Synopsis
○○○

Situation Analysis
○○○○○○○

Implementation of Experiment
○○○○○○○○

Class 11 Application of RCT

Dr Wei Miao

UCL School of Management

November 8, 2023

Synopsis
●○○

Situation Analysis
○○○○○○○

Implementation of Experiment
○○○○○○○○

Section 1

Synopsis

Case Background

Andrew and Hammond, 2 recently graduated MBA students, were tasked with developing an **ad-serving learning algorithm** for Vungle, a **mobile ad-serving** company.

Zain Jaffer, the firm's CEO, planned to **test the developed method in parallel with the existing Vungle algorithm**.

The hope was that the new algorithm would increase **conversion rates** and, more specifically, **profits** (as measured by **eRPM**).

To test this, two conditions (A, Vungle's existing algorithm, and B, the data science approach) were evaluated in parallel on **randomly assigned users**.

Synopsis
○○●

Situation Analysis
○○○○○○○

Implementation of Experiment
○○○○○○○○

Case Core Question

The case examines the results of an A/B test of the two algorithms during the month of June 2014. You will need to determine whether B outperformed A.

- How might Jaffer conclude that B is better than A?

- If it is, what would the financial benefits be?

- Finally, how long would Jaffer need to wait before declaring a winning algorithm?

Synopsis
OOO

Situation Analysis
●OOOOOO

Implementation of Experiment
OOOOOOOOO
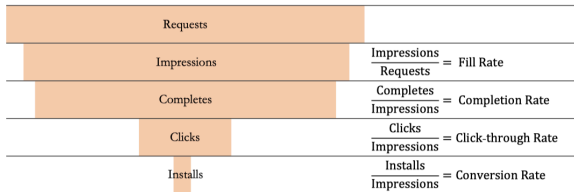
Section 2

Situation Analysis

Company

- Business model of Vungle?
- What are the key players in this mobile video ads market (i.e., Vungle)? Find the info in the case.
  - As a comparison, what are the key players in website ads case?
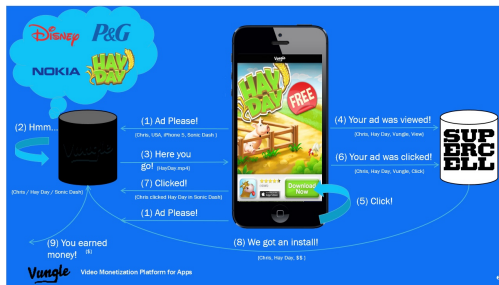
Company

- How does Vungle make money? Find the info in the case.

Figure 1. Mobile in-app advertising funnel.

Requests	
Impressions	$\frac{\text{Impressions}}{\text{Requests}}$ = Fill Rate
Completes	$\frac{\text{Completes}}{\text{Impressions}}$ = Completion Rate
Clicks	$\frac{\text{Clicks}}{\text{Impressions}}$ = Click-through Rate
Installs	$\frac{\text{Installs}}{\text{Impressions}}$ = Conversion Rate

Source: Created by case writer.

- How can Vungle improve its revenue using what we've learned in Marketing Analytics so far?

Synopsis
000

Situation Analysis
0000000

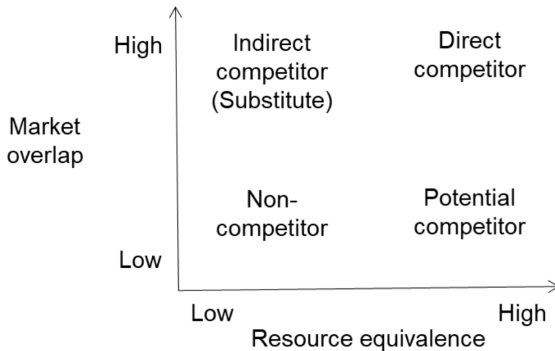Implementation of Experiment
00000000

Customer

- Due to the nature of business model (multi-sided market), who are Vungle's customers? Find the info in the case.
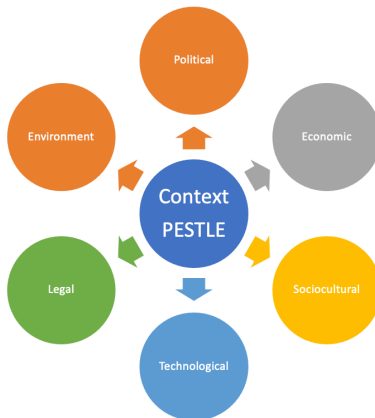
Collaborators

- Who are the collaborators of Vungle?

Competitors

- Direct competitors
- Indirect competitors
- Potential competitors

Synopsis
○○○

Situation Analysis
○○○○○○○●

Implementation of Experiment
○○○○○○○○

Context

- Legal: GDPR

- Technological: penetration of mobile phones

- ...

Synopsis
000

Situation Analysis
0000000

Implementation of Experiment
●0000000

Section 3

Implementation of Experiment

Synopsis
000

Situation Analysis
0000000

Implementation of Experiment
0●000000

Step 1: Decide on the Unit of Randomization

- What would be the best unit of randomization?

- How about website-based online ads, say Google ads?

Synopsis
000

Situation Analysis
0000000

Implementation of Experiment
00●00000

Step 2: Ensure No Spillover and Crossover Effects

- What are the potential problems for spillover and crossover?
- How about website-based online ads, say Google ads?

Synopsis
○○○

Situation Analysis
○○○○○○○

Implementation of Experiment
○○○●○○○○

Step 3: Decide on Randomization Allocation Scheme

- How did Vungle implement the randomization scheme? Is it sensible?

Synopsis
000

Situation Analysis
0000000

Implementation of Experiment
00000●000

Step 4: Collect Data

- What data did Vungle collect?

- Can you do better?

Synopsis
○○○

Situation Analysis
○○○○○○○

Implementation of Experiment
○○○○○●○○

Step 5: Interpreting Results from a Field Experiment

- Which step is missing in Vungle A-B testing?

- How to draw statistical conclusions from the Exhibits A and B?

Synopsis
○○○

Situation Analysis
○○○○○○○

Implementation of Experiment
○○○○○○●○

Step 5: Paired t-test

```
1    pacman::p_load(dplyr)
```

```
1    data_vungle <- read.csv("https://www.dropbox.com/s/nsxnworjggreh4s/UV69
2
3    t.test((data_vungle%>%filter(Strategy == "Vungle A"))$eRPM,
4           (data_vungle%>%filter(Strategy == "Vungle B"))$eRPM,
5           paired = TRUE)
```

```
        Paired t-test

    data:  (data_vungle %>% filter(Strategy == "Vungle A"))$eRPM and (data_
    t = -3.2837, df = 29, p-value = 0.002677
    alternative hypothesis: true mean difference is not equal to 0
    95 percent confidence interval:
     -0.17959566 -0.04173767
    sample estimates:
    mean difference
        -0.1106667
```

Conclusion

Guerin was curious to see how the superior condition would be chosen. How
would one conclude that B was better than A?