In [576]:
```
# SHIZA ALI
# 30 MAY 2022
```

In [532]:
```
import pandas as pd
import seaborn as sns
import numpy as np
import plotly.express as px
import matplotlib.pyplot as plt

pd.set_option('display.max_colwidth', None)
```

In [533]:
```
funnel_data = pd.read_csv('dataset.csv')
```

In [534]:
```
funnel_data.head()
```

Out[534]:

	user_id	created_at	event
0	1	2019-11-27 11:22	category-5-registered
1	1	2019-11-27 11:24	category-5-completed-profile
2	1	2019-11-27 11:24	category-5-started-application
3	2	2019-11-27 11:27	category-5-registered
4	2	2019-11-27 11:28	category-5-completed-profile

In [535]:
```
len(funnel_data)
```

Out[535]:
```
26840
```

In [536]:
```
funnel_data.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 26840 entries, 0 to 26839
Data columns (total 3 columns):
 #   Column      Non-Null Count  Dtype 
---  ------      --------------  ----- 
 0   user_id     26840 non-null  int64 
 1   created_at  26840 non-null  object
 2   event       26840 non-null  object
dtypes: int64(1), object(2)
memory usage: 629.2+ KB
```

In [566]:
```
funnel_data['created_at'] = pd.to_datetime(funnel_data['created_at'])
```

In [538]:
```
funnel_data = funnel_data.sort_values(['user_id', 'created_at'])
```

```
In [539]: #There are 5005 unique customer_ids
          len(funnel_data['user_id'].unique())

Out[539]: 5005
```

```
In [540]: print('Minimum created datetime: ',min(funnel_data['created_at']))
          print('Maximum created datetime: ',max(funnel_data['created_at']))
          print('Difference between minumium and maximum datetimes: ',
                max(funnel_data['created_at']) - min(funnel_data['created_at']))

          Minimum created datetime:  2019-11-27 11:22:00
          Maximum created datetime:  2020-03-16 09:57:00
          Difference between minumium and maximum datetimes:  109 days 22:35:00
```

```
In [541]: funnel_data['category'] = funnel_data['event'].str.split('-',2).str[1]
          funnel_data['event'] = funnel_data['event'].str.split('-',2).str[2]
```

```
In [542]: #There are 8 key events in total
          event_order = funnel_data['event'].unique().tolist()
          event_order

Out[542]: ['registered',
           'completed-profile',
           'started-application',
           'finished-application',
           'entered-checkout',
           'shipping-info',
           'payment-info',
           'fully-complete']
```

```
In [543]: #There are seven different categories of customers
          sorted(funnel_data['category'].unique())

Out[543]: ['1', '2', '3', '4', '5', '6', '7']
```

```
In [564]: funnel_data['time_duration_in_minutes'] = funnel_data.groupby('user_id')['created_at'].diff().dt.total_se
```

```
In [565]: funnel_data.head()

Out[565]:
```

	user_id	created_at	event	category	time_duration_in_minutes
0	1	2019-11-27 11:22:00	registered	5	NaN
1	1	2019-11-27 11:24:00	completed-profile	5	2.0
2	1	2019-11-27 11:24:00	started-application	5	0.0
7	1	2019-11-27 11:32:00	finished-application	5	8.0
12	1	2019-11-27 11:35:00	entered-checkout	5	3.0

In [575]:
```
funnel_data[funnel_data.user_id == 4957]
```

Out[575]:

	user_id	created_at	event	category	time_duration_in_minutes
23620	4957	2019-12-15 10:15:00	registered	3	NaN
23621	4957	2019-12-15 10:15:00	completed-profile	3	0.0
23624	4957	2019-12-15 10:17:00	payment-info	3	2.0
23632	4957	2019-12-15 10:28:00	shipping-info	3	11.0
23669	4957	2019-12-15 10:55:00	started-application	3	27.0
23675	4957	2019-12-15 11:00:00	finished-application	3	5.0
23677	4957	2019-12-15 11:01:00	entered-checkout	3	1.0
23678	4957	2019-12-15 11:01:00	shipping-info	3	0.0
23683	4957	2019-12-15 11:03:00	payment-info	3	2.0

Acquistion_funnel Analysis

```
In [366]: acquisition_funnel_df = funnel_data[['user_id', 'event']]
```

```
In [367]: acquisition_funnel_df
```

Out[367]:

	user_id	event
0	1	registered
1	1	completed-profile
2	1	started-application
7	1	finished-application
12	1	entered-checkout
...	...	...
26012	5013	completed-profile
26013	5013	started-application
26014	5013	finished-application
26015	5013	entered-checkout
26016	5013	shipping-info

26840 rows × 2 columns

```
In [25]: acquisition_funnel_df = acquisition_funnel_df[~acquisition_funnel_df.duplicated(keep='last')]
```

```
In [26]: acquisition_funnel_users_data = acquisition_funnel_df.groupby('user_id')['event'].apply(lambda x: x.tolis
```

```
In [568]: acquisition_funnel_users_data.head()
```

Out[568]:

	user_id	category	events_list
0	1	5	[registered, completed-profile, started-application, finished-application, entered-checkout, shipping-info, payment-info, fully-complete]
1	2	5	[registered, completed-profile, started-application, finished-application, entered-checkout, shipping-info]
2	3	5	[registered, completed-profile, started-application, finished-application, entered-checkout, shipping-info]
3	4	5	[registered, completed-profile, started-application, finished-application]
4	5	3	[registered, completed-profile, started-application, finished-application, entered-checkout, shipping-info, payment-info, fully-complete]

```
In [28]: acquisition_funnel_dummies = acquisition_funnel_users_data.events_list.apply(pd.Series).stack().str.get_d
         acquisition_funnel_dummies = pd.concat([acquisition_funnel_users_data.drop('events_list', axis=1), acquis
```

In [29]:
```
acquisition_funnel_dummies.head()
```

Out[29]:

	user_id	completed-profile	entered-checkout	finished-application	fully-complete	payment-info	registered	shipping-info	started-application
0	1	1	1	1	1	1	1	1	1
1	2	1	1	1	0	0	1	1	1
2	3	1	1	1	0	0	1	1	1
3	4	1	0	1	0	0	1	0	1
4	5	1	1	1	1	1	1	1	1

In [502]:
```
filtered_acquisition_funnel_dummies = acquisition_funnel_dummies[acquisition_funnel_dummies['registered']
```

In [515]:
```
filtered_acquisition_funnel_counts = filtered_acquisition_funnel_dummies.loc[:,event_order].sum().to_fram
filtered_acquisition_funnel_counts
```

Out[515]:

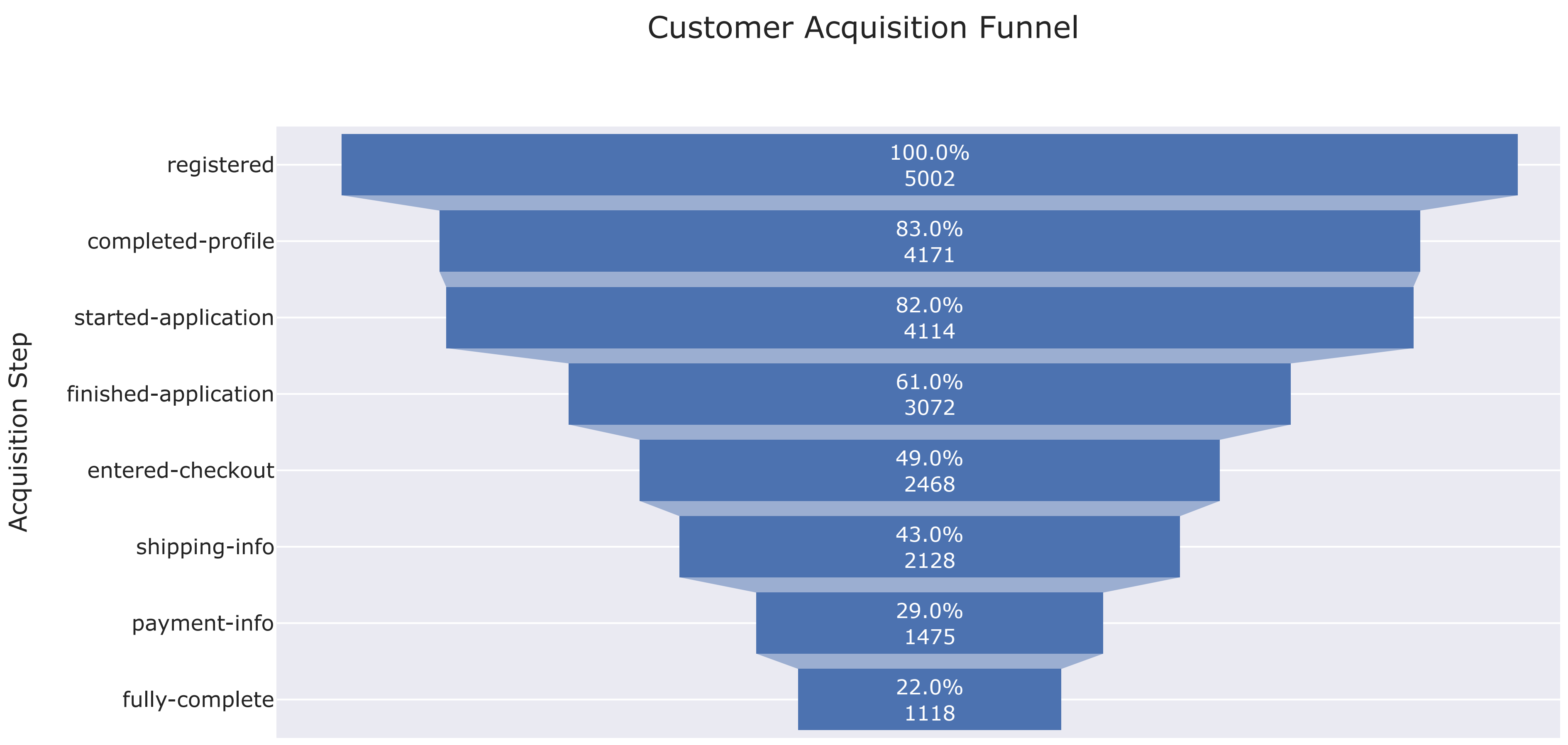
	Acquisition Step	User Count
0	registered	5002
1	completed-profile	4171
2	started-application	4114
3	finished-application	3072
4	entered-checkout	2468
5	shipping-info	2128
6	payment-info	1475
7	fully-complete	1118

In [522]:
```
filtered_acquisition_funnel_counts['Percentage Drop'] = (5002-filtered_acquisition_funnel_counts['User Co
```

In [523]:
```
filtered_acquisition_funnel_counts['Percentage Drop Difference']= filtered_acquisition_funnel_counts['Per
filtered_acquisition_funnel_counts['Percentage Drop Difference']= round(filtered_acquisition_funnel_count
filtered_acquisition_funnel_counts['Percentage Drop'] = round(100-filtered_acquisition_funnel_counts['Per
In [524]: filtered_acquisition_funnel_counts
Out[524]:
```

	Acquisition Step	User Count	Percentage Drop	Percentage Drop Difference
0	registered	5002	100.0%	0.0%
1	completed-profile	4171	83.0%	17.0%
2	started-application	4114	82.0%	1.0%
3	finished-application	3072	61.0%	21.0%
4	entered-checkout	2468	49.0%	12.0%
5	shipping-info	2128	43.0%	7.0%
6	payment-info	1475	29.0%	13.0%
7	fully-complete	1118	22.0%	7.0%

```
In [48]: fig = px.funnel(filtered_acquisition_funnel_counts, x='User Count', y='Acquisition Step', text='Percentag
         fig.show()
```



Major Dropoff points in the acquisition funnel:

-> finished application

-> completed profile

-> payment info

-> entered checkout

Category wise Analysis

In [569]:
```
acquisition_funnel_df_category = funnel_data[['user_id','event']]
acquisition_funnel_df_category = acquisition_funnel_df_category[~acquisition_funnel_df_category.duplicate
acquisition_funnel_df_category.head()
```

Out[569]:

	user_id	event
0	1	registered
1	1	completed-profile
2	1	started-application
7	1	finished-application
12	1	entered-checkout

In [328]:
```
acquisition_funnel_users_data_category = acquisition_funnel_df_category.groupby('user_id')['event'].apply
```

In [330]:
```
acquisition_funnel_df_category
```

Out[330]:

	user_id	event
0	1	registered
1	1	completed-profile
2	1	started-application
7	1	finished-application
12	1	entered-checkout
...	...	...
26012	5013	completed-profile
26013	5013	started-application
26014	5013	finished-application
26015	5013	entered-checkout
26016	5013	shipping-info

23558 rows × 2 columns

```
In [331]: users_category = funnel_data.groupby('user_id')['category'].min().reset_index()
          acquisition_funnel_users_data_category = users_category.merge(acquisition_funnel_users_data_category, on=
          acquisition_funnel_users_data_category.head()
```

Out[331]:

	user_id	category	events_list
0	1	5	[registered, completed-profile, started-application, finished-application, entered-checkout, shipping-info, payment-info, fully-complete]
1	2	5	[registered, completed-profile, started-application, finished-application, entered-checkout, shipping-info]
2	3	5	[registered, completed-profile, started-application, finished-application, entered-checkout, shipping-info]
3	4	5	[registered, completed-profile, started-application, finished-application]
4	5	3	[registered, completed-profile, started-application, finished-application, entered-checkout, shipping-info, payment-info, fully-complete]

```
In [332]: acquisition_funnel_category_dummies = acquisition_funnel_users_data_category.events_list.apply(pd.Series)
          acquisition_funnel_category_dummies = pd.concat([acquisition_funnel_users_data_category.drop('events_list
```

```
In [333]: filtered_category_dummies = acquisition_funnel_category_dummies[acquisition_funnel_category_dummies['regi
```

```
In [570]: filtered_category_dummies.head()
```

Out[570]:

	user_id	category	completed-profile	entered-checkout	finished-application	fully-complete	payment-info	registered	shipping-info	started-application
0	1	5	1	1	1	1	1	1	1	1
1	2	5	1	1	1	0	0	1	1	1
2	3	5	1	1	1	0	0	1	1	1
3	4	5	1	0	1	0	0	1	0	1
4	5	3	1	1	1	1	1	1	1	1

```
In [335]: :egory_acquisition_funnel_dummies = filtered_category_dummies.groupby('category')[event_order].apply(lambd
          :egory_acquisition_funnel_dummies
```

Out[335]:

category	registered	completed-profile	started-application	finished-application	entered-checkout	shipping-info	payment-info	fully-complete
1	100.0	95.0	94.0	72.0	65.0	60.0	48.0	44.0
2	100.0	83.0	83.0	78.0	72.0	67.0	50.0	56.0
3	100.0	87.0	86.0	59.0	52.0	45.0	27.0	20.0
4	100.0	83.0	75.0	75.0	67.0	67.0	58.0	58.0
5	100.0	78.0	77.0	61.0	44.0	37.0	28.0	20.0
6	100.0	60.0	40.0	20.0	20.0	10.0	10.0	10.0
7	100.0	79.0	79.0	72.0	58.0	55.0	45.0	33.0

```
In [572]: category_acquisition_funnel_dummies_transposed = category_acquisition_funnel_dummies.T
          category_acquisition_funnel_dummies_transposed = category_acquisition_funnel_dummies_transposed.reset_ind
          category_acquisition_funnel_dummies_transposed
```

Out[572]:

category	Acquisition Step	1	2	3	4	5	6	7
0	registered	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1	completed-profile	95.0	83.0	87.0	83.0	78.0	60.0	79.0
2	started-application	94.0	83.0	86.0	75.0	77.0	40.0	79.0
3	finished-application	72.0	78.0	59.0	75.0	61.0	20.0	72.0
4	entered-checkout	65.0	72.0	52.0	67.0	44.0	20.0	58.0
5	shipping-info	60.0	67.0	45.0	67.0	37.0	10.0	55.0
6	payment-info	48.0	50.0	27.0	58.0	28.0	10.0	45.0
7	fully-complete	44.0	56.0	20.0	58.0	20.0	10.0	33.0

```
In [530]: filtered_category_dummies.groupby('category')[event_order].apply(lambda x : x.astype(int).sum()).sort_val
```

Out[530]:

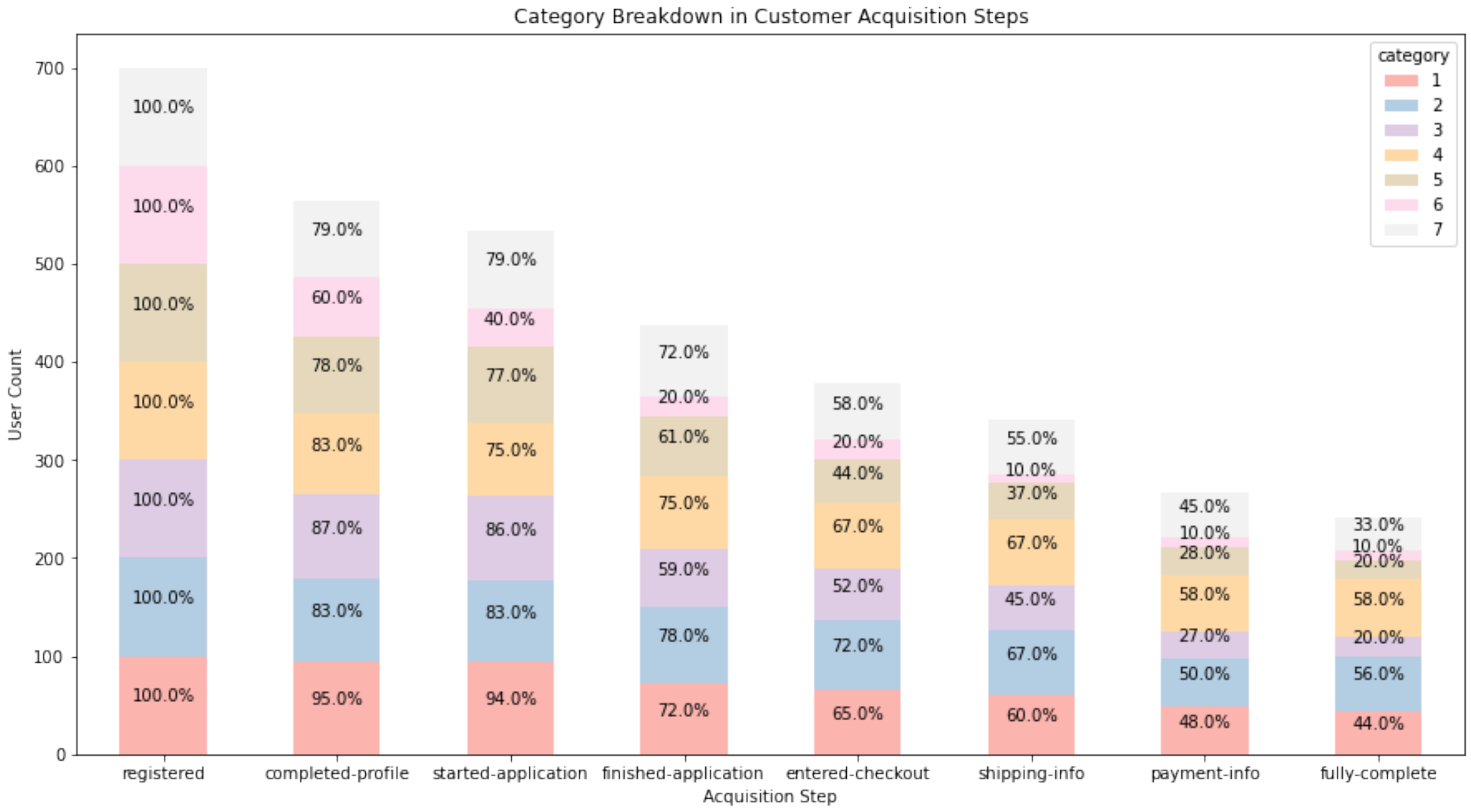
category	registered	completed-profile	started-application	finished-application	entered-checkout	shipping-info	payment-info	fully-complete
5	2324	1824	1799	1423	1016	853	649	466
3	2187	1906	1882	1297	1141	986	595	445
1	326	310	306	236	213	197	157	144
7	107	85	84	77	62	59	48	35
2	36	30	30	28	26	24	18	20
4	12	10	9	9	8	8	7	7
6	10	6	4	2	2	1	1	1

```
In [337]: ax = category_acquisition_funnel_dummies_transposed.plot(x='Acquisition Step', kind='bar', stacked=True,
                  title='Category Breakdown in Customer Acquisition Steps', colormap='Pastel1', figsize=(15, 8))

          plt.ylabel('User Count')
          ax.set_xticklabels(event_order,fontsize = 10, rotation=0)

          for x in range(0,len(ax.containers)):
              ax.bar_label(ax.containers[x], labels=(category_acquisition_funnel_dummies_transposed.iloc[0:,1+x]).a

          plt.show()
```


Category Breakdown in Customer Acquisition Steps
User Count
Acquisition Step
registered
completed-profile
started-application
finished-application
entered-checkout
shipping-info
payment-info
fully-complete
category