# Case Study 2

October 29, 2021

0.1 Case Study #2

[34]:
```
import pandas as pd
import numpy as np
from tqdm import tqdm
import matplotlib.pyplot as plt
import os
```

[2]:
```
# import data
data = pd.read_csv("C:/Users/pc/Desktop/casestudy.csv")
```

[3]:
```
data
```

[3]:
```
        Unnamed: 0         customer_email  net_revenue  year
0                0  nhknapwsbx@gmail.com       249.92  2015
1                1  joiuzbvcpn@gmail.com        87.61  2015
2                2   ukkjctepxt@gmail.com      168.38  2015
3                3   gykatilzrt@gmail.com       62.40  2015
4                4   mmsgsrtxah@gmail.com       43.08  2015
…              …                    …          …    …
685922      685922  qzqttwiftu@gmail.com       184.58  2017
685923      685923   pjodiifjop@gmail.com       133.03  2017
685924      685924   appaplmgko@gmail.com       200.98  2017
685925      685925   wvkpmwsgck@gmail.com       235.35  2017
685926      685926    aregboumbw@gmail.com      208.43  2017

[685927 rows x 4 columns]
```

[29]:
```
# Create a new dataframe to display required information for each year
result = pd.DataFrame(index = ['2015','2016','2017'],columns = ['Total revenue␣
 ↪for the current year','New Customer Revenue','Existing Customer␣
 ↪Growth','Revenue lost from attrition','Existing Customer Revenue Current␣
 ↪Year','Existing Customer Revenue Prior Year','Total Customers Current␣
 ↪Year','Total Customers Previous Year','New Customers','Lost Customers'])
```

[30]:
```
# Filter basic datasets
```

[35]:

```
data_2015= data[data['year'] == 2015]
data_2016= data[data['year'] == 2016]
data_2017= data[data['year'] == 2017]

revenue_2015 = data_2015.iloc[:,2].sum()
revenue_2016 = data_2016.iloc[:,2].sum()
revenue_2017 = data_2017.iloc[:,2].sum()

customers_2015 = data_2015.iloc[:,1].tolist()
customers_2016 = data_2016.iloc[:,1].tolist()
customers_2017 = data_2017.iloc[:,1].tolist()

new_customer_2016 = list(set(customers_2016) - set(customers_2015))
data_new_customers_2016 = data_2016[data_2016['customer_email'].
 ↪isin(new_customer_2016)]
lost_customer_2016 = list(set(customers_2015) - set(customers_2016))
data_lost_customers_2016 = data_2015[data_2015['customer_email'].
 ↪isin(lost_customer_2016)]

new_customer_2017 = list(set(customers_2017) - set(customers_2016))
data_new_customers_2017 = data_2017[data_2017['customer_email'].
 ↪isin(new_customer_2017)]
lost_customer_2017 = list(set(customers_2016) - set(customers_2017))
data_lost_customers_2017 = data_2016[data_2016['customer_email'].
 ↪isin(lost_customer_2017)]

existing_customer_2016 = list(set(customers_2016) & set(customers_2015))
data_existing_customers_2016 = data_2016[data_2016['customer_email'].
 ↪isin(existing_customer_2016)]

existing_customer_2017 = list(set(customers_2017) & set(customers_2016))
data_existing_customers_2017 = data_2017[data_2017['customer_email'].
 ↪isin(existing_customer_2017)]
```

[36]:

```
# Calculate / sort required information
#•         Total revenue for the current year
result.iloc[0,0] = revenue_2015
result.iloc[1,0] = revenue_2016
result.iloc[2,0] = revenue_2017

#•         New Customer Revenue e.g., new customers not present in previous year␣
 ↪only
# result.iloc[0,1] = data_new_customers_2015.iloc[:,2].sum()
result.iloc[1,1] = data_new_customers_2016.iloc[:,2].sum()
result.iloc[2,1] = data_new_customers_2017.iloc[:,2].sum()

#•         Existing Customer Revenue Current Year
```

```
result.iloc[1,4] = data_existing_customers_2016.iloc[:,2].sum()
result.iloc[2,4] = data_existing_customers_2017.iloc[:,2].sum()

#•        Existing Customer Revenue Prior Year
data_existing_customers_2016_pre = data_2015[data_2015['customer_email'].
 ↪isin(existing_customer_2016)]
data_existing_customers_2017_pre = data_2016[data_2016['customer_email'].
 ↪isin(existing_customer_2017)]
result.iloc[1,5] = data_existing_customers_2016_pre.iloc[:,2].sum()
result.iloc[2,5] = data_existing_customers_2017_pre.iloc[:,2].sum()

#•        Existing Customer Growth. To calculate this, use the Revenue of␣
 ↪existing customers for current year -(minus) Revenue of existing customers␣
 ↪from the previous year
result.iloc[1,2] = result.iloc[1,4] - result.iloc[1,5]
result.iloc[2,2] = result.iloc[2,4] - result.iloc[2,5]

#•        Revenue lost from attrition
result.iloc[1,3] = data_lost_customers_2016.iloc[:,2].sum()
result.iloc[2,3] = data_lost_customers_2017.iloc[:,2].sum()

#•        Total Customers Current Year
result.iloc[0,6] = len(data_2015)
result.iloc[1,6] = len(data_2016)
result.iloc[2,6] = len(data_2017)

#•        Total Customers Previous Year
result.iloc[1,7] = len(data_2015)
result.iloc[2,7] = len(data_2016)

#•        New Customers
result.iloc[1,8] = len(data_new_customers_2016)
result.iloc[2,8] = len(data_new_customers_2017)

#•        Lost Customers
result.iloc[1,9] = len(data_lost_customers_2016)
result.iloc[2,9] = len(data_lost_customers_2017)
```

[37]:

```
result
```

[37]:

```
     Total revenue for the current year New Customer Revenue  \
2015                           29036749.19                  NaN
2016                           25730943.59          18245491.01
2017                           31417495.03          28776235.04

     Existing Customer Growth Revenue lost from attrition  \
2015                      NaN                         NaN
```

```
2016                 20335.46                 21571632.07
2017                 20611.34                 23110294.94

     Existing Customer Revenue Current Year  \
2015                                    NaN
2016                             7485452.58
2017                             2641259.99

     Existing Customer Revenue Prior Year Total Customers Current Year  \
2015                                  NaN                       231294
2016                           7465117.12                       204646
2017                           2620648.65                       249987

     Total Customers Previous Year New Customers Lost Customers
2015                           NaN           NaN            NaN
2016                        231294        145062         171710
2017                        204646        229028         183687
```

[42]:
```
result['current average'] = result['Total revenue for the current year']/
 ↪result['Total Customers Current Year']
result['new average'] = result['New Customer Revenue']/result['New Customers']
result['lost average'] = result['Revenue lost from attrition']/result['Lost␣
 ↪Customers']
```

[43]:
```
result
```

[43]:
```
     Total revenue for the current year New Customer Revenue  \
2015                        29036749.19                  NaN
2016                        25730943.59          18245491.01
2017                        31417495.03          28776235.04

     Existing Customer Growth Revenue lost from attrition  \
2015                      NaN                         NaN
2016                 20335.46                 21571632.07
2017                 20611.34                 23110294.94

     Existing Customer Revenue Current Year  \
2015                                    NaN
2016                             7485452.58
2017                             2641259.99

     Existing Customer Revenue Prior Year Total Customers Current Year  \
2015                                  NaN                       231294
2016                           7465117.12                       204646
2017                           2620648.65                       249987

     Total Customers Previous Year New Customers Lost Customers  \
2015                                NaN          NaN             NaN
2016                             231294       145062          171710
2017                             204646       229028          183687

      current average new average lost average
2015       125.540434         NaN          NaN
2016       125.733919  125.777192   125.628281
2017       125.676515  125.645052   125.813449
```

0.2 Plot

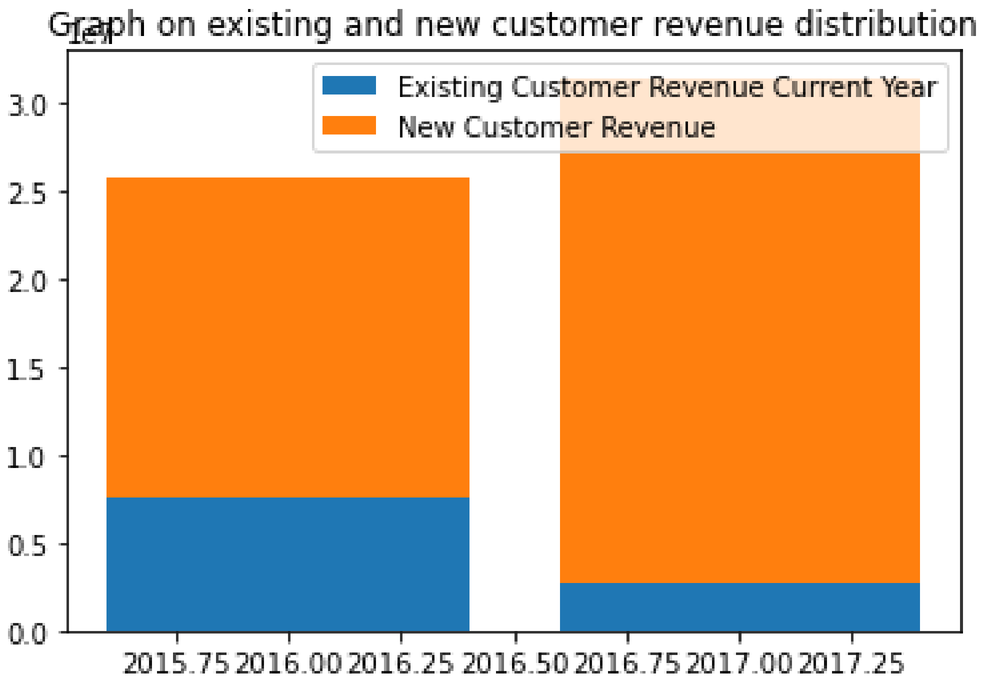
0.2.1 A few insights from the result:

1) Total revenue has been constantly increasing throughout 2015-2017 2) From the total revenue, new customer revenue accounts for a major part, and is increasingly important 3) Existing customer growing slight larger than last year 4) Revenue lost from attrition is huge compared with previous year revenue 5) As to total number of customers, it is fluctuating while we may see that it attracts growing numbers of new customers, while maintaining a stable lost customer number. 6) When calculating the spending power of each customer, we may from that average current customer expenditure is relatively constant through the three years, and so do new average and lost average.

[81]:

```
#fig, ax = plt.subplots(figsize = (6,10))
plt.bar([2016,2017],result['Existing Customer Revenue Current Year'][1:],label␣
 ↪= 'Existing Customer Revenue Current Year')
plt.bar([2016,2017],result['New Customer Revenue'][1:], bottom =␣
 ↪result['Existing Customer Revenue Current Year'][1:],label = 'New Customer␣
 ↪Revenue')

#ax.set_ylabel('number')
plt.title('Graph on existing and new customer revenue distribution')
plt.legend()
# plt.xticks(rotation = 300)
plt.show()
```



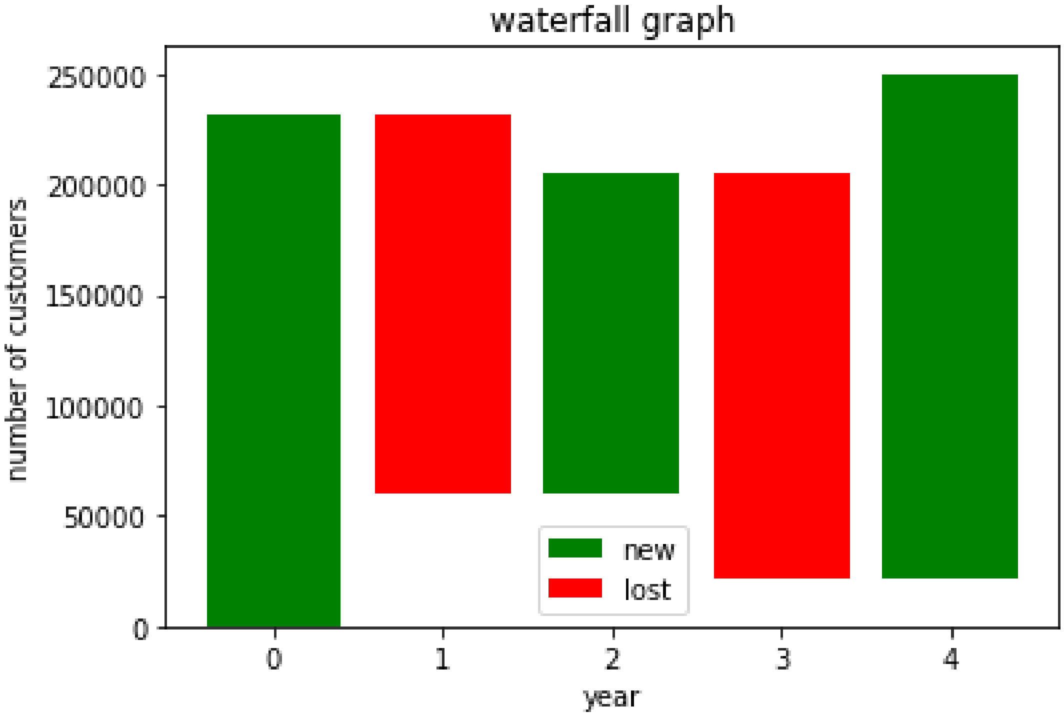
[86]:

```
# A waterfall graph denoting the change of number of consumers
data1 = pd.read_csv("C:/Users/pc/Desktop/change in customers.csv")
customer = data1['change']
bottom1 = 0
bar_width = 0.8
x_idx = np.arange(len(customer),dtype = np.float64)

for i in customer.index:
    x = x_idx[i]
    y = customer[i]
    if data1['change'][i]>0:
        label1 = "new"
        new = plt.bar(x,y,bar_width, align = "center", bottom = bottom1, label␣
 ↪= label1, color = "green")
    else:
        label1 = "lost"
        lost = plt.bar(x,y,bar_width, align = "center", bottom = bottom1, label␣
 ↪= label1, color = "red")
    bottom1 += y
    x += 0.8

plt.legend(handles = [new, lost])
plt.title("waterfall graph")
plt.xlabel("year")
plt.ylabel("number of customers")
```

```
[86]: Text(0, 0.5, 'number of customers')
```



```
[ ]:
```