Week 4 - A/B Testing

Dates	@2019년 10월 17일
Type	📌 Assignment
Topic	

This figure represents the difference in units sold between round 1 and round 2 for the same group. To solve this problem, you'll need to subtract the difference between the round 1 test and control groups units sold and the round 2 test and control groups units sold.

AB Testing

- Evaluate the consequences of different marketing actions like advertising or sales promotion
- Why it’s important to find out causality and effect of Marketing?
  - 낭비되는 마케팅 채널을 찾아내서 효율성을 높임
  - 관계부서에 투입을 요구할 때 ‘마케팅을 하지 않았을 때’와 ‘마케팅을 했을 때’의 차이를 증명할 수 있음

Rules for establishing casuality

- Change in marketing mix produces change in sales
  - Increasing Advertising dollars → Increased Sales
- No sales increase when there is no change in the marketing mix
  - No Increase in Advertising dollars → Same sales
- Time Sequence
  - Increased advertising dollars today leads to higher sales tomorrow
- No other external factor

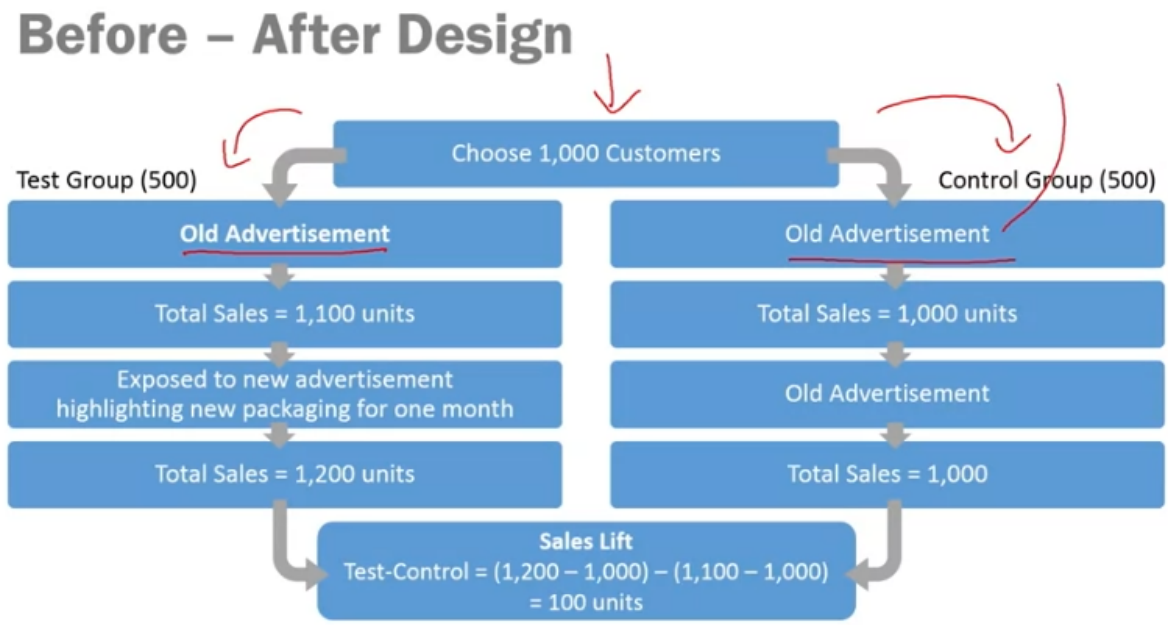
    - When advertising was Increased, one of the competitors left the market. So sales Increased because of lesser competition not because of increased advertising.

Experiment for measuring casuality

- Test group: subjects with new marketing
- Control group: subjects that does not see any new marketing
- The consequence difference between test group and control group is the proof for marketing effect

Designing Before - After Experiments

- How to assign customers to to test and control group?
    - randomization : the assigning is made by chance
        - Note that if we have 1,000 or more customers, randomization is achieved.
    - Choose subjects with similar environment.
        - 겨울재킷에 대한 마케팅 효과를 판단할 때 추운 지역과 더운 지역의 고객을 함께 넣고 랜덤추출할 수는 없다.
- Difference between “before-after experiment” and “A/B Test”
    - “Before-after experiment” control the preexisting differences between test and control groups.
    - 아래 예시에서 마케팅 Control group과 Test group의 매출 차이는 200이 아니라 100이다 (Test group의 증가분 100 - Control group의 증가분 0) → 이렇게 이전 차이를 고려한 difference를 “Sales Lift”라고 부름
    - AB 테스트는 실험군과 대조군이 원래부터 가지고 있었던 차이를 고려하지 않고 결과를 확인함.



Designing Full Factorial Web Experiments

- Advantages of web experiments
  - Cheap and Quick
  - Allows to change multiple conditions
- Full factorial Design
  - Changing multiple factors and find what condition leads to the greatest lift

Analyzing an Experiment: Etch A Sketch

- Ohio Art, which owns the program “Etch A Sketch” did TV Advertising Experiment
  - Test group: Cincinnati
  - Control group: Other states in U.S
- Experiment results
  - Test Product: Etch A Sketch
  - Control Product: Doodle
    - Reason for establishing control product

      → Measuring external factors (Etch a Sketch는 판매량이 늘어나는 시기가 존재하기 때문에 판매량 상승이 시기의 영향일 수도 있음. 같은 시기 비슷한 물

품의 판매량을 확인하여 시기의 영향을 파악한다)

- Doodle sales become the baseline (removing seasonal effect)

		Etch A Sketch			Doodle		
		Test Product			Control Product		
	Number of Weeks	Cincinnati Units	Control* Units	Cincinnati Shares (%)	Cincinnati Units	Control Units	Cincinnati Share
Pre Test 5 Dec 2005 – 26 Nov 2006	12	162	1526	9.6	1517	6742	18.4
Test 27 Nov 2006 – 16 Dec 2006	3	240	1598	13.1	816	3780	17.7
Lift				136.1			96.7

- Measuring net lift for the promotion
  - Etch A Sketch sales lift in Cincinnati: 13.1 / 9.6 = 136.1
  - Doodle sales lift in Cincinnati: 17.7 / 18.4 = 96.7

    → Doodle sales was declined during the test
  - Net lift (순수상승률) : Test Product lift - Control Product lift (136.1 - 96.7)
- Calculating promotion spending

Retail Price	10
Retail Margin (소매업체가 가져가는 돈)	36%
Manufacturer Selling Price	10 * (1 - 0.36) = 6.4
Manufacturer Contribution Margin %	58%
Manufacturer Contribution Margin $ (Margin for the Ohio Art)	6.4 * 0.58 = 3.71

National Budget (Amount spent for Marketing)	5,000,000
Unit Break Even (Amount needed to compensate national budget)	5 million / 3.71 1,346,983
Base Units (Sales without promotion)	3,100,000
Base Units Test Period (Sales during promotion)	1,085,000
Break Even Lift % of Base	1.3 million / 1.08 million = 124(%)

- Break Even Lift % of Base (124%) > Net lift from TV Ads (39.4%)

  → TV advertising campaign for Etch A Sketch isn't efficient

Practice Quiz on Calculating Break Even and Lift

1.

In an advertising experiment using before-after design, 1000 customers are randomly assigned to 3 groups. All groups are exposed to the existing advertisement for round 1 of the experiment. In round 2 of the experiment, groups 2 and 3 see the new ad while group 1 (the control) is still shown the old ad.

	Control Group1	Test Group2	Test Group3
Round 1 sales —old ad	295	310	300
Round 2 sales - Group1, old ad, Gropu2 and 3, new ad	310	450	325

answer) 325 - 300 = 25

틀림!! ㅠㅠ

Feedback: This figure represents the difference in units sold between round 1 and round 2 for the same group. To solve this problem, you'll need to subtract the difference between the round 1 test and control groups units sold and the round 2 test and control groups units sold.

new answer)

- how to get lift?
  1. calculate the share of test group 3 with old ad

     → 300 / 905 = 0.3315
  2. calculate the share of test group 3 with new ad

     → 325 / 1085 = 0.2995
  3. calculate (2) / 1)) * 100

     → 90.3469

답은 10인데 도대체 왜 10인지 도저히 몰라

2. Correct

What is the manufacturer contribution margin ($)?

Retail price	$100
Retail margin	30%
Manufacturer contribution margin	42%

answer) $ 100 * (1-0.3) * 0.42 = 29.4

3. Correct

A "Mom & Pop" startup wants to increase brand awareness of their delicious hot sauce. How many bottle of hot sauce do they need to sell to break even on the ad campaign?

Ad budget	$25,000
Retail price	$4.50 / bottle
Retail margin	45%
Manufacturer contribution margin	30%

answer)

- manufacturer contribution margin in dollars : 4.5 * 0.55 * 0.3 = 0.7425($)
- Unit Break Even: 25,000 / 0.7425 = 33,670.033

→ Isn’t the unit break even 33,671?

4. Correct

Calculate net lift given the following information:

		Test Product			Control Product		
	Number of weeks	Mumbai Units	Control* Units	Mumbai Share (%)	Mumbai Units	Control * Units	Mumbai Share
Pre-test	12	5310	22334	?	2033	5777	?
Test	3	9231	29589	?	2512	6820	?
Lift				?			?
Net lift				?			

*Control cities include: New Delhi, Calcutta, Bangalore, Chennai.

Answer)

- Lift for Test product: Test / Pretest = {9231/(29589+9231)} / { 5310/(5310+22334)} = (9231/38820) / (5310/27644)

  = 0.2378 / 0.1921 = 1.2378...

  Lift = 123.79

- Lift for Control Product

  (2512/9332) / (2033/7810) = 0.2692 / 0.2603 = 1.0342

  Lift = 103.42

- Net Lift : (Lift for Test Product) - (Lift for Control Product)

  = About 20.37

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