

FREE

Control Group Holdout Planner

Multi-segment Strategy & Financial Analysis

FREE FEATURE

ⓘ

WARNING: UNDER-POWERED SEGMENTS

HOLDOUT RATIO ⓘ

10%

CONFIDENCE LEVEL ⓘ

95% Confidence

STATISTICAL POWER ⓘ

80% Power

ACTIVE SEGMENTS (1)

+ Add Segment

Segment 1

DELETE

DAILY TRAFFIC ⓘ

10000

BASELINE CR % ⓘ

4.5

RELATIVE LIFT % ⓘ

8

AVG REV \$ ⓘ

120

REQUIRED 300,039 users

DURATION 31 days

HOLDOUT COST \$12,962

Global Results

TOTAL USERS REQUIRED

300,039

MAX DURATION

31 Days

PARALLEL BOTTLENECK

HOLDOUT COST

\$12,962

AGGREGATED RISK

TOTAL CONTROL

30,004

TOTAL TREATMENT

270,035

PLANNING INSIGHT

The bottleneck for your campaign is segment "Segment 1". This segment determines your test duration.

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1 ACTIVE SEGMENTS

IMBALANCE ADJUSTED LOGIC

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## Technical Specification: Control Group Holdout Planner

This document serves as the implementation guide for developers building or extending the Multi-Segment Control Group Holdout Planner.

### 1. Input Definitions & Default Values

#### Global Parameters

These settings apply to all segments to ensure statistical consistency.

Parameter	Type	Default	Selected Options / Range
Holdout (Control) Ratio (\$R\$)	Slider	10%	1% to 50%
Confidence Level	Dropdown	95%	90%, 95%, 99%
Statistical Power	Dropdown	80%	80%, 90%

#### Segment-Specific Parameters (Per Segment)

The app should support up to 10 segments.

Parameter	Type	Default	Description
<b>Segment Name</b>	Text	"Segment 1"	User-defined label.
<b>Daily Traffic (\$T\$)</b>	Number	10,000	Unique visitors per day.
<b>Baseline (\$p_1\$)</b>	Number	4.5%	Current conversion rate.
<b>Lift (\$L\$)</b>	Number	8%	Expected relative improvement.
<b>Value (\$V\$)</b>	Number	\$120	Revenue generated per conversion.

## 2. Calculation Logic (The Math)

For each segment, the logic follows these steps:

### Step 1: Prep Constants

- **Z-scores for Alpha (Confidence):**
  - 90% → 1.645
  - 95% → 1.96
  - 99% → 2.57
- **Z-scores for Beta (Power):**
  - 80% → 0.841
  - 90% → 1.28

### Step 2: Define Target Rates

- **Control Rate (\$p\_1\$):** Baseline / 100
- **Treatment Rate (\$p\_2\$):**  $p_1 * (1 + (\text{Lift} / 100))$

### Step 3: Calculate Base Sample Size (\$n\$)

This calculates users needed *per group* as if the split was a standard 50/50:  $n = ((Z_{\alpha} + Z_{\beta})^2 * (p_1*(1-p_1) + p_2*(1-p_2))) / (p_1 - p_2)^2$

### Step 4: Adjust for Imbalanced Holdout Split

Since business holdouts are rarely 50/50, we adjust the **Total Required Users (\$N\$)** for the segment:

- $p = \text{HoldoutRatio} / 100$
- $q = 1 - p$
- $\text{ImbalanceFactor} = (1/p + 1/q) / 4$
- **Segment Total (\$N\$):**  $(n * 2) * \text{ImbalanceFactor}$

### Step 5: Segment Outputs

- **Duration (Days):**  $N / \text{Traffic}$
- **Holdout Users:**  $N * p$
- **Holdout Cost (\$):**  $\text{HoldoutUsers} * (p_1 * (\text{Lift}/100)) * \text{Value}$  (*The revenue lost by keeping a portion of users in the lower-performing Control group*).

## 3. Aggregation (Dashboard Results)

Once individual segment results are calculated, generate the aggregate Global Results:

1. **Total Users Required:** Sum of all Segment Total (N) values.
2. **Max Duration:** The Duration (Days) of the **slowest** segment (the parallel bottleneck).
3. **Total Holdout Cost:** Sum of all segment Holdout Cost (\$) values.

## 4. UI/UX & CTA

- **Warning Label:** If Holdout Users < n, flag the segment as "Under-powered" or display a "Small Control" warning.

- **Free Feature Badge:** Ensure the header includes a "Free Feature" badge to differentiate from paid agentic services.
- **CTA:** Include the following banner at the bottom:

"Want an agentic app like this without the \$50K price tag? Build one starting at \$2K. Use it internally, publish it on your site, or list it on Agensium to earn revenue." **Button:** [Build My App]