Amazon Marketing Cloud Dashboard Insights

(AMC Delivery Kit Solution)

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Overview

The AMC Dashboard provides an interactive visualization of marketing performance insights with the ability to slice the data by campaign, device type, DMA, frequency, audience segments, and time periods.

The dashboard's goal is to provide a plethora of event level marketing insights in one visualized central location. The dashboard draws from a series of custom workflows built upon Demo Customer data available in AMC that are run on a daily basis. It has a text visual that describes how to read and understand the dashboard
The users can get read only permissions to this dashboard and can view relevant data visuals.

The dashboard shows metrics both numerically (in tabular form) and graphically (bar charts, stacked bar combo charts, maps, etc.) to enable quick insight discovery. This data can be exported into csv files for further analysis.

Amazon Marketing Cloud Advertising Use cases

Through the newly launched API based solution in closed beta called Amazon Marketing Cloud (AMC), that allows advertisers to query event level data within a privacy friendly environment, 5 uses were created to explore the data from multiple perspectives. Quicksight was used for visualization to highlight the marketing insights provided by the use cases.
The dashboard was designed keeping in mind 5 most commonly used advertising use cases that highlight the applications of using AMC's event level data. The 5 uses cases highlighted in the dashboard are as below:

1. Audience Analysis
2. Frequency Distribution
3. Device Exposure
4. Geo Analysis
5. Product Mix Analysis

Below are the details of visualizations offered in the AMC Delivery Kit Dashboard

1. Audience Analysis

This use case gives the analysis of audience segments targeted by the customer and also details of audience segments that user was a part of but not targeted for purchases of customer products on Amazon. It provides KPIs for in-proposal Display campaigns like impressions, reach, cost, details by audience segments and campaign. The purchases and revenue are provided per product (ASIN) for both the targeted and untargeted audience segments. The impressions, reach, purchases and sales number on these charts cannot be added up as one purchaser may fall into multiple audiences. Each audience's performance should be analyzed on its own.

Key Performance Indicators:

a. Impressions – Per Audience Segment
b. Clicks – Per Audience Segment
c. Reach – Per Audience Segment

d. Total Cost – Per Audience Segment
e. Sales tracked (Revenue) – Per Product
f. Total Sales tracked (Brand Revenue) – Per Product
g. Conversions – Per Product
h. Purchases – Per Product
i. ROAS over Sales tracked (Revenue)– Per Product
j. ROAS over Total Sales tracked (Brand Revenue) – Per Product

Business Outcomes:

This section provides potential business outcomes derived from the Audience analysis use case

1. Investigating performance of untargeted audiences helps to discover audience segments that can be added to current targeted due to their potential positive impact on performance or scale.
2. Additionally, we can discover more insights into the attributes of our targeted audiences by seeing what other untargeted audience segments show strong performance – learning more about our most valued users or audiences to best target for potential new customers. This can be used for building better customer profiles, new creative messaging, campaign construction, etc.

Visual Details:

This section provides details on the Quicksight dashboard visuals for Audience Analysis use case.

Query used for the visual:
SQL Name: **AudienceAnalysis.sql**

```
--Audience Analysis Query
--This query provides holistic overview of Advertisers Audience Analysis that includes targeted and untargeted audiences for DSP campaigns
--Note: You can also filter out the desired Campaigns and perform analysis only for those campaigns by adding a campaign filter in the where clause

--Identify KPIs from the Display Impressions Table per campaign
WITH IMP_CLICKSSEG AS (
  SELECT
    A.ADVERTISER,
    A.campaign,
    A.behavior_segment_name AS SEGMENT,
    SUM(A.total_cost / 100000) AS impression_cost,
    behavior_segment_matched AS MATCHED_SEGMENT,
    SUM(A.IMPRESSIONS) AS IMPRESSIONS,
    SUM(B.clicks) as CLICKS,
    COUNT(DISTINCT A.USER_ID) AS REACH
  FROM
    display_impressions_by_user_segments A
--request_tag is used to match Display_Clicks and display_impressions_by_user_segments table
  LEFT JOIN DISPLAY_CLICKS B ON A.request_tag = B.request_tag
```

```
GROUP BY
   A.ADVERTISER,
   A.campaign,
   A.behavior_segment_name,
   A.behavior_segment_matched),


--Identify user level information per campaign from the display_impressions_by_user_segments
--Note: User level information can only be accessed via sub queries
USR_SEG_IMP as (
   select
      user_id,
      advertiser_id,
      campaign,
      behavior_segment_name,
      behavior_segment_matched,
      sum(total_cost) / 100000 as impression_cost
   from
      display_impressions_by_user_segments
   group by
      user_id,
      campaign,
      advertiser_id,
      behavior_segment_name,
      behavior_segment_matched),


-- Identify Sales information for all users present in the display impressions Table
--You can use either amazon_attributed_events_by_conversion_time or the amazon_attributed_events_by_traffic_time based on your use case
CONV_SEG AS (
   SELECT
      A.ADVERTISER,
      A.campaign,
      A.tracked_asin,
      B.behavior_segment_name AS SEGMENT,
      B.behavior_segment_matched AS MATCHED_SEGMENT,
--Total Conversions, Note: This will be same as Total Product Sales as we have added a condition of conversion_event_subtype = 'order'
      SUM(A.CONVERSIONS) AS PURCHASES,
--Product Sales is total sales (in local currency) of promoted ASINs purchased by customers on Amazon after delivering an ad.
--Total Product Sales is total sales (in local currency) of promoted ASINs and ASINs from the same brands as promoted ASINs purchased by customers on Amazon after delivering an ad.
      sum(A.product_sales) as sales_tracked,
      sum(A.total_product_sales) as sales_tracked_brand,
--Calculated fields
      ROUND(sum(A.total_product_sales) / sum(B.impression_cost), 2) as roas_brand,
```

```
    ROUND(sum(A.product_sales) / sum(B.impression_cost), 2) as roas_salestracked,


    SUM(B.impression_cost) AS total_cost_fromconvtable
  From
    amazon_attributed_events_by_conversion_time A
  INNER JOIN USR_SEG_IMP B ON A.USER_ID = B.USER_ID
    AND A.ADVERTISER_ID = B.ADVERTISER_ID
    AND A.campaign = B.campaign
  WHERE
 --This condition only fetches information for purchases made
    conversion_event_subtype = 'order'
  GROUP BY
    A.ADVERTISER,
    A.tracked_asin,
    B.behavior_segment_name,
    B.behavior_segment_matched,
    A.campaign
)

--Identify the columns required to from the above tables to be used in an Audience Analysis Report.
SELECT
  A.ADVERTISER,
  A.campaign,
  BUILT_IN_PARAMETER ('TIME_WINDOW_START') AS time_window_start,
  BUILT_IN_PARAMETER ('TIME_WINDOW_END') AS time_window_end,
  A.SEGMENT,
  A.MATCHED_SEGMENT,
  A.IMPRESSIONS,
  A.REACH,
  B.tracked_asin,
  B.PURCHASES,
  B.SALES_TRACKED,
  B.sales_tracked_brand,
  A.CLICKS,
  roas_brand,
  roas_salestracked,
  A.impression_cost, (B.PURCHASES / A.REACH) as conversion_rate_perc,
  B.total_cost_fromconvtable
FROM
  IMP_CLICKSSEG A
  LEFT JOIN CONV_SEG B ON A.ADVERTISER = B.ADVERTISER
  AND A.SEGMENT = B.SEGMENT
  AND A.MATCHED_SEGMENT = B.MATCHED_SEGMENT
  AND A.campaign = B.campaign
```

Visual Description:
Tabular View:
This visual provides an overview of all audience segments per campaign and ASIN
Each audience can be analyzed separately by clicking audience segment from controls and it can be further analyzed per product by clicking on the List of ASINs table on the left

List of ASINs with Sales

ASIN
XXX113N6LP
XXX16CKB4Y
XXX1DPCBQG
XXX1EJOQII
XXX23JV25J
XXX23YDCWF
XXX2AA13M2
XXX2F1F3BH
XXX2F1LVBR
XXX2F1MGLZ
XXX2F1P8C2
XXX2F1Q1T9
XXX2F1QH7S
XXX2F1VGP4
XXX2VK8TQ1
XXX2VKHR6F
XXX2VKHR6Q
XXX2VKS7HY
XXX2VL1T6F

Audience Analysis Overview

Advertiser	Campaign	Matched Segm...	Segment Name	Tracked ASIN	Impressions	Total Reach	Total Cost	Product Sales	Total Product Sales (Brand)	ROAS over Product Sales	ROAS over Total Product
Demobrand_1	Campaign1	Yes	Demo_Segment2242	XXXCC6XSRC	3,657	936	19.50	0	8.98	0	
Demobrand_1	Campaign1	Yes	Demo_Segment2242	XXXCC6XSSQ	3,657	936	19.50	0	13.32	0	
Demobrand_1	Campaign1	Yes	Demo_Segment2242	XXXK7VZ138	3,657	936	19.50	0	12.21	0	
Demobrand_1	Campaign1	Yes	Demo_Segment2242	XXXKKVMNMJ	3,657	936	19.50	0	10	0	
Demobrand_1	Campaign10	Yes	Demo_Segment1390	XXX8BS7Z1Y	5,664	5,104	43.12	10	10	511.25	
Demobrand_1	Campaign10	Yes	Demo_Segment1390	XXXCC6XSSQ	5,664	5,104	43.12	0	8.88	0	
Demobrand_1	Campaign10	Yes	Demo_Segment1390	XXXKKVMN...	5,664	5,104	43.12	0	10	0	
Demobrand_1	Campaign10	Yes	Demo_Segment1880	XXX8BS7Z1Y	21,812	7,049	105.76	25	25	421.73	
Demobrand_1	Campaign10	Yes	Demo_Segment1880	XXXCC6XSSQ	21,812	7,049	105.76	0	22.2	0	
Demobrand_1	Campaign10	Yes	Demo_Segment1880	XXXKKVMN...	21,812	7,049	105.76	0	20	0	
Demobrand_1	Campaign10	Yes	Demo_Segment1880	XXXXCJLBF7	21,812	7,049	105.76	0	36.83	0	
Demobrand_1	Campaign10	Yes	Demo_Segment2054	XXX2HQCPU8	109,728	50,729	668.04	0	7.78	0	
Demobrand_1	Campaign10	Yes	Demo_Segment2054	XXX8BMYR3F	109,728	50,729	668.04	10	10	235.52	
Demobrand_1	Campaign10	Yes	Demo_Segment2054	XXX8BN6HZF	109,728	50,729	668.04	29.98	29.98	606.76	
Demobrand_1	Campaign10	Yes	Demo_Segment2054	XXX8BQ43YR	109,728	50,729	668.04	30.95	30.95	444.88	
Demobrand_1	Campaign10	Yes	Demo_Segment2054	XXX8BS7Z1Y	109,728	50,729	668.04	55	55	399.07	
Demobrand_1	Campaign10	Yes	Demo_Segment2054	XXX8BVP9S1	109,728	50,729	668.04	24.97	24.97	331.04	
Demobrand_1	Campaign10	Yes	Demo_Segment2054	XXX95VHRY1	109,728	50,729	668.04	31.68	31.68	544.99	
Demobrand_1	Campaign10	Yes	Demo_Segment2054	XXXCC6XSRC	109,728	50,729	668.04	0	18.9	0	

Figure 1.1: Audience Analysis Tabular view

Targeted and Untargeted Analysis View:
This visual provides details about the impressions, purchases and ROAS over targeted and untargeted audience segments.

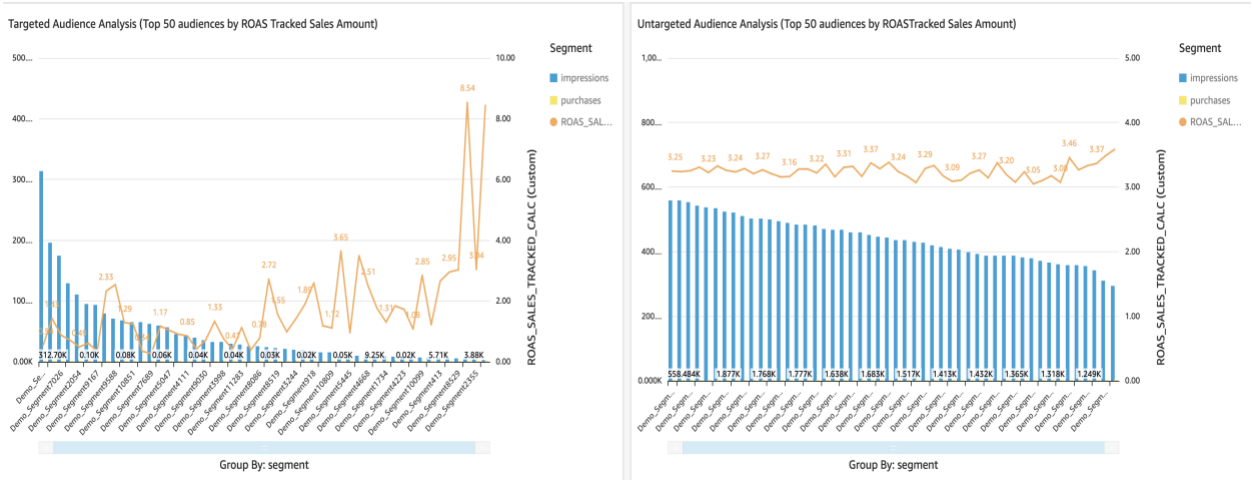

Figure 1.2: Targeted and Untargeted Audience Analysis view

Performance ROAS over average ROAS View:
This visual provides details about the impressions, purchases and ROAS over targeted and untargeted audience segments.

Figure 1.3: Targeted and Untargeted ROAS performance view

2. Frequency Distribution

This use case gives an analysis of performance and delivery by different frequencies/impression exposures to help optimize campaign frequency caps to maximize conversion likelihood for purchases of assigned customer products on Amazon. It is used to analyze performance across campaigns and device type within multiple frequency buckets from reach, impressions, purchases, conversion rate, and ROAS

Key Performance Indicators:

a. Impressions – Per Campaign, Device Type
b. Reach – Per Campaign, Device Type
c. Total Cost – Per Campaign, Device Type
d. Product Sales (Revenue)– Per Campaign, Device Type
e. Total Product Sales (Brand Revenue) – Per Campaign, Device Type
f. Conversions – Per Campaign, Device Type
g. Purchases – Per Campaign, Device Type
h. Total Purchases – Per Campaign, Device Type
i. Total Cost – Per Campaign, Device Type

j. ROAS over Revenue – Per Campaign, Device Type
k. Frequency Buckets

Business Outcomes:

This section provides potential business outcomes derived from the Frequency Distribution use case

1. Identify opportunities to increase or decrease frequency caps to improve performance and/or reach over a period of time
2. Identify potential campaign level frequency cap maximums by analyzing order level frequency over an extended period time instead of analyzing shorter time periods of frequency caps at the line-item level.
3. Identify opportunities to increase or decrease frequency caps on each device types based on campaign performance

Visual Details:

Query used for the visual:
SQL Name: **FrequencyDistribution.sql**

```
--Frequency Distribution Query
--This query provides a breakdown of the  Display campaign performances based on the frequency.

--Note: You can also filter out the desired Campaigns and perform analysis only for those campaigns by adding adding a campaign filter in the where clause
--Gather Impressions and Click Information from display_impressions and display_clicks tables
With IMPCLICK as
(SELECT A.ADVERTISER,
      A.CAMPAIGN,
      A.device_type,
      SUM(A.total_cost/100000)  as TOTAL_COST,
      SUM(A.IMPRESSIONS) AS IMPRESSIONS,
      SUM(B.clicks) as CLICKS,
      A.USER_ID
FROM display_impressions A LEFT JOIN DISPLAY_CLICKS B ON A.request_tag = B.request_tag
GROUP BY A.ADVERTISER, A.CAMPAIGN, A.USER_ID, A.device_type),

--Gather all Sales Information from amazon_attributed_events_by_traffic_time
CONV AS (SELECT c.advertiser,
            c.user_id,
            c.campaign,
            c.device_type,
            SUM(c.conversions) as conversions,
            SUM(c.purchases) as purchases,
             SUM(c.total_purchases) as total_purchases,
            SUM(c.total_product_sales) AS total_product_sales,
            SUM(c.product_sales) AS product_sales

   FROM amazon_attributed_events_by_traffic_time c
   -- Condition to only extract sales information for purchases made
   WHERE c.conversion_event_subtype = 'order'
   GROUP BY c.advertiser, c.user_id,c.campaign,c.device_type)
```

```
--Query to generate a report by combining information from the above tables
SELECT d.advertiser,
   d.campaign,
   d.device_type,

   --Identify the different frequency buckets. This can be modified based on which frequency buckets the customer wants to
focus on
  CASE
        WHEN d.impressions BETWEEN 1 AND 5 THEN 'Freq 01 to 05'
        WHEN d.impressions BETWEEN 6 AND 10 THEN 'Freq 06 to 10'
        WHEN d.impressions BETWEEN 11 AND 15 THEN 'Freq 11 to 15'
        WHEN d.impressions BETWEEN 16 AND 20 THEN 'Freq 16 to 20'
        WHEN d.impressions BETWEEN 21 AND 25 THEN 'Freq 21 to 25'
        WHEN d.impressions BETWEEN 26 AND 30 THEN 'Freq 26 to 30'
        WHEN d.impressions BETWEEN 31 AND 35 THEN 'Freq 31 to 35'
        ELSE 'Freq 35+' END as frequency_buckets,
      COUNT(DISTINCT d.user_id) AS users_in_bucket,
      sum(d.impressions) as impressions,
      sum(d.TOTAL_COST) as total_cost,
      sum(c.conversions) as conversions,
      sum(c.purchases) as purchases,
      sum(c.total_purchases) as total_purchases,

      --Product Sales is total sales (in local currency) of promoted ASINs purchased by customers on Amazon after delivering
an ad.
      --Total Product Sales is The total sales (in local currency) of promoted ASINs and ASINs from the same brands as promoted
ASINs purchased by customers on Amazon after delivering an ad.
      SUM(c.product_sales) AS product_sales,
      sum(c.total_product_sales) as total_product_sales,

    --Calculated ROAS values using Sales and Cost information. Query can be expanded by adding additional calculated fields
      ROUND(sum(c.total_product_sales)/sum(d.total_cost),2) as ROAS_Totalproductsales,
      ROUND(sum(c.product_sales)/sum(d.total_cost),2) as ROAS_Productsales
      ,sum(c.total_purchases)/COUNT(DISTINCT d.user_id) as conversion_rate_total_purchases
      ,sum(c.purchases)/COUNT(DISTINCT d.user_id)    as conversion_rate_purchases
      ,sum(c.total_purchases)/SUM(d.impressions)                as conversion_rate_impressions_total_purchases
      ,sum(c.purchases)/SUM(d.impressions)                as conversion_rate_impressions_purchases
      ,sum(d.clicks) as Clicks,
      BUILT_IN_PARAMETER('TIME_WINDOW_START') AS time_window_start,
      BUILT_IN_PARAMETER('TIME_WINDOW_END') AS time_window_end
 FROM IMPCLICK d
LEFT JOIN CONV c on d.advertiser = c.advertiser and d.campaign = c.campaign
and d.user_id =c.user_id  and d.device_type =c.device_type
GROUP BY d.advertiser,
d.campaign, frequency_buckets,d.device_type
```

Visual Description:
Users per bucket (Reach) against ROAS View:
Provides details on Reach and Return on Ad spend for a selected campaign.

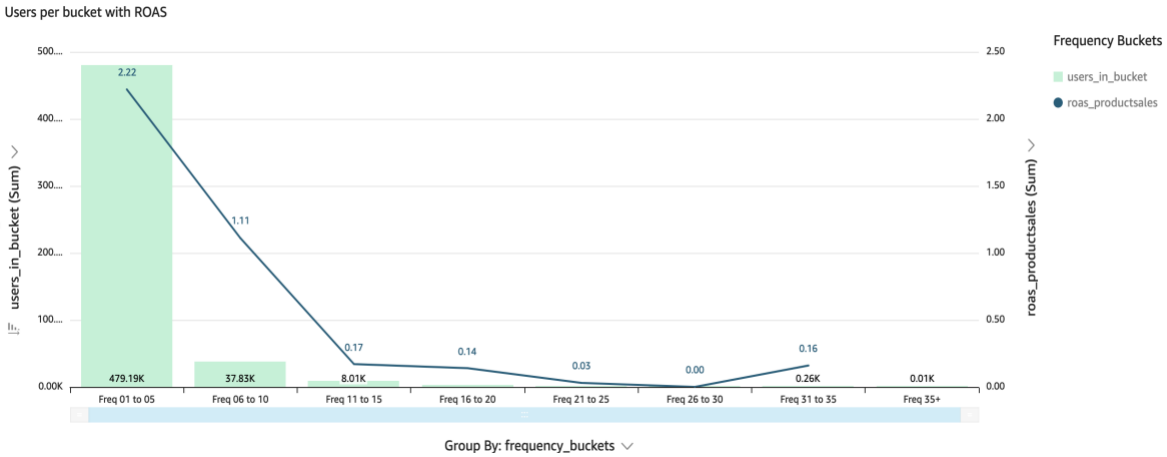

Figure 2.1: Frequency Distribution with ROAS and Reach

Tabular View:
Provides the view of various KPIs per Campaign. This table provides details about the revenue, purchases, and ROAS for a given campaign over a specified timeframe.

Tabular Overview of Frequency Distribution

Advertiser	Campaign	Device Type	Frequency Buckets	Impressions	Impression Cost	Purchases	Revenue	ROAS over Revenue
Demobrand_3	Campaign26	Phone	Freq 01 to 05	163,979	954.49	995	9,167.11	9.60
Demobrand_3	Campaign26	PC	Freq 01 to 05	77,196	345.50	275	2,920.39	8.45
Demobrand_4	Campaign23	Phone	Freq 01 to 05	302,223	2,213.17	1,339	16,817.33	7.60
Demobrand_2	Campaign16	Tablet	Freq 01 to 05	2,984	7.79	4	57.15	7.33
Demobrand_3	Campaign26	Tablet	Freq 01 to 05	5,770	15.61	11	114.22	7.32
Demobrand_2	Campaign16	Phone	Freq 01 to 05	141,749	965.57	513	6,081.59	6.30
Demobrand_4	Campaign23	PC	Freq 01 to 05	132,833	779.40	309	4,582.70	5.88
Demobrand_4	Campaign23	Tablet	Freq 01 to 05	9,956	51.92	19	291.53	5.61
Demobrand_4	Campaign22	PC	Freq 01 to 05	48,656	267.82	73	1,393.91	5.20
Demobrand_3	Campaign18	PC	Freq 01 to 05	26,406	116.21	67	575.70	4.95
Demobrand_3	Campaign18	Phone	Freq 01 to 05	153,787	937.72	600	4,621.15	4.93
Demobrand_1	Campaign4	TV	Freq 01 to 05	307	1.89	2	9.30	4.92
Demobrand_4	Campaign22	Phone	Freq 01 to 05	232,044	1,963.98	462	8,500.35	4.33
Demobrand_3	Campaign26	PC	Freq 11 to 15	16,936	59.95	8	252.36	4.21
Demobrand_2	Campaign16	Phone	Freq 06 to 10	23,831	139.94	35	536.93	3.84

Figure 2.2: Frequency Distribution Tabular View

Users per bucket (Reach), with device type against ROAS View:
Provides details on Reach and product sales per device type for a selected campaign.

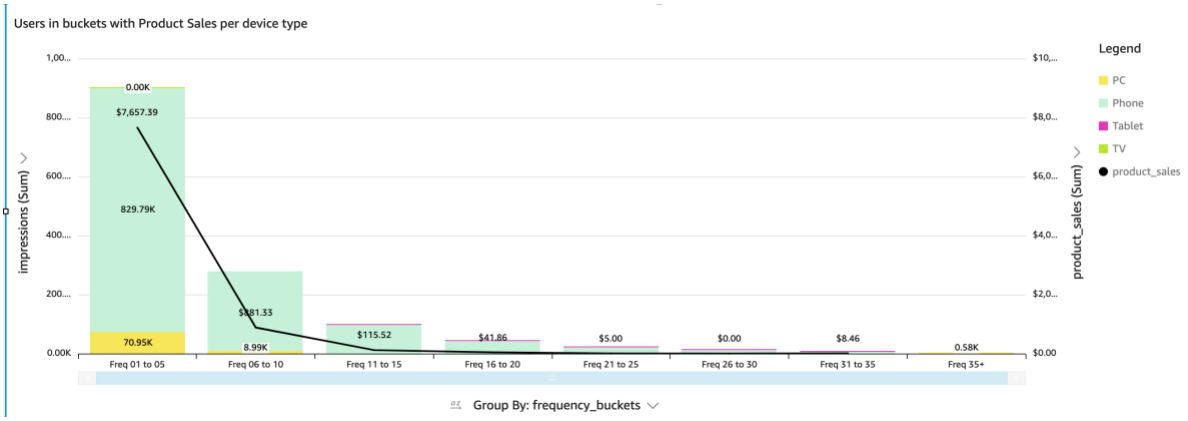

Figure 2.3: Frequency Distribution with ROAS per Reach and Device Type

ROAS over frequency buckets and device type view:
Provides an overview on ROAS distributed across frequency buckets and Device Type

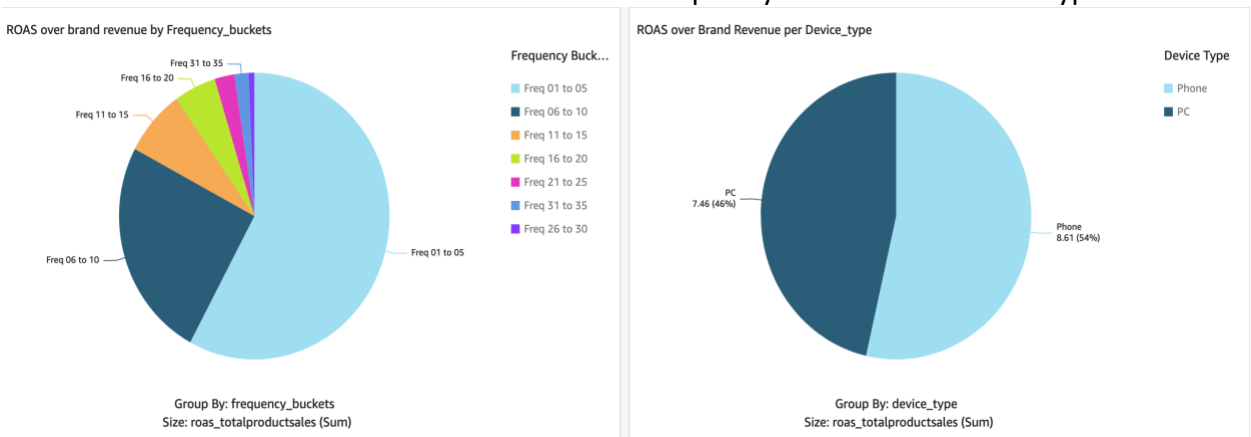

Figure 2.4: Frequency Distribution ROAS over Frequency Buckets and Device Type

3. Device Exposure

This use case helps to determine performance metrics (i.e., ROAS, Impressions, Conversions, Clicks) across device types (e.g., TV, Mobile, PC, Tablet) for purchases of assigned customer products on Amazon. It is used to analyze the reach overlap across devices and/or exposure path to understand their impact on performance data. It helps clients gain visibility into how their users are being served media across their different devices, and the associated cost (E.g., how many TV users vs phone users were presented an impression over time). This use highlights the targeted device combinations that maximize reach and understand conversion performance for those device combinations for returning and new to brand users.

Key Performance Indicators:

a. Impressions – Per device path, Campaign
b. Total Cost – Per device path, Campaign
c. Reach – Per device path, Campaign
d. Clicks – Per device path, Campaign
e. Detail Page View – Per device path, Campaign
f. Product Sales (Revenue)– Per device path, Campaign
g. Purchases – Per device path, Campaign
h. New to brand purchases – Per device path, Campaign
i. Total Cost – Per device path, Campaign
j. ROAS over Product Sales (Revenue)– – Per device path, Campaign

Business Outcomes:

This section provides potential business outcomes derived from the Device Exposure use case

1. Investigate customer's path to conversion based on different devices vs combination of devices (PC, TV, Mobile, Tablet) to understand if there is a pattern that indicates a better chance of conversion, further knowledge of upper funnel device impact on conversions that occur on other devices, etc.
2. Understand the impact of being served advertisements on more than one device (PC, TV, Mobile, Tablet) vs only one (e.g., exposed to impressions only on phone vs phone and TV, and any other combination) to better understand performance impact of omnichannel targeting
3. Optimize Campaign to select device combinations that can yield better conversions and reach.

Visual Details:

Query used for the visual:

SQL Name: **DeviceExposure.sql**

```
--Device Exposure Query
--This query provides a holistic view of customer's path to conversion based on different devices vs combination of devices (PC, TV, Mobile, Tablet) for DSP campaigns

--Note: You can also filter out the desired Campaigns and perform analysis only for those campaigns by adding adding a campaign filter in the where clause

--Perform a union all from three tables to collect KPIs from the display_impressions,display_clicks and amazon_attributed_events_by_traffic_time tables
WITH user_exposure AS (
  (
  SELECT  'dsp' as ad_product_type,
   A.user_id,
   A.campaign,
   A.Advertiser,
   1 as user_count,
```

```
    0 as new_to_brand,
    0 as DPV_dsp,
    0 as unique_dpv,
    0 as purchases,
    0 as unique_purchases,
    0 as phone_purch,
    0 as tablet_purch,
    0 as TV_purch,
    0 as PC_purch,
    0 as other_purch,
    0.0 as phone_rev,
    0.0 as tablet_rev,
    0.0 as TV_rev,
    0.0 as PC_rev,
    0.0 as other_rev,
--The case statements are used to identify the different device types the user was exposed to
    SUM( CASE WHEN A.device_type = 'Phone' THEN A.impressions ELSE 0 END ) as phone_imp,
    SUM( CASE WHEN A.device_type = 'Tablet' THEN A.impressions ELSE 0 END ) as tablet_imp,
    SUM( CASE WHEN A.device_type = 'TV' THEN A.impressions ELSE 0 END ) as TV_imp,
    SUM( CASE WHEN A.device_type = 'PC' THEN A.impressions ELSE 0 END ) as PC_imp,
    SUM( CASE WHEN A.device_type != 'PC' AND A.device_type != 'TV' AND A.device_type != 'Phone' AND A.device_type !=
'Tablet' THEN A.impressions ELSE 0 END ) as other_imp,
    SUM( CASE WHEN A.device_type = 'Phone' THEN A.total_cost ELSE 0.0 END ) as phone_cost,
    SUM( CASE WHEN A.device_type = 'Tablet' THEN A.total_cost ELSE 0.0 END ) as tablet_cost,
    SUM( CASE WHEN A.device_type = 'TV' THEN A.total_cost ELSE 0.0 END ) as TV_cost,
    SUM( CASE WHEN A.device_type = 'PC' THEN A.total_cost ELSE 0.0 END ) as PC_cost,
    SUM( CASE WHEN A.device_type != 'PC' AND A.device_type != 'TV' AND A.device_type != 'Phone' AND A.device_type !=
'Tablet' THEN A.total_cost ELSE 0.0 END ) as other_cost,
    0 as phone_clicks,
    0 as tablet_clicks,
    0 as TV_clicks,
    0 as PC_clicks,
    0 as other_clicks
    FROM display_impressions A
    WHERE user_id is not null
    GROUP BY user_id,campaign,Advertiser
    )
 UNION ALL
    (
    SELECT  'dsp' as ad_product_type,
    B.user_id,
    campaign,
    Advertiser,
    1 as user_count,
    0 as new_to_brand,
    0 as DPV_dsp,
    0 as unique_dpv,
```

```
    0 as purchases,
    0 as unique_purchases,
    0 as phone_purch,
    0 as tablet_purch,
    0 as TV_purch,
    0 as PC_purch,
    0 as other_purch,
    0.0 as phone_rev,
    0.0 as tablet_rev,
    0.0 as TV_rev,
    0.0 as PC_rev,
    0.0 as other_rev,
    0 as phone_imp,
    0 as tablet_imp,
    0 as TV_imp,
    0 as PC_imp,
    0 as other_imp,
    0.0 as phone_cost,
    0.0 as tablet_cost,
    0.0 as TV_cost,
    0.0 as PC_cost,
    0.0 as other_cost,
    SUM( CASE WHEN B.device_type = 'Phone' THEN B.clicks ELSE 0 END ) as phone_clicks,
    SUM( CASE WHEN B.device_type = 'Tablet' THEN B.clicks ELSE 0 END ) as tablet_clicks,
    SUM( CASE WHEN B.device_type = 'TV' THEN B.clicks ELSE 0 END ) as TV_clicks,
    SUM( CASE WHEN B.device_type = 'PC' THEN B.clicks ELSE 0 END ) as PC_clicks,
    SUM( CASE WHEN B.device_type != 'PC' AND B.device_type != 'TV' AND B.device_type != 'Phone' AND B.device_type !=
'Tablet' THEN B.clicks ELSE 0 END ) as other_clicks
    from display_clicks B
    WHERE user_id is not null
    GROUP BY user_id,campaign,Advertiser
    )
    UNION ALL
    (
    SELECT  COALESCE(ad_product_type,'dsp'),
    user_id,
    campaign,
    Advertiser,
    1 as user_count,
    SUM(new_to_brand_purchases) as new_to_brand,
    SUM(case when conversion_event_subtype = 'detailPageView' then 1 else 0 end) as DPV_dsp,
    case when SUM(case when conversion_event_subtype = 'detailPageView' then 1 else 0 end) > 0 then 1 else 0 end as
unique_dpv,
    SUM(purchases) as purchases,
    case when SUM(purchases) > 0 then 1 else 0 end as unique_purchases,
    --Identified only purchases and product_sales here. This can be expanded to bring the total_purchases and
total_product_sales
```

```
    SUM( CASE WHEN device_type = 'Phone' THEN purchases ELSE 0 END ) as phone_purch,
    SUM( CASE WHEN device_type = 'Tablet' THEN purchases ELSE 0 END ) as tablet_purch,
    SUM( CASE WHEN device_type = 'TV' THEN purchases ELSE 0 END ) as TV_purch,
    SUM( CASE WHEN device_type = 'PC' THEN purchases ELSE 0 END ) as PC_purch,
    SUM( CASE WHEN device_type != 'PC' AND device_type != 'TV' AND device_type != 'Phone' AND device_type != 'Tablet'
THEN purchases ELSE 0 END ) as other_purch,
    SUM( CASE WHEN device_type = 'Phone' THEN product_sales ELSE 0.0 END ) as phone_rev,
    SUM( CASE WHEN device_type = 'Tablet' THEN product_sales ELSE 0.0 END ) as tablet_rev,
    SUM( CASE WHEN device_type = 'TV' THEN product_sales ELSE 0.0 END ) as TV_rev,
    SUM( CASE WHEN device_type = 'PC' THEN product_sales ELSE 0.0 END ) as PC_rev,
    SUM( CASE WHEN device_type != 'PC' AND device_type != 'TV' AND device_type != 'Phone' AND device_type != 'Tablet'
THEN product_sales ELSE 0.0 END ) as other_rev,
    0 as phone_imp,
    0 as tablet_imp,
    0 as TV_imp,
    0 as PC_imp,
    0 as other_imp,
    0.0 as phone_cost,
    0.0 as tablet_cost,
    0.0 as TV_cost,
    0.0 as PC_cost,
    0.0 as other_cost ,
    0 as phone_clicks,
    0 as tablet_clicks,
    0 as TV_clicks,
    0 as PC_clicks,
    0 as other_clicks
    FROM amazon_attributed_events_by_traffic_time
    WHERE user_id is not null
    and ad_product_type is null
    GROUP BY user_id,ad_product_type,campaign,Advertiser)
),
--Combine the values from the above table and identify the pre aggregated values
pre_aggregated as (
select case when ad_product_type='dsp' THEN 'dsp' else '' end as ad_product_type,
 user_id,
 campaign,
 Advertiser,
 SUM(user_count) as reach,
 SUM(new_to_brand) as new_to_brand,
 SUM(DPV_dsp) as DPV_dsp,
 SUM(unique_dpv) as unique_dpv,
 SUM(purchases) as purchases,
 SUM(unique_purchases) as unique_purchases,
 SUM(phone_purch) as phone_purch,
 SUM(tablet_purch) as tablet_purch,
 SUM(TV_purch) as TV_purch,
```

```
 SUM(PC_purch) as PC_purch,
 SUM(other_purch) as other_purch,
 SUM(phone_rev) as phone_rev,
 SUM(tablet_rev) as tablet_rev,
 SUM(TV_rev) as TV_rev,
 SUM(PC_rev) as PC_rev,
 SUM(cast(other_rev as double)) as other_rev,
 SUM(phone_imp) as phone_imp,
 SUM(tablet_imp) as tablet_imp,
 SUM(TV_imp) as TV_imp,
 SUM(PC_imp) as PC_imp,
 SUM(other_imp) as other_imp,
 SUM(phone_cost) as phone_cost,
 SUM(tablet_cost) as tablet_cost,
 SUM(TV_cost) as TV_cost,
 SUM(PC_cost) as PC_cost,
 SUM(other_cost) as other_cost ,
 SUM(phone_clicks) as phone_clicks,
 SUM(tablet_clicks) as tablet_clicks,
 SUM(TV_clicks) as TV_clicks,
 SUM(PC_clicks) as PC_clicks,
 SUM(other_clicks) as other_clicks
 from user_exposure
 group by ad_product_type, user_id, campaign, Advertiser
 ),
--Identify the exposure group using the case statements and KPIs per exposure group and users
aggregated as (
select ad_product_type,
 user_id,
 campaign,
 Advertiser,
 reach,
 new_to_brand,
 DPV_dsp,
 unique_dpv,
 purchases,
 unique_purchases,
 CASE
   WHEN (phone_imp > 0 OR phone_purch > 0) AND tablet_imp = 0 AND tablet_purch = 0 AND PC_imp = 0 AND PC_purch = 0
AND TV_imp = 0 AND TV_purch = 0 AND other_imp = 0 AND other_purch = 0 THEN 'phone_only'
   WHEN phone_imp = 0 AND phone_purch = 0 AND (tablet_imp > 0 OR tablet_purch > 0) AND PC_imp = 0 AND PC_purch = 0
AND TV_imp = 0 AND TV_purch = 0 AND other_imp = 0 AND other_purch = 0 THEN 'tablet_only'
   WHEN phone_imp = 0 AND phone_purch = 0 AND tablet_imp = 0 AND tablet_purch = 0 AND (PC_imp > 0 OR PC_purch > 0)
AND TV_imp = 0 AND TV_purch = 0 AND other_imp = 0 AND other_purch = 0 THEN 'PC_only'
   WHEN phone_imp = 0 AND phone_purch = 0 AND tablet_imp = 0 AND tablet_purch = 0 AND PC_imp = 0 AND PC_purch = 0
AND (TV_imp > 0 OR TV_purch > 0) AND other_imp = 0 AND other_purch = 0 THEN 'TV_only'
```

```
   WHEN (phone_imp > 0 OR phone_purch > 0) AND tablet_imp = 0 AND tablet_purch = 0 AND PC_imp = 0 AND PC_purch = 0
AND (TV_imp > 0 OR TV_purch > 0) AND other_imp = 0 AND other_purch = 0 THEN 'Phone_and_TV'
   WHEN phone_imp = 0 AND phone_purch = 0 AND tablet_imp = 0 AND tablet_purch = 0 AND (PC_imp > 0 OR PC_purch > 0)
AND (TV_imp > 0 OR TV_purch > 0) AND other_imp = 0 AND other_purch = 0 THEN 'PC_and_TV'
   WHEN phone_imp = 0 AND phone_purch = 0 AND (tablet_imp > 0 OR tablet_purch > 0) AND PC_imp = 0 AND PC_purch = 0
AND (TV_imp > 0 OR TV_purch > 0) AND other_imp = 0 AND other_purch = 0 THEN 'Tablet_and_TV'
   WHEN (phone_imp > 0 OR phone_purch > 0) AND tablet_imp = 0 AND tablet_purch = 0 AND (PC_imp > 0 OR PC_purch > 0)
AND TV_imp = 0 AND TV_purch = 0 AND other_imp = 0 AND other_purch = 0 THEN 'PC_and_Phone'
   WHEN (phone_imp > 0 OR phone_purch > 0) AND (tablet_imp > 0 OR tablet_purch > 0) AND PC_imp = 0 AND PC_purch = 0
AND TV_imp = 0 AND TV_purch = 0 AND other_imp = 0 AND other_purch = 0 THEN 'Tablet_and_Phone'
   WHEN phone_imp = 0 AND phone_purch = 0 AND (tablet_imp > 0 OR tablet_purch > 0) AND (PC_imp > 0 OR PC_purch > 0)
AND TV_imp = 0 AND TV_purch = 0 AND other_imp = 0 AND other_purch = 0 THEN 'PC_and_Tablet'
   WHEN (phone_imp > 0 OR phone_purch > 0) AND tablet_imp = 0 AND tablet_purch = 0 AND (PC_imp > 0 OR PC_purch > 0)
AND (TV_imp > 0 OR TV_purch > 0) AND other_imp = 0 AND other_purch = 0 THEN 'Phone_and_TV_and_PC'
   WHEN (phone_imp > 0 OR phone_purch > 0) AND (tablet_imp > 0 OR tablet_purch > 0) AND PC_imp = 0 AND PC_purch = 0
AND (TV_imp > 0 OR TV_purch > 0) AND other_imp = 0 AND other_purch = 0 THEN 'Phone_and_TV_and_Tablet'
   WHEN phone_imp = 0 AND phone_purch = 0 AND (tablet_imp > 0 OR tablet_purch > 0) AND (PC_imp > 0 OR PC_purch > 0)
AND (TV_imp > 0 OR TV_purch > 0) AND other_imp = 0 AND other_purch = 0 THEN 'PC_and_TV_and_Tablet'
   WHEN (phone_imp > 0 OR phone_purch > 0) AND (tablet_imp > 0 OR tablet_purch > 0) AND (PC_imp > 0 OR PC_purch > 0)
AND TV_imp = 0 AND TV_purch = 0 AND other_imp = 0 AND other_purch = 0 THEN 'Phone_and_PC_and_Tablet'
   WHEN (phone_imp > 0 OR phone_purch > 0) AND (tablet_imp > 0 OR tablet_purch > 0) AND (PC_imp > 0 OR PC_purch > 0)
AND (TV_imp > 0 OR TV_purch > 0) AND other_imp = 0 AND other_purch = 0 THEN 'PC_and_TV_and_Tablet_and_Phone'
ELSE 'NA' END as exposure_group,
 phone_purch,
 tablet_purch,
 TV_purch,
 PC_purch,
 other_purch,
 phone_rev,
 tablet_rev,
 TV_rev,
 PC_rev,
 other_rev,
 phone_imp,
 tablet_imp,
 TV_imp,
 PC_imp,
 other_imp,
 phone_cost,
 tablet_cost,
 TV_cost,
 PC_cost,
 other_cost ,
 phone_clicks,
 tablet_clicks,
 TV_clicks,
 PC_clicks,
```

```
 other_clicks
  from pre_aggregated
)


--Build a report to extract all the aggregated value per exposure group for DSP campaigns
SELECT ad_product_type,
 Advertiser,
 campaign,
 exposure_group,
 BUILT_IN_PARAMETER('TIME_WINDOW_START') AS time_window_start,
 BUILT_IN_PARAMETER('TIME_WINDOW_END') AS time_window_end,
 SUM(reach) as reach,
 sum(new_to_brand) as new_to_brand,
 SUM(DPV_dsp) as DPV_dsp,
 SUM(unique_dpv) as unique_dpv,
 SUM(purchases) as purchases,
 SUM(unique_purchases) as unique_purchases,
 SUM(phone_imp) as phone_impressions,
 SUM(tablet_imp) as tablet_impressions,
 SUM(TV_imp) as TV_impressions,
 SUM(PC_imp) as PC_impressions,
 SUM(other_imp) as other_impressions,
 (SUM(phone_imp)+SUM(tablet_imp)+SUM(TV_imp)+SUM(PC_imp)+SUM(other_imp)) as exposure_group_imp,
 SUM(phone_cost)/100000 as phone_cost,
 SUM(tablet_cost)/100000 as tablet_cost,
 SUM(TV_cost)/100000 as TV_cost,
 SUM(PC_cost)/100000 as PC_cost,
 SUM(other_cost)/100000 as other_cost,
 ((SUM(phone_cost)+SUM(tablet_cost)+SUM(TV_cost)+SUM(PC_cost)+SUM(other_cost))/100000) as exposure_group_cost,
 SUM(phone_clicks) as phone_clicks,
 SUM(tablet_clicks) as tablet_clicks,
 SUM(TV_clicks) as TV_clicks,
 SUM(PC_clicks) as PC_clicks,
 SUM(other_clicks) as other_clicks,
 ((SUM(phone_clicks)+SUM(tablet_clicks)+SUM(TV_clicks)+SUM(PC_clicks)+SUM(other_clicks))) as exposure_group_clicks,
 SUM(phone_purch) as phone_purchases,
 SUM(tablet_purch) as tablet_purchases,
 SUM(TV_purch) as TV_purchases,
 SUM(PC_purch) as PC_purchases,
 SUM(other_purch) as other_purchases,
 (SUM(phone_purch)+SUM(tablet_purch)+SUM(TV_purch)+SUM(PC_purch)+SUM(other_purch))                    as
exposure_group_purchases,
 SUM(phone_rev)*1.0 as phone_revenue,
 CASE WHEN SUM(tablet_rev)>0 THEN SUM(tablet_rev) ELSE 0.0 END as tablet_revenue,
 CASE WHEN SUM(TV_rev)>0 THEN SUM(TV_rev) ELSE 0.0 END as TV_revenue,
 CASE WHEN SUM(PC_rev)>0 THEN SUM(PC_rev) ELSE 0.0 END as PC_revenue,
```

```
CASE WHEN SUM(other_rev)>0 THEN SUM(other_rev) ELSE 0.0 END as other_revenue,
(SUM(phone_rev)+SUM(tablet_rev)+SUM(TV_rev)+SUM(PC_rev)+SUM(other_rev))*1.0 as exposure_group_revenue,

--Calculated ROAS values using Sales and Cost information. Query can be expanded by adding additional calculated fields
CASE WHEN SUM(phone_cost)>0 THEN SUM(phone_rev)/(SUM(phone_cost)/100000) ELSE 0.0 END as phone_roas,
CASE WHEN SUM(tablet_cost)>0 THEN SUM(tablet_rev)/(SUM(tablet_cost)/100000) ELSE 0.0 END as tablet_roas,
CASE WHEN SUM(TV_cost)>0 THEN SUM(TV_rev)/(SUM(TV_cost)/100000) ELSE 0.0 END as TV_roas,
CASE WHEN SUM(PC_cost)>0 THEN SUM(PC_rev)/(SUM(PC_cost)/100000) ELSE 0.0 END as PC_roas,
CASE WHEN SUM(other_cost)>0 THEN SUM(other_rev)/(SUM(other_cost)/100000) ELSE 0.0 END as Other_roas,
CASE WHEN ((SUM(phone_cost)+SUM(tablet_cost) +SUM(TV_cost)+SUM(PC_cost)+SUM(other_cost))/100000)>0
THEN (SUM(phone_rev)+SUM(tablet_rev)+SUM(TV_rev)+SUM(PC_rev)+SUM(other_rev))/
((SUM(phone_cost)+SUM(tablet_cost) +SUM(TV_cost)+SUM(PC_cost)+SUM(other_cost))/100000)
ELSE 0.0 END as exposure_group_roas
FROM aggregated
GROUP BY ad_product_type, exposure_group, campaign, Advertiser
```

Graphs across specified date range:

Table View:

Provides the view of various KPIs per device path. This table provides details about the impressions, revenue, purchases, cost and ROAS for a given device path over a specified timeframe.

Exposure Overview

Advertiser	Campaign	Analysis Start Date	Analysis End Date	Exposure Group	PC Impressions	Phone Impressions	Tablet Impressions	TV Impressions	Other Impressions	Exposure Group Impressions	PC Clicks	Phone Clicks	Tablet Clicl
Demobrand_1	Campaign1	Aug 1, 2021	Aug 8, 2021	PC_only	2,197	0	0	0	0	2,197	4	0	
Demobrand_1	Campaign1	Aug 1, 2021	Aug 8, 2021	TV_only	0	0	0	7	0	7	0	0	
Demobrand_1	Campaign1	Aug 1, 2021	Aug 8, 2021	tablet_only	0	0	555	0	0	555	0	0	
Demobrand_1	Campaign10	Aug 1, 2021	Aug 8, 2021	PC_and_Phone	8,238	15,508	0	0	0	23,746	2	32	
Demobrand_1	Campaign10	Aug 1, 2021	Aug 8, 2021	PC_and_Tablet	209	0	4,105	0	0	4,314	0	0	
Demobrand_1	Campaign10	Aug 1, 2021	Aug 8, 2021	PC_only	46,575	0	0	0	0	46,575	11	0	
Demobrand_1	Campaign10	Aug 1, 2021	Aug 8, 2021	Phone_and_PC_and_...	62	117	2,972	0	0	3,151	0	0	
Demobrand_1	Campaign10	Aug 1, 2021	Aug 8, 2021	Phone_and_TV	0	19	0	4	0	23	0	0	
Demobrand_1	Campaign10	Aug 1, 2021	Aug 8, 2021	TV_only	0	0	0	3	0	3	0	0	
Demobrand_1	Campaign10	Aug 1, 2021	Aug 8, 2021	Tablet_and_Phone	0	9,120	28,748	0	0	37,868	0	42	1
Demobrand_1	Campaign10	Aug 1, 2021	Aug 8, 2021	phone_only	0	732,740	0	0	0	732,740	0	1,674	
Demobrand_1	Campaign10	Aug 1, 2021	Aug 8, 2021	tablet_only	0	0	70,399	0	0	70,399	0	0	4
Demobrand_1	Campaign11	Aug 1, 2021	Aug 8, 2021	TV_only	0	0	0	200,320	0	200,320	0	0	
Demobrand_1	Campaign11	Aug 1, 2021	Aug 8, 2021	phone_only	0	3	0	0	0	3	0	0	
Demobrand_1	Campaign12	Aug 1, 2021	Aug 8, 2021	PC_and_Tablet	50	0	669	0	0	719	0	0	
Demobrand_1	Campaign12	Aug 1, 2021	Aug 8, 2021	PC_only	167	0	0	0	0	167	0	0	
Demobrand_1	Campaign12	Aug 1, 2021	Aug 8, 2021	Phone_and_PC_and_...	67	45	965	0	0	1,077	0	0	
Demobrand_1	Campaign12	Aug 1, 2021	Aug 8, 2021	TV_only	0	0	0	364	0	364	0	0	
Demobrand_1	Campaign12	Aug 1, 2021	Aug 8, 2021	Tablet_and_Phone	0	39,575	85,473	0	0	125,048	0	80	3

Figure 3.1: Device Exposure Tabular view

Users per device path View:

Provides ROAS, Cost and Purchases KPIs for users per device path

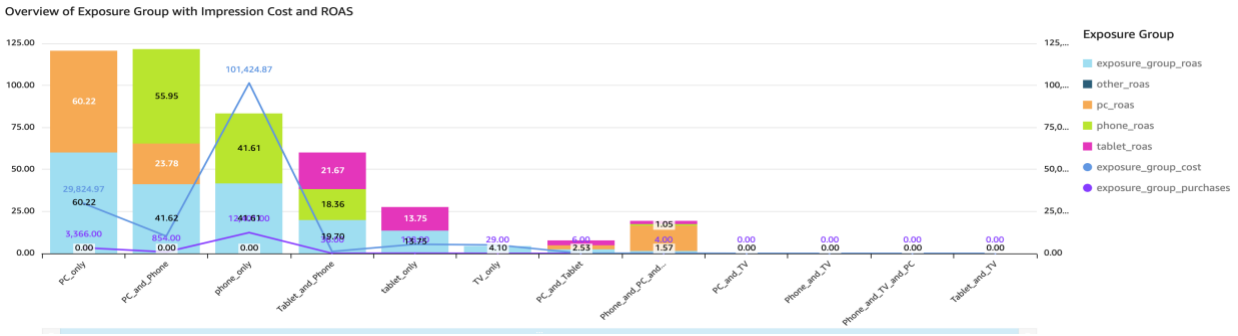

Figure 3.2: Device Exposure KPI view

New to Brand purchases and Unique Detail Page Views per Device Path View:
Provides details of new to brand purchases and detail page view across various device path combinations (PC, PC and Phone, Phone and Tablet, Phone etc.).

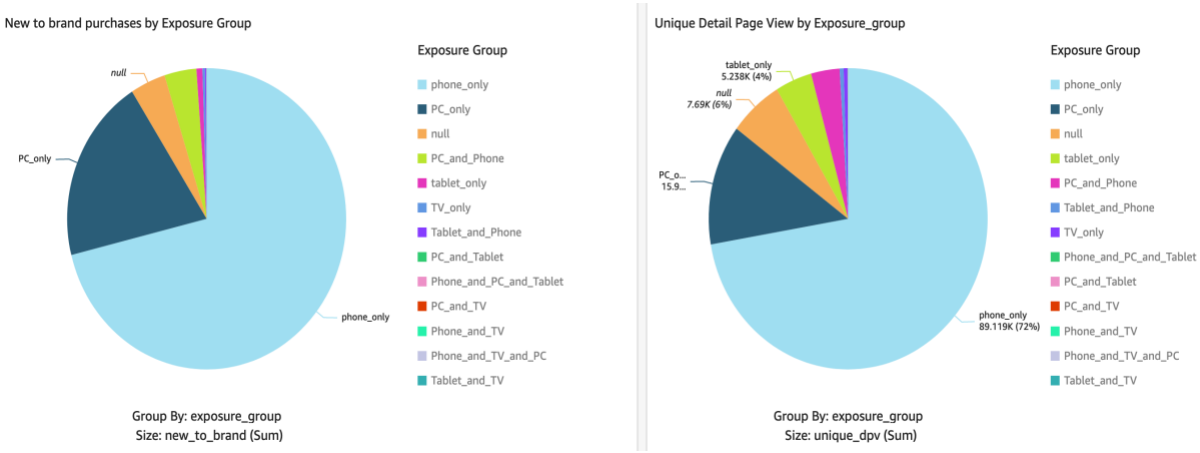

Figure 3.3: Device Exposure New to brand and Detail Page View

4. Geo Analysis

This use case determines performance data by geographic location (e.g.DMA) for purchases of assigned customer products on Amazon. It helps identify geographic location where the advertiser is over or under performing and highlights areas with highest purchases, reach, impressions and ROAS. Visuals can be analyzed per conversion event subtype, campaign, region and city.

Key Performance Indicators:

a. Impressions – Per Campaign, Device Type, DMA
b. Reach – Per Campaign, Device Type, DMA
c. Total Cost – Per Campaign, Device Type, DMA
d. Conversions – Per Campaign, Device Type, DMA
e. Purchases – Per Campaign, Device Type, DMA
f. New to brand Purchases – Per Campaign, Device Type, DMA
g. New to brand Product Sales – Per Campaign, Device Type, DMA
h. Product Sales (Revenue) – Per Campaign, Device Type, DMA
i. ROAS over Revenue – Per Campaign, Device Type, DMA

Business Outcomes:

This section provides potential business outcomes derived from the Geo Analysis use case

1. Shift lower funnel/performance media spend away from geographic locations that are underperforming ROAS, Revenue, Purchases, and/or committed action data.
2. Shift lower funnel/performance media spends towards geographic locations with high performance ROAS, Revenue, Purchases, and/or committed action data

3. Test shifting upper funnel/branding media spend towards underperforming ROAS, Revenue, and/or Purchases DMAs in order to improve brand's footprints in the geos to help drive better lower funnel performance.

Visual Details:

Query used for the visual:

SQL Name: **GeoAnalysis.sql**

```
--Geo Analysis Query
--This query provides a holistic performance of DSP Campaigns based on geographic locations
--Note: You can also filter out the desired Campaigns and perform analysis only for those campaigns by adding adding a campaign filter in the where clause

--Gather impressions, clicks , geo information per user,advertiser and campaign
WITH IMP_CLK_INFO AS (
  SELECT
    A.ADVERTISER,
    A.advertiser_id,
    A.CAMPAIGN_ID,
    A.CAMPAIGN,
    A.campaign_start_date,
    A.campaign_end_date,
    A.device_type,
--Mapping between dma_code, city, region , latitude and longitude is available today and can be accessed for any visualization purposes or to identify any city or region in specific
    A.dma_code,
    A.user_id,
    SUM(A.IMPRESSIONS) AS IMPRESSIONS,
    SUM(B.CLICKS) AS TOTAL_CLICKS,
    SUM(A.TOTAL_COST / 100000) AS TOTAL_COST,
    BUILT_IN_PARAMETER ('TIME_WINDOW_START') AS time_window_start,
    BUILT_IN_PARAMETER ('TIME_WINDOW_END') AS time_window_end
  FROM
    display_impressions A
  LEFT JOIN DISPLAY_CLICKS B ON A.request_tag = B.request_tag and A.user_id =b.user_id
GROUP BY
  A.ADVERTISER,
  A.advertiser_id,
  A.CAMPAIGN_ID,
  A.CAMPAIGN,
  A.campaign_start_date,
  A.campaign_end_date,
  A.device_type,
  A.dma_code,
  A.user_id),

--Gather sales, geo information per user,advertiser and campaign
CONVERSIONS AS (
  SELECT
```

```
    A.ADVERTISER,
    A.advertiser_id,
    A.user_id,
    A.CAMPAIGN_ID,
    A.CAMPAIGN,
    A.campaign_start_date,
    A.campaign_end_date,
    A.device_type,
    A.dma_code,
    A.conversion_event_subtype,
    SUM(A.CONVERSIONS) AS CONVERSIONS,
    MAX(new_to_brand_purchases)  AS ntb -- Flag that indicates that within this timeframe the customer became a new to brand - not necessarily used here
   , SUM(purchases)              AS purchases
   , SUM(product_sales)          AS product_sales
   , SUM(new_to_brand_purchases)  AS ntb_purchases
   , SUM(new_to_brand_product_sales) AS ntb_product_sales
    ,BUILT_IN_PARAMETER ('TIME_WINDOW_START') AS time_window_start
   , BUILT_IN_PARAMETER ('TIME_WINDOW_END') AS time_window_end
  from
    amazon_attributed_events_by_conversion_time A
  group by
    A.ADVERTISER,
    A.advertiser_id,
    A.user_id,
    A.CAMPAIGN_ID,
    A.CAMPAIGN,
    A.campaign_start_date,
    A.campaign_end_date,
    A.dma_code,
    A.device_type,
    A.conversion_event_subtype
)
--Combine the sales and impressions , clicks and geo information from the above created tables and identify fields to be a part of the report
--This aggregation is only at the advertiser and the campaign level
--Geo level fields dma_code is only available for US only advertisers. Additional Geo fields like iso_state_province_code, postal_code can be used otherwise
SELECT
  A.ADVERTISER,
  A.CAMPAIGN_ID,
  A.CAMPAIGN,
  A.campaign_start_date,
  A.campaign_end_date,
  A.device_type,
  A.dma_code,
   B.conversion_event_subtype,
```

```
   SUM(A.IMPRESSIONS) AS IMPRESSIONS,
   SUM(A.TOTAL_CLICKS) AS TOTAL_CLICKS,
   SUM(A.TOTAL_COST) as TOTAL_COST,
   SUM(B.CONVERSIONS)                    AS Conversions
  ,COUNT(DISTINCT a.user_id)             AS total_unique_users
  , SUM(B.ntb)                           AS total_converted_ntb_users
  --Identified only purchases and product_sales here. This can be expanded to bring the total_purchases and
total_product_sales
  , SUM(B.purchases)                     AS purchases
  , SUM(B.product_sales)                 AS product_sales
  , SUM(B.ntb_purchases)                 AS total_ntb_purchases
  , SUM(B.ntb_product_sales)             AS total_ntb_product_sales
  , BUILT_IN_PARAMETER ('TIME_WINDOW_START') AS time_window_start
  , BUILT_IN_PARAMETER ('TIME_WINDOW_END') AS time_window_end

  --Calculated ROAS values using Sales and Cost information and Click thorugh rate based on Clicks and Impression KPIs. Query
can be expanded by adding additional calculated fields
   , SUM(B.product_sales) / SUM(A.total_cost) as ROAS
   , SUM(A.TOTAL_CLICKS )/ SUM(A.IMPRESSIONS) * 100 as CTR
FROM
   IMP_CLK_INFO A
   LEFT JOIN CONVERSIONS B ON A.ADVERTISER = B.ADVERTISER AND A.user_id = b.user_id
   AND A.CAMPAIGN_ID = B.CAMPAIGN_ID
   AND A.device_type = B.device_type
   AND A.dma_code = b.dma_code
   group by 1,2,3,4,5,6,7,8
```

Graphs across specified date range:

ROAS by region per Campaign (Choose the campaign from the table to analyze per campaign)

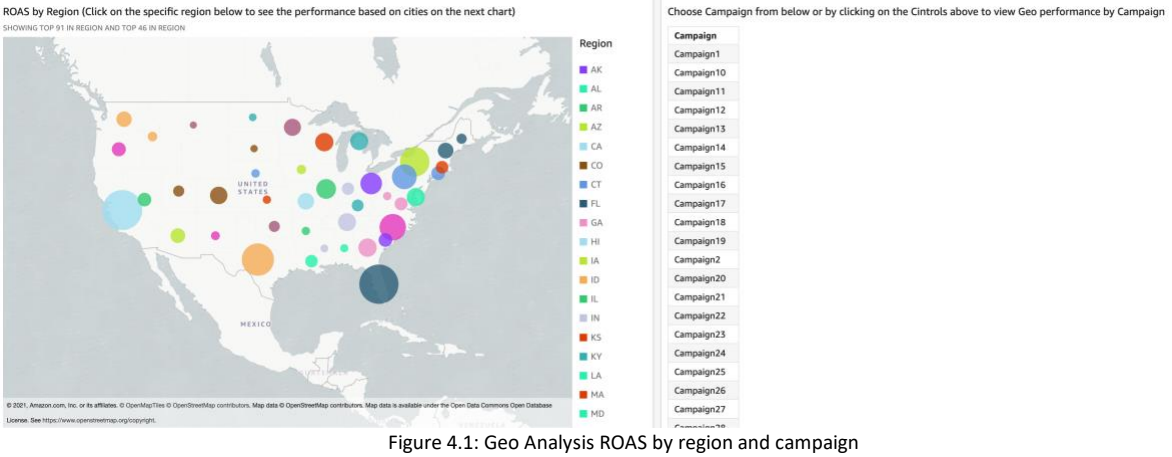

Figure 4.1: Geo Analysis ROAS by region and campaign

Impression and ROAS over Revenue (Click the Region on the Map to analyze per city))

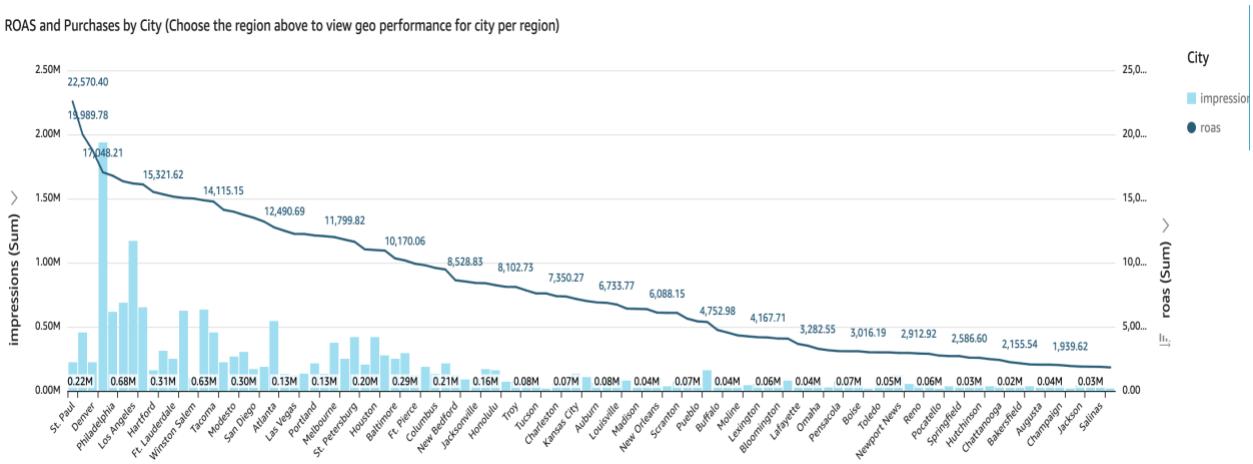

Figure 4.2: Geo Analysis ROAS by city

Impression and ROAS over Revenue (Click the Region on the Map to analyze per city))

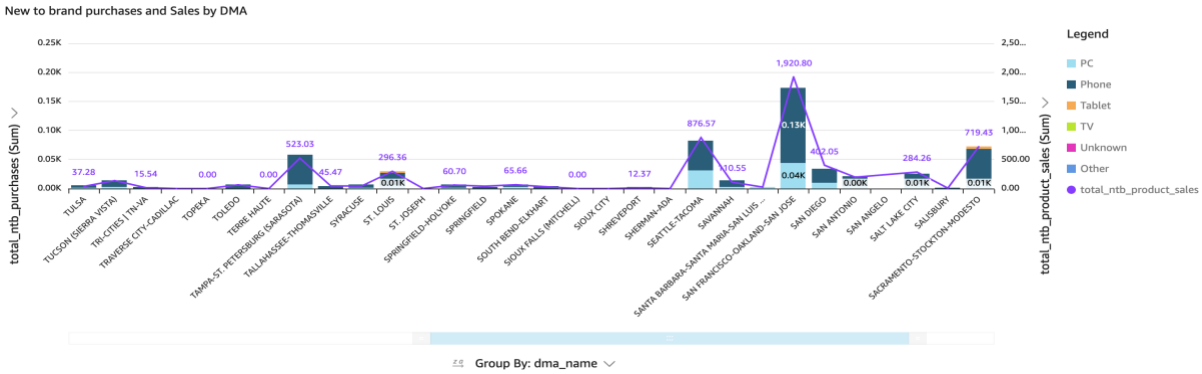

Figure 4.3: Geo Analysis New to brand and sales by DMA

Table View:

Provides the view of various KPIs per campaign, DMA, device type, conversion event subtype and City. This table provides details about the impressions, revenue, purchases, cost and ROAS for a given campaign over a specified timeframe.

Table Overview

Advertiser	Campaign	Campaign Start Date	Campaign End Date	City	Conversion Event Subtype	Device type	Conversions	Impressions	Purchases	Product Sales (Revenue)	ROAS over Revenue
Demobrand_1	Campaign1	Mar 2, 2021	Jul 31, 2021	New York	order	PC	3	5	0	0	0
Demobrand_1	Campaign1	Mar 2, 2021	Jul 31, 2021	Philadelphia	order	PC	3	2	0	0	0
Demobrand_1	Campaign10	Jan 1, 2021	Dec 31, 2021	Baltimore	order	PC	2	5	0	0	0
Demobrand_1	Campaign10	Jan 1, 2021	Dec 31, 2021	Ft. Lauderdale	order	PC	2	2	2	10	674.7638327000001
Demobrand_1	Campaign10	Jan 1, 2021	Dec 31, 2021	Ft. Worth	order	PC	3	8	1	14.64	217.59809750000002
Demobrand_1	Campaign10	Jan 1, 2021	Dec 31, 2021	Houston	order	PC	4	8	1	11.34	246.95121949999998
Demobrand_1	Campaign10	Jan 1, 2021	Dec 31, 2021	Jacksonville	order	PC	2	4	1	5	145.0957632
Demobrand_1	Campaign10	Jan 1, 2021	Dec 31, 2021	Kansas City	order	PC	3	5	1	5	155.18311609999998
Demobrand_1	Campaign10	Jan 1, 2021	Dec 31, 2021	Los Angeles	order	PC	11	27	2	19.26	96.72559261
Demobrand_1	Campaign10	Jan 1, 2021	Dec 31, 2021	Manchester	order	PC	4	19	0	0	0
Demobrand_1	Campaign10	Jan 1, 2021	Dec 31, 2021	Melbourne	order	PC	3	4	0	0	0
Demobrand_1	Campaign10	Jan 1, 2021	Dec 31, 2021	Philadelphia	order	PC	2	3	1	11.34	530.8988764
Demobrand_1	Campaign10	Jan 1, 2021	Dec 31, 2021	San Jose	order	PC	11	32	5	46.08	199.9479302
Demobrand_1	Campaign10	Jan 1, 2021	Dec 31, 2021	Toledo	order	PC	2	2	0	0	0
Demobrand_1	Campaign10	Jan 1, 2021	Dec 31, 2021	Washington DC	order	PC	8	27	1	8.46	52.68073977
Demobrand_1	Campaign13	Jan 1, 2021	Dec 31, 2021	Akron	order	PC	2	32	2	14.73	89.68036529999999
Demobrand_1	Campaign13	Jan 1, 2021	Dec 31, 2021	Ames	order	PC	2	4	1	6.49	203.9597737
Demobrand_1	Campaign13	Jan 1, 2021	Dec 31, 2021	Atlanta	order	PC	5	52	2	19.47	63.30883787

Figure 4.4: Geo Analysis Tabular View

5. Product Mix Analysis

This use case provides performance data of users exposed to both sponsored products (SP) and display campaigns (DSP) and KPIs surrounding them. It helps to analyze overall user performance across SP and DSP campaigns. This analysis is done at a user level.

Key Performance Indicators:

a. Impressions – DSP, SP and DSP&SP campaigns
b. Reach – DSP, SP and DSP&SP campaigns
c. Clicks – DSP, SP and DSP&SP campaigns
d. Total Cost – DSP, SP and DSP&SP campaigns
e. Product Sales (Revenue) – DSP, SP and DSP&SP campaign
f. Purchases – DSP, SP and DSP&SP campaigns
g. New to brand purchases– DSP, SP and DSP&SP campaigns
h. ROAS over Revenue – DSP, SP and DSP&SP campaigns

Business Outcomes:

This section provides potential business outcomes derived from the Product Mix Analysis use case.

1. This use case helps to study users exposed to both sponsored products and display. Were they more likely to purchase, or make a new to brand purchase, etc. when users were exposed to both vs just sponsored products or just display
2. Identify conversions and other performance metrics improvement by comparing user performance who have been exposed to sponsored products vs display and expose users to either both DSP or Sponsored products or both based on the insights derived from the analysis

Visual Details:

Query used for the visual:

SQL Name: **ProductMixAnalysis.sql**

```
--Product Mix Query
--This query provides a holistic overview of performance of users exposed to DSP and SP campaigns
--This query can be expanded to campaign level by introducing a campaign field with input provided from the user to
understand which DSP campaigns are to be compared with which Sponsored Products Advertiser campaigns

--Gather all sales information for targeted products
WITH SALES AS (
        SELECT USER_ID
            , CASE WHEN ADVERTISER_ID IS NULL THEN 'SP' ELSE 'ADSP' END AS sales_source
            , SUM(purchases)                        AS CONVERSIONS
            , SUM(product_sales)                    AS sales_amount
            , SUM(new_to_brand_purchases)           AS ntb_conversions
        FROM amazon_attributed_events_by_conversion_time
        WHERE conversion_event_subtype = 'order'
```

```
            AND purchases >= 1

          GROUP BY USER_ID, sales_source),


  -- Gather all display campaign KPI information
   ADSP_overall AS (
              SELECT A.user_id
                 , SUM(A.IMPRESSIONS)       AS adsp_impressions
                 , SUM(A.total_cost) / 100000 AS adsp_cost
                 , SUM(B.CLICKS)            AS adsp_clicks
              FROM DISPLAY_IMPRESSIONS A
                    LEFT JOIN DISPLAY_CLICKS B ON A.request_tag = B.request_tag
              GROUP BY A.user_id),


--Gather all Sponsored products information
   SP_overall AS (
             SELECT A.USER_ID
                , SUM(A.IMPRESSIONS)      AS SP_IMPRESSIONS
                , SUM(A.CLICKS)           AS SP_CLICKS
                , SUM(A.SPEND) / 100000000 AS SP_COST
             FROM sponsored_ads_traffic A
             GROUP BY A.user_id),

  --Combine the sponsored ads and display information and create the mix of products column
   Combined AS (
           SELECT DISTINCT
   --Case statement to identify users exposed to DSP campaigns and SP campaigns
           CASE
                       WHEN A.USER_ID IS NOT NULL
                          AND B.USER_ID IS NOT NULL
                          AND A.USER_ID = B.USER_ID THEN
                          'SP + ADSP'
                       WHEN A.USER_ID IS NOT NULL
                          AND B.USER_ID IS NULL THEN
                          'ADSP'
                       WHEN A.USER_ID IS NULL
                          AND B.USER_ID IS NOT NULL THEN
                          'SP'
                       ELSE
                          'NOT FOUND IN ADSP OR SP'
              END                              AS MIX_OF_PRODUCTS
                    , COALESCE(A.USER_ID, B.USER_ID) AS USER_ID
                    , A.adsp_impressions
                    , A.adsp_cost
                    , B.SP_IMPRESSIONS
```

```
                    , B.SP_CLICKS
                    , B.SP_COST
                    , A.adsp_clicks
            FROM ADSP_overall A
                FULL JOIN SP_overall B ON a.user_id = b.user_id
    )


--Bring in the fields from above tables along with individual SP and ADSP KPIs
SELECT BUILT_IN_PARAMETER('TIME_WINDOW_START')                              AS time_window_start
    , BUILT_IN_PARAMETER('TIME_WINDOW_END')                                 AS time_window_end
    , A.MIX_OF_PRODUCTS
    , COUNT(DISTINCT a.user_Id)                                             AS TOTAL_UNIQUE_USERS
    , COUNT(DISTINCT B.USER_ID)                                             AS TOTAL_UNIQUE_USERS_CONVERSIONS
    , (COUNT(DISTINCT a.user_Id) - COUNT(DISTINCT B.USER_ID))               AS
TOTAL_UNIQUE_USERS_NOT_CONVERTED
    , SUM(B.CONVERSIONS)                                                    AS TOTAL_CONVERSIONS
    , SUM(B.ntb_conversions)                                                AS NTB_CONVERSIONS
    , SUM(B.SALES_AMOUNT)                                                   AS SALES_AMOUNT
    , SUM(CASE WHEN B.SALES_SOURCE = 'ADSP' THEN B.SALES_AMOUNT ELSE 0 END)     AS ADSP_SALES
    , SUM(CASE WHEN B.SALES_SOURCE = 'SP' THEN B.SALES_AMOUNT ELSE 0 END)       AS SP_SALES
    , SUM(A.ADSP_impressions)                                               AS OVERALL_ADSP_impressions
    , SUM(A.adsp_clicks)                                                    AS OVERALL_ADSP_CLICKS
    , COUNT(A.ADSP_impressions)                                             AS OVERALL_ADSP_UNIQUE_USERS
    , SUM(A.ADSP_COST)                                                      AS OVERALL_ADSP_COST
    , SUM(CASE WHEN B.USER_ID IS NOT NULL THEN A.ADSP_impressions ELSE 0 END)    AS
CONVERTED_ADSP_IMPRESSIONS
    , SUM(CASE
          WHEN B.USER_ID IS NOT NULL AND COALESCE(A.ADSP_impressions, 0) > 0 THEN 1
          ELSE 0 END)                                                       AS CONVERTED_ADSP_UNIQUE_USERS
    , SUM(CASE WHEN B.USER_ID IS NOT NULL THEN A.ADSP_COST ELSE 0 END)          AS CONVERTED_ADSP_COST
    , (SUM(CASE WHEN B.SALES_SOURCE = 'ADSP' THEN B.SALES_AMOUNT ELSE 0 END) / SUM(A.ADSP_COST))    AS
ADSP_ROAS
    , SUM(A.SP_IMPRESSIONS)                                                 AS OVERALL_SP_IMPRESSIONS
    , SUM(A.SP_CLICKS)                                                      AS OVERALL_SP_CLICKS
    , COUNT(A.SP_IMPRESSIONS)                                               AS OVERALL_SP_UNIQUE_USERS
    , SUM(A.SP_COST)                                                        AS OVERALL_SP_COST
    , SUM(CASE WHEN B.USER_ID IS NOT NULL THEN A.SP_IMPRESSIONS ELSE 0 END)     AS
CONVERTED_SP_IMPRESSIONS
    , SUM(CASE WHEN B.USER_ID IS NOT NULL THEN A.SP_CLICKS ELSE 0 END)          AS CONVERTED_SP_CLICKS
    , SUM(CASE WHEN B.USER_ID IS NOT NULL AND COALESCE(A.SP_IMPRESSIONS, 0) > 0 THEN 1
      ELSE 0 END)                                                           AS CONVERTED_SP_UNIQUE_USERS
    , SUM(CASE WHEN B.USER_ID IS NOT NULL THEN A.SP_COST ELSE 0 END)            AS CONVERTED_SP_COST
    , (SUM(CASE WHEN B.SALES_SOURCE = 'SP' THEN B.SALES_AMOUNT ELSE 0 END) / SUM(A.SP_COST))    AS SP_ROAS
    , COUNT(a.user_id)                                                      AS TOTAL_RECORDS
    , (SUM(B.SALES_AMOUNT) / (SUM(A.SP_COST) + SUM(A.ADSP_COST)))           AS COMBINED_ROAS
FROM Combined A
```

```
    LEFT JOIN SALES B ON a.user_id = b.user_id
GROUP BY 3
```

Graphs across specified date range:

Table View:

This visual provides tabular view of key performance indicators for a specific given

Tabular Overview - Product Mix Analysis

Mix of Products	Analysis Start D...	Analysis End Date	Total Users	Total Unique User Conversi...	Total Unique Users not conve...	Combined RO...	ADSP ROAS	SP ROAS	New to brand conversi...	Overall SP C...
ADSP	Jul 25, 2021	Jul 31, 2021	4,324,946	1,859	4,323,084		0.20		472	
SP	Jul 25, 2021	Jul 31, 2021	2,508,754	18,395	2,490,346			1.72	460	138,514.24
SP + ADSP	Jul 25, 2021	Jul 31, 2021	734,844	21,022	713,677	1.68	4.68	1.31	3,161	152,624.58

Figure 5.1: Product Mix Analysis Tabular View

Total Users and User conversions per product mix view:

This visual provides details of total users exposed to DSP, SP and both DSP and SP campaigns and the total user conversions

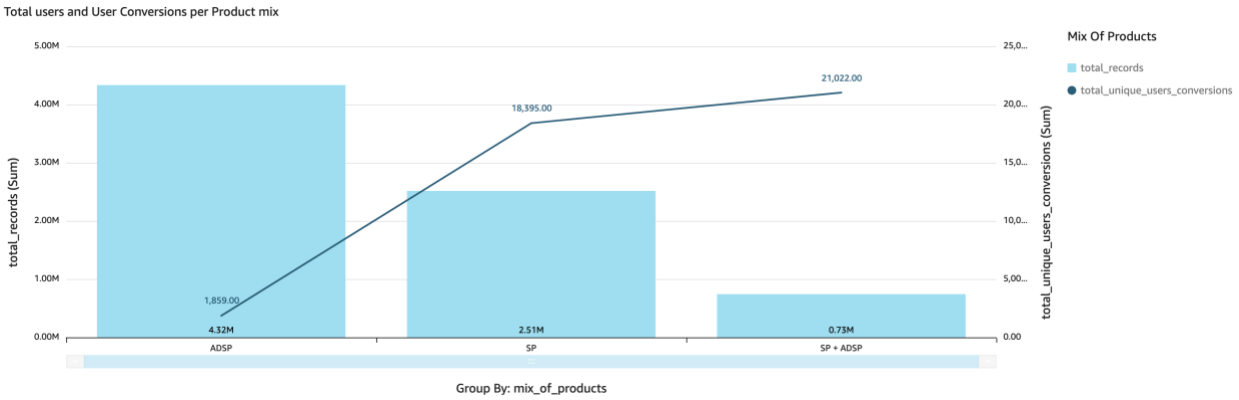

Figure 5.2: Product Mix Analysis by product type with reach and conversions View

New to brand purchases and non-converted user view:

This first pie chart provides details on New to brand purchases made by the user exposed to DSP, SP and both DSP and SP and second provides details on how many users did not get converted when exposed to either DSP, SP and both.

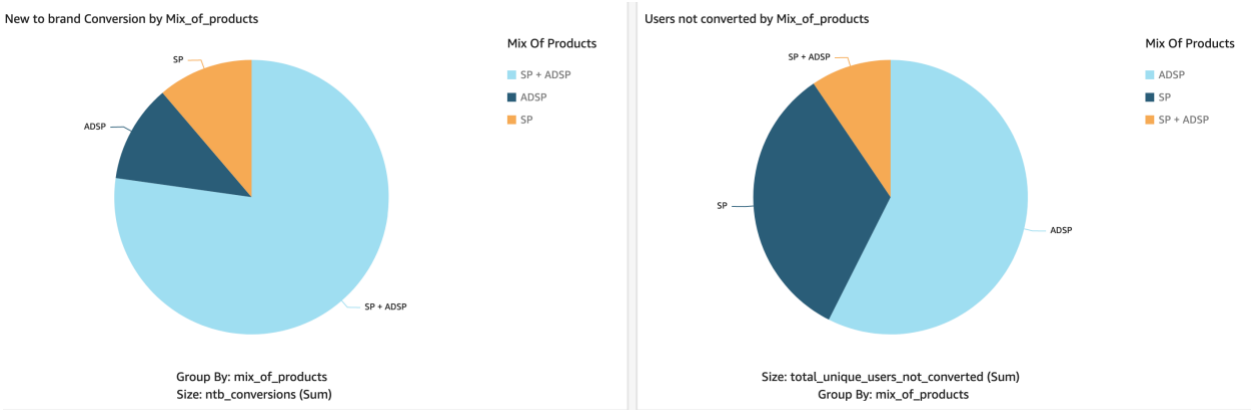

Figure 5.3: Product Mix Analysis showing New to Brand conversions and non-converted users