

Timber Mountain 2.0

Data Scientist, Experimentation Case Study

Introduction

This case study is designed to evaluate candidates for the Data Scientist, Experimentation role across two essential areas: analyzing A/B test results and developing a compelling A/B test proposal.

Submission Requirements

1. Please create a presentation to answer the questions listed in Part One and Part Two of this case study.
Format: Keynote, PowerPoint, or Google Slides

2. Please create a Python or R script to analyze the A/B test results in Part One.
Format: Python or R script; Jupyter Notebook preferred (.ipynb)

3. Email your presentation and any scripts to your recruiting team.

Confidentiality Notice

We take secrecy seriously.
Please do not share these case questions.



Case Study Evaluation Criteria

| Category | Description |
|--|---|
| Strategic Thinking and Business Acumen | <ul style="list-style-type: none">Effectively connects quantitative and qualitative insights with broader business objectives to ensure your work drives meaningful impact.Demonstrates foundational knowledge of web metrics, and ability to ideate and prioritize engagement and conversion drivers. |
| Technical Proficiency | <ul style="list-style-type: none">Demonstrates expertise with experimentation statistics (e.g. statistical significance, power analysis, confidence intervals).Produces analysis that is replicable, transparent, and clearly documented in Python or R code |
| Communication and Presentation Skills | <ul style="list-style-type: none">Clearly and persuasively communicates A/B test results, conclusions, and recommendations.Creates presentation that is structured, engaging, and suitable for non-technical stakeholders. |

Background: Timber Mountain

About the Theme Park Industry

Theme parks aren't just playgrounds — they're powerhouses of imagination, escapism, and revenue. Blending thrill rides, live entertainment, and immersive environments, theme parks have become one of the most lucrative segments in the travel and entertainment industry.

Theme parks create immersive environments, with each section designed around a specific theme. For example, Disneyland features areas like Adventureland, Fantasyland, and Star Wars: Galaxy's Edge, each offering unique experiences.

In 2023, the global theme park market was valued at approximately \$52 billion, with projections indicating growth to \$125 billion by 2032, reflecting a compound annual growth rate (CAGR) of 10%.





About Timber Mountain

Timber Mountain is a (fictional) Wild West-themed amusement park located in Northern California. Attracting nearly 4 million visitors annually, it ranks as the state's third-largest ticketed tourist destination, behind Disneyland Resort and Universal Studios Hollywood.

Renowned for its immersive design, Timber Mountain recreates a bustling 1800s frontier town nestled within a majestic forest. The park offers a variety of attractions, including adrenaline-pumping roller coasters, majestic dark rides, riveting stage performances, falconry shows, and a petting zoo.

Note: All branding and data are fictional in this case study.



Part One: A/B Test Results Analysis



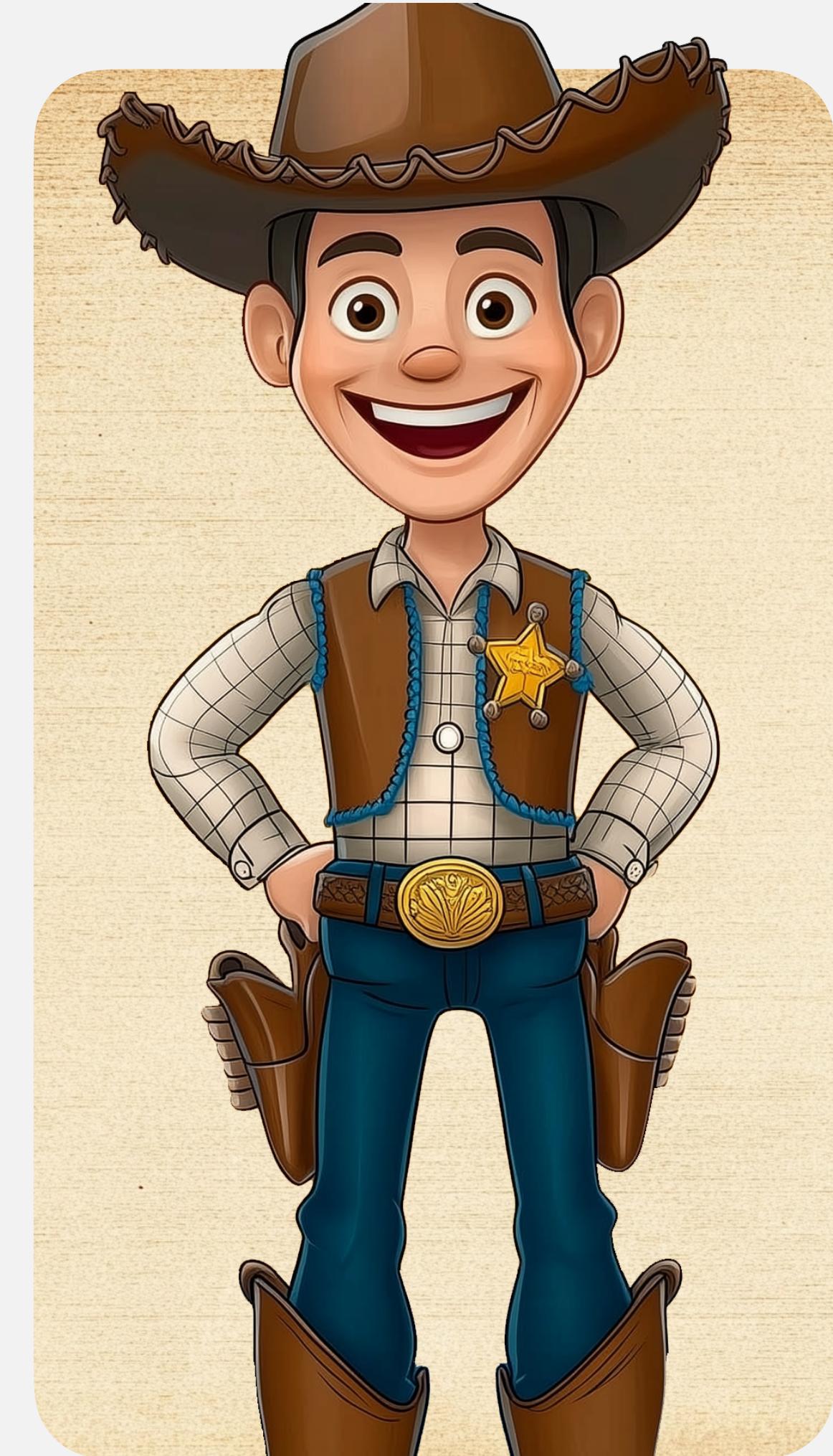
Wild Willy AI-Powered Travel Planner

In January 2024, Timber Mountain's digital marketing team launched a new feature enabling guests to pre-book dining reservations, show seats, and entry times for popular rides. Surprisingly, this innovation led to an immediate 8-point drop in online customer satisfaction scores—from 85% down to 77%.

Most guests reported feeling overwhelmed, describing the trip planning process as overly complicated. They faced significant mental fatigue, struggling to manage Timber Mountain's many experiences on top of coordinating flights, hotels, and car rentals.

To tackle these customer frustrations head-on, **Timber Mountain unveiled Wild Willy, an innovative AI-powered travel planner, in April 2024**. Wild Willy lets visitors effortlessly arrange flights, hotels, rental cars, and even Timber Mountain's own rides, dining, and shows—all in one convenient place.

Ultimately, the goal of Wild Willy is simple: **turn more planners into purchasers**, boosting Timber Mountain's ticket conversion rates and delivering a smoother guest experience.





Timber Mountain Homepage A/B Test

Timber Mountain's digital marketing team ran an A/B test to identify the optimal way to promote their AI-powered travel planner on the Timber Mountain Homepage. They hypothesized that adding an interactive travel planning wizard to the Homepage would boost ticket purchase conversion rates.

Please complete the following steps:

1. Write a Python or R script to analyze the A/B test results from "timber-mountain-experiment-data.csv". Jupyter Notebook preferred (.ipynb).

Your audience for this deliverable is Timber Mountain data science team.

1. What is the ticket purchase conversion rate for Control, Variation A, and Variation B?
2. What are the % lifts for the treatments?
3. Are the % lifts statistically significant at a 95% confidence level?

2. Build a short presentation deck to present the A/B test results. Keynote, PowerPoint, or Google Slides.

Your audience for this deliverable is Timber Mountain marketing team.

1. What were the A/B test results?
2. Which treatment should the Timber Mountain digital marketing team launch?

Data Dictionary:

| A/B Test Treatment | Description |
|--------------------|--|
| Control | Default Homepage |
| Variation A | Homepage with AI-Powered Trip Planner marketing module |
| Variation B | Homepage with AI-Powered Trip Planner interactive wizard |

| Data Column | Description |
|----------------------|--|
| date | Date of visit to Timber Mountain Homepage (e.g. 4/1/24) |
| visit_id | Unique ID for each visit to Timber Mountain website |
| treatment | Homepage A/B test treatment (e.g. Control, Variation A, Variation B) |
| trip_planner_engaged | Binary variable: 0 = did not engage with Trip Planner tool; 1 = engaged with Trip Planner tool |
| ticket_purchased | Binary variable: 0 = did not purchase Timber Mountain theme park ticket; 1 = purchased Timber Mountain theme park ticket |

CONTROL

Default Homepage

The homepage features a large banner at the top with a roller coaster and the text "Prepare for a majestic, action-packed day" and "TripAdvisor 'Best of the Bay' 2025". Below the banner, there's a section titled "Featured Attractions" with three cards: "Maverick Mine Train", "Wings of the West", and "Cascade Canyon". Each card includes a thumbnail, a brief description, and an "Explore" button. A "Accommodations" section follows, featuring a hotel building and the text "Experience the Timber Mountain Hotel" with a "Check Availability" button. At the bottom is a detailed "Theme Park Map".

VARIATION A:

Homepage with AI-Powered Trip Planner marketing module

This variation adds a "Let Us Help You Plan Your Trip" module. It features a cartoon cowboy character named Wild Willy, who is described as an AI-powered travel planner. Below him is a "Start Planning" button. The rest of the page layout remains identical to the control version.

VARIATION B:

Homepage with AI-Powered Trip Planner interactive wizard

This variation adds a more interactive "Let Us Help You Plan Your Trip" module. It includes a "Tell us what you're interested in:" section with checkboxes for Flights, Hotels, Car Rental, Dining, and Tickets. It also has a "Tell us about your party:" section with checkboxes for Arrival, Departure, Adults, and Children. A "Start Planning" button is present. The rest of the page layout remains identical to the control version.

Part Two: A/B Test Proposal

Timber Mountain A/B Test Ideation

Business Challenge:

In April 2024, Timber Mountain launched Wild Willy—an AI-powered travel planner on its website. The tool enables visitors to book flights, hotel, cars, and Timber Mountain shows, rides, and dining within one tool.

Six months post-launch, the digital marketing team see strong visitor engagement with the trip planner tool, but the tool has significant friction points that are hurting ticket purchase conversion rates. While 30% of website visitors engage with the tool, only **20% of those users** create a trip itinerary. This drop-off is a major concern, as the overall ticket purchase conversion rate from the tool is **only about 3%**.

Presentation Requirements:

As Timber Mountain's Data Science Lead for experimentation, please develop an A/B test proposal that addresses one friction point you believe will significantly lift ticket purchase conversion rates. Please see the supporting data on the following slides.

Your audience for this deliverable is Timber Mountain digital marketing team.

- Build a short presentation deck to present your A/B test proposal.
- Format: Keynote, PowerPoint, or Google Slides.

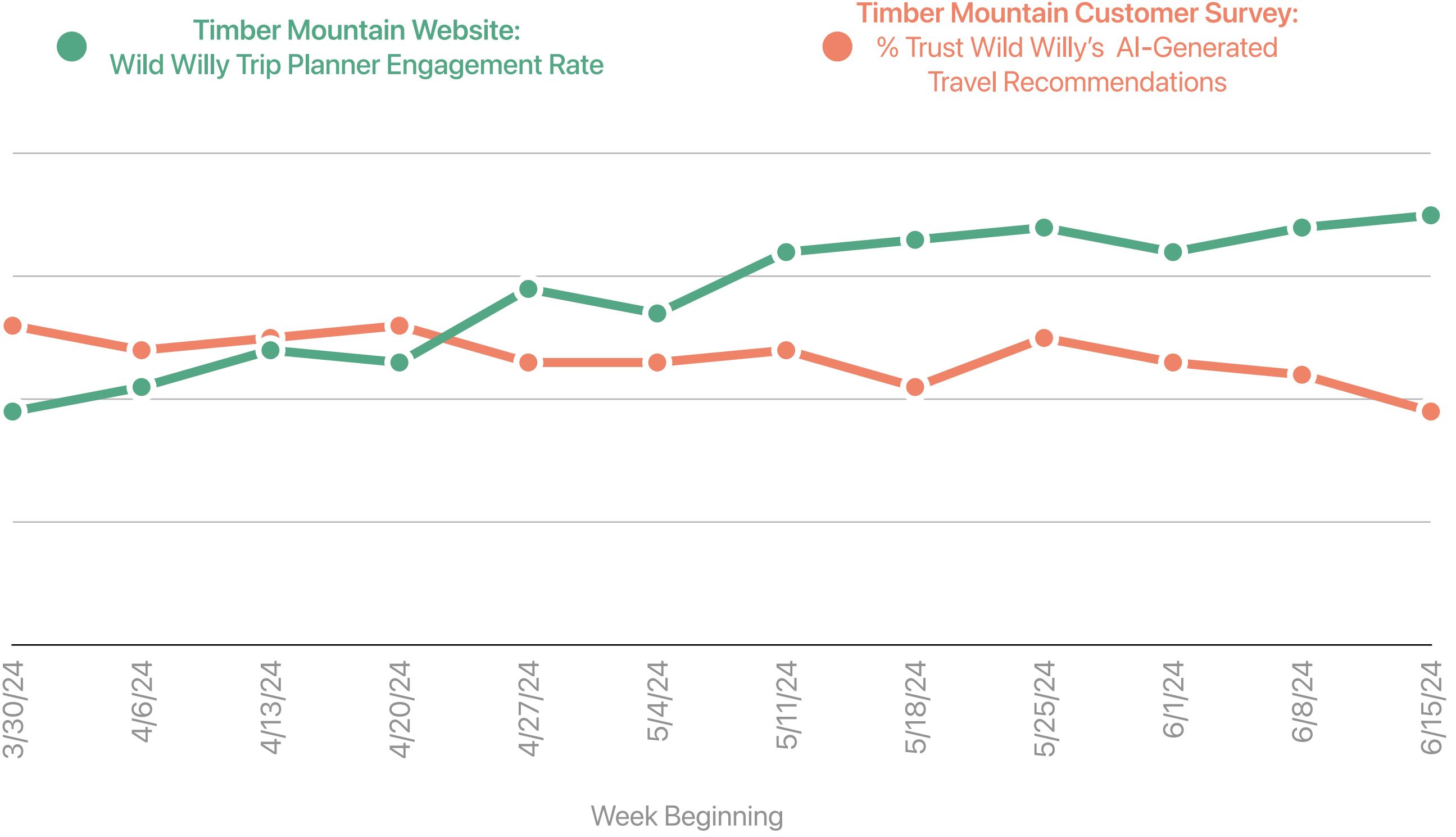
Guiding Questions:

1. Pick one friction point from the supporting data on following slides. Justify why this is an important problem to solve, using both quantitative data and/or external business intuition.
2. What is the hypothesis for your A/B test?
3. What is the A/B test design? (Feel free to describe via text. No need to design mockups.)
4. What are the KPIs for the test?
5. How would you calculate the sample size and required runtime?
6. How would you analyze the results?

👉 Trust and Transparency of AI Recommendations

Friction Point:

It appears many Timber Mountain customers are approaching the Wild Willy AI-powered travel planner tool with skepticism, asking the question "Can I trust the recommendations and information?" In survey results, many customers express concern with the black-box nature of AI-generated travel suggestions.

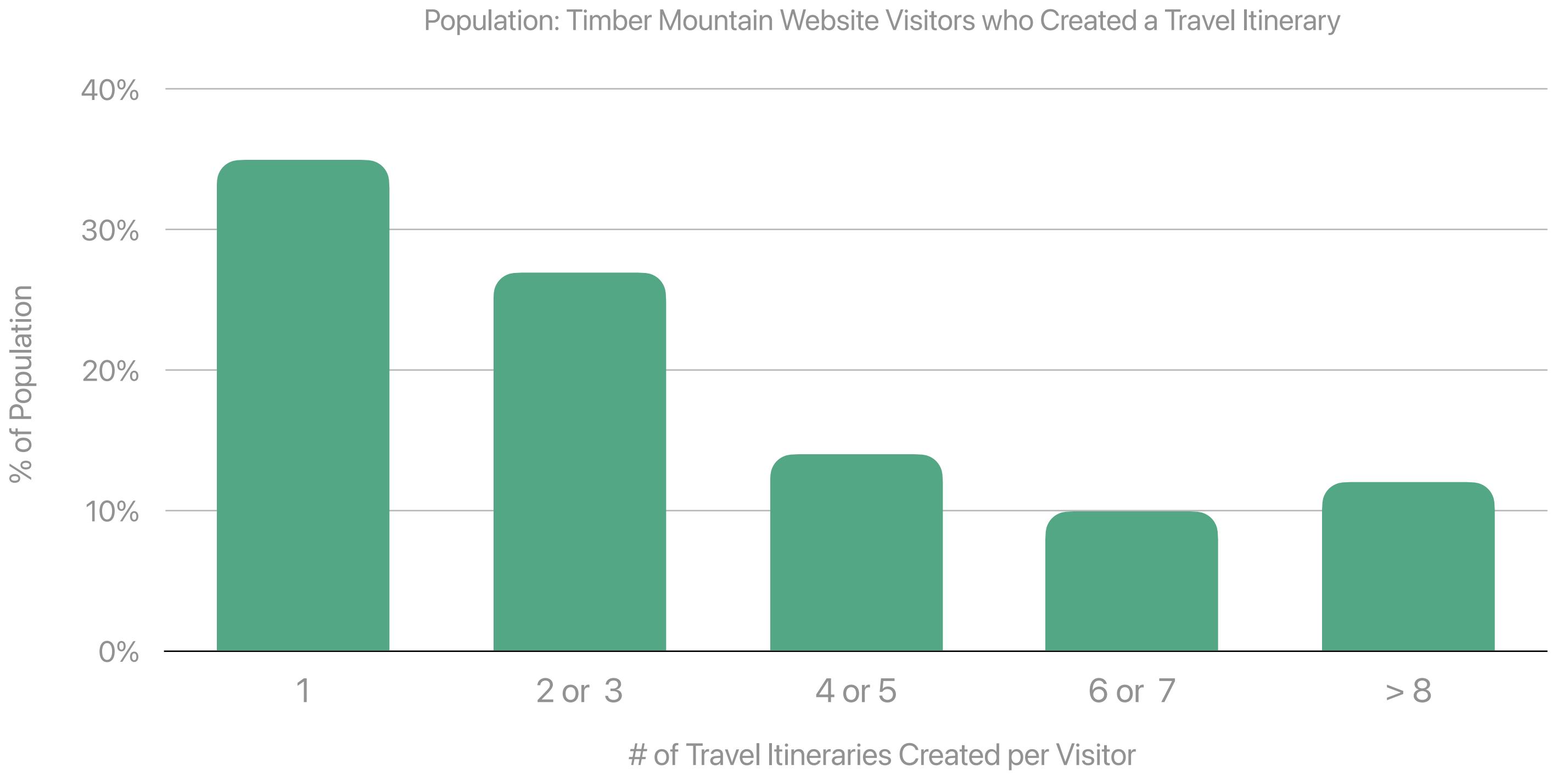


The screenshot shows the Timber Mountain website homepage. At the top, there's a navigation bar with links for Attractions, Experiences, Hotels, Plan Your Visit, and a search icon. Below the header is a large image of a roller coaster with several people smiling. A call-to-action box contains the text "Prepare for a majestic, action-packed day" and "TripAdvisor: 'Best of the Bay' 2025". Another text box below it says "Experience high-octane roller coasters, enchanting attractions, and rousing shows within a mystical, mountainous Northern California forest." To the right, there's a section titled "Let Us Help You Plan Your Trip" featuring a cartoon cowboy character and a form for users to input travel details like flights, hotels, car rental, dining, and tickets. Below this are sections for "Featured Attractions" (Maverick Mine Train, Wings of the West, Cascade Canyon) and "Accommodations" (Timber Mountain Hotel). At the bottom is a "Theme Park Map" showing the layout of the park.

Comparing Alternatives and Decision Support

Friction Point:

Timber Mountain web analytics data has revealed that travel planning isn't linear. Visitors often research multiple options in parallel. Survey results reveal a common UX friction is the inability to compare different travel scenarios side-by-side. For example, a customer might want to explore two versions of a trip: one with a shorter stay but fancier hotels, and another with more affordable hotels but a longer duration.



Example Interpretation: Of the Wild Willy tool users who created an itinerary, 35% only created one travel itinerary.

TIMBER MOUNTAIN Attractions Experiences Hotels Plan Your Visit Buy Tickets

"Prepare for a majestic, action-packed day"
— TripAdvisor "Best of the Bay" 2025

Experience high-octane roller coasters, enchanting attractions, and rousing shows within a mystical, mountainous Northern California forest.

Let Us Help You Plan Your Trip

Plan your vacation with Wild Willy, our AI-powered travel planner!

Tell us what you're interested in:
Select all that apply
 Flights Hotels Car Rental Dining Tickets

Tell us about your party:
 Arrival Departure Adults Children

Featured Attractions

- Maverick Mine Train**
Ride ore cars through dark tunnels and past glittering caverns, geysers, and hidden falls.
[Explore](#)
- Wings of the West**
Watch in wonder as the winged stars of this show soar overhead and performing daring feats.
[Explore](#)
- Cascade Canyon**
Brave roaring rapids, swirling currents, and wild waterfalls in this soaking adventure.
[Explore](#)

Accommodations

- Experience the Timber Mountain Hotel**
Relax in rustic elegance and enjoy majestic décor. Explore scenic trails, lush pine forests, and peaceful creekside moments at your doorstep.
 - ▲ Skip-the-line passes to Timber Mountain
 - ▲ Walking distance to Timber Mountain
 - ▲ Priority restaurant reservations[Check Availability](#)

Theme Park Map

🔗 Seamless Integration from Planning to Booking

Friction Point:

While Timber Mountain's Wild Willy AI-Powered Travel Tool delivers complete itinerary recommendations across flights, hotels, car rentals, dining, theme park tickets, and more—there is no unified booking process. Customers must navigate to separate websites to book each element (e.g. [Southwest.com](#) for flights, [Avis.com](#) for car rentals, and [TimberMountain.com](#) for theme park tickets, dining, and skip-the-line ride reservations).

| Booking Category | Booking Recommended | Booking Completed | Booking Abandoned | Booking Completed % |
|--------------------|---------------------|-------------------|-------------------|---------------------|
| Flights | 28,800 | 1,440 | 27,360 | 5% |
| Hotel | 23,250 | 698 | 22,553 | 3% |
| Car Rental | 4,320 | 86 | 4,234 | 2% |
| Theme Park Tickets | 72,000 | 10,080 | 61,920 | 14% |
| Theme Park Rides | 61,200 | 7,344 | 53,856 | 12% |
| Theme Park Dining | 25,200 | 2,016 | 23,184 | 8% |
| Theme Park Shows | 30,600 | 1,836 | 28,764 | 6% |

The screenshot shows the Timber Mountain website homepage. At the top, there's a navigation bar with links for Attractions, Experiences, Hotels, Plan Your Visit, and a search bar. A prominent feature is a large image of people riding a roller coaster. Below it, a call-to-action box says "Prepare for a majestic, action-packed day" and includes a quote from TripAdvisor: "Best of the Bay" 2025. Another text box below describes the park as having "high-octane roller coasters, enchanting attractions, and rousing shows within a mystical, mountainous Northern California forest." A central section features a cartoon character named Wild Willy, described as an AI-powered travel planner. It includes fields for users to tell what they're interested in (Flights, Hotels, Car Rental, Dining, Tickets) and about their party (Arrival, Departure, Adults, Children), with a "Start Planning" button. Below this are sections for "Featured Attractions" (Maverick Mine Train, Wings of the West, Cascade Canyon) and "Accommodations" (Timber Mountain Hotel). Each attraction and accommodation has a small image, a title, a brief description, and an "Explore" button. At the bottom is a "Theme Park Map" showing the layout of the park.

Thank You 🙏