

# LAB - Part 2: ANALYZE CAMPAIGN EFFECTIVENESS

## 1. Tổng quan Lab

### Mục tiêu

- So sánh hiệu suất giữa các RFM segments thông qua metrics và visualizations
- Phân tích độ chính xác của product recommendations từ LAB Part 1
- Xác định top-performing next best offers cho từng customer segment
- Tạo dashboard tương tác với AWS QuickSight để monitor campaign effectiveness

### Những gì bạn sẽ xây dựng

Một dashboard hoàn chỉnh gồm 4 parts:

1. **Overview & Executive Summary** - KPI cards, segment distribution, conversion funnel
2. **Segment Performance Analysis** - Performance comparison table, trends, heatmap
3. **Next Best Offer Performance** - Top recommendations, accuracy analysis
4. **Customer Feedback & Sentiment** - Sentiment analysis, feedback patterns

### Kết quả mong đợi

- Dashboard tương tác với 15+ visualizations
- Insights về hiệu suất từng customer segment
- Recommendations để optimize marketing campaigns
- Framework có thể tái sử dụng cho dự án thực tế

## 2. Yêu cầu

### Checklist trước khi bắt đầu:

- Đã hoàn thành LAB Part 1 (RFM Model + AI Agent)
- Dữ liệu RFM segmentation đã được lưu trong S3
- Campaign performance data đã sẵn sàng

### 1.1: Đăng ký QuickSight

1. Truy cập **AWS Console** → Tìm "QuickSight"
2. Click **"Sign up for QuickSight"**
3. Nhập account name: workshop-[your-name]
4. Notification email: email cá nhân của bạn

## 1.2: Cấu hình Permissions và Access

1. Trong setup process, enable access to:
  - o Amazon S3 (chọn bucket chứa data từ LAB Part 1)
  - o Nhập thông tin đường dẫn đến bucket
2. Click **"Finish"** để hoàn tất setup
3. Đợi 2-3 phút để QuickSight khởi tạo

## 1.3: Kết nối Data Source

1. Từ QuickSight homepage, click **"Datasets"** → **"New dataset"**
2. Chọn data source type:
  - o **S3**: Nếu data ở S3 buckets
  - o **Upload file CSV manual**: Theo file CSV đã chuẩn bị
3. Nhập connection details và test connection

## 2.1: Import RFM Segmentation Data

1. Create dataset từ **AWS S3**
2. Review data types và field names
3. Ensure các trường sau có mặt:
  - o customer\_id (String)
  - o rfm\_segment (String: High-value, Medium, Low)
  - o recency\_score (Integer: 1-5)
  - o frequency\_score (Integer: 1-5)
  - o monetary\_score (Integer: 1-5)
  - o total\_revenue (Decimal)
  - o avg\_order\_value (Decimal)

## 2.2: Import Campaign Performance Data

1. Import **campaign\_performance.csv** với các trường:

customer\_id  
segment  
campaign\_type  
channel  
impressions  
clicks  
conversions  
revenue  
sent\_date

## 2.3: Data Preparation và Cleaning

1. Trong QuickSight dataset editor:
  - o Check for null values và handle appropriately
  - o Validate data types cho tất cả columns
  - o Remove duplicate records nếu có

- Format date fields properly
- 2. Join datasets nếu cần thiết

## 2.4: Tạo Calculated Fields

Tạo các calculated fields quan trọng:

1. Conversion Rate:  $\{\text{conversions}\} / \{\text{impressions}\} * 100$
2. Click-through Rate (CTR):  $\{\text{clicks}\} / \{\text{impressions}\} * 100$
3. Revenue per Customer:  $\{\text{revenue}\} / \{\text{unique\_customers}\}$
4. Segment Performance Score:  $(\{\text{conversion\_rate}\} * 0.4) + (\{\text{ctr}\} * 0.3) + (\{\text{revenue\_per\_customer}\} / 100 * 0.3)$

## 3.1: Tạo New Analysis

1. Từ QuickSight homepage → **"Analyses"** → **"New analysis"**
2. Chọn dataset đã prepare → **"Create analysis"**

## 3.2: Build KPI Cards (4 metrics chính)

### KPI Card 1: Total Customers

1. Add visual → chọn **"KPI"**
2. Value: `distinctCount(customer_id)`
3. Comparison: `previousPeriod(distinctCount(customer_id))`
4. Format: Số nguyên với thousands separator

### KPI Card 2: Overall Conversion Rate

1. Add visual → **"KPI"**
2. Value: `sum(conversions)/sum(impressions)*100`
3. Format: Percentage với 1 decimal place
4. Conditional formatting: Green if >5%, Red if <2%

### KPI Card 3: Total Revenue

1. Value: `sum(revenue)`
2. Format: Currency (\$) với K/M suffixes
3. Trend arrow: So với previous period

### KPI Card 4: Average Order Value

1. Value: `sum(revenue)/sum(conversions)`
2. Format: Currency (\$)

## 3.3: Create Segment Distribution Pie Chart

1. Add visual → **"Pie chart"**
2. Group by: `rfm_segment`
3. Value: `distinctCount(customer_id)`
4. Show percentages và data labels

## 3.4: Create Revenue by Segment Bar Chart

1. Add visual → **"Vertical bar chart"**
2. X-axis: rfm\_segment
3. Value: sum(revenue)
4. Sort: Descending by revenue
5. Apply same color scheme như pie chart
6. Format Y-axis: Currency với K/M notation

### 3.5: Build Conversion Funnel Visualization

1. Add visual → **"Horizontal bar chart"**
2. Y-axis: Funnel stages ["Impressions", "Clicks", "Add to Cart", "Purchase"]
3. Value: Calculated field cho từng stage
4. Color by: rfm\_segment
5. Stack bars để compare segments

Conversion Funnel Calculated Fields: Impressions\_Rate = 100 (base 100%)  
Clicks\_Rate =  $\text{sum}(\text{clicks}) / \text{sum}(\text{impressions}) * 100$   
AddToCart\_Rate =  $\text{sum}(\text{add\_to\_carts}) / \text{sum}(\text{impressions}) * 100$   
Purchase\_Rate =  $\text{sum}(\text{conversions}) / \text{sum}(\text{impressions}) * 100$

**Insight:** Funnel chart cho thấy drop-off rates ở mỗi stage, giúp identify bottlenecks trong customer journey

### 4.1: Create Performance Comparison Table

1. Switch sang Sheet 2: "Segment Performance"
2. Add visual → **"Table"**
3. Rows: rfm\_segment
4. Values (columns):
  - Customer Count:  $\text{distinctCount}(\text{customer\_id})$
  - Response Rate:  $\text{sum}(\text{clicks}) / \text{sum}(\text{impressions}) * 100$
  - CTR:  $\text{sum}(\text{clicks}) / \text{sum}(\text{impressions}) * 100$
  - Conversion Rate:  $\text{sum}(\text{conversions}) / \text{sum}(\text{impressions}) * 100$
  - Revenue/Customer:  $\text{sum}(\text{revenue}) / \text{distinctCount}(\text{customer\_id})$
  - AOV:  $\text{sum}(\text{revenue}) / \text{sum}(\text{conversions})$
  - Churn Risk:  $\text{avg}(\text{churn\_risk\_score})$
5. Apply conditional formatting:
  - Green cho high performance metrics
  - Red cho low performance metrics

### 4.2: Build Performance Trends Line Chart

1. Add visual → **"Line chart"**
2. X-axis: campaign\_date (by week)
3. Value: conversion\_rate
4. Color: rfm\_segment
5. Show trend lines để identify patterns
6. Add reference lines cho average performance

**Insight:** Line chart giúp identify seasonal trends và performance changes theo thời gian cho từng segment

#### 4.3: Create Engagement Heatmap

1. Add visual → **"Heat map"**
2. Rows: channel (Email, Mobile, Website)
3. Columns: rfm\_segment
4. Values: avg(engagement\_score)
5. Color scale: Gradient từ gray (low) đến red (high)

Engagement Score Calculation:  $(\text{clicks/impressions} * 0.3) + (\text{conversions/clicks} * 0.4) + (\text{revenue/conversions} * 0.3)$

#### 5.1: Top 10 Product Recommendations Chart

1. Switch sang Sheet 3: "Next Best Offers"
2. Import product recommendations data từ LAB Part 1
3. Add visual → **"Horizontal bar chart"**
4. Y-axis: product\_name (top 10)
5. Value: recommendation\_score hoặc conversion\_rate
6. Sort: Descending
7. Color by: product\_category

#### 5.2: Accuracy vs Conversion Scatter Plot

1. Add visual → **"Scatter plot"**
2. X-axis: recommendation\_accuracy (0-100%)
3. Y-axis: conversion\_rate (0-100%)
4. Size: total\_revenue
5. Color: product\_category
6. Add trend line để show correlation

**Business Insight:** Scatter plot cho thấy relationship giữa accuracy của AI recommendations và actual conversion rates

#### 5.3: Recommendations by Segment Table

1. Add visual → **"Table"**
2. Rows: product\_name
3. Columns:
  - Target Segment
  - Recommendation Score
  - Conversion Rate
  - Revenue Generated
  - AI Confidence
4. Sort by conversion rate descending
5. Add conditional formatting cho high-performing recommendations

#### 6.1: Sentiment Distribution Stacked Bar

1. Switch sang Sheet 4: "Customer Feedback"
2. Import customer feedback data với sentiment scores
3. Add visual → **"Stacked bar chart"**
4. X-axis: rfm\_segment
5. Value: count(feedback\_id)
6. Color (Stack): sentiment (Positive, Neutral, Negative)
7. Show as percentage stacked

## 6.2: Sentiment Trends Over Time

1. Add visual → **"Line chart"**
2. X-axis: feedback\_date (by week/month)
3. Value: avg(sentiment\_score)
4. Color: sentiment\_category
5. Y-axis range: -1 to 1 (negative to positive)
6. Add reference line tại y=0 (neutral)

## 6.3: Common Themes Visualization (Word Cloud Alternative)

1. Tạo calculated field để extract top keywords
2. Add visual → **"Tree map"**
3. Group by: feedback\_theme
4. Size: frequency\_count
5. Color: sentiment\_impact

## 6.4: Negative Feedback Patterns Table

1. Filter data cho sentiment = "Negative"
2. Add visual → **"Table"**
3. Rows: issue\_category
4. Columns:
  - Most Affected Segment
  - Frequency (%)
  - Avg Impact Score
  - Resolution Time
5. Sort by frequency descending

**Insight:** Table này giúp identify pain points cần ưu tiên để improve customer experience

## 7: Publish Dashboard

1. Review tất cả visuals và ensure they work correctly
2. Add descriptions và tooltips cho clarity
3. Click **"Publish dashboard"**
4. Đặt tên: **"Customer Segmentation Analytics - Production"**
5. Add dashboard description và tags
6. Test published dashboard với different user roles

# Key Insights Section

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## Cách phân tích từng Dashboard Page

### Page 1: Overview & Executive Summary

- **KPI Cards:** Monitor overall health - growth in customers, conversion rates
- **Segment Distribution:** Understand customer portfolio composition
- **Revenue by Segment:** Identify which segments drive most revenue
- **Conversion Funnel:** Spot drop-off points in customer journey

### Page 2: Segment Performance Analysis

- **Performance Table:** Compare metrics across segments để prioritize efforts
- **Trends Chart:** Identify seasonal patterns và campaign effectiveness over time
- **Engagement Heatmap:** Find best channel-segment combinations

### Page 3: Next Best Offer Performance

- **Top Products:** Focus marketing budget on high-converting products
- **Accuracy vs Conversion:** Validate AI recommendation quality
- **Category Distribution:** Understand product preferences by segment

## Business Insights to Look For

- **High-value segment trends:** Are they growing or declining?
- **Channel effectiveness:** Which channels work best for each segment?
- **Product recommendation accuracy:** Is AI delivering relevant suggestions?
- **Sentiment patterns:** Are there systematic issues affecting customer satisfaction?

## Actionable Recommendations

1. **Segment Prioritization:** Allocate budget based on ROI per segment
2. **Channel Optimization:** Shift spend to high-performing channel-segment combinations
3. **Product Strategy:** Promote AI-recommended products với high conversion rates
4. **Customer Retention:** Proactive outreach to high-churn-risk customers
5. **Campaign Timing:** Use trends data để optimize send times

## Workshop Support

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