Marketing Mix Modeling: Optimizing Marketing ROI

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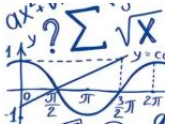
MMM is a statistical modeling to **quantify the incremental impact** of **marketing** and **non-marketing** activities, and recommend **optimal budget allocation** across media channels to maximize future marketing returns

1. Data Foundation

Consolidated data sources through **pipelines** with regular refreshes, quality checks



2. Measurement & Validation

Statistical **models** (Mixed, Bayesian) to quantify **impact** and effectiveness, calibrated with experiments

3. Insights & Optimization

Report marketing performance (e.g., **ROI, incr. sales**) and simulate optimal **budget allocation**

Outcomes: Sales, Revenue, etc.

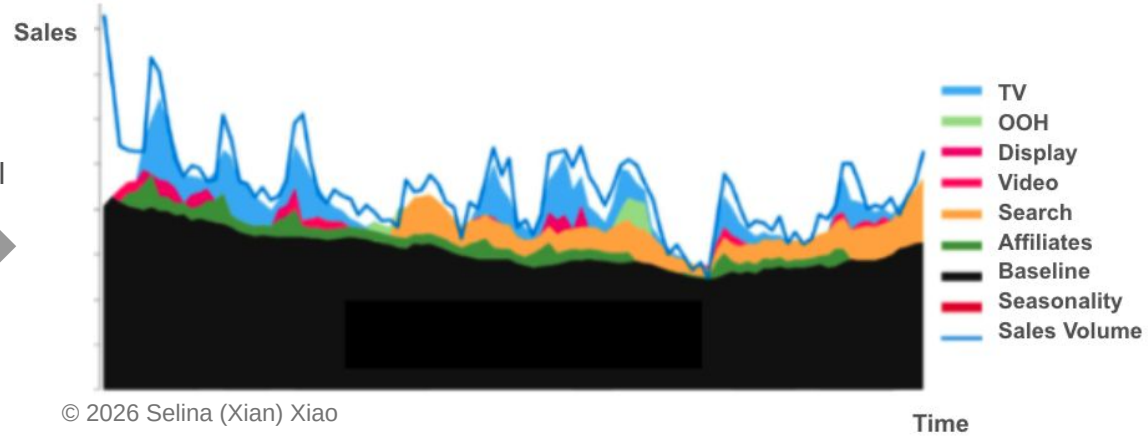
Marketing (paid, owned, earned)

- Display, Video, Search
- Affiliates, Social, Email, SMS, DM
- TV, OOH, Radio, Audio
- Promotions

Non-Marketing / External

Seasonality, Trends, Competitors

MMM
Statistical Modeling



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MMM can provide **campaign- and channel-level measurement** when running experiments is too costly, and it is also well-suited to the emerging cookieless world. In addition, it has unique applications, e.g., scenario planning and forecasting.

	Experiment Ground Truth where available	MMM Holistic view across all activities	Attribution Micro-level digital journey
Anchored on true value	Could be costly to run	Calibration through experiment	Data-driven optimization
Ensure comparability across all marketing activities	Single or overall paid	Paid, owned, earned, external factors	Limited to digital
Resilient to changes in privacy ecosystem			
Budget Scenario Planning & Forecasting			
Real-time Optimization	by experiment length	Monthly, quarterly	Digital, near real-time
Impact over time	Short term	Short & Long term	Short term

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Marketing Mix Modeling: Optimizing Marketing ROI

MMM with **adstock** and **diminishing returns** provides a more realistic and effective way to optimize marketing strategies

Adstock

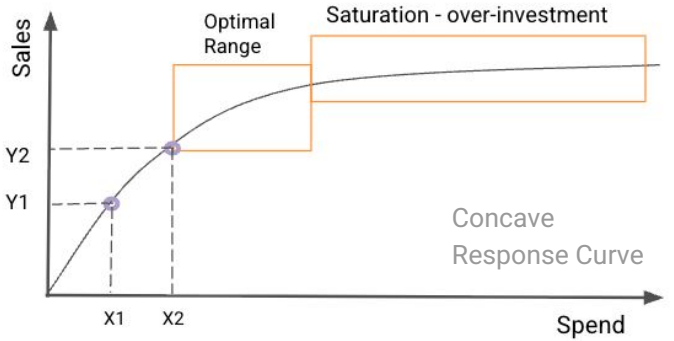
Capture the **carryover (decay)** effect of marketing investment. Advertising impact may lag after exposure, as not all effects are immediate, and then gradually diminishes over time. A **higher** adstock means greater **retention** of ad effects, while a **lower** value indicates faster **decay**.

Week	Purchased Impression	Carryover (Ex: 30% Adstock)	Effective Impression
wk1	1,000	0	1,000
wk2	1,000	1,000*30%	1,300
wk3	1,000	1,300*30%	1,390
wk4	1,000	1,390*30%	1,417
wk5	1,000	1,417*30%	1,425

Diminishing Return

In general, a market has finite resources, thus likely each additional unit of Ad increases the return but likely at a **declining rate**.

- **Average** - estimates a channel's impact on business KPI at an investment level, e.g., *Sales Y2 / Spend X2*
- **Marginal** - estimates effectiveness for the next dollar spend, e.g., *Sales (Y2 - Y1) / Spend (X2 - X1)*



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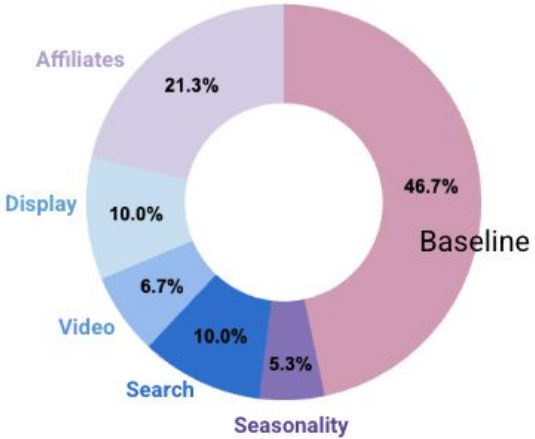
Marketing Mix Modeling: Optimizing Marketing ROI

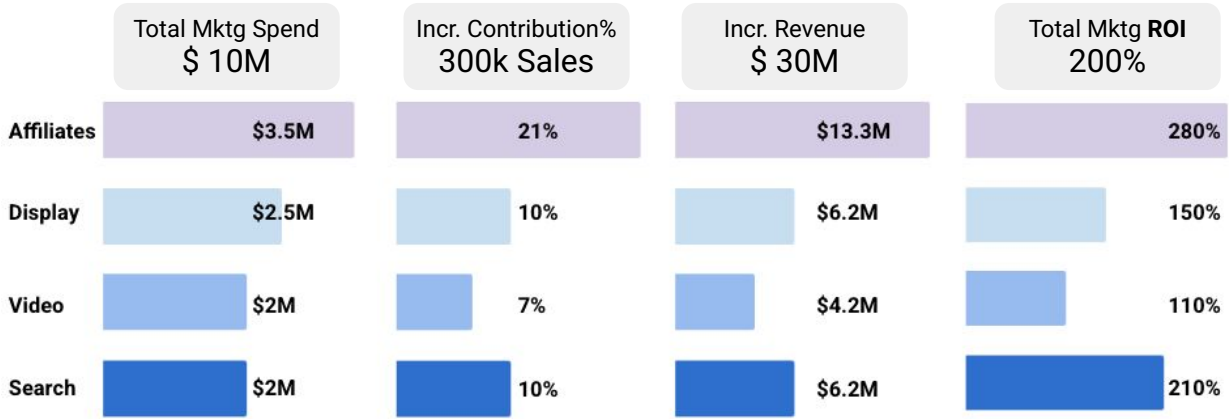
MMM Dashboard

MMM quantifies the **performance** of each marketing channel, showing how each translates into incremental sales, revenue, and ROI, by product and market, to guide budget allocation decisions

Incr. Contribution % to Sales



Incr. Sales, Revenue & Marketing ROI



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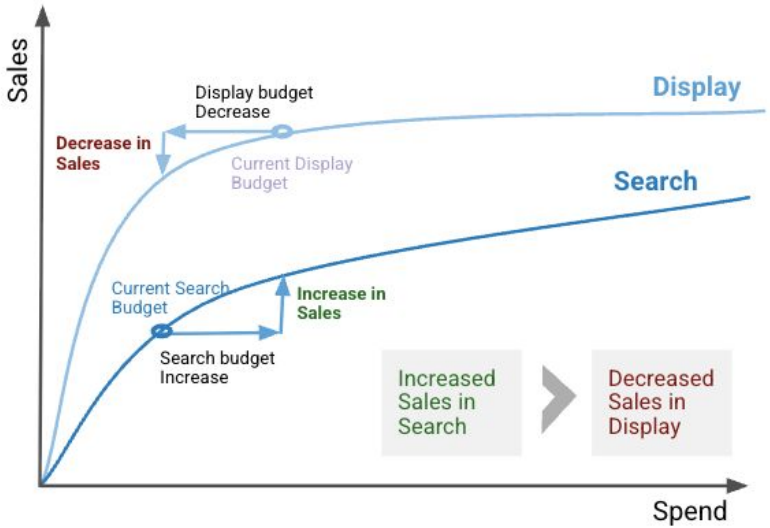
** All numbers and use cases are illustrative only*

Marketing Mix Modeling: Optimizing Marketing ROI

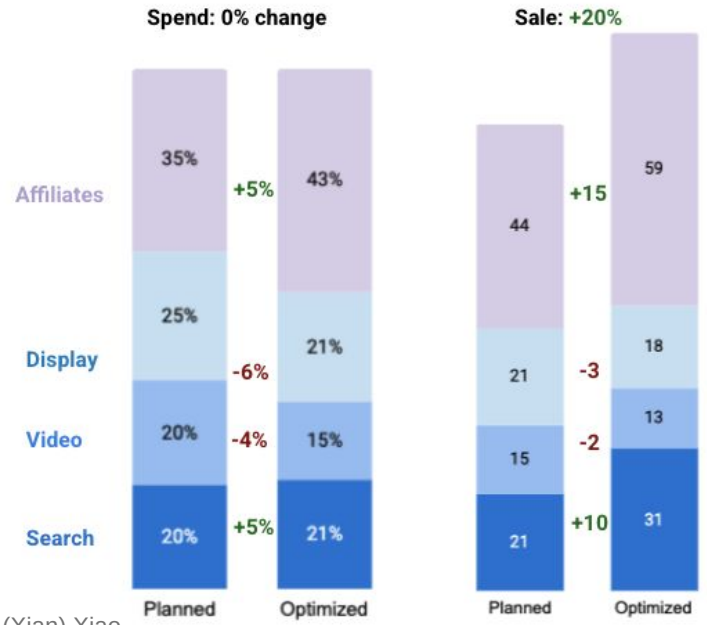
MMM Self Service Tools

MMM generates channel response curves to highlight **marginal ROI**, and **simulates budget allocation** scenarios to identify the optimal mix for maximizing business results

Channel Response Curve



Scenario Planning Tool



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Omnichannel Center: powered by Clean Room

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Omnichannel Attribution: powered by Clean Room

Privacy-safe Clean Room contains **de-identified** 1P and 3P data at **user** and **household** level, linked via a universal ID in the 3P customer attributes file.

Display	Video	Search	OTT	Podcast	Influencer	EM, SMS, DM
✓	✓	✗	✓	✗	✗	✓
✓	✓	✓	✓	✓	✓	✓
✓	✗	✗	✗	✗	✓	✗
✓	✗	✗	✗	✗	✓	✗

✓ Ad Impression Exposure, w/ # touchpoints
✗ No Ad Exposure

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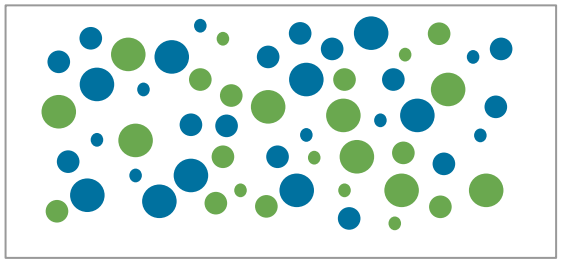
Omnichannel Attribution: powered by Clean Room

Scalable across any channel with shareable user-level exposure data, enabling unified **cross-channel attribution**, including historically difficult-to-control channels (e.g., influencers).

1. User-level with ad exposure data across channels in Clean Room



Ad Exposure
No Ad Exposure

2. **PSM** to select matching **Group A** and Group B

Group A: Ad Exposure
Group B: No Ad Exposure

3. **IPW** or **Shapley Value** approach to measure Incr. Conversion%

	Video	Video Display	Video Search	Video Search Display
Group A	22%	22%	26%	30%
Group B	20%	20%	20%	20%
Incr. Conv%	2% ± CI non-stat sig	2% ±CI non-stat sig	**6%** ±CI stat sig at 90%	**10%** ±CI stat sig at 95%

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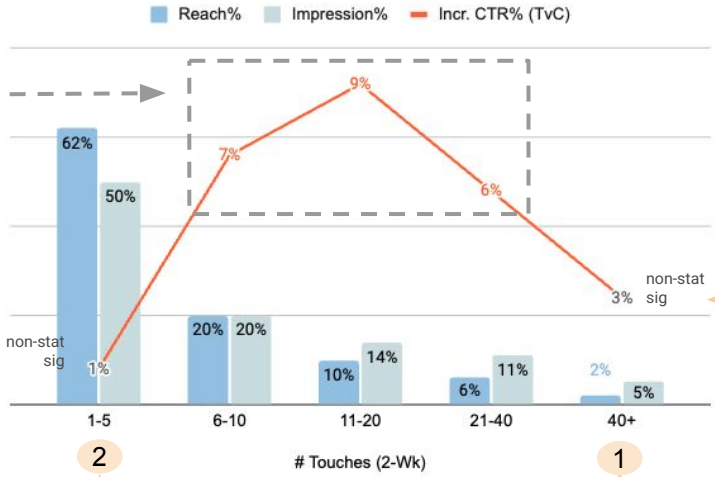
Omnichannel Attribution: powered by Clean Room

Detected diminishing returns and **touchpoints saturation** in-flight, **reallocating** investment toward underpenetrated audiences to improve campaign efficiency and ROI.

1. Identify **optimal touchpoints** (6-40x) with **incremental** lift



Suppression: ad fatigue occurred after 40+

2. **Suppress 40+ & Boost <6**

Retargeting: shift budget from 40+ group to audiences with fewer than 6x

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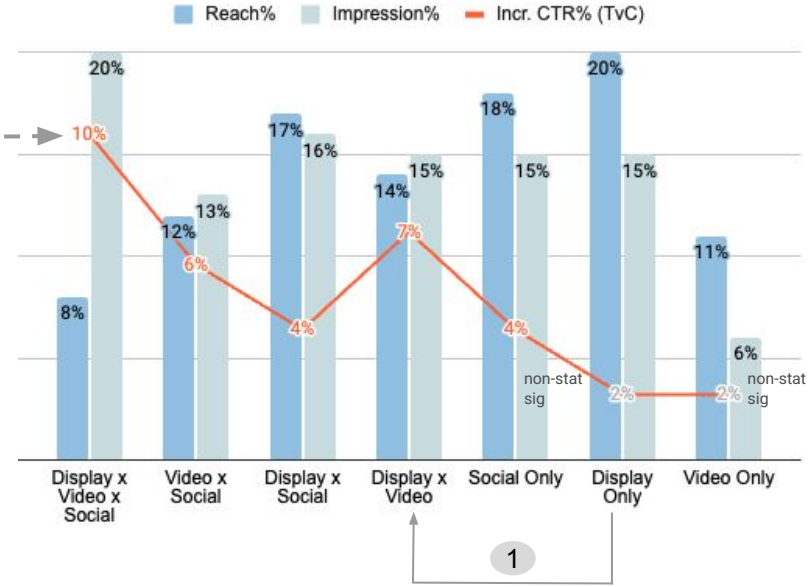
Omnichannel Attribution: powered by Clean Room

Tracked audience reach depth and marginal response in-flight, recalibrating delivery strategy to preserve incremental impact across channels.

3. Identify optimal **channel mix**



4. Identify **Next Best Action**

depended on prior channel exposure

1 +5% ⬆: Display Only (2%) → Display x **Video** (7%)

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AI Innovation Lab: Accelerating the Future of Business

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AI & Automation

AI Innovation Lab: Accelerating the Future of Business

Our AI-powered **Ad Optimizer tool** automatically processes ad images and uses LLMs, NLP and ML models to identify the visual and textual elements that resonate most with target audiences.

Ad Optimizer: Maximizing Creative measurement, optimization and generation

1. Automate Ad **Image** Processing
2. Identify **Top Ad Features & Content** Boosting KPIs
3. **Auto Generate Ad Image** with Optimal Features

Used **prompt engineering** with the latest LLM version

90%+ Accuracy 10% better than manual labeling	70% Faster through automation

Example of prompts:

- **Background -** Is the background bright, dark or neutral?
- **Background -** Is the background a lifestyle image?
- **Product Placement**: Where is the product placed in the ad? Choose from top, center, bottom.

Feature	Short Description (sample)	Prompt Accuracy
Headline	Length and capitalization: Short, Short Caps, Long, Long Caps, etc.	95%
Theme	Hardware, Pricing and Promotion, Seasonal, Retargeting, Social Proof	92%
Copy Tone	Rational (Informative, Confident), Emotional (Caring, Inspirational)	91%
Background	Gradient, Solid, Color themes (Warm, Fresh, Modern, Clean)	90%
Product	Number, Display (Size), Placement (Top, Center, Bottom)	90%
Portrait	Age Range, Gender, Race, Number	89%

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AI & Automation

AI Innovation Lab: Accelerating the Future of Business

1. Automate Ad **Image** Processing
2. Identify **Top Ad Features & Content** Boosting KPIs
3. **Auto Generate Ad Image** with Optimal Features

ML models identified **top-performing** AI labeled ad features that drive **incr. KPIs**

1. Solid image background drives 6-10% higher CTR than lighter gradient background
2. Including a specific CTR drives 15% higher CTR
3. Longer title (8+ words) drives 10% higher CTR
4. Using words denoting “hassle free” drives up to 5% higher CTR

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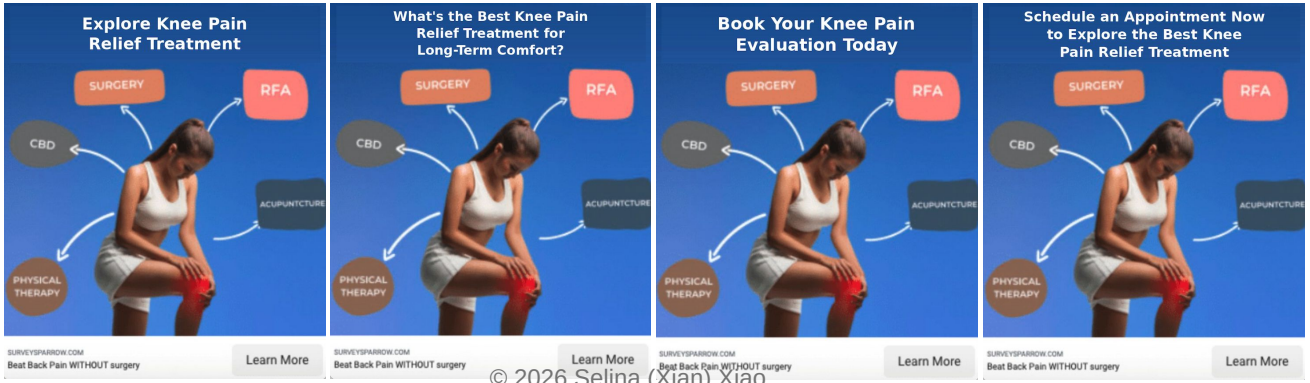
AI & Automation

AI Innovation Lab: Accelerating the Future of Business

1. Automate Ad **Image** Processing
2. Identify **Top Ad Features & Content** Boosting KPIs
3. **Auto Generate Ad Image** with Optimal Features

Implemented generative AI to create new ad variations based on optimal features to conduct **multivariate** testing and deployed the **highest-lift variant to production**

	BAU	Variant 1	Variant 2	Variant 3
Tested Features	- title <=5 words - no CTA in headline - no 'better / best'	- title > 10 words - with 'better / best'	- CTA in headline	- title > 10 words - CTA in headline - with 'better / best'
CTR	**2.20%**	**2.50%**	**2.62%**	**2.70%**
Incr. Lift vs. BAU w/ 90% CI		+13.6% [8.6%, 18.6%]	+19.1% [13.1%, 25.1%]	**+22.7%** [14.7%, 30.7%]



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