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## GROUP ELEVEN

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# PopCrt Digital Marketing

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## PROBLEM

The purpose of this study is to determine the effectiveness of PopCrt Digital Marketing campaigns based on 1) Product popularity, 2) Campaign performance and 3) Location-based engagement through data analysis in Microsoft Excel and Structured Query Language (SQL).

## METHODOLOGY

Analyze marketing impressions and sales data in SQL and convert to Excel tables for visualization. The following are the SQL syntaxes used:

Import .csv data to PostgreSQL

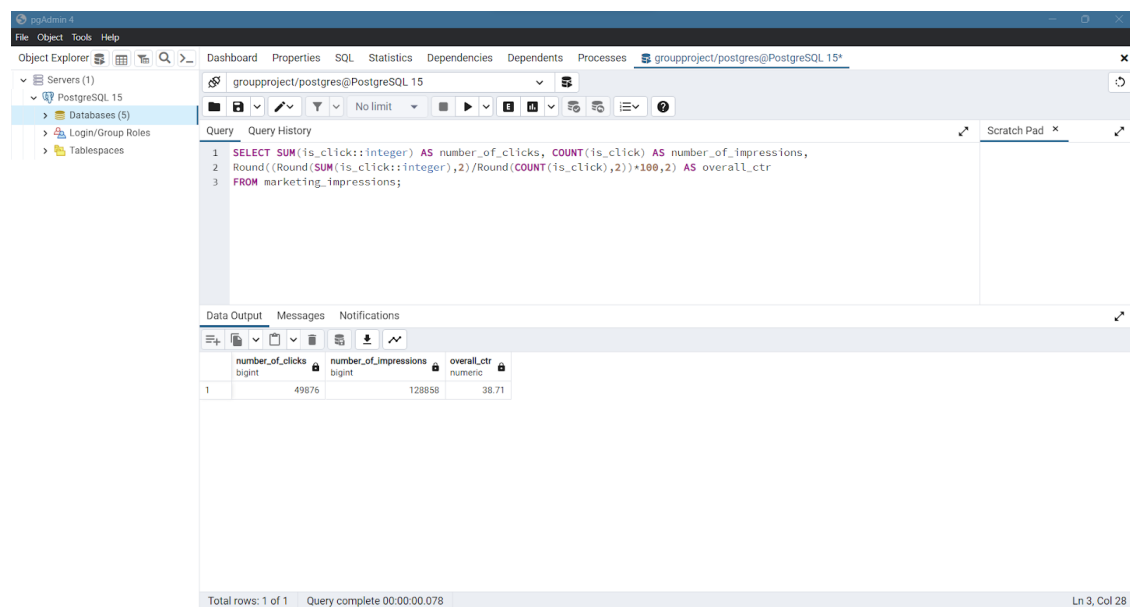
```
CREATE TABLE IF NOT EXISTS marketing_impressions(  
    session id integer,  
    user_id integer,  
    campaign_id integer,  
    campaign name character varying,  
    webpage id integer,  
    product category character varying,  
    gender text,  
    age level character varying,  
    region text,  
    is_click boolean  
);  
  
CREATE TABLE IF NOT EXISTS sales_data(  
    session id integer,  
    user id integer,  
    product category character varying,  
    region text,  
    is_campaign boolean,  
    total_php numeric  
);  
  
SELECT * FROM marketing_impressions;  
SELECT * FROM sales_data;
```

1. Calculate for overall click-through-rate (CTR) given the formula:  
(Number of clicks / Number of impressions) x 100

#### SQL syntax

```
SELECT SUM(is_click::integer) AS number_of_clicks,  
COUNT(is_click) AS number_of_impressions,  
  
Round((Round(SUM(is_click::integer),2)/Round(COUNT(is_click),2)  
)*100,2) AS overall_ctr  
FROM marketing_impressions;
```

#### PostgreSQL output



The screenshot shows the pgAdmin 4 interface. The 'Query' tab is active, displaying the following SQL query:

```
1 SELECT SUM(is_click::integer) AS number_of_clicks, COUNT(is_click) AS number_of_impressions,  
2 Round((Round(SUM(is_click::integer),2)/Round(COUNT(is_click),2))*100,2) AS overall_ctr  
3 FROM marketing_impressions;
```

The 'Data Output' tab shows the results of the query in a table with 3 columns: `number_of_clicks` (bigint), `number_of_impressions` (bigint), and `overallCtr` (numeric). The table contains one row of data:

	number_of_clicks	number_of_impressions	overallCtr
1	49876	128858	38.71

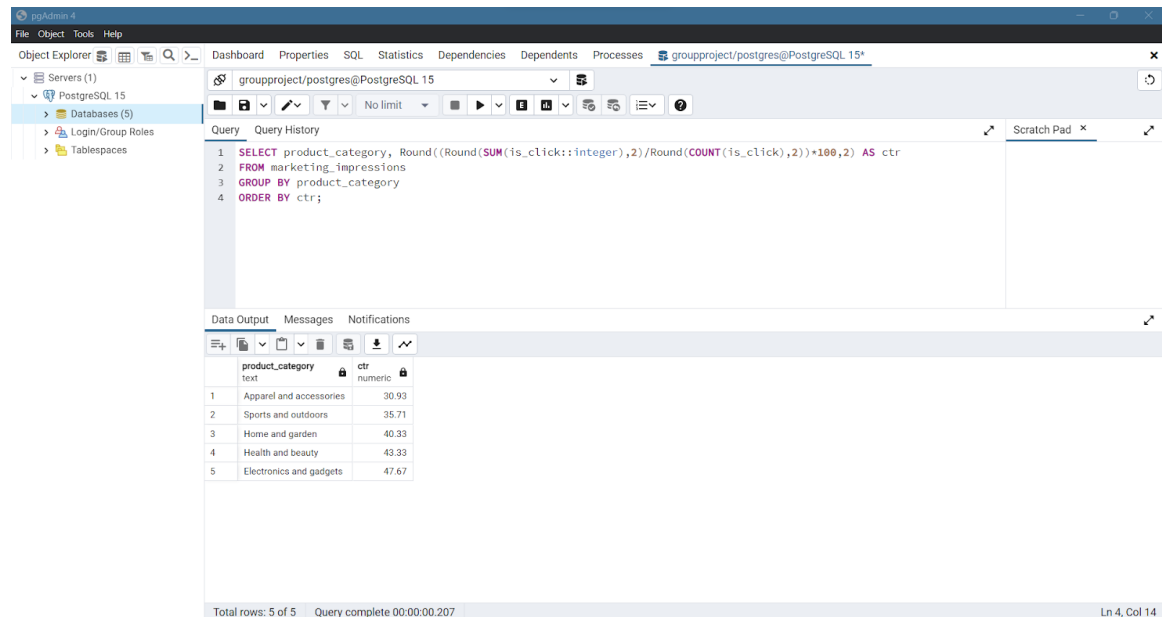
The status bar at the bottom indicates 'Total rows: 1 of 1' and 'Query complete 00:00:00.078'.

2. Calculate CTR for each product category:

#### SQL syntax

```
SELECT product_category,  
Round((Round(SUM(is_click::integer),2)/Round(COUNT(is_click),2))  
*100,2) AS ctr  
FROM marketing_impressions  
GROUP BY product_category  
ORDER BY ctr;
```

## PostgreSQL output



The screenshot shows the pgAdmin 4 interface. The left sidebar displays the 'Object Explorer' with a tree view containing 'Servers (1)', 'PostgreSQL 15', 'Databases (5)', 'Login/Group Roles', and 'Tablespaces'. The main pane is titled 'groupproject/postgres@PostgreSQL 15'. It contains a 'Query' editor with the following SQL code:

```
1 SELECT product_category, Round((Round(SUM(is_click::integer),2)/Round(COUNT(is_click),2))*100,2) AS ctr
2 FROM marketing_impressions
3 GROUP BY product_category
4 ORDER BY ctr;
```

Below the query editor is the 'Data Output' tab, which displays the results of the query in a table format. The table has two columns: 'product\_category' (text) and 'ctr' (numeric). The results are as follows:

product_category	ctr
Apparel and accessories	30.93
Sports and outdoors	35.71
Home and garden	40.33
Health and beauty	43.33
Electronics and gadgets	47.67

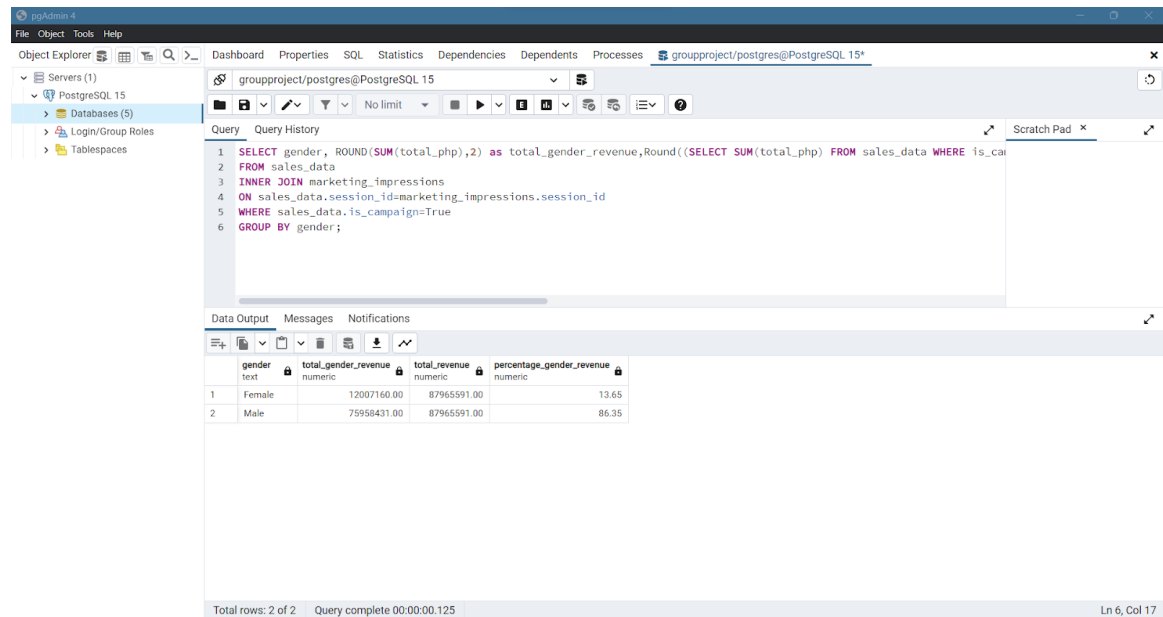
The status bar at the bottom indicates 'Total rows: 5 of 5' and 'Query complete 00:00:00.207'.

3. Calculate what percentage of the total revenue is contributed by female users during campaign periods.

## SQL syntax

```
SELECT gender, ROUND(SUM(total_php),2) as
total_gender_revenue, Round((SELECT SUM(total_php) FROM sales_data WHERE
is_campaign=TRUE),2) AS
total_revenue, Round((Round(SUM(total_php),2)/Round((SELECT
SUM(total_php) FROM sales_data WHERE is_campaign=TRUE),2))*100,2) AS
percentage_gender_revenue
FROM sales_data
INNER JOIN marketing_impressions
ON sales_data.session_id=marketing_impressions.session_id
WHERE sales_data.is_campaign=True
GROUP BY gender;
```

## PostgreSQL output



The screenshot shows the pgAdmin 4 interface. The left sidebar displays the 'Servers' tree with 'PostgreSQL 15' selected. The main pane shows a query window with the following SQL:

```
1 SELECT gender, ROUND(SUM(total_php),2) as total_gender_revenue, Round((SELECT SUM(total_php) FROM sales_data WHERE is_ca
2 FROM sales_data
3 INNER JOIN marketing_impressions
4 ON sales_data.session_id=marketing_impressions.session_id
5 WHERE sales_data.is_campaign=True
6 GROUP BY gender;
```

The 'Data Output' tab shows the results of the query:

	gender	total_gender_revenue	total_revenue	percentage_gender_revenue
	text	numeric	numeric	numeric
1	Female	12007160.00	87965591.00	13.65
2	Male	75958431.00	87965591.00	86.35

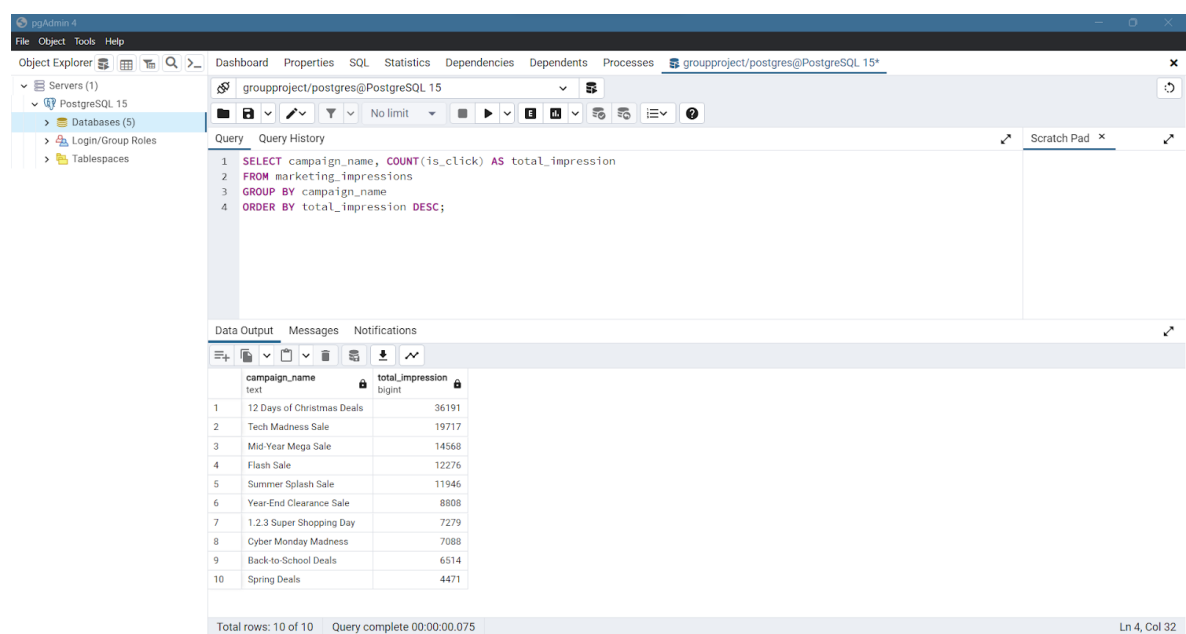
Total rows: 2 of 2 Query complete 00:00:00.125 Ln 6, Col 17

4. Calculate which campaign has generated the most impressions.

## SQL syntax

```
SELECT campaign_name, COUNT(is_click) AS total_impression
FROM marketing_impressions
GROUP BY campaign_name
ORDER BY total_impression DESC;
```

## PostgreSQL output



The screenshot shows the pgAdmin 4 interface. The left sidebar displays the 'Servers' tree with 'PostgreSQL 15' selected. The main pane shows a query window with the following SQL:

```
1 SELECT campaign_name, COUNT(is_click) AS total_impression
2 FROM marketing_impressions
3 GROUP BY campaign_name
4 ORDER BY total_impression DESC;
```

The 'Data Output' tab shows the results of the query:

	campaign_name	total_impression
	text	bigint
1	12 Days of Christmas Deals	36191
2	Tech Madness Sale	19717
3	Mid-Year Mega Sale	14568
4	Flash Sale	12276
5	Summer Splash Sale	11946
6	Year-End Clearance Sale	8808
7	1.2.3 Super Shopping Day	7279
8	Cyber Monday Madness	7088
9	Back-to-School Deals	6514
10	Spring Deals	4471

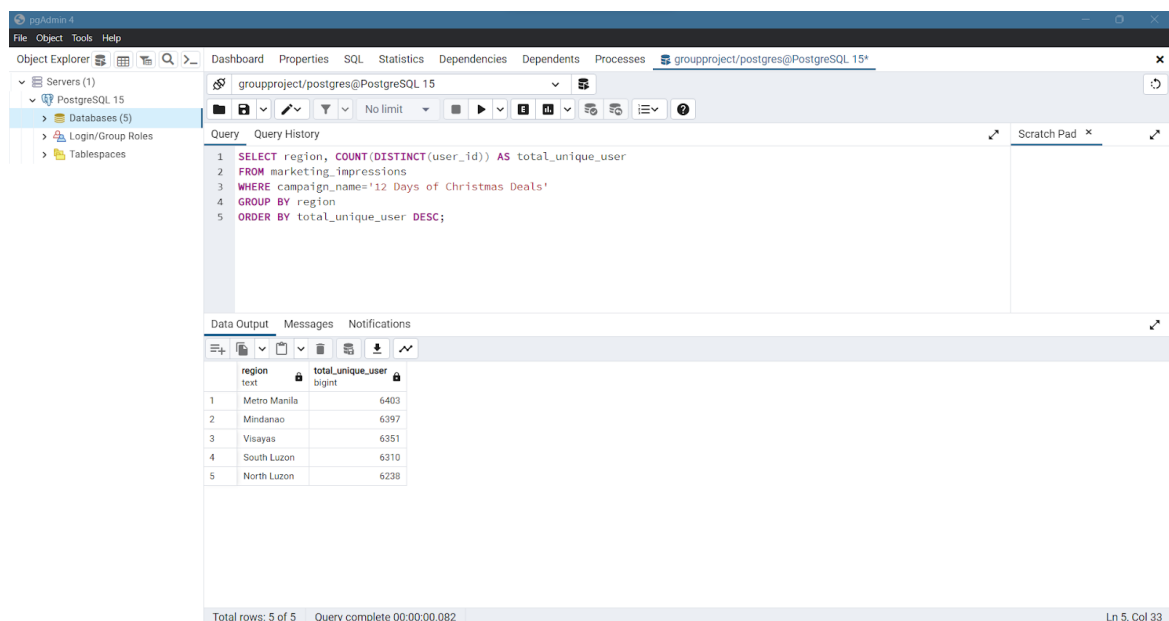
Total rows: 10 of 10 Query complete 00:00:00.075 Ln 4, Col 32

5. Calculate how many unique users per location viewed the campaign with the most impressions.

#### SQL syntax

```
SELECT region, COUNT(DISTINCT(user_id)) AS total_unique_user
FROM marketing_impressions
WHERE campaign_name='12 Days of Christmas Deals'
GROUP BY region
ORDER BY total_unique_user DESC;
```

#### PostgreSQL output



The screenshot shows the pgAdmin 4 interface. The 'Query' tab is active, displaying the following SQL query:

```
1 SELECT region, COUNT(DISTINCT(user_id)) AS total_unique_user
2 FROM marketing_impressions
3 WHERE campaign_name='12 Days of Christmas Deals'
4 GROUP BY region
5 ORDER BY total_unique_user DESC;
```

The 'Data Output' tab shows the results of the query in a table with 5 rows and 2 columns: 'region' (text) and 'total\_unique\_user' (bigint).

	region	total_unique_user
1	Metro Manila	6403
2	Mindanao	6397
3	Visayas	6351
4	South Luzon	6310
5	North Luzon	6238

The status bar at the bottom indicates 'Total rows: 5 of 5' and 'Query complete 00:00:00.082'.

#### Additional calculations:

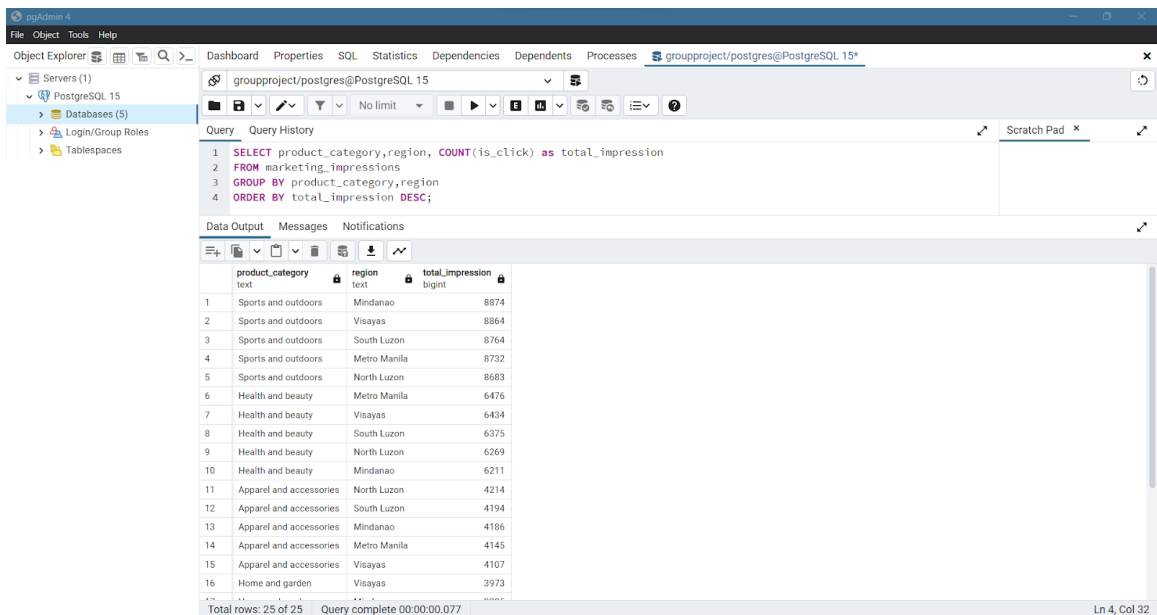
- 1.) Calculate the popularity of products based on:

- a. Location

#### SQL syntax

```
SELECT product_category, region, COUNT(is_click) as total_impression
FROM marketing_impressions
GROUP BY product_category, region
ORDER BY total_impression DESC;
```

## PostgreSQL output



The screenshot shows the pgAdmin 4 interface. The left sidebar displays the 'Object Explorer' with 'Servers (1)' expanded, showing 'PostgreSQL 15'. The main pane shows a query window for 'groupproject/postgres@PostgreSQL 15'. The query is:

```
1 SELECT product_category,region, COUNT(is_click) as total_impression
2 FROM marketing_impressions
3 GROUP BY product_category,region
4 ORDER BY total_impression DESC;
```

The 'Data Output' tab shows the results of the query. The table has 4 columns: 'product\_category' (text), 'region' (text), and 'total\_impression' (bigint). The results are sorted by 'total\_impression' in descending order.

	product_category	region	total_impression
1	Sports and outdoors	Mindanao	8874
2	Sports and outdoors	Visayas	8864
3	Sports and outdoors	South Luzon	8764
4	Sports and outdoors	Metro Manila	8722
5	Sports and outdoors	North Luzon	8683
6	Health and beauty	Metro Manila	6476
7	Health and beauty	Visayas	6434
8	Health and beauty	South Luzon	6375
9	Health and beauty	North Luzon	6269
10	Health and beauty	Mindanao	6211
11	Apparel and accessories	North Luzon	4214
12	Apparel and accessories	South Luzon	4194
13	Apparel and accessories	Mindanao	4186
14	Apparel and accessories	Metro Manila	4145
15	Apparel and accessories	Visayas	4107
16	Home and garden	Visayas	3973

Total rows: 25 of 25 Query complete 00:00:00.077 Ln 4, Col 32

### b. Age level

## SQL syntax

```
SELECT product_category, age_level, COUNT(is_click) as
total_impression
FROM marketing_impressions
GROUP BY product_category, age_level
ORDER BY total_impression DESC;
```

## PostgreSQL output

pgAdmin 4

Object Explorer: Servers (1) > PostgreSQL 15 > Databases (5) > Login/Group Roles > Tablespaces

Query: groupproject/postgres@PostgreSQL 15

```

1 SELECT product_category, age_level, COUNT(is_click) as total_impression
2 FROM marketing_impressions
3 GROUP BY product_category, age_level
4 ORDER BY total_impression DESC;

```

Data Output

	product_category	age_level	total_impression
1	Sports and outdoors	35-44 years	16868
2	Sports and outdoors	25-34 years	12880
3	Health and beauty	35-44 years	12291
4	Health and beauty	25-34 years	10156
5	Apparel and accessories	25-34 years	9687
6	Sports and outdoors	45-54 years	8518
7	Home and garden	25-34 years	7836
8	Home and garden	35-44 years	5821
9	Health and beauty	45-54 years	5365
10	Electronics and gadgets	35-44 years	4925
11	Apparel and accessories	18-24 years	4470
12	Electronics and gadgets	25-34 years	3836
13	Apparel and accessories	35-44 years	3329
14	Sports and outdoors	55-64 years	2906
15	Sports and outdoors	18-24 years	2541
16	Electronics and gadgets	45-54 years	2315

Total rows: 35 of 35 Query complete 00:00:00.083

## c. Gender

### SQL syntax

```

SELECT product_category, gender, COUNT(is_click) as total_impression
FROM marketing_impressions
GROUP BY product_category, gender
ORDER BY total_impression DESC;

```

### PostgreSQL output

pgAdmin 4

Object Explorer: Servers (1) > PostgreSQL 15 > Databases (5) > Login/Group Roles > Tablespaces

Query: groupproject/postgres@PostgreSQL 15

```

1 SELECT product_category, gender, COUNT(is_click) as total_impression
2 FROM marketing_impressions
3 GROUP BY product_category, gender
4 ORDER BY total_impression DESC;

```

Data Output

	product_category	gender	total_impression
1	Sports and outdoors	Male	36279
2	Health and beauty	Male	27148
3	Apparel and accessories	Male	17416
4	Home and garden	Male	16983
5	Electronics and gadgets	Male	10703
6	Sports and outdoors	Female	7638
7	Health and beauty	Female	4617
8	Apparel and accessories	Female	3430
9	Home and garden	Female	2520
10	Electronics and gadgets	Female	2124

Total rows: 10 of 10 Query complete 00:00:00.088

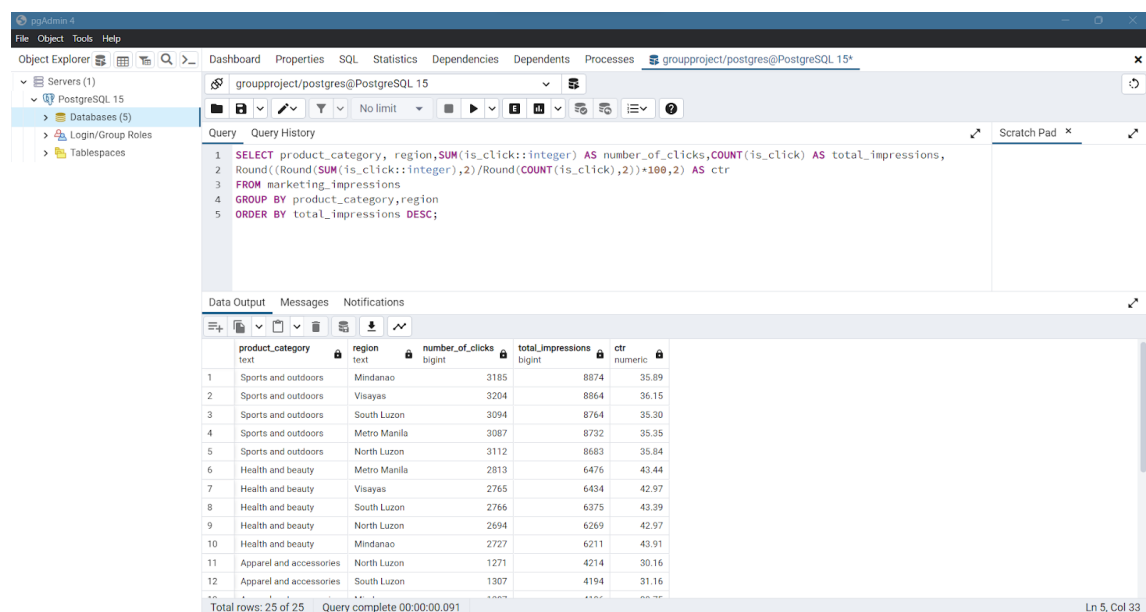
## 2.) Calculate total impression and CTR of product category by:

### a. Location

## SQL syntax

```
SELECT product_category, region,SUM(is_click::integer) AS
number_of_clicks,COUNT(is_click) AS total_impressions,
Round((Round(SUM(is_click::integer),2)/Round(COUNT(is_click),2))*100,2) AS ctr
FROM marketing_impressions
GROUP BY product_category,region
ORDER BY total_impressions DESC;
```

## PostgreSQL output



The screenshot shows the pgAdmin 4 interface. The 'Query' tab is active, displaying the following SQL query:

```
1 SELECT product_category, region,SUM(is_click::integer) AS number_of_clicks,COUNT(is_click) AS total_impressions,
2 Round((Round(SUM(is_click::integer),2)/Round(COUNT(is_click),2))*100,2) AS ctr
3 FROM marketing_impressions
4 GROUP BY product_category,region
5 ORDER BY total_impressions DESC;
```

The 'Data Output' tab shows the results of the query in a table with 5 columns: product\_category, region, number\_of\_clicks, total\_impressions, and ctr. The table contains 12 rows of data, sorted by total\_impressions in descending order.

	product_category	region	number_of_clicks	total_impressions	ctr
1	Sports and outdoors	Mindanao	3185	8874	35.89
2	Sports and outdoors	Visayas	3204	8864	36.15
3	Sports and outdoors	South Luzon	3094	8764	35.30
4	Sports and outdoors	Metro Manila	3067	8732	35.35
5	Sports and outdoors	North Luzon	3112	8683	35.84
6	Health and beauty	Metro Manila	2813	6476	43.44
7	Health and beauty	Visayas	2765	6434	42.97
8	Health and beauty	South Luzon	2766	6375	43.39
9	Health and beauty	North Luzon	2694	6269	42.97
10	Health and beauty	Mindanao	2727	6211	43.91
11	Apparel and accessories	North Luzon	1271	4214	30.16
12	Apparel and accessories	South Luzon	1307	4194	31.16

Total rows: 25 of 25 Query complete 00:00:00.091

### b. Age level

## SQL syntax

```
SELECT product_category, age_level,SUM(is_click::integer) AS
number_of_clicks,COUNT(is_click) AS total_impressions,
Round((Round(SUM(is_click::integer),2)/Round(COUNT(is_click),2))*100,2) AS ctr
FROM marketing_impressions
GROUP BY product_category,age_level
ORDER BY total_impressions DESC;
```

## PostgreSQL output



pgAdmin 4

Object Explorer: Servers (1) > PostgreSQL 15 > Databases (5) > Login/Group Roles > Tablespace

Query:

```

1 SELECT product_category, age_level,SUM(is_click::integer) AS number_of_clicks,COUNT(is_click) AS total_impressions,
2 Round((Round(SUM(is_click::integer),2)/Round(COUNT(is_click),2))*100,2) AS ctr
3 FROM marketing_impressions
4 GROUP BY product_category,age_level
5 ORDER BY total_impressions DESC;

```

Data Output:

	product_category	age_level	number_of_clicks	total_impressions	ctr
1	Sports and outdoors	35-44 years	7208	16868	42.73
2	Sports and outdoors	25-34 years	3474	12880	26.97
3	Health and beauty	35-44 years	6343	12291	51.61
4	Health and beauty	25-34 years	3576	10156	35.21
5	Apparel and accessories	25-34 years	3164	9687	32.66
6	Sports and outdoors	45-54 years	3706	8518	43.51
7	Home and garden	25-34 years	2729	7836	34.83
8	Home and garden	35-44 years	3272	5821	56.21
9	Health and beauty	45-54 years	2704	5365	50.40
10	Electronics and gadgets	35-44 years	2703	4925	54.88
11	Apparel and accessories	18-24 years	733	4470	16.40
12	Electronics and gadgets	25-34 years	1496	3836	39.00

Total rows: 35 of 35 Query complete 00:00:00.092 Ln 5, Col 33

## c. Gender

### SQL syntax

```

SELECT product_category, gender,SUM(is_click::integer) AS
number_of_clicks,COUNT(is_click) AS total_impressions,
Round((Round(SUM(is_click::integer),2)/Round(COUNT(is_click),2))
*100,2) AS ctr
FROM marketing_impressions
GROUP BY product_category,gender
ORDER BY total_impressions DESC;

```

### PostgreSQL output

pgAdmin 4

Object Explorer: Servers (1) > PostgreSQL 15 > Databases (5) > Login/Group Roles > Tablespace

Query:

```

1 SELECT product_category, gender,SUM(is_click::integer) AS number_of_clicks,COUNT(is_click) AS total_impressions,
2 Round((Round(SUM(is_click::integer),2)/Round(COUNT(is_click),2))*100,2) AS ctr
3 FROM marketing_impressions
4 GROUP BY product_category,gender
5 ORDER BY total_impressions DESC;

```

Data Output:

	product_category	gender	number_of_clicks	total_impressions	ctr
1	Sports and outdoors	Male	13200	36279	36.38
2	Health and beauty	Male	12048	27148	44.38
3	Apparel and accessories	Male	5628	17416	32.32
4	Home and garden	Male	6999	16983	41.21
5	Electronics and gadgets	Male	5256	10703	49.11
6	Sports and outdoors	Female	2482	7638	32.50
7	Health and beauty	Female	1717	4617	37.19
8	Apparel and accessories	Female	820	3430	23.91
9	Home and garden	Female	867	2520	34.40
10	Electronics and gadgets	Female	859	2124	40.44

Total rows: 10 of 10 Query complete 00:00:00.086 Ln 5, Col 33

## FINDINGS

The overall click-through-rate (CTR) of the campaigns by PopCrt was calculated to be 38.71%. This result is acceptable considering that generally a good CTR is ranging around 3.17% to 6.64% (for search) and 0.46% to 0.57% (for display) as per Google Adwords Benchmark and Datawrapper<sup>2,3</sup>. According to WEbFX, the industry average CTR that is considered good is 1.90% or higher<sup>1</sup>. Therefore, PopCrt digital marketing campaigns are good based on the average industry CTR. However, the effectiveness of these campaigns are not just evaluated by the overall CTR.

The CTR per product category was calculated as shown in figure 1, where the Electronics and gadgets category has the highest CTR of 47.67% and the lowest was 30.93% from the Apparel and accessories category.

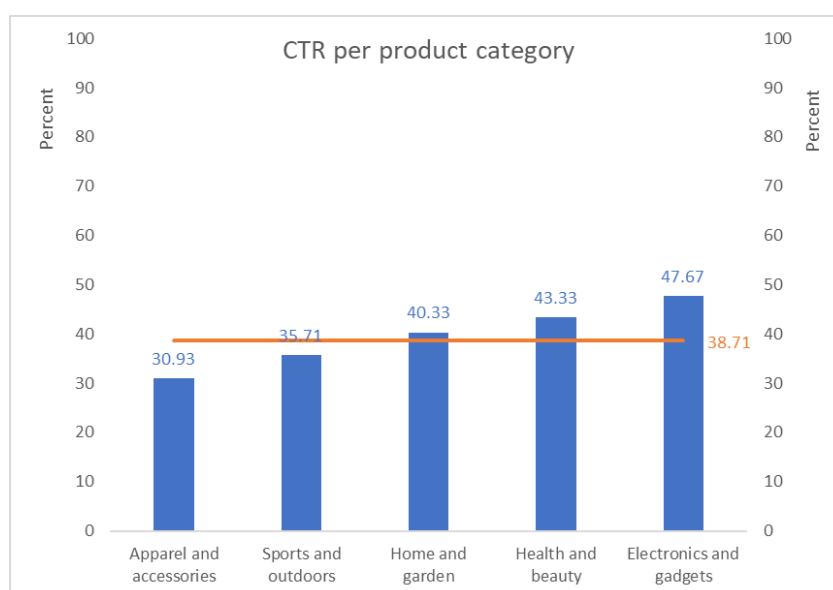


Figure 1. Chart of CTR per product category and the overall CTR

The Apparel and accessories and Sports and outdoors categories are lower than the overall CTR. This cannot conclude anything since we need to look at other factors on why these categories are less than the overall CTR. One factor is the relationship of the CTR to the revenue that is generated.

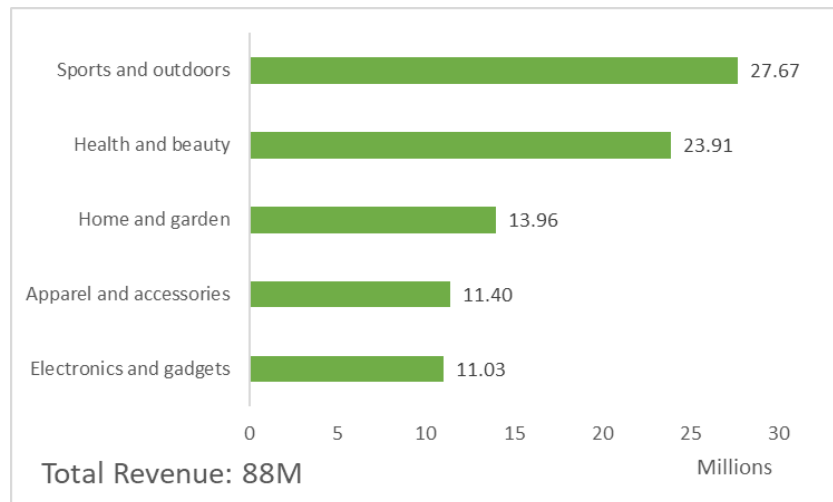


Figure 2 shows the relationship between the CTR and the revenue per product category.

The total revenue recorded was Php 87,965,591.00 during campaign periods. It can be seen in figure 2 that the highest revenue contribution is from the Sports and outdoors and the lowest is from Electronics and gadgets. The Electronics and gadgets category has the highest CTR but has the lowest revenue generation. This shows that this category is popular but does not generate much sales.

The revenue can be further analyzed by looking at its percentage distribution between genders. Figure 3 shows the distribution of revenue between genders during campaign periods. Males have the highest contribution to the total revenue with 86.35% while the female contribution is 13.65%. This shows that the campaigns target mostly the male gender.

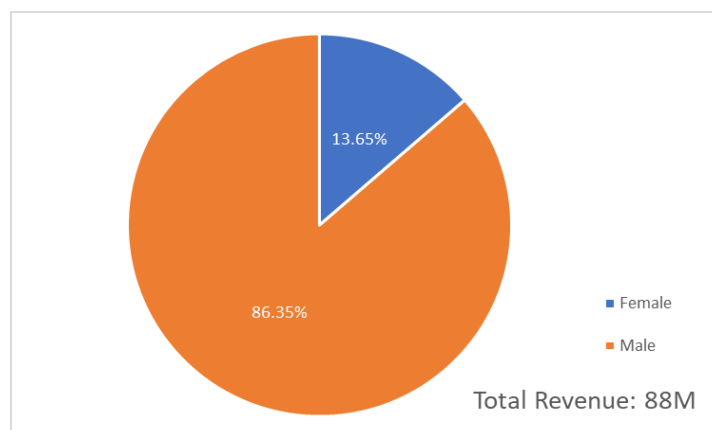


Figure 3. Percentage revenue contribution by gender

To further determine the campaign performance, the total impressions of each campaign was calculated. The 12 Days of Christmas Deals has the highest number of impressions while the Spring Deals is the lowest as shown in figure 4. The 12 Days of Christmas Deals is the most popular campaign with impressions more than double the other campaigns.

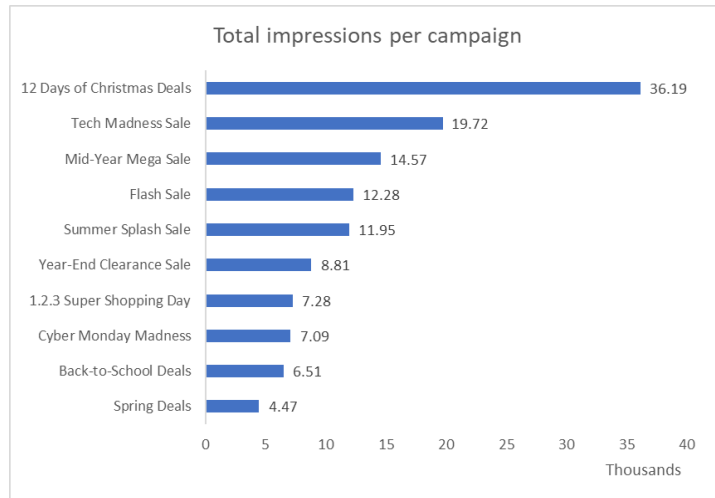


Figure 4. Total impressions of each campaign

To further look into the popularity of the campaign with the highest impression, the unique users per region was determined and plotted in figure 5. It can be seen that the distribution of the number of users is almost equal.

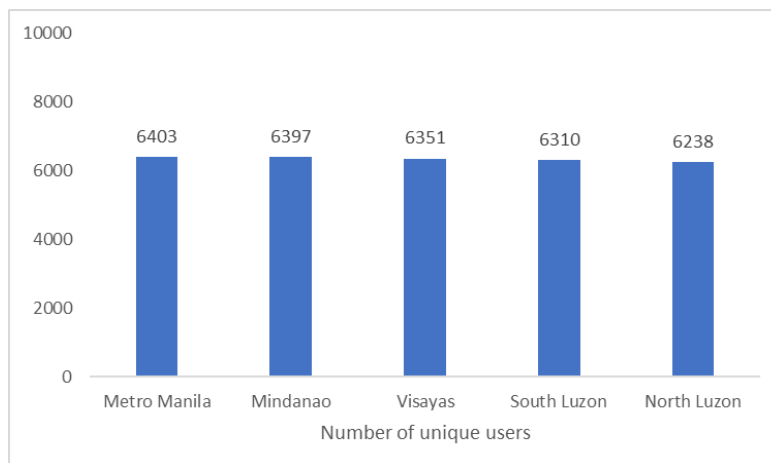


Figure 5. Total unique users who viewed the campaign with most impressions

The popularity of product categories was further explored by computing the total impressions and CTR of product categories by region, age groups, and gender. Total impressions for each user segment is shown below in figures 6, 7, and 8.

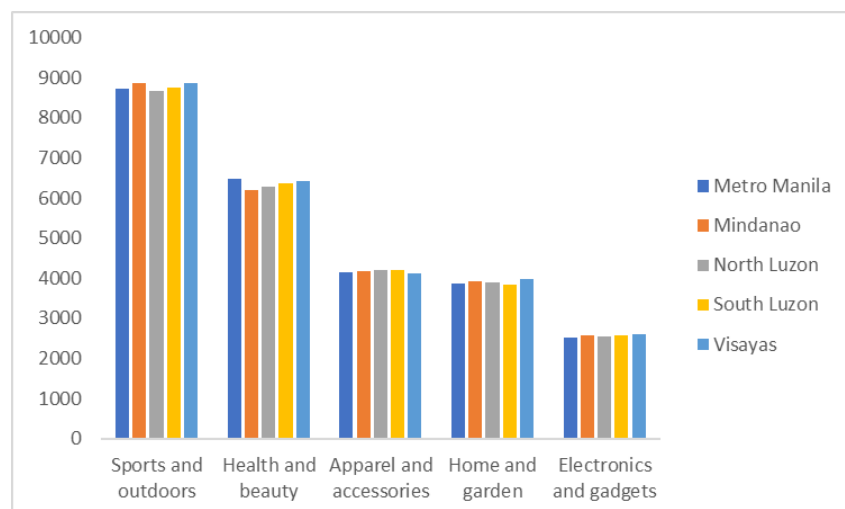


Figure 6. Total impressions of product categories by region

The highest impressions for all the regions is the Sports and outdoors category while the lowest is the Electronics and gadgets category. The distribution of impressions by region can be considered to be almost equal where differences in total impressions by region are at a minimum.

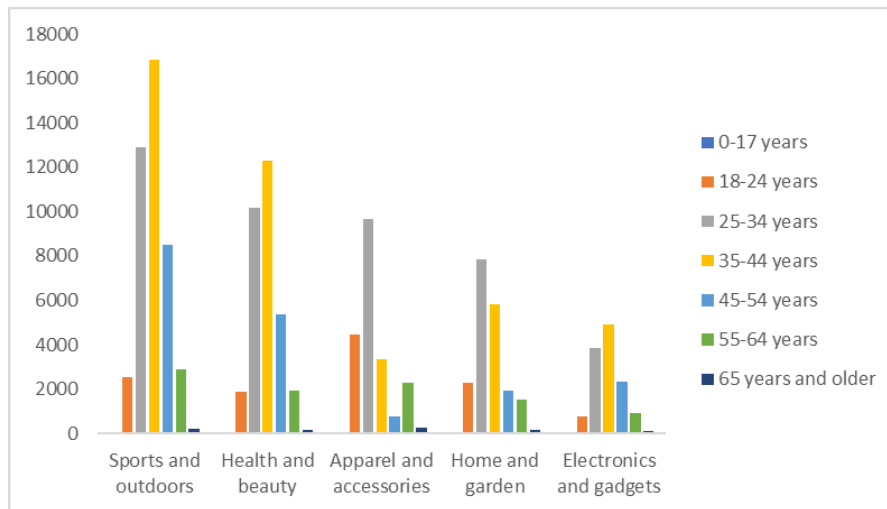


Figure 7. Total impressions of product categories by age group

The highest impressions for all the age groups is the Sports and outdoors category while the lowest is the Electronics and gadgets category. The distribution of impressions by age group is bell shaped symmetric where the age groups of 25-34 years old and 35-44 years old show the highest impressions among all age groups for all the product categories.

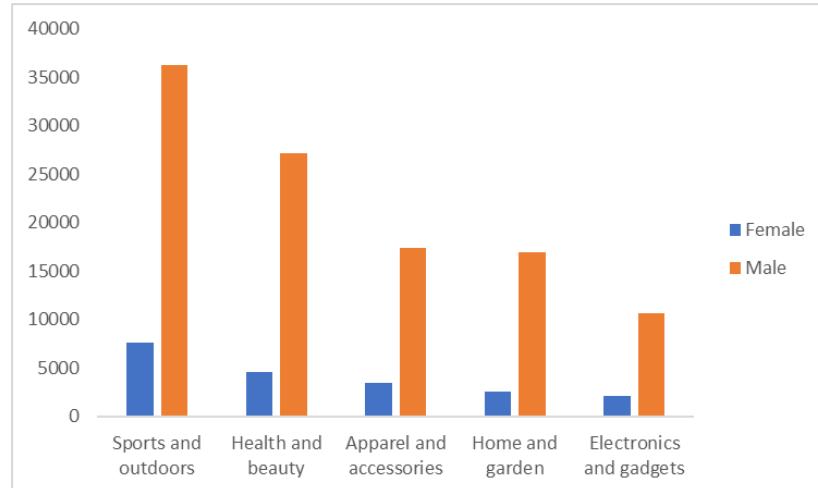


Figure 8. Total impressions of product categories by gender

Similar to both user segments under region and age group, the highest impression is calculated for the Sports and outdoors category while the lowest is the Electronics and gadgets category. The distribution of data shows that the impressions are relatively high for the male gender user segment.

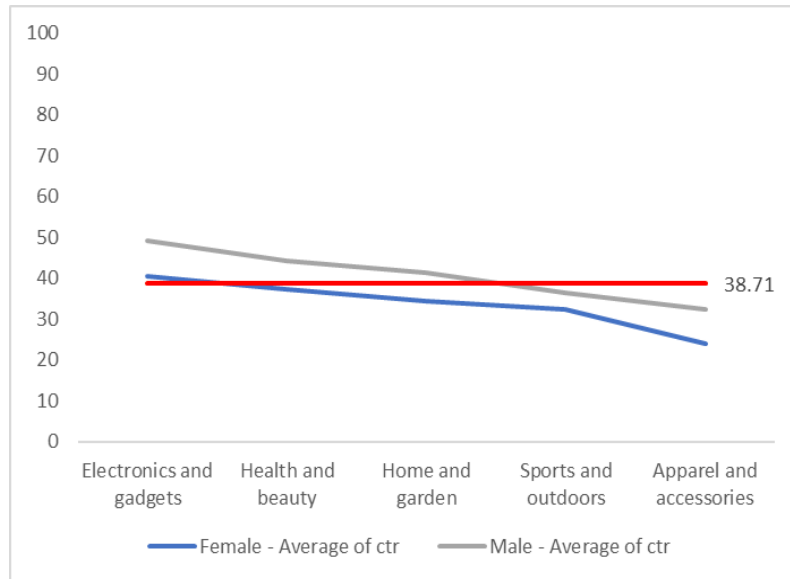


Figure 9. Average CTR compared to overall CTR by gender

Only the Electronics and gadgets category has an average CTR above the overall CTR under the gender user segment.

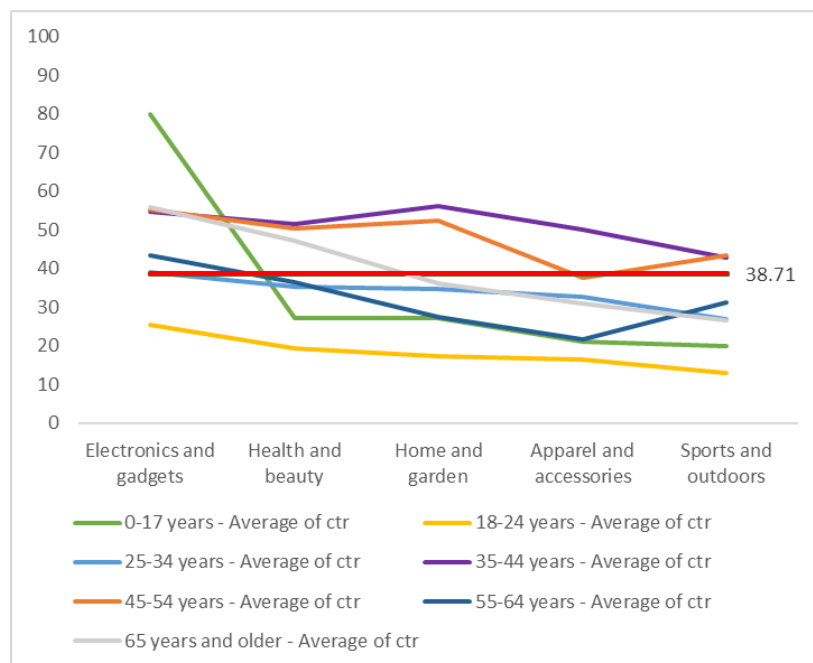


Figure 10. Average CTR compared to overall CTR by age group

The Electronics and gadgets category has the highest average CTR and the Sports and outdoors category has the lowest. For all the age groups, the average CTR's of 35-44 years old and 45-54 years old are those that are generally above the overall CTR.

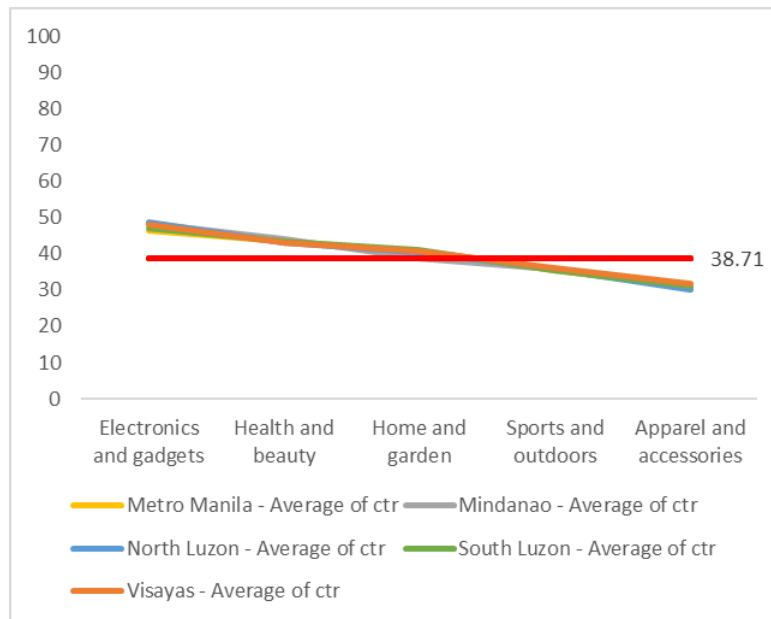


Figure 11. Average CTR compared to overall CTR by region

The Electronics and gadgets category, Health and beauty category and the Home and garden have average CTR's above the overall CTR under the regional user segment.

## CONCLUSIONS

### Product popularity

1. PopCrt digital marketing campaigns have accumulated an overall click-through rate of 38.71% which is good as per average industry CTR.
2. The Electronics and gadgets category has the highest CTR 47.67% of but has the lowest revenue.
3. Highest revenue is generated from the Sports and outdoors category even though it has a CTR of 35.71% which is lower than the overall CTR of 38.71%.
4. The 25-34 year old age group is the most engaged when it comes to all product categories but the CTR is lower than the overall CTR.

### Campaign performance

1. In terms of gender, males are the highest contributor to revenue. Thus, the campaigns generally target the male audience. Females only have a 13.65% share in the revenues during campaign periods.
2. In terms of campaign performance, the 12 Days of Christmas Deals campaign is the most popular.

### Location-based engagement

1. Based on the distribution of unique users and total impressions per product category by region, campaigns are effective in terms of location and have a nationwide reach.

## RECOMMENDATIONS

### Product popularity

1. Focus campaigns for Electronics and gadgets category since this is the most popular product but generates the least revenue.
2. Focus on increasing the CTR for the 25-34 year old age group to capitalize in their engagements in all product categories.

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### Campaign performance

1. Create campaigns that will engage the female audience by advertising products for women in order to increase their share in revenue.

### Location-based engagement

1. Since campaigns are effective in reaching nationwide audiences, a campaign boost is needed to increase users per location.
2. Collaborate with local influencers or content creators with a strong presence in your target location. This will promote products or services to the local audience through content, review or giveaways.
3. Try Customer Referral Programs to encourage existing customers to refer their friends and family from different locations.
4. Implement location-specific referral programs to incentivize referrals from specific geographic areas.

### Suggested marketing strategies

1. Optimize Low-CTR Category (Apparel and accessories)
  - Improve creativity in advertisements by enhancing visual elements, messages and call-to-action statements such as “if not satisfied, money back guarantee”.
  - Refine target audience to female users
  - Experiment with different ad formats to generate higher engagements
  - Optimize ad placement by adjusting search engine results
2. Capitalize on High-CTR Category (Electronics and gadgets)
  - Increase advertising budget for electronics and gadgets to capitalize on its high CTR
  - Improve design, content, and user experience in landing pages
  - Expand reach to a wider audience (other than 0-17 years old)

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