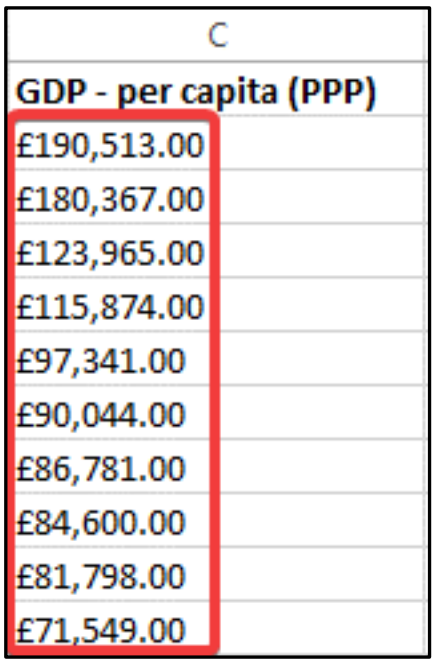


- In Format Cells in the **Category**, select **Currency** and then **Symbol**. You now have a list of **Currencies** to select from.



- In this case we need to display the data in **British pounds**. You can see we have selected the pound symbol **(£)** and confirmed the change by clicking on **OK**. We can see that this change has now been made to our data.





3. Turn the GDP sheet into a table

- First select the cells in your sheet you want to convert into a table. You have two options do this. Either use the **Home → Format as Table** option or go to **Insert → Table**. Both do the same job. In this scenario we will use the **Format as Table** options on the **Home** tab.

Rank	Country	GDP - per capita (PPP)	Year of Information
1	Monaco	£190,513.00	2019
2	Liechtenstein	£180,367.00	2018
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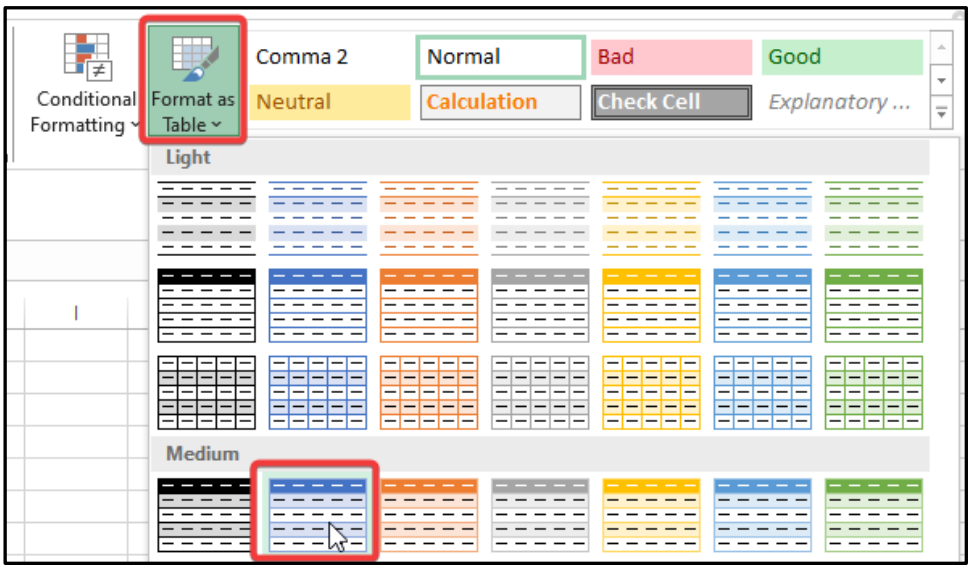
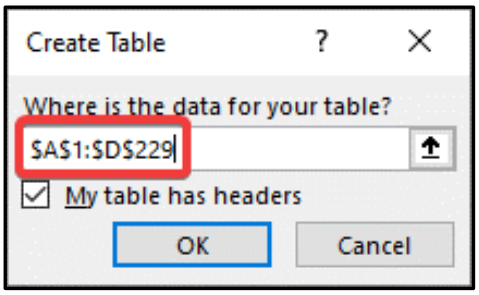
15	United States	£62,530.00	2019
16	Brunei	£62,100.00	2019
17	Gibraltar	£61,700.00	2014
18	Hong Kong	£59,848.00	2019
19	San Marino	£59,439.00	2018
20	Denmark	£57,804.00	2019
21	Netherlands	£56,935.00	2019
22	Jersey	£56,600.00	2016
23	Austria	£56,188.00	2019
24	Iceland	£55,874.00	2019
25	Germany	£53,919.00	2019
26	Sweden	£53,240.00	2019
27	Guernsey	£52,500.00	2014
28	Belgium	£51,934.00	2019
29	Taiwan	£50,500.00	2017
30	Andorra	£49,900.00	2015
31	Australia	£49,854.00	2019
32	Kuwait	£49,854.00	2019
33	Canada	£49,031.00	2019
34	Finland	£48,668.00	2019
35	Saudi Arabia	£46,962.00	2019
36	United Kingdom	£46,659.00	2019

GDP | Life Expectancy | Smartphones

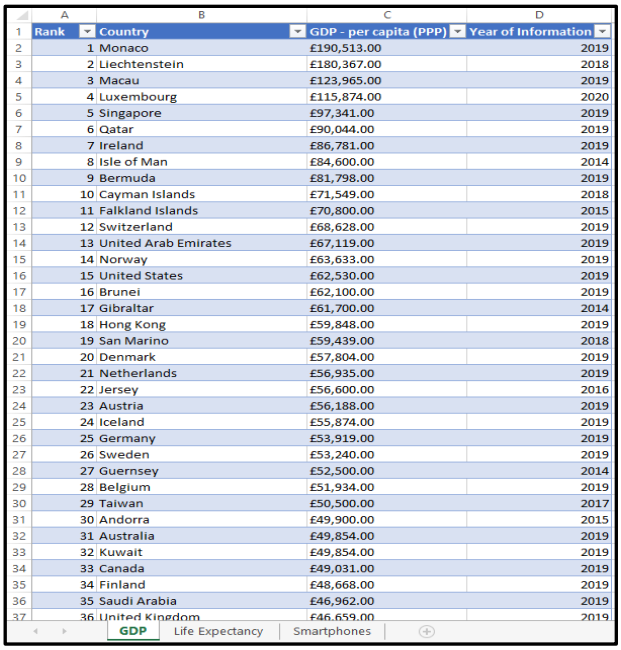
- Once you have selected the data you want to turn into a table click on **Format as Table** and select the **Style** you want your **Table** to be in.



- When you confirm the **Style of Table** you want, you will be presented with a prompt asking you where your data is for your **Table**. You can either enter the **cells reference** or **highlight** the data in the **GDP sheet** for this example. In addition to this there is a check box **My table has headers** this option will be selected as we have headers in our data selection.



- We can now see the **Table** has been formatted according to the **Style** selected previously.



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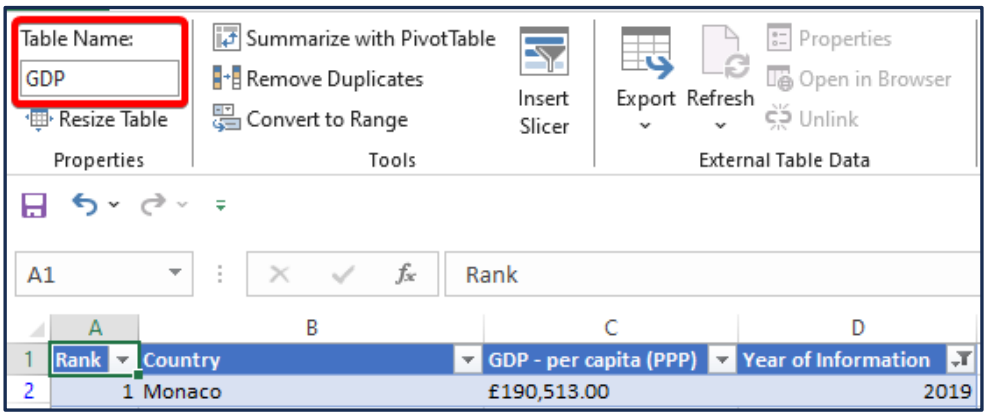
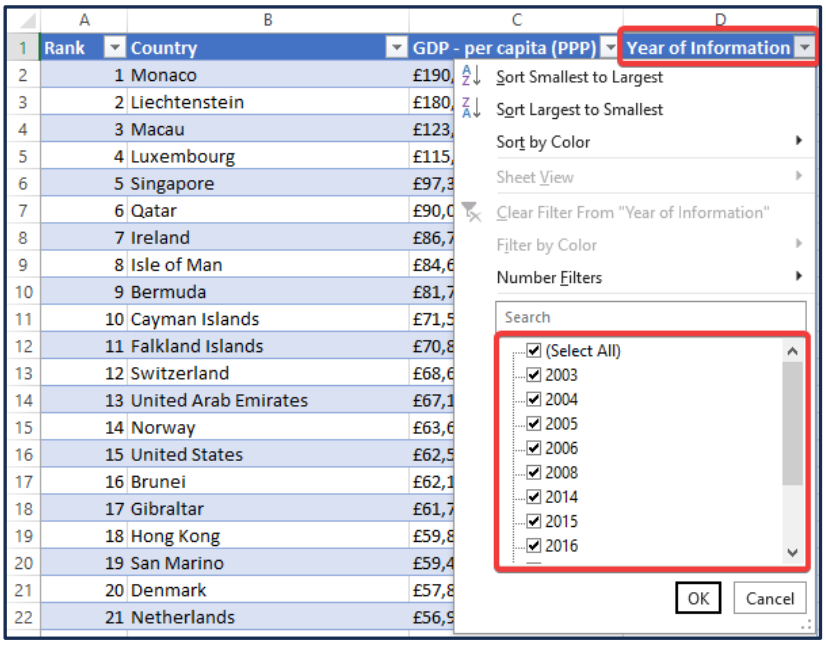
GDP | Life Expectancy | Smartphones

- Finally, we have provided the **Table** with a name. We have named it **GDP**.

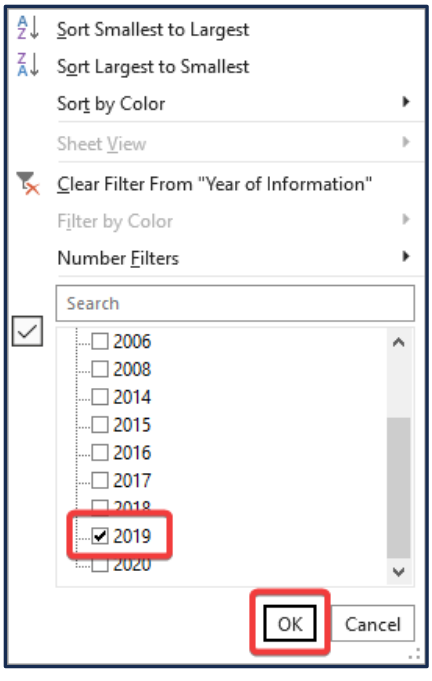


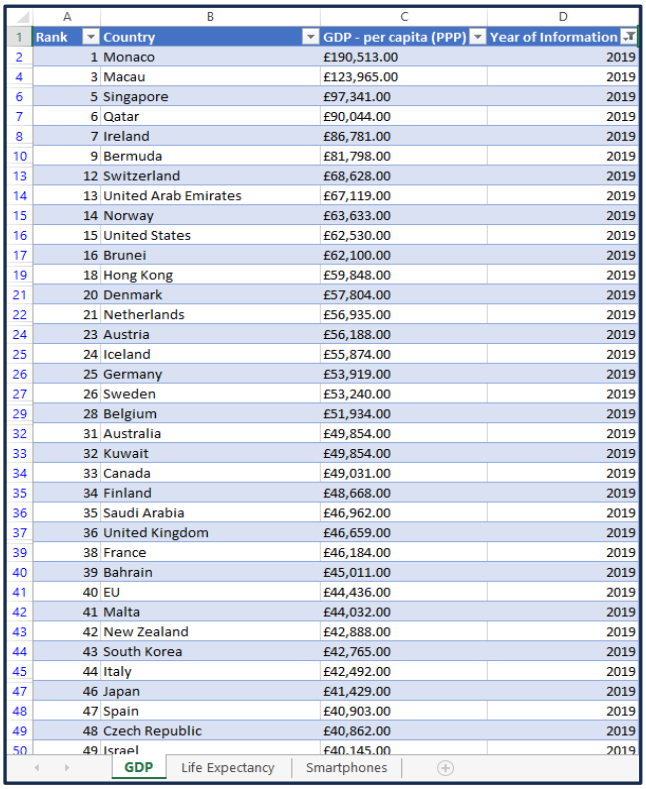
4. Filter the table to display only the information for 2019

- We will now use the filter option on our table to display information only for the year 2019. Once the filter for the **Year of Information** has been selected. You will be presented with the option to select what data you want to select.



- We have selected the year **2019**. As you can clearly see the data in table only shows information for the year **2019**.





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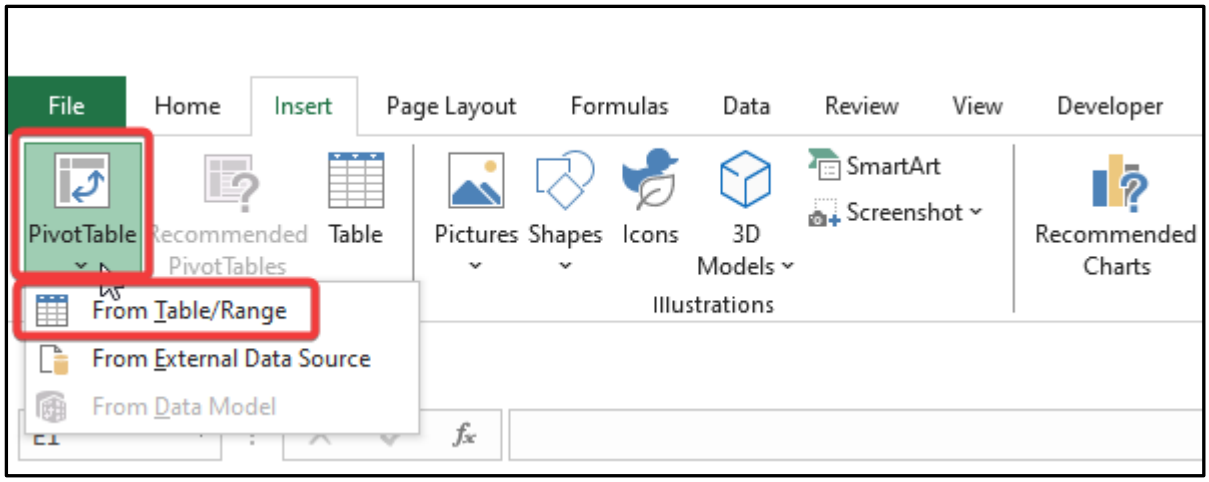
34	Finland	£48,668.00	2019
35	Saudi Arabia	£46,962.00	2019
36	United Kingdom	£46,659.00	2019
38	France	£46,184.00	2019
39	Bahrain	£45,011.00	2019
40	EU	£44,436.00	2019
41	Malta	£44,032.00	2019
42	New Zealand	£42,888.00	2019
43	South Korea	£42,765.00	2019
44	Italy	£42,492.00	2019
46	Japan	£41,429.00	2019
47	Spain	£40,903.00	2019
48	Czech Republic	£40,862.00	2019
49	Israel	£40,145.00	2019

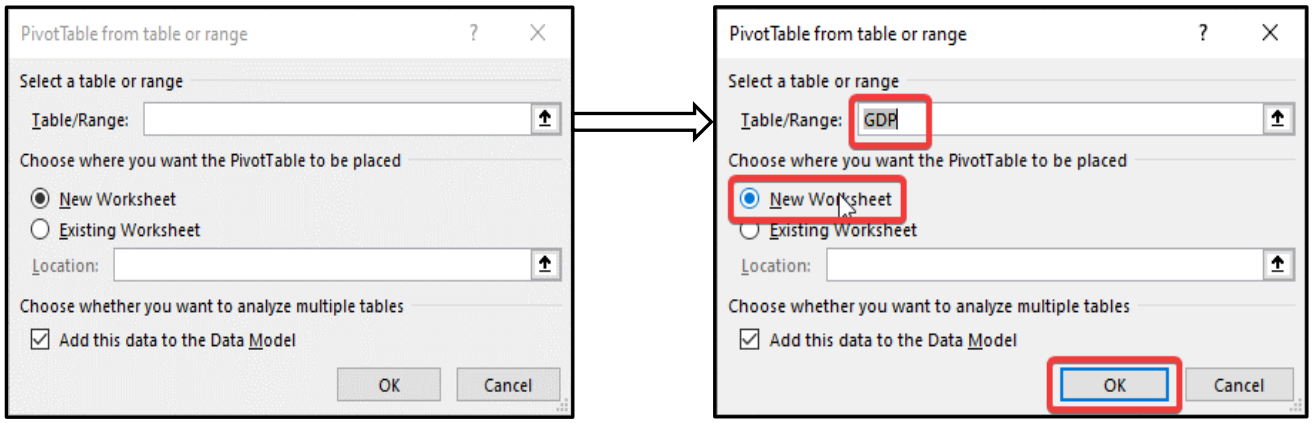
GDP | Life Expectancy | Smartphones

5. **Create a chart that will only display the following data 'Rank, Country and GDP – per capita (PPP).**

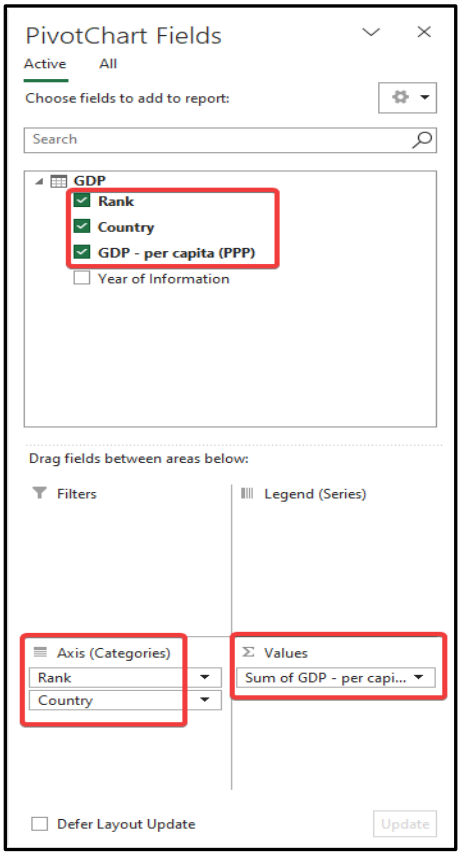
- As we are handling a large amount of data, we will create a **Pivot Table** to summarise the data, before moving on with creating the chart.

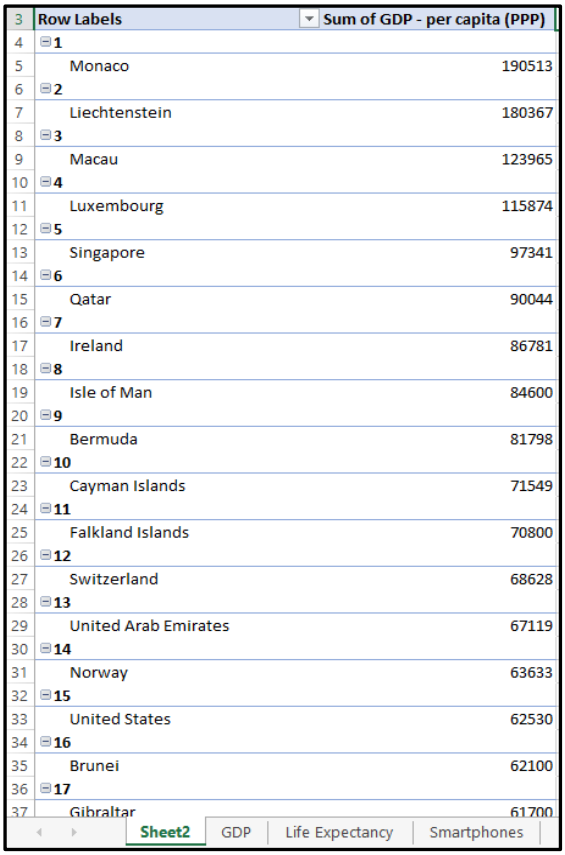


- We will be presented with a pop up when which click on **PivotTable → From Table/Range.** As you can see, we have entered the Table/Range with the **GDP** table we created earlier. The **PivotTable** will be placed on a **New Worksheet**.



- Using the **PivotTable** I added **Rank** and **Country** to the **Axis Category** and **GDP – per capita (PPP)** to the V**alues**. The **PivotTable** has now been populated with the data we want.

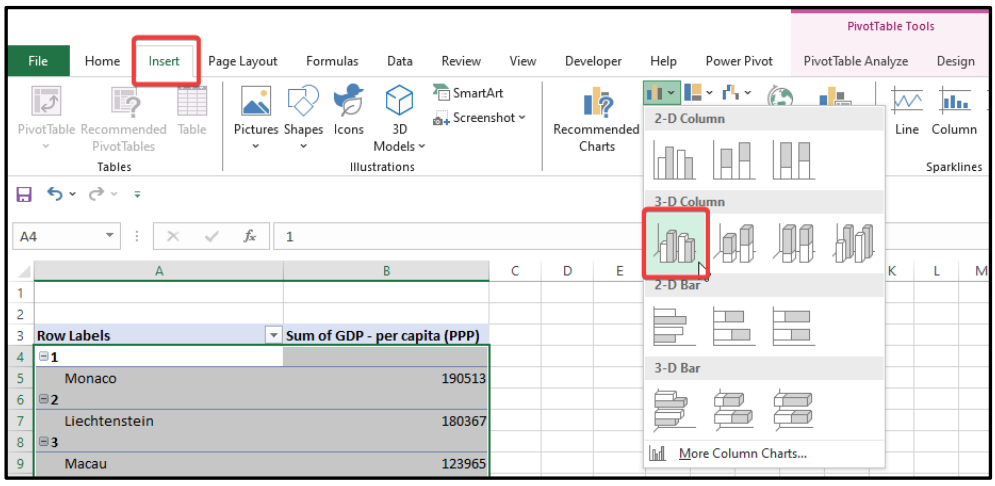




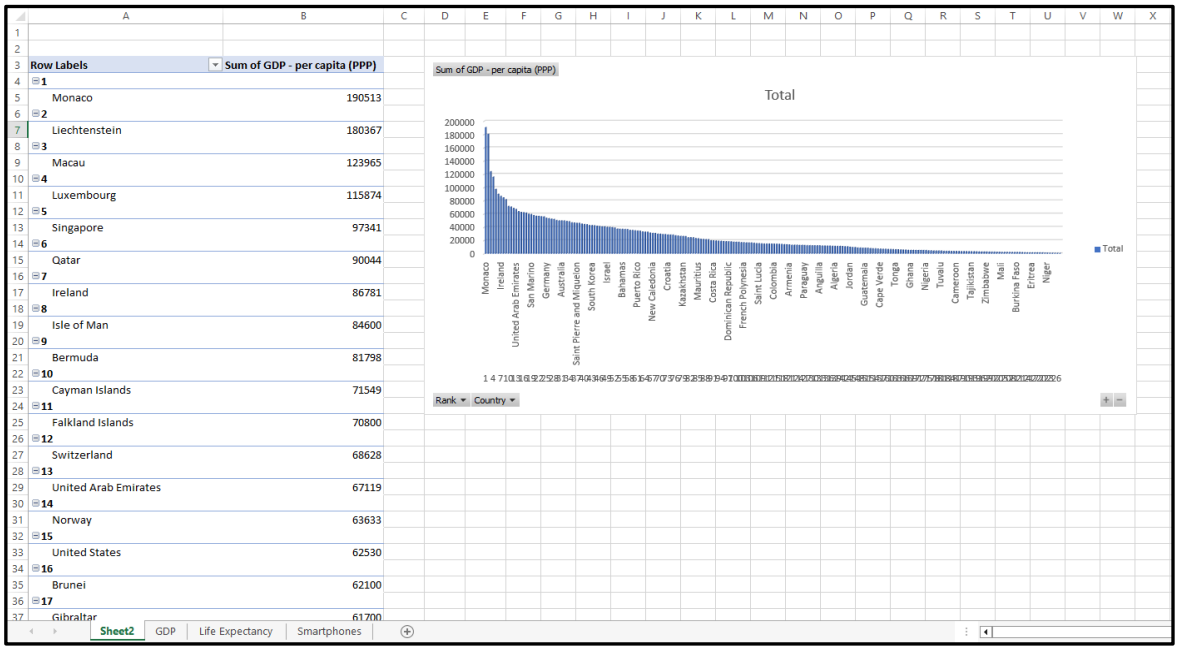
Row Labels	Sum of GDP - per capita (PPP)
1	
Monaco	190513
2	
Liechtenstein	180367
3	
Macau	123965
4	
Luxembourg	115874
5	
Singapore	97341
6	
Qatar	90044
7	
Ireland	86781
8	
Isle of Man	84600
9	
Bermuda	81798
10	
Cayman Islands	71549
11	
Falkland Islands	70800
12	
Switzerland	68628
13	
United Arab Emirates	67119
14	
Norway	63633
15	
United States	62530
16	
Brunei	62100
17	
Gibraltar	61700

- The two **chart types** that we will use to create our charts
    1. **3-D Clustered Column** with a filter on both **Country** and **Rank**
    2. **Map Chart**

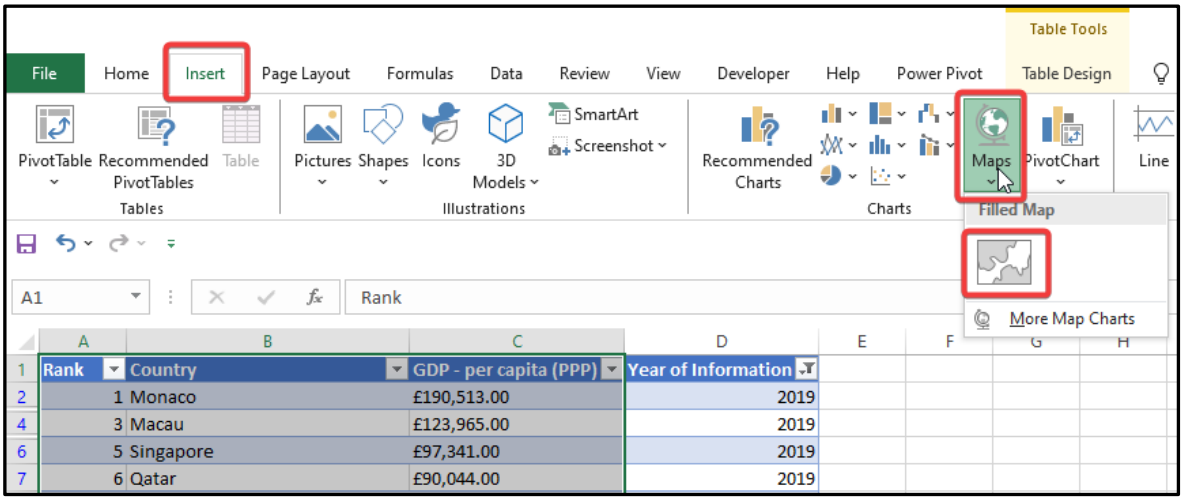
- As there is a total of **228 countries** in our **data set,** we will to use a filter so that we have the ability to choose what countries we want to include or exclude from our chart.



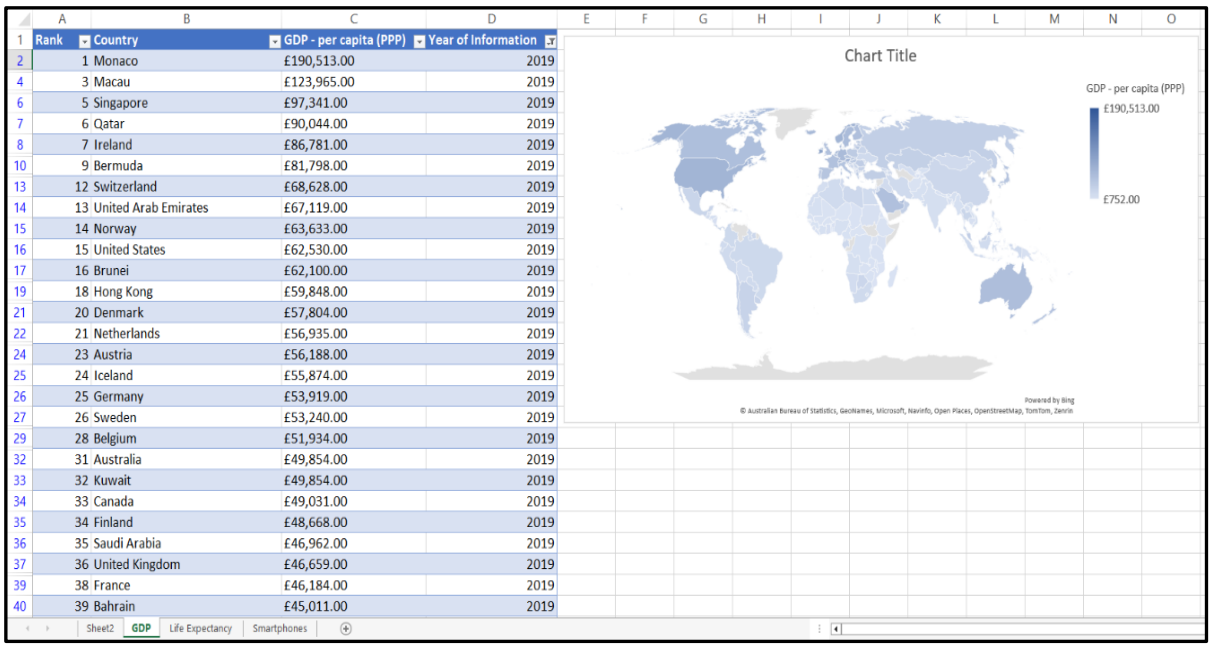
- The **3-D Clustered Column** chart has now been added to the worksheet. In the next section the charts features will be improved.



- As our data includes a total of **228** geographical countries for the year 2019, a Map Chart will be added. We will use the **Maps** icon as shown below to construct a **Filled Map Chart**.



- A Filled Map Chart has now been added to our **worksheet** showing a **World Map** representing our data in shaded colours. In the next section the chart will be improved, giving it a professional presentation.

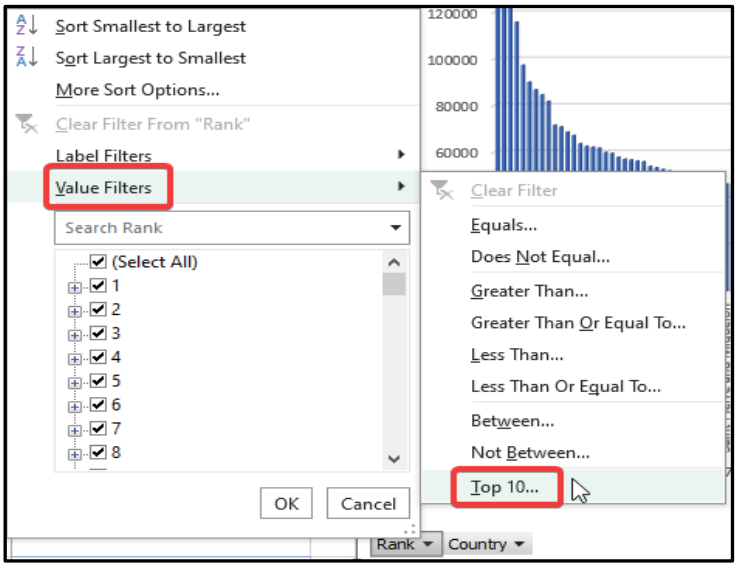


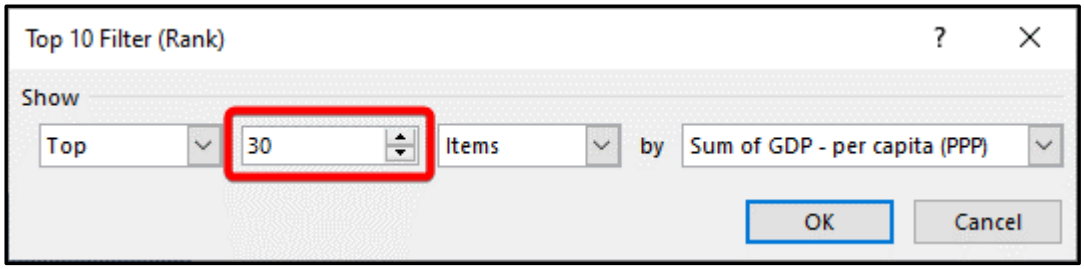
Rank	Country	GDP - per capita (PPP)	Year of Information
1	Monaco	£190,513.00	2019
3	Macau	£123,965.00	2019
5	Singapore	£97,341.00	2019
6	Qatar	£90,044.00	2019
7	Ireland	£86,781.00	2019
9	Bermuda	£81,798.00	2019
12	Switzerland	£68,628.00	2019
13	United Arab Emirates	£67,119.00	2019
14	Norway	£63,633.00	2019
15	United States	£62,530.00	2019
16	Brunei	£62,100.00	2019
18	Hong Kong	£59,848.00	2019
20	Denmark	£57,804.00	2019
21	Netherlands	£56,935.00	2019
23	Austria	£56,188.00	2019
24	Iceland	£55,874.00	2019
25	Germany	£53,919.00	2019
26	Sweden	£53,240.00	2019
28	Belgium	£51,934.00	2019
31	Australia	£49,854.00	2019
32	Kuwait	£49,854.00	2019
33	Canada	£49,031.00	2019
34	Finland	£48,668.00	2019
35	Saudi Arabia	£46,962.00	2019
36	United Kingdom	£46,659.00	2019
38	France	£46,184.00	2019
39	Bahrain	£45,011.00	2019

6. **Using your creative skills edit the chart**
    - **Add a title**
    - **Add X and Y axis labels**
    - **Make the chart visually pleasing**

3-D Clustered Column

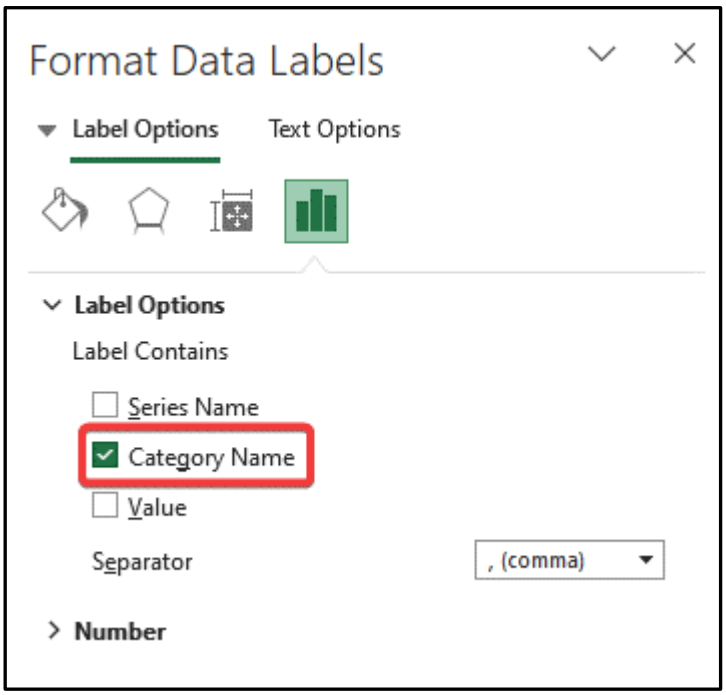
- In order for our data to look visually pleasing, we will create a **filter** on our chart to show the **Top 30** ranked countries by using the filter option. Our original chart is too cluttered, as the **x-axis** does not permit all the countries to be easily displayed. A filter on our data will remove this cluttered look and give our chart a cleaner look.





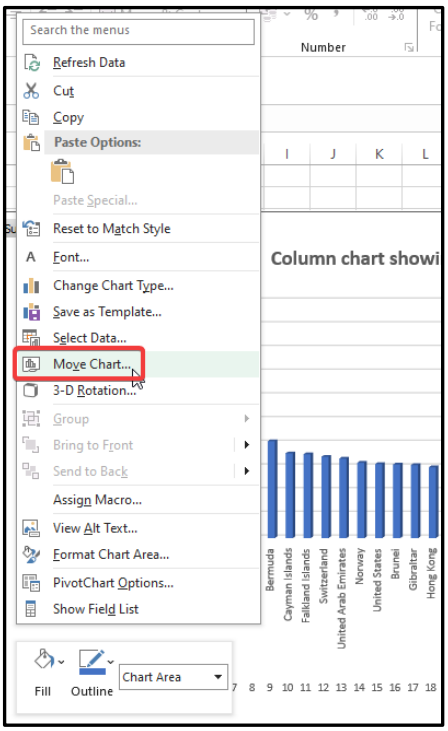
Map Chart

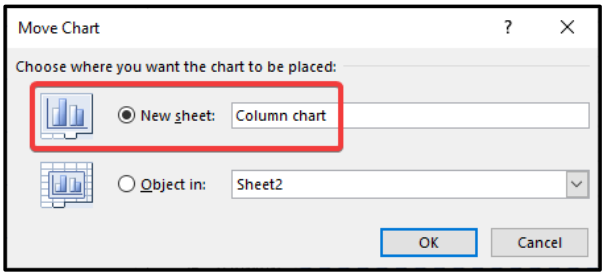
- The **Map Chart** will also be formatted, to display the country names on the Map, so you can identify where the countries are located on the **World Map**



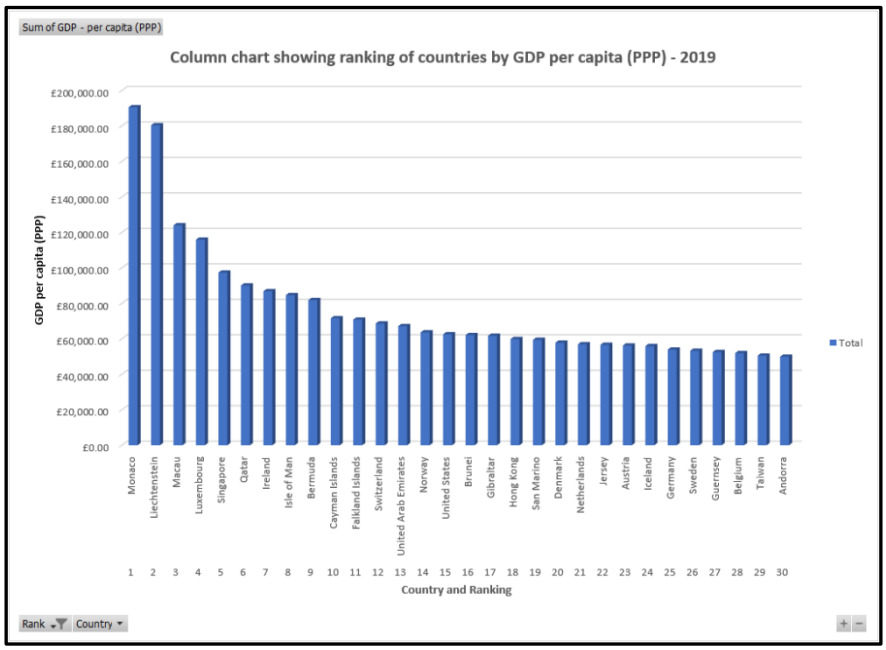
7. Move the chart to a new sheet tab and label with a suitable name

- To move a chart to a new sheet, you need to right click on the chart and click on Move Chart. A small window will appear which will enable you to move the chart to a **New Sheet**.

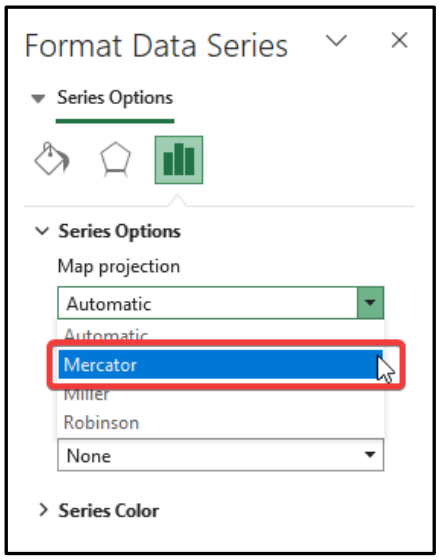




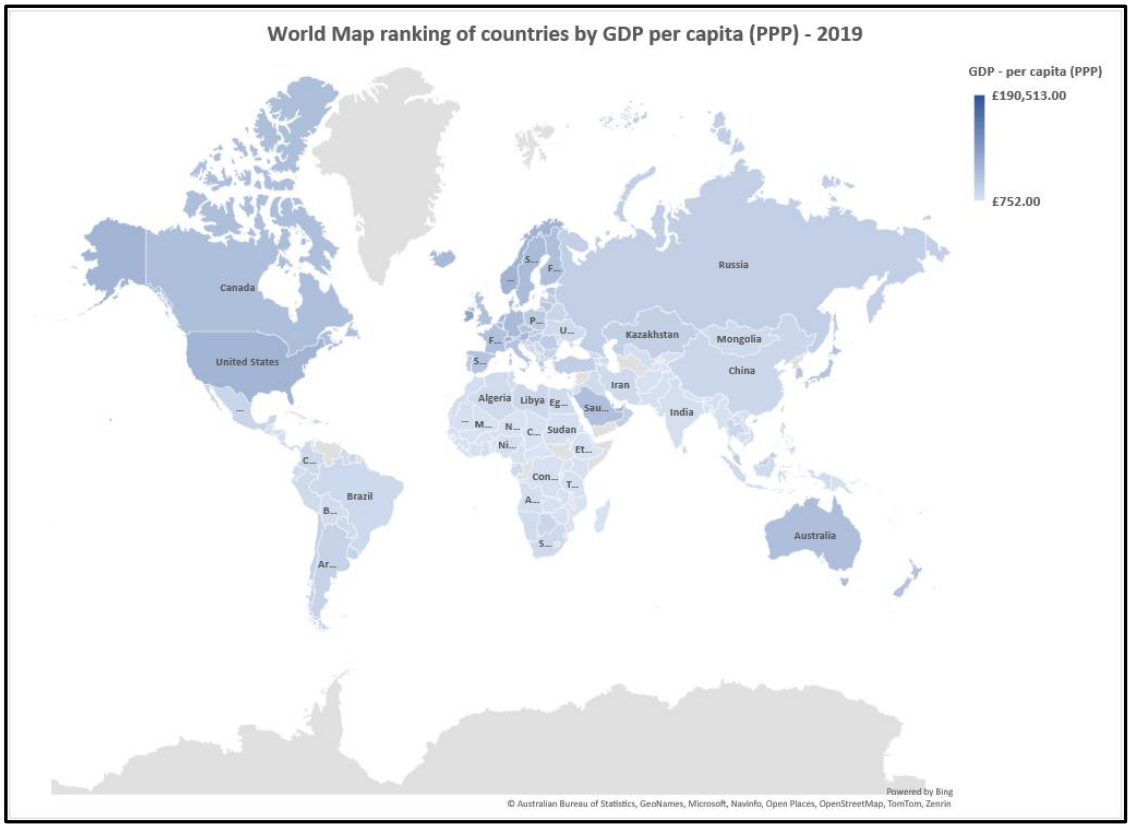
- We will name the chart after the type of chart as there is a character restriction on the sheet name.



- We want to expand the **World Map** to give it larger look. We will format the Map using the Format Series Options and select the **Mercator** map projection.

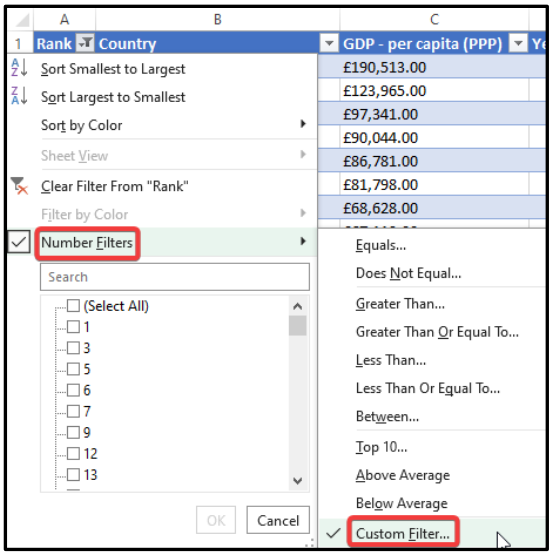


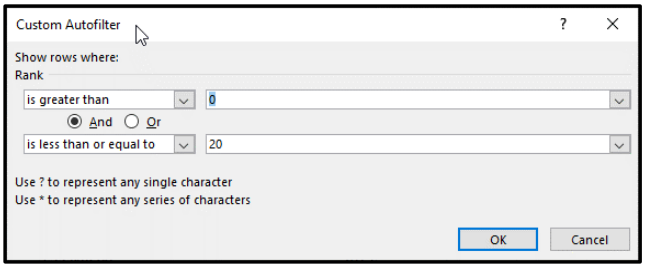
- The World Map chart has now been given a larger look with the Mercator map projection. The countries are now clear with the countries name shown.



8. Create a sort for the top 20 highest ranking countries

- We will use a filter to show only the 20 highest ranking countries from our data set.
- We will show the highest-ranking countries with their value greater than 0 and less or equal to 20.



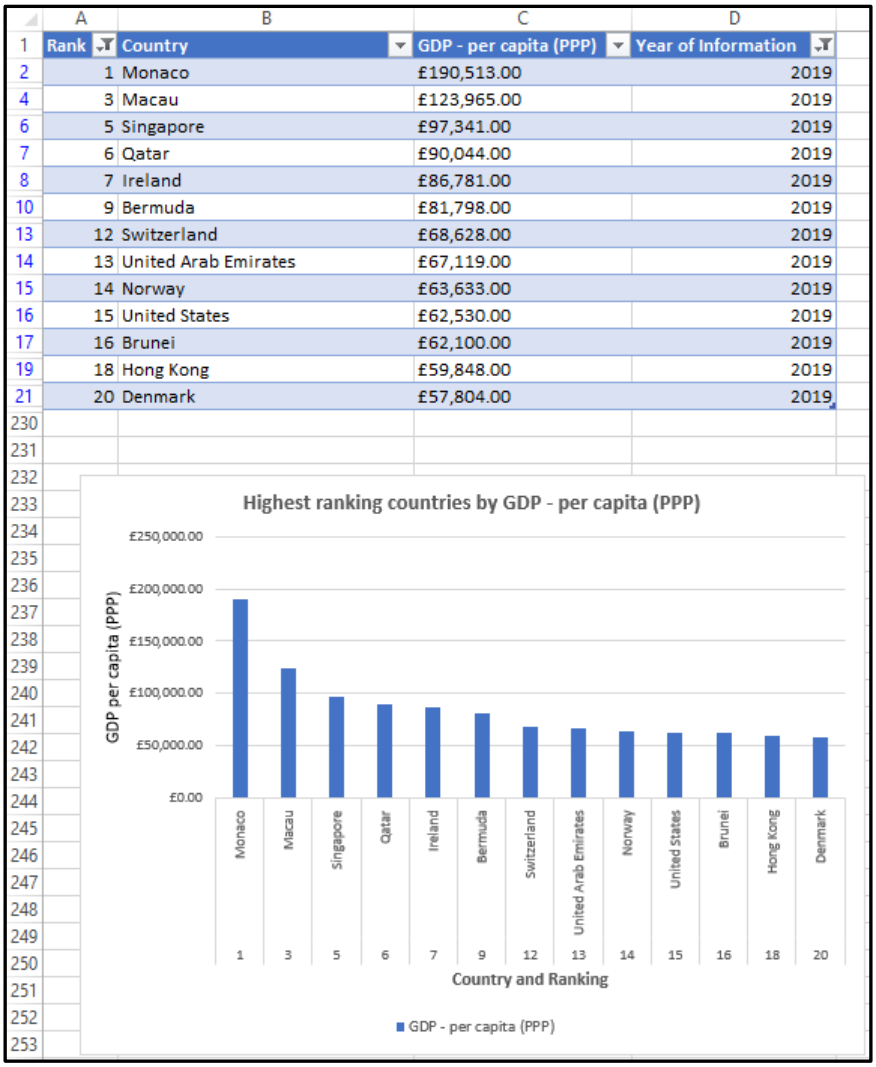


- Once that filter has been applied our data now shows only the 20 highest ranking countries.

Rank	Country	GDP - per capita (PPP)	Year of Information
1	Monaco	£190,513.00	2019
3	Macau	£123,965.00	2019
5	Singapore	£97,341.00	2019
6	Qatar	£90,044.00	2019
7	Ireland	£86,781.00	2019
9	Bermuda	£81,798.00	2019
12	Switzerland	£68,628.00	2019
13	United Arab Emirates	£67,119.00	2019
14	Norway	£63,633.00	2019
15	United States	£62,530.00	2019
16	Brunei	£62,100.00	2019
18	Hong Kong	£59,848.00	2019
20	Denmark	£57,804.00	2019

9. **Create a new bar chart to display the 20 highest ranking countries from your sort and then move the chart to be underneath the table**

- From the data we have already filtered. We will create a bar chart displaying the top 20 highest ranking countries by GDP.



Rank	Country	GDP - per capita (PPP)	Year of Information
1	Monaco	£190,513.00	2019
3	Macau	£123,965.00	2019
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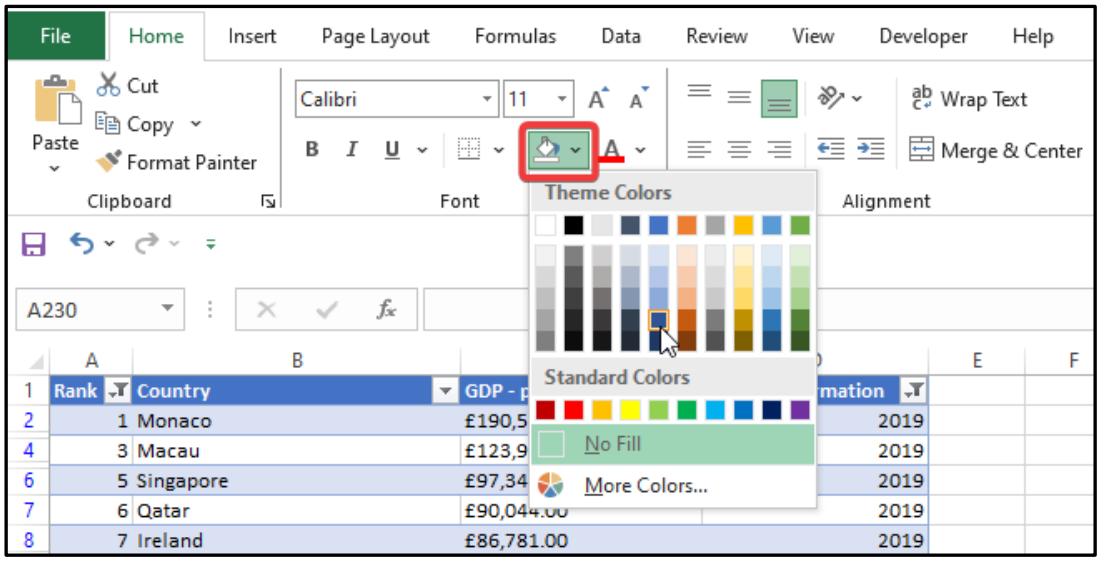
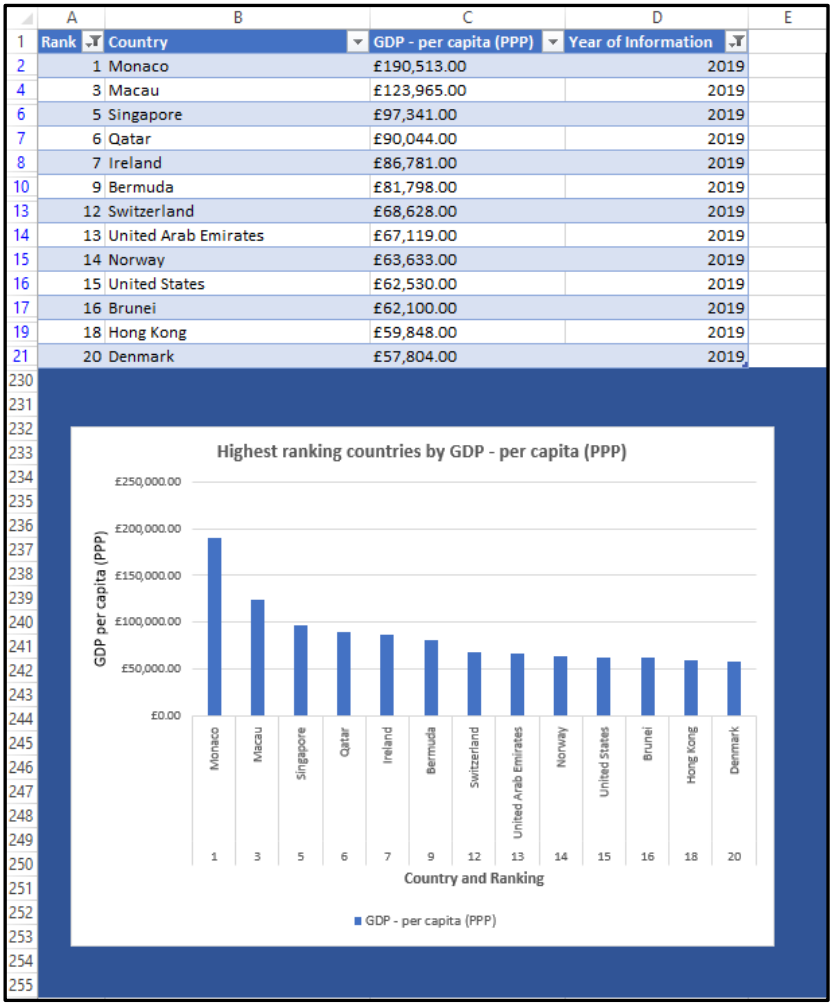
15	United States	£62,530.00	2019
16	Brunei	£62,100.00	2019
18	Hong Kong	£59,848.00	2019
20	Denmark	£57,804.00	2019

10. Colour the background by highlighting the area underneath the table

- We will use the fill colour options to highlight the area underneath our table.



- We have coloured the area underneath the table in the colour **blue**

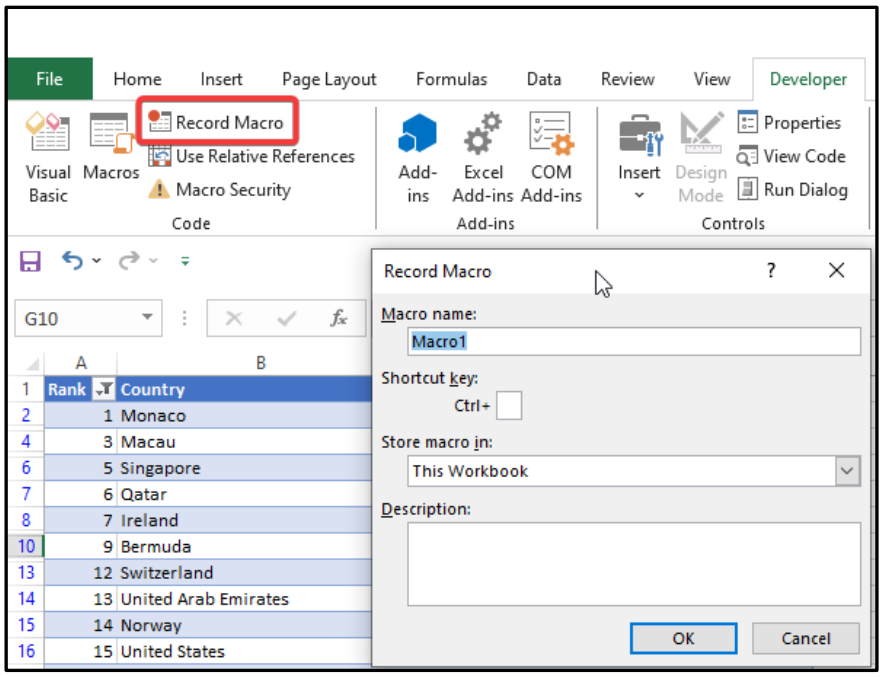


Macros

Three Macro buttons will be created to perform the following commands

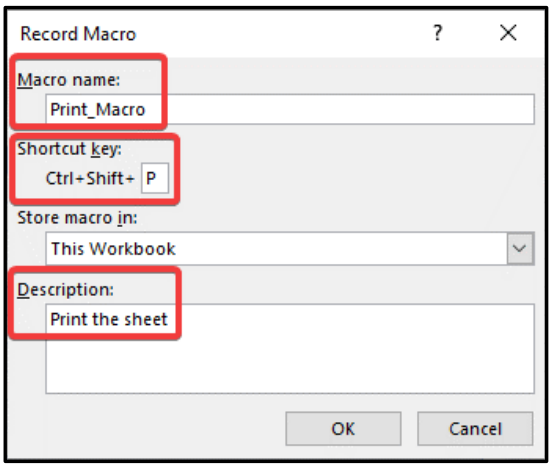
1. **Print the sheet**
2. **Save the file**
3. **Copy the sheet**

- We will be using the Record Macro function as this will record the actions we need to perform. For each Macro we will need to provide a **macro name**, **a shortcut key** and a **short description**.



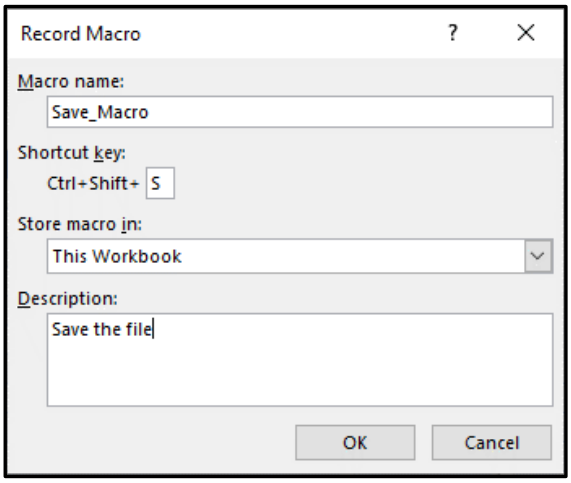
Print the sheet

- For this Macro we will create a print Macro that will send the worksheet to the printer.



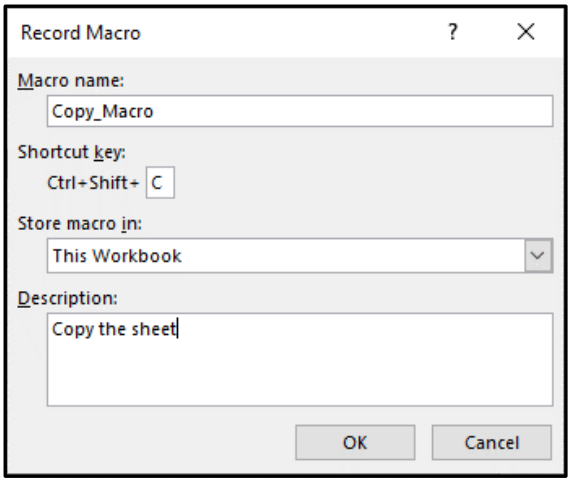
Save the file

- This macro will save the workbook to your local computer.



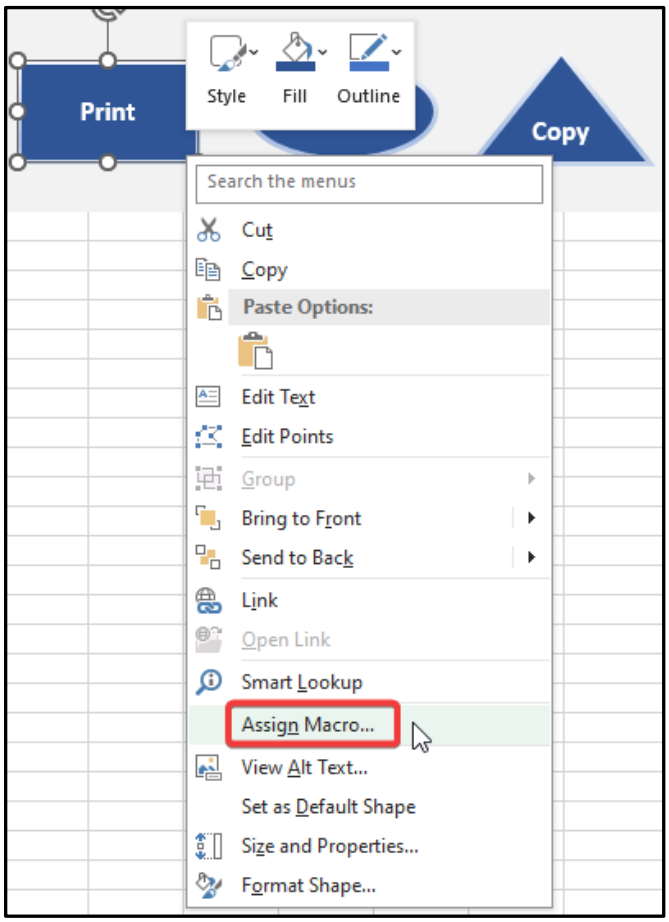
Copy the sheet

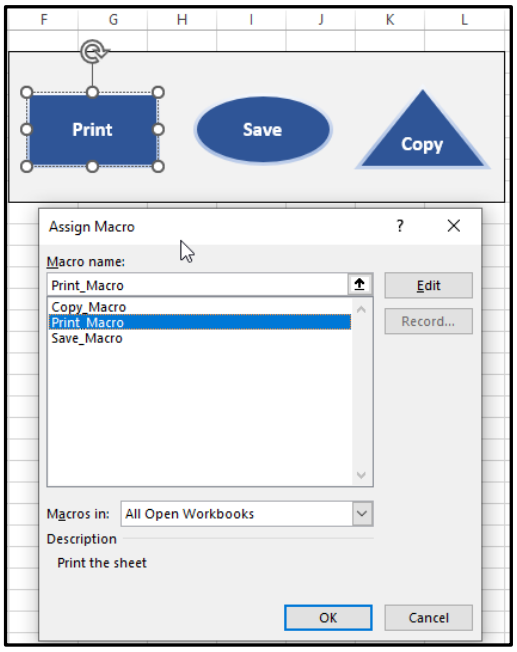
- The copy macro will copy the sheet and then it will be pasted onto a new worksheet.



- The **Macro** buttons will be displayed on the worksheet to allow the user to select what of the three commands they want to perform.

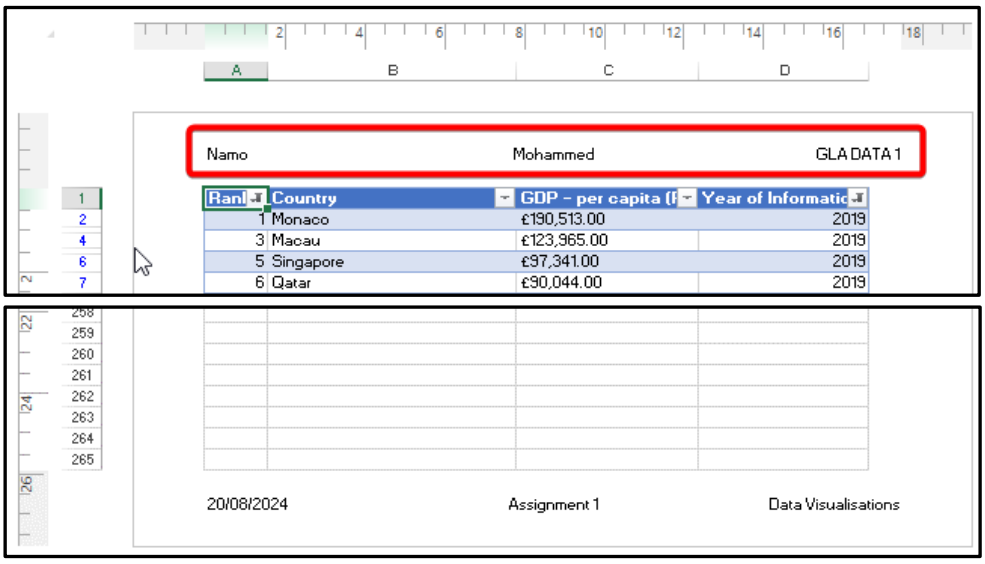
- All the assigned Macros have been tested and returned positive results. They performed their intended function e.g. **Print, Save & Copy**





Adding a Header & Footer to our Table

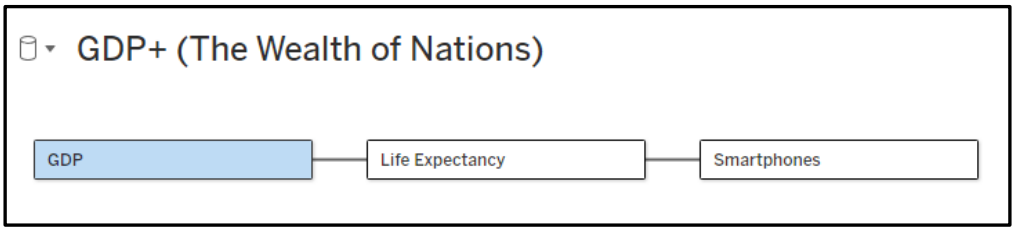
- We have added both a Header & Footer to our **GDP** table



Third Task

Tableau

We will use Tableau to **import** the Wealth of nations Excel file and create **relationships** between the data stored in the each of the sheets.

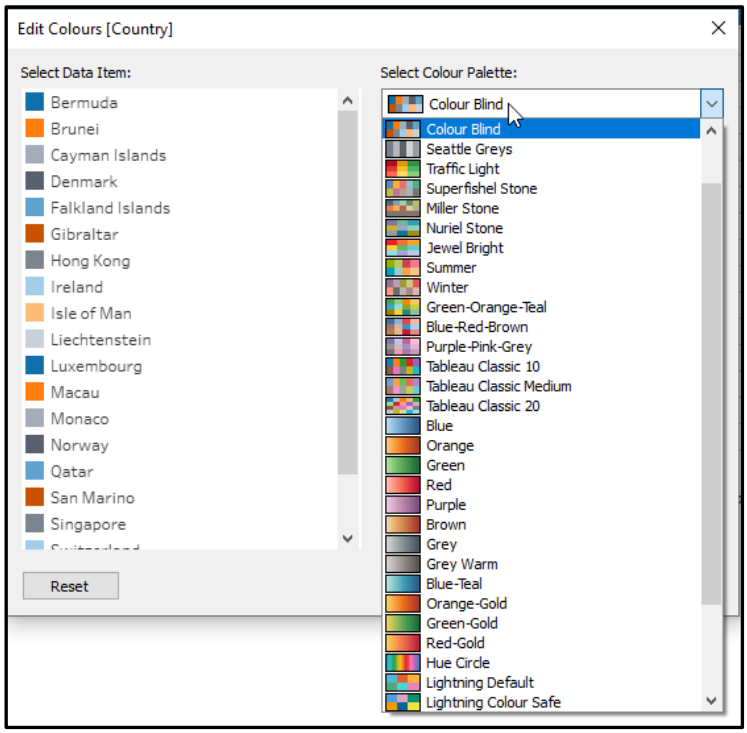


Client Requirements

- The client is colour blind and has requested us to bear this in mind when building the visualisation / dashboards. We will accommodate this requirement by using the right colour combinations and colour palettes.
- Visuals should be for the top 20 highest ranking countries

Colour Blind

- In Tableau in the select colour options, there is a pre-configured Colour-Blind option as shown in the screenshot below. In instances where this is option is available, we will use the Colour Palette.

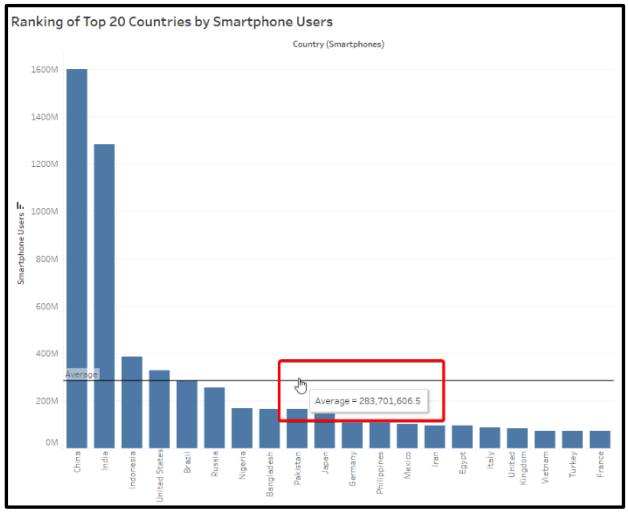


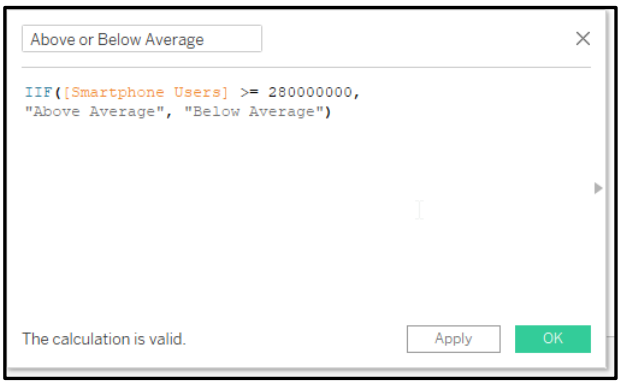
When selecting the colours in our visualisation, where the Colour-Blind palette was not available, we have selected the appropriate colours to accommodate the client's request.

Calculated Field

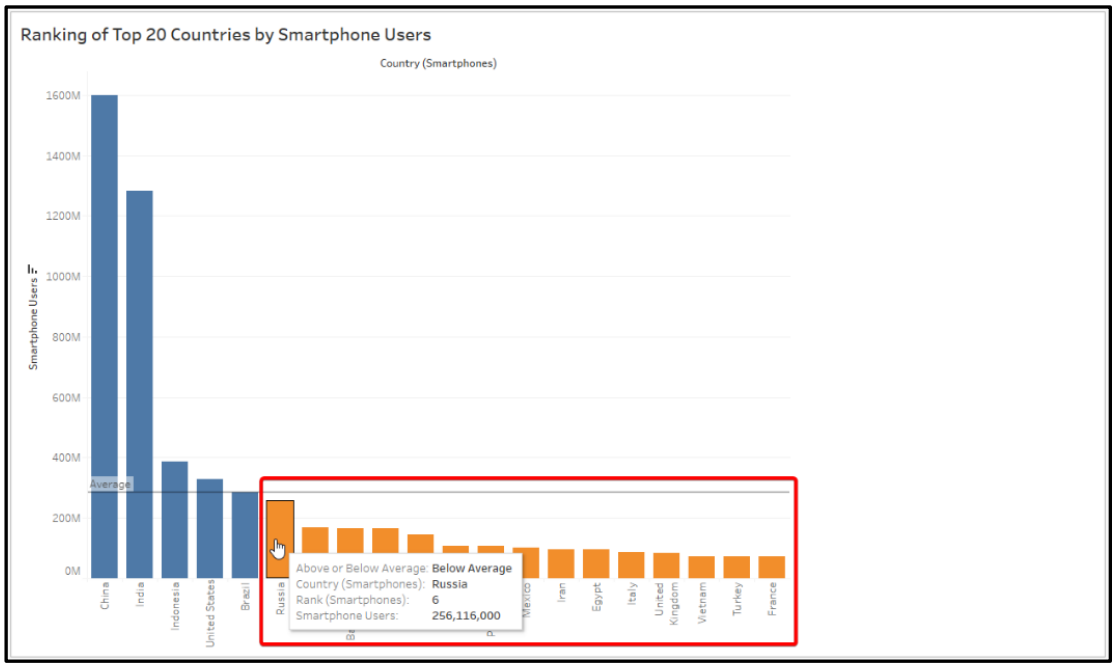
For our Smartphone Users Bar Chart, we added an Average reference line. The Average returned the value 283,701,606. We will use this average number to create a calculated field. The calculated field will return the either "Above Average" or "Below Average" based the amount of Smartphone Users.

- We have decided to use a round number for our calculated field to keep it simple.





- The new calculated field has been added to our chart and you can see that anything below average is shown in **orange** and above average is shown in **blue**.



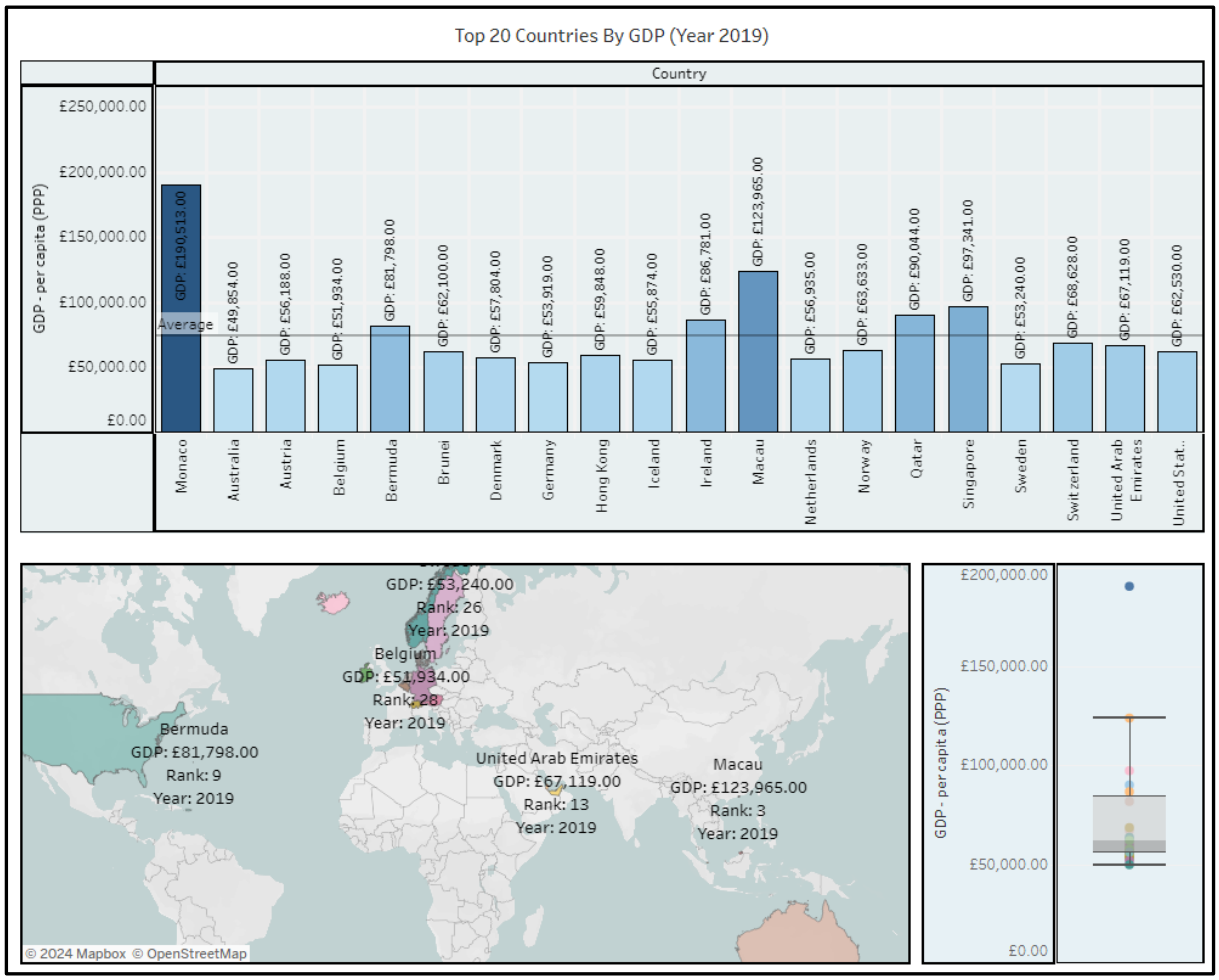
Visualisations

- The different visualisation will be shown in the following screenshots below.
- The visualisation and dashboards will also be shared on my Tableau Public Profile https://public.tableau.com/app/profile/namo.mohammed/vizzes
- Each visualisation is different and represents different viewpoints based on the data provided.

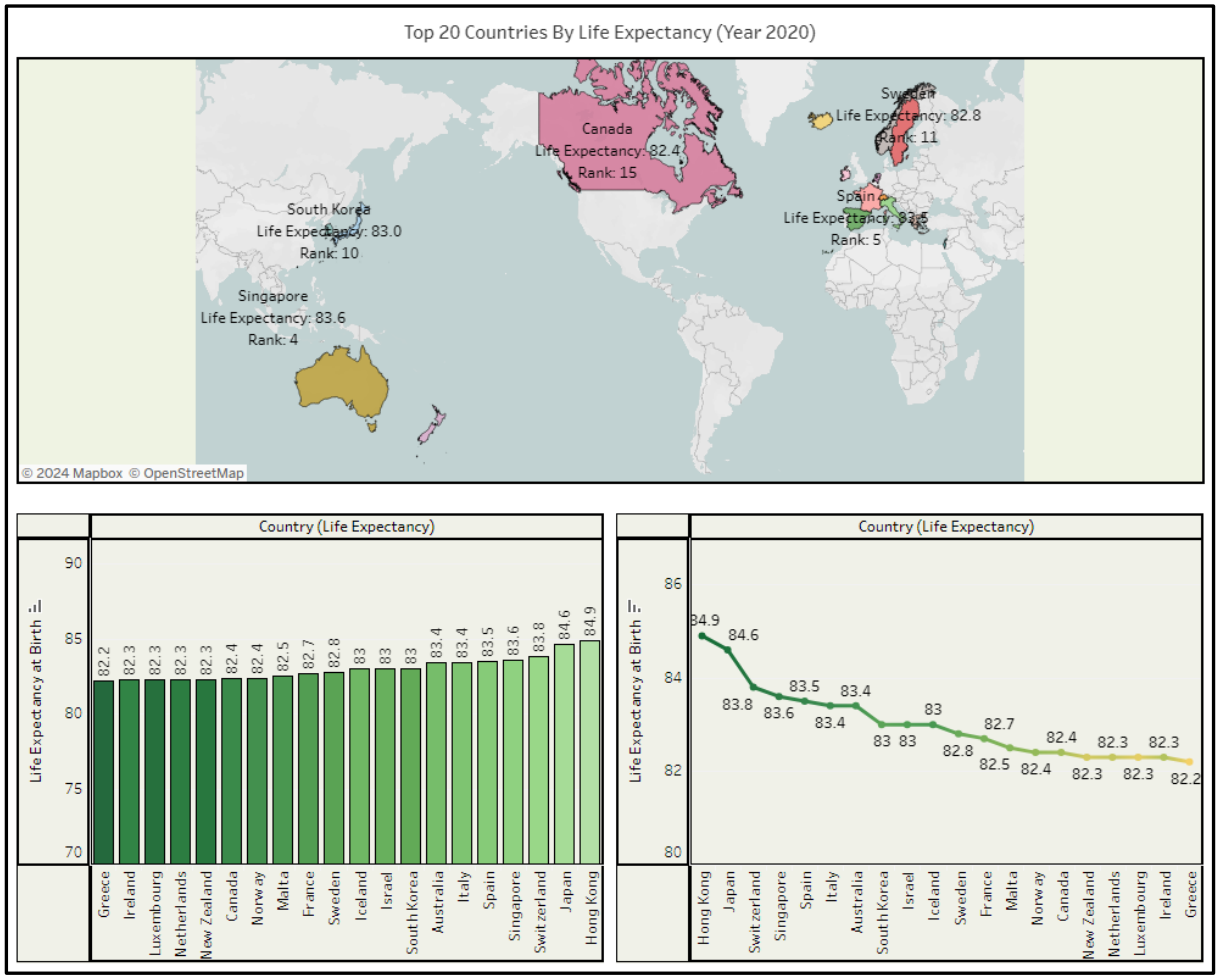
Dashboards

Three Dashboards have been put together for each of the Excel sheets. GDP, Life Expectancy and Smartphone Users.

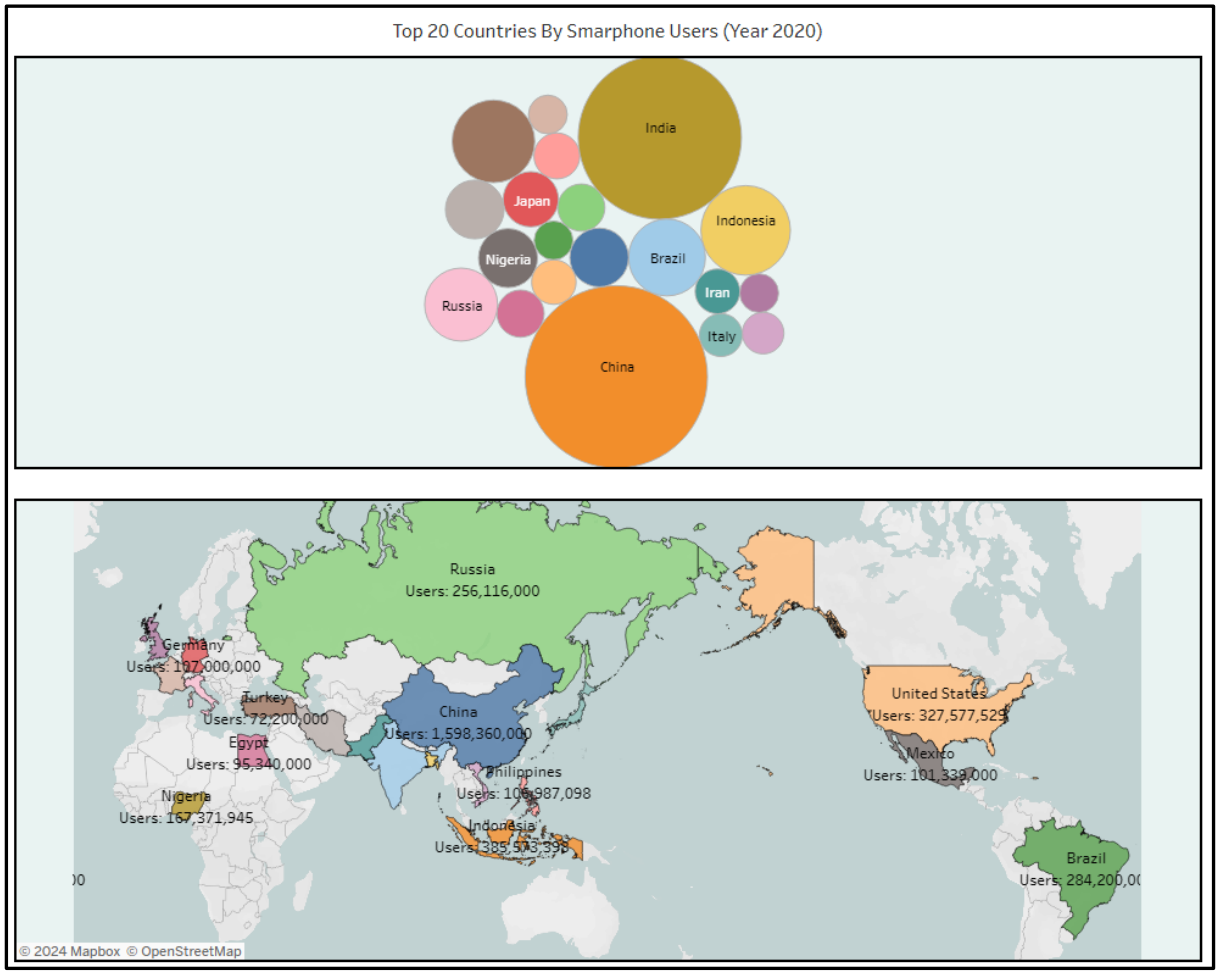
GDP – Per Capita (PPP)



Life Expectancy



Smartphone Users



Reflections

Overall, this assignment went well and according to plan. The progression at each stage of the assignment reaffirmed what was taught during the first three weeks of the bootcamp training. Using Excel and Tableau, I transformed the provided data into meaningful insights through visualizations.

While creating the visualizations in Tableau, I would have preferred to have access to more historical data for forecasting purposes. This feature would determine the direction of future trends, based on the filtered data. Additionally, historical data would be more meaning when comparing specific metrics such as GDP per capita, life expectancy and the smartphone users. The access to this data would provide the client with more insights and enable the creator of the visualisation to have the ability to create a variety of chart types and ultimately be able enhance the analysis.

References

Data Privacy Manager (2024) *What are the 7 principles of GDPR* https://dataprivacymanager.net/what-are-the-7-gdpr-principles/ (Accessed: 18 August 2024)

Gov UK (2024) *The Data Protection Act* https://www.gov.uk/data-protection (Accessed: 17 August 2024)

The Knowledge Academy (2024) *What are the Differences Between GDPR and the Data Protection Act?* https://www.theknowledgeacademy.com/blog/gdpr-and-data-protection-act/ (Accessed: 16 August 2024)