trivago

CASE STUDY

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01

DATA OVERVIEW

The data sample provides information about about performance of different keywords, adgroups and campaigns.

The dataset contains marketing campaigns conducted from 05 Sept 2020 to 03 Mar 2021 in 5 markets worldwide.

5 MARKETS TARGETED

DE

UK

CA

AU

BR

In every market, ad campaigns are controlled by different accounts.

Data Overview

Ads are optimised for 3 device types - **PC, Mobile and Tablet**.

Every '**Keyword**' for which the advertisement is displayed can be categorized under '**Theme Name**' which can be classified further under '**Replacement Type**'. Replacement Type essentially captures the **Keyword Category** on a broader scale. There are 10 Keyword Categories. All theme names in the dataset are related to **stay type** (hotels, accommodation, hostels etc.) searches.

To measure the performance of an ad-campaign on a given date, metrics such as **impressions, cost, click-ins, clickouts, bookings, clickout_rev, booking_amount** and **user_engagement** are recorded.
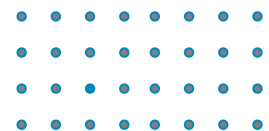
01

DUPLICATE ENTRIES

The duplicate entries were dropped.

02

MISSING VALUE

Rows with missing value were dropped.

03

IMPRESSIONS > 0

When Ads don't get impressions, no click-ins and bookings occur, hence this case is not considered in analysis.

01

Revenue on Ad Spend

Defined as $\dfrac{\text{clickout\_rev}}{\text{cost}}$

Measures profitability for the campaign.

02

Click - through Rate

Defined as $\dfrac{\text{clickins}}{\text{impressions}}$

Measures the no. of visitors clicking on the Ad, for every Ad displayed

03

Conversion

Defined as $\dfrac{\text{bookings}}{\text{clickins}}$

Measures the no. of visitors on the website converting to a customer

Some Numbers Describing Performance

Total number of Ads in the dataset

1,062,654

Total number of Ads that were clicked

142,622

Click Through Rate

0.0168

8,474,379

Total number of impressions from all Ads

1790

Total number of Ads that were booked

0.00021

Conversion Rate

SOME ADS DON'T GET IMPRESSIONS

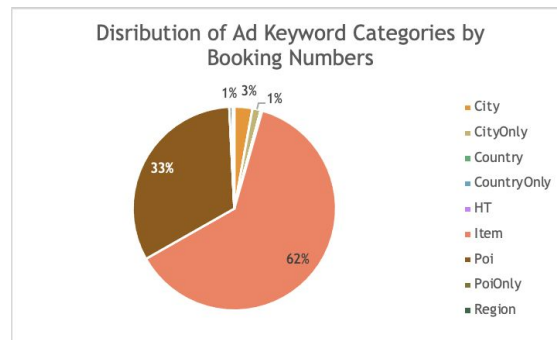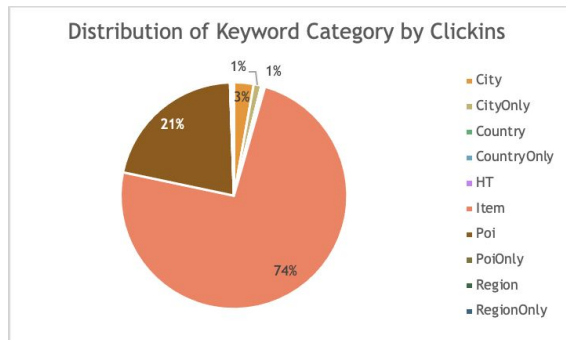Ads belonging to keyword **categories other than Poi and Item don't receive impressions** often.

As a result, countries where larger number of Ads belong to categories other Poi and Item have less number of Impressions.

	Total Ads	No. of Ads with 0 Impressions	% of Ads displayed
CountryOnly	5952	5247	12%
PoiOnly	6422	5901	8%
HT	8965	7939	11%
RegionOnly	10005	8854	12%
Country	25680	23663	8%
Poi	39221	0	100%
Region	76627	70741	8%
CityOnly	78203	70610	10%
Item	171313	0	100%
City	640266	592376	7%

AD INSIGHTS - Theme Wise

AMONG ADS THAT GET IMPRESSION
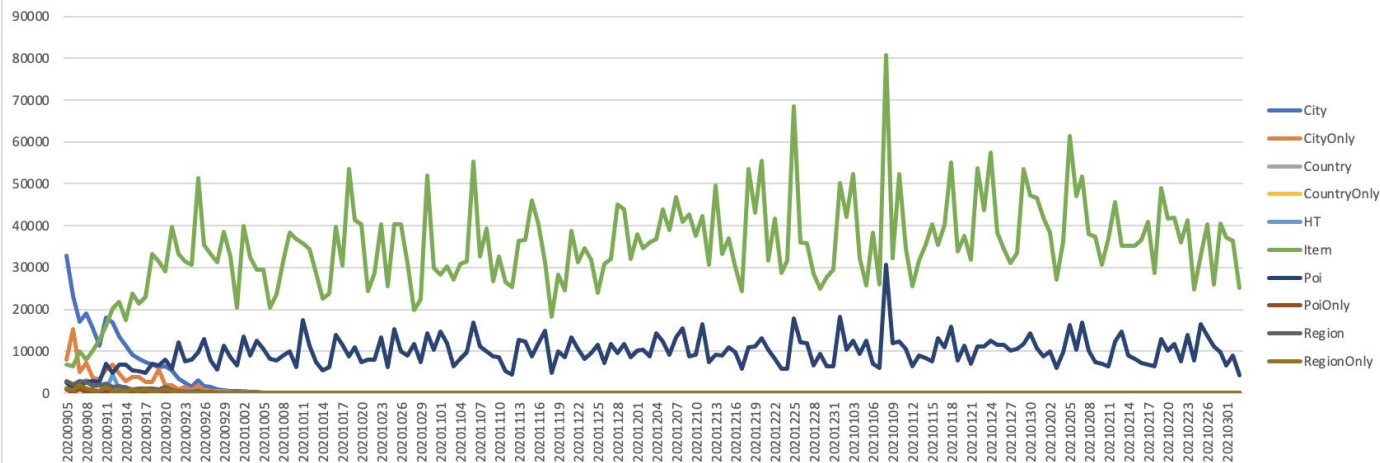
Highest impressions are gathered by Item, Poi and City Category. Higher impressions would guarantee higher click-ins and bookings. This pattern was observed too.

Distribution of Keyword Category by Impression

1% 3% 1%
21%
74%

- City
- CityOnly
- Country
- CountryOnly
- HT
- Item
- Poi
- PoiOnly
- Region

Distribution of Keyword Category by Clickins

1% 1%
3%
21%
74%

- City
- CityOnly
- Country
- CountryOnly
- HT
- Item
- Poi
- PoiOnly
- Region
- RegionOnly

Disribution of Ad Keyword Categories by Booking Numbers

1% 3% 1%
33%
62%

- City
- CityOnly
- Country
- CountryOnly
- HT
- Item
- Poi
- PoiOnly
- Region

The fall in the distribution percentages for Item Category for bookings suggest that the **conversion of clickin to booking of POI is greater than Item**.
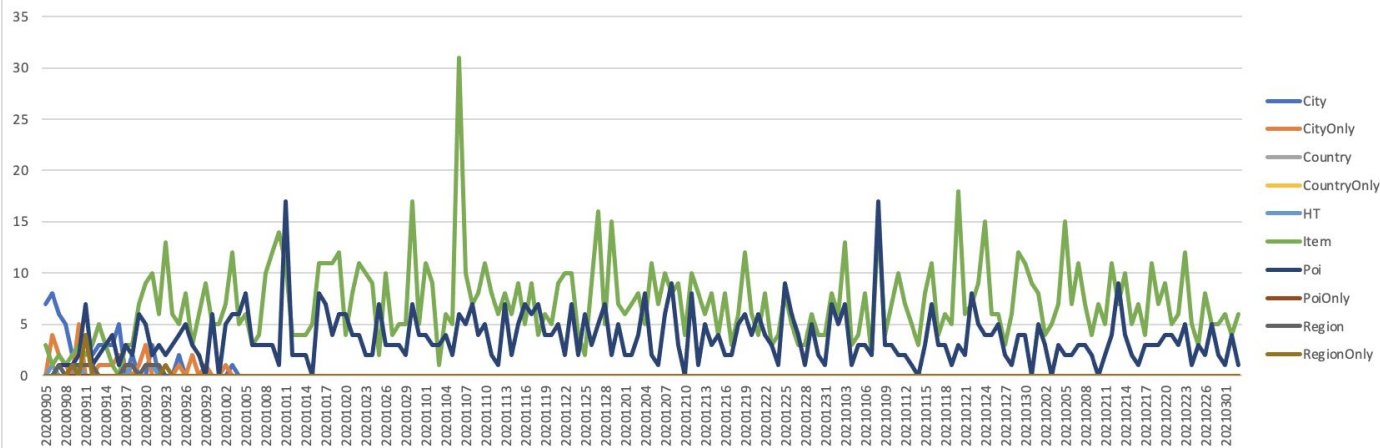
Impressions By Date Across Keyword Categories

Booking Numbers By Date Across Keyword Categories

Legend (both charts): City, CityOnly, Country, CountryOnly, HT, Item, Poi, PoiOnly, Region, RegionOnly

Item and POI Category Ads receive impressions throughout the time period.

The other categories receive impressions till 02 Oct 2020.

Despite Item category has higher impressions, Poi and Item categories have similar booking numbers.

Distribution of Keyword Categories by Cost and Revenue
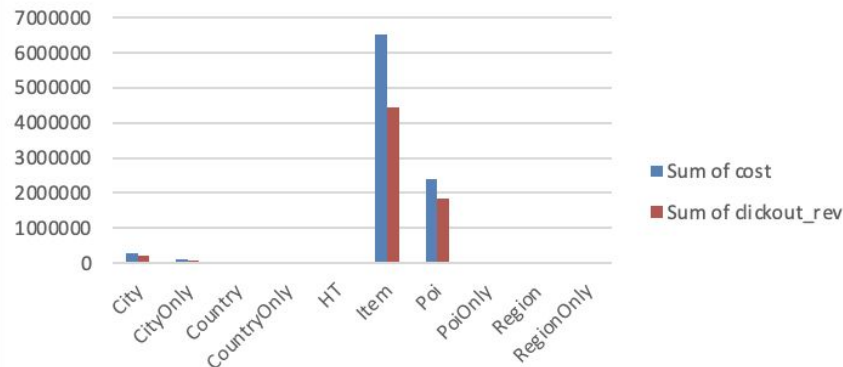
KEYWORD CATEGORIES BY COST AND REVENUE

Item Category generates the highest revenue. However this category costs the most.
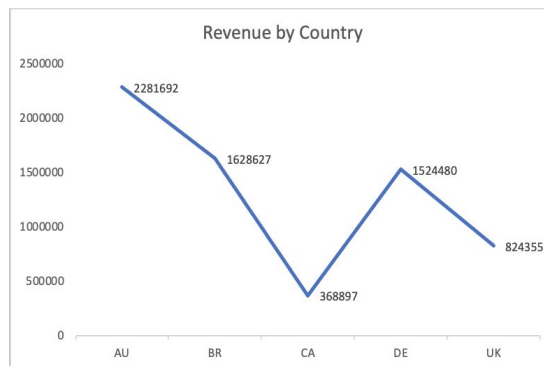
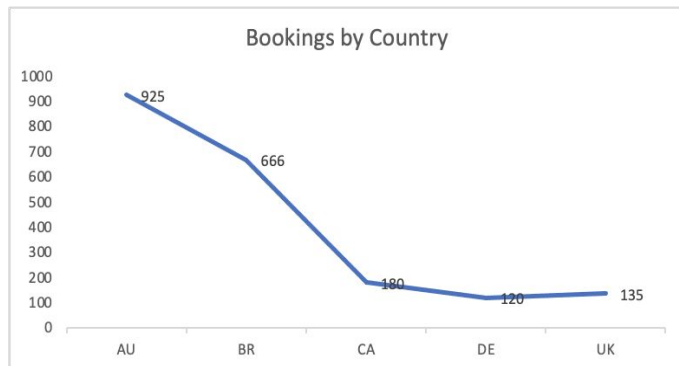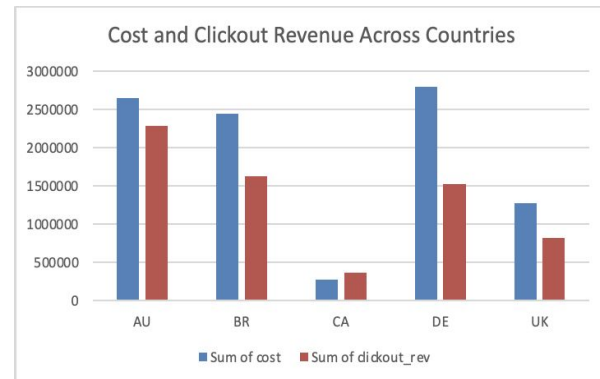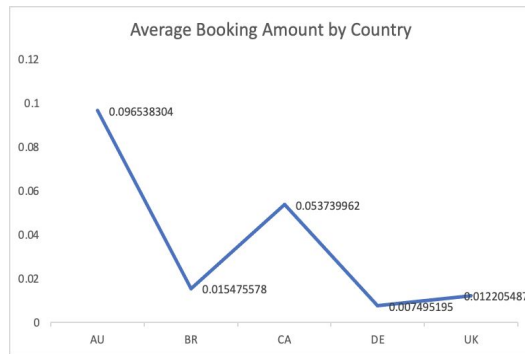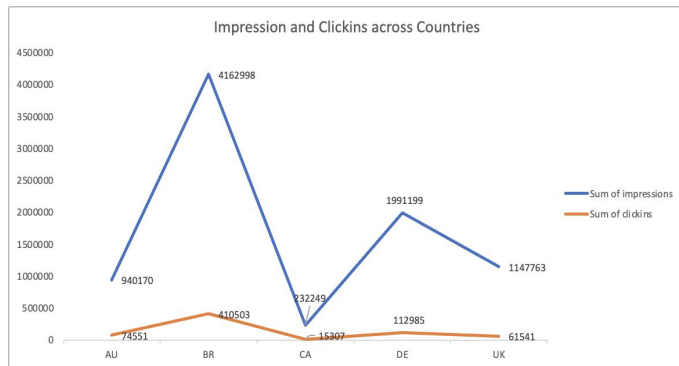The order of return on advertising spend for keyword categories is -

Poi 〉 City 〉 CityOnly 〉 Item

DEVICE TYPE

While the average user_engagement is similar across all devices - Desktop, Phone and Tablet. Ads targeted for Phones receive greater clickins and clickouts than Desktop. However the **average number of bookings for Desktops are higher** indicating users find it easier to book using a Desktop.

03 AD INSIGHTS - Country Wise

Impression and Clickins across Countries

- Sum of impressions
- Sum of clickins

4162998
1991199
1147763
940170
232249
74551
410503
15307
112985
61541

Average Booking Amount by Country

0.096538304
0.053739962
0.015475578
0.007495195
0.012205487

Cost and Clickout Revenue Across Countries

- Sum of cost
- Sum of clickout_rev

Bookings by Country

925
666
180
120
135

Revenue by Country

2281692
1628627
1524480
824355
368897

In AU, despite the lower impression numbers, the booking numbers, revenue and average booking amount is the highest. However, from a cost perspective, CA offers greater return on advertising spends.

AD INSIGHTS - Date Wise

Total Impressions Across Dates
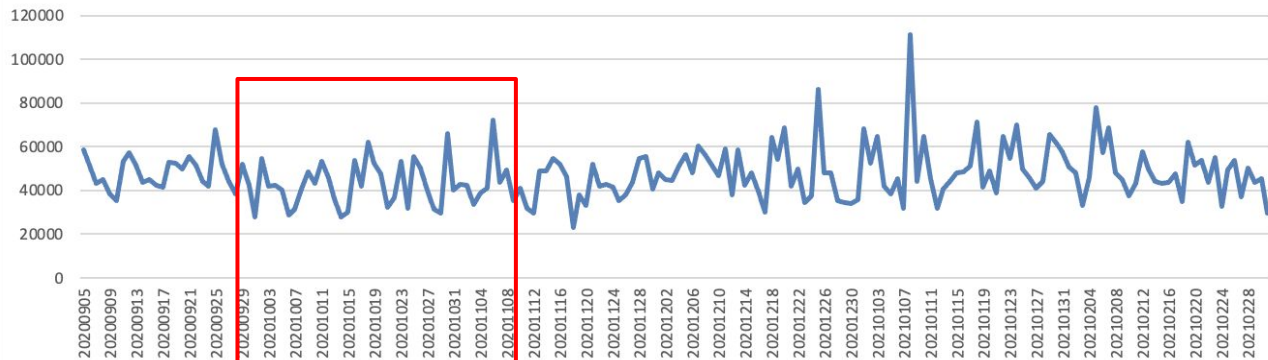
Booking Numbers Across Dates

IMPRESSIONS VS BOOKINGS

Having greater impressions on days where more bookings tend to occur would help increase revenue more.

This calls for search engine optimization, using appropriate keywords for reaching the correct audience.

SOLUTIONS

What is the best performing Market for trivago?
Give your definition of performance and explain why we need to look at performance using your proposed definition.
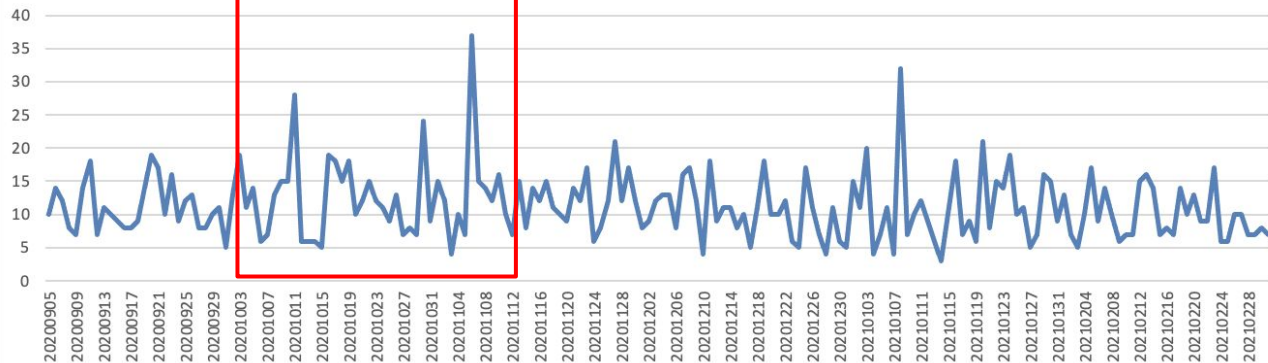
Definition of performance used - $\dfrac{\text{clickout\_rev}}{\text{cost}} * \dfrac{\text{bookings}}{\text{impressions}}$

This metric captures all aspects for an advertisement. Greater clickout revenue to cost ratio is a measure of profitability of the company. The number of bookings to impression ratio captures the goodness of reach of the advertisement to the correct users.

Based on this metric, the **best performing market is CA.**

market_code	Impressions sum	Clickins sum	Cost sum	Clickout sum	Bookings sum	Clickout_rev sum	Booking_amount sum	Users_engagement sum	revenue/ cost	click_through_rate	bookings/ impressions	performance
AU	940170	74551	2643375	29723	925	2281692	2339.316	6480465	0.863174	0.079295234	0.000984	0.000849
BR	4162998	410503	2446950	96653	666	1628627	1016.838	17522732	0.665574	0.098607542	0.00016	0.000106
CA	232249	15307	273687	6313	180	368897	439.2167	2144033	1.347879	0.065907711	0.000775	0.001045
DE	1991199	112985	2797243	20817	120	1524480	943.66	33527712	0.544994	0.056742194	6.03E-05	3.28E-05
UK	1147763	61541	1279709	14086	135	824355	650.6745	14158955	0.644174	0.053618212	0.000118	7.58E-05

Based on this metric, the **best performing market is CA.**

SOLUTIONS

What are the global and market average trivago revenue per clickin?
What does it measure? o Which metric(s) would you consider as other valuable KPI for measuring performance? Why?

The average revenue per clickin = sum(clickout_rev)/sum(clickins)

The global trivago revenue per clickin = 9.82097891943392 euro cents
The market average revenue per clickin is provided in the table.

This metric measures the average revenue generated for a user visiting the Trivago website.

Other valuable KPIs for measuring performance are -
1.   Return on Advertising Spend = clickout_rev/cost
2.   Cost of Acquisition = cost/ bookings
3.   Conversion Rate = bookings/ clickins

market_code	clickout_rev/clickins (in euro cents)
AU	30.605
BR	3.967
CA	24.099
DE	13.492
UK	13.395

SOLUTIONS

How can we use `user_engagement` to explain `pub_keyword_id` or `theme_name` value?

There are 112254 pub_keyword_ids.
There are 386 theme names.

Under a theme name there can be multiple keyword ids.
Some theme names gather more user engagement. These theme names interest the users more.
Keyword Categories that contain a large number of keywords tend to have a larger spread of user engagement and hence a lower average user engagement.

SOLUTIONS

What are the Clickout to Booking ratios by locale and what are possible explanations for observed differences? What could the SEM team do to increase the C2B?

The clickout to booking ratios by locale are indicated in the table.

Clickout to Bookings Ratio signifies the number of people who book after browsing through the website. Clickout to Bookings Ratio is driven by Impressions. BR, DE and UK markets have a higher impression of Ads. The conversion rates are also lower for BR, DE and UK markets signifying lower booking numbers.

The ratio is also indicative of the booking experience of the user. The ease of navigation and performance will ensure the users reach the booking stage. Targeted advertising and chat bots ensure users genuinely interested in booking succeed in doing so.
Following the best Search Engine Optimisation by the SEM team, ensures that the ad is found by the correct audience. Markets like CA and UK, have lower impressions. This is also indicated by average match types being lower for these country codes than BR, DE and UK. Driving the number of impressions by using the appropriate keywords, will gather more users to the website.

market_code	clickout/bookings
AU	32.1329
BR	145.124
CA	35.0722
DE	173.475
UK	104.340

SOLUTIONS

What should be the average price to pay for a conversion (defined as clickouts) if we wanted a 125% ROAS (clickout_rev/cost)?

The current click_out rev = 6628051 euro cents.
With a 125% ROAS, the cost is found to be 5302440.8000 euro cents.
Average cost = sum of Cost/ number of Ads.
Average price to pay for a conversion 19.12009029182578 euro cents.

SOLUTIONS

SEM team has tested a new bidding algorithm only in the Australian market (AU) during Oct-Nov. Please summarize the business impact of the test, and explain what you would suggest as next steps. Describe how we can ensure that your findings are statistically significant?

Impact on Business -
The average impressions, clickins, clickouts, costs, clickout_rev, user_engagement and bookings per ad has increased. The Return on Advertising Spend, increase in conversion rate and click through rate will also tend to increase.

Next Steps -
Optimizing costs for spending for greater revenue generation.
Improving the landing page, booking experience and easy navigation would allow greater conversion of users.
Making Ads more creative for greater click-ins.

SOLUTIONS

SEM team has tested a new bidding algorithm only in the Australian market (AU) during Oct-Nov. Please summarize the business impact of the test, and explain what you would suggest as next steps. Describe how we can ensure that your findings are statistical significant?

The number of advertisements in the month of Sept in the AU market - 9838
The number of advertisements between Oct - Nov in the AU market - 5974

The distribution of the variables - impressions, cost, clickins, clickout, bookings, clickout_rev, booking_amuount need to be transformed to a normal distribution.
T-test with level of significance as 5% can then be applied.

	Sum_Sept	Sum_Oct-Nov	Average_Sept	SD_sept	Average_Oct_Nov	SD_oct_nov
Impressions	124500.00	362217.00	12.6550112	53.09254	60.6322397	235.0334
Clickins	8877.00	33408.00	0.90231754	3.968811	5.59223301	21.94323
Cost	301573.00	1247338.00	30.6538931	137.2837	208.794443	821.8786
Clickout	3499.00	13331.00	0.35566172	1.597324	2.23150318	8.785641
Bookings	118.00	412.00	0.01199431	0.138459	0.06896552	0.400399
Clickout_rev	246940.00	1128848.00	25.1006302	110.2935	188.960161	728.3587
Booking_Amount	300.75	1042.91	0.0305702	0.360013	0.17457516	1.029037
User_engagement	2576074	1627563	261.84936	169.8213	272.441078	193.164

THANKS!

Do you have any questions?

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