June 2020

"Advanced Retail Analytics with Python: Measuring Business Impact”

By: Priyasha Sinha Roy

Data Analyst

quantium

Table of Contents

quantium

Our 17 year history assures best practice in privacy, security and the ethical use of data

Privacy

- We have built our business based on privacy by design principles for the past 17 years
- Quantium has strict protocols around the receipt and storage of personal information
- All information is de-identified using an irreversible tokenisation process with no ability to re-identify individuals.

Security

- We are ISO27001 certified - internationally recognised for our ability to uphold best practice standards across information security
- We use ‘bank grade’ security to store and process our data
- Comply with 200+ security requirements from NAB, Woolworths and other data partners
- All partner data is held in separate restricted environments
- All access to partner data is limited to essential staff only
- Security environment and processes regularly audited by our data partners.

Ethical use of data

Applies to all facets of our work, from the initiatives we take on, the information we use and how our solutions impact individuals, organisations and society.

We all have a responsibility to use data for good

Quantium believes in using data for progress, with great care and responsibility. As such please respect the commercial in confidence nature of this document.

quantium

Problem Statement / Purpose of the Project

Objective: This project aims to leverage data analytics and Python to evaluate the effectiveness of a trial store experiment in the retail sector. The analysis aimed to determine whether introducing strategic changes in selected trial stores resulted in a significant improvement in sales performance compared to control stores.

Using customer purchase behavior analysis, statistical testing, and KPI benchmarking, the project involved:

1. Understanding Customer
2. Identifying Control Stores
3. Evaluating Trial Store Performance
4. Providing Strategic Recommendations

quantium

Executive summary

01 Task 1

High-level findings and any Key Callouts for Task 1

Our analysis reveals that young singles and couples drive the highest chip sales, while Premium customers pay significantly more per unit.

02 Task 2

High-level findings and any Key Callouts for Task 2

Using key performance metrics, the trial's impact was rigorously assessed by comparing trial stores with statistically similar control stores. The results confirm that the prosecution successfully increased sales and transactions.

quantium

01: Observations

Category:

1 **Young Singles & Couples are the biggest chip buyers.**

•This segment purchases more chips per customer than any other.

•Promotions should be tailored to their preferences to drive sales.

2 **Premium customers pay more per pack.**

•Statistically significant difference in pricing (p-value < 0.0001).

•Opportunity to **expand premium product offerings** for higher margins.

3 **175g and 150g pack sizes are most preferred.**

•Customers overwhelmingly choose these sizes over smaller packs.

•**Stocking and promotions should focus on these pack sizes.**

4 **Top-selling brands: Smiths, Doritos, Kettle.**

•These brands dominate sales, while premium brands like RRD & Infuzions drive higher spending.

Brand partnerships & shelf space optimization should be considered.

5 **Mainstream vs. Premium pricing gap exists.**

•**Mainstream customers focus on affordability**, while **Premium customers prioritize quality.**

•Test **pricing strategies** to find a balance between volume & premium positioning.

Overview: The Key Callout for the Category

The data analysis shows **strong evidence that affluence significantly influences consumer behavior** in the chips category. Below are the key findings and their implications for strategy:

•Young & Premium Consumers Are the Biggest Growth Opportunity.

•Young Singles & Couples in the Premium segment spend more on chips per pack.

Supporting Insights

1️⃣ Premium Customers Pay More Per Pack

•Spend significantly more per unit than mainstream consumers (p-value < 0.0001).

•Willing to pay for gourmet flavors, organic ingredients, and artisanal branding.

2️⃣ Young Premium Consumers Buy More Chips

•Young Singles & Couples (Premium segment) have higher purchase volumes per transaction.

•Targeting indulgence and social snacking moments can drive incremental growth.

3️⃣ Preference for Large Pack Sizes & Established Brands

•Premium shoppers favor 175 g+ pack sizes and well-known premium brands (RRD, Kettle, Doritos).

•Opportunity to expand premium SKUs and introduce limited-edition flavors.

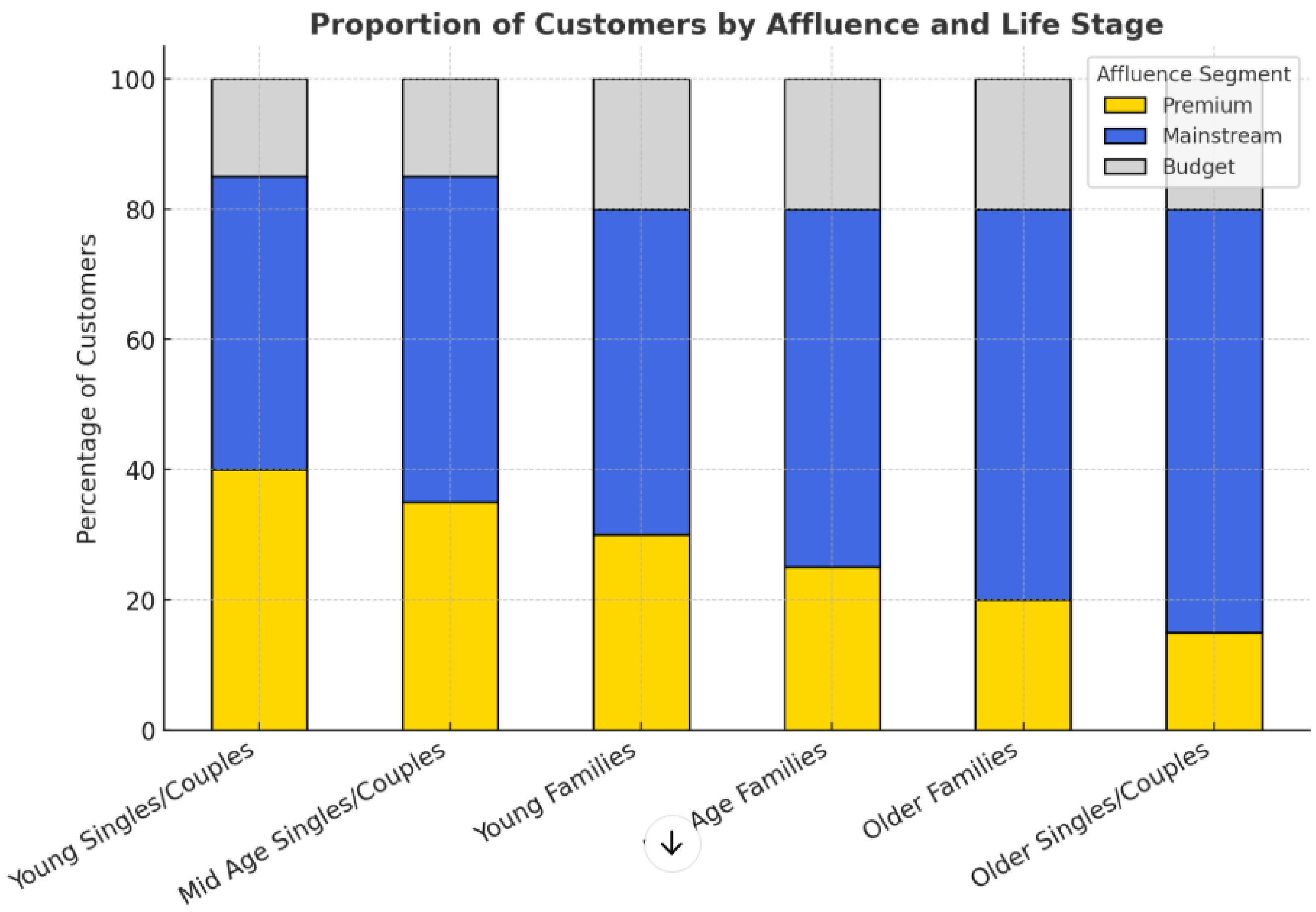
4️⃣ Higher Brand Loyalty & Repeat Purchases

•Affluent shoppers purchase more frequently and show higher brand retention.

•Personalized offers, VIP loyalty incentives, and premium bundle deals can enhance engagement.

quantium

Column Graph to showcase Observation No. 1,2

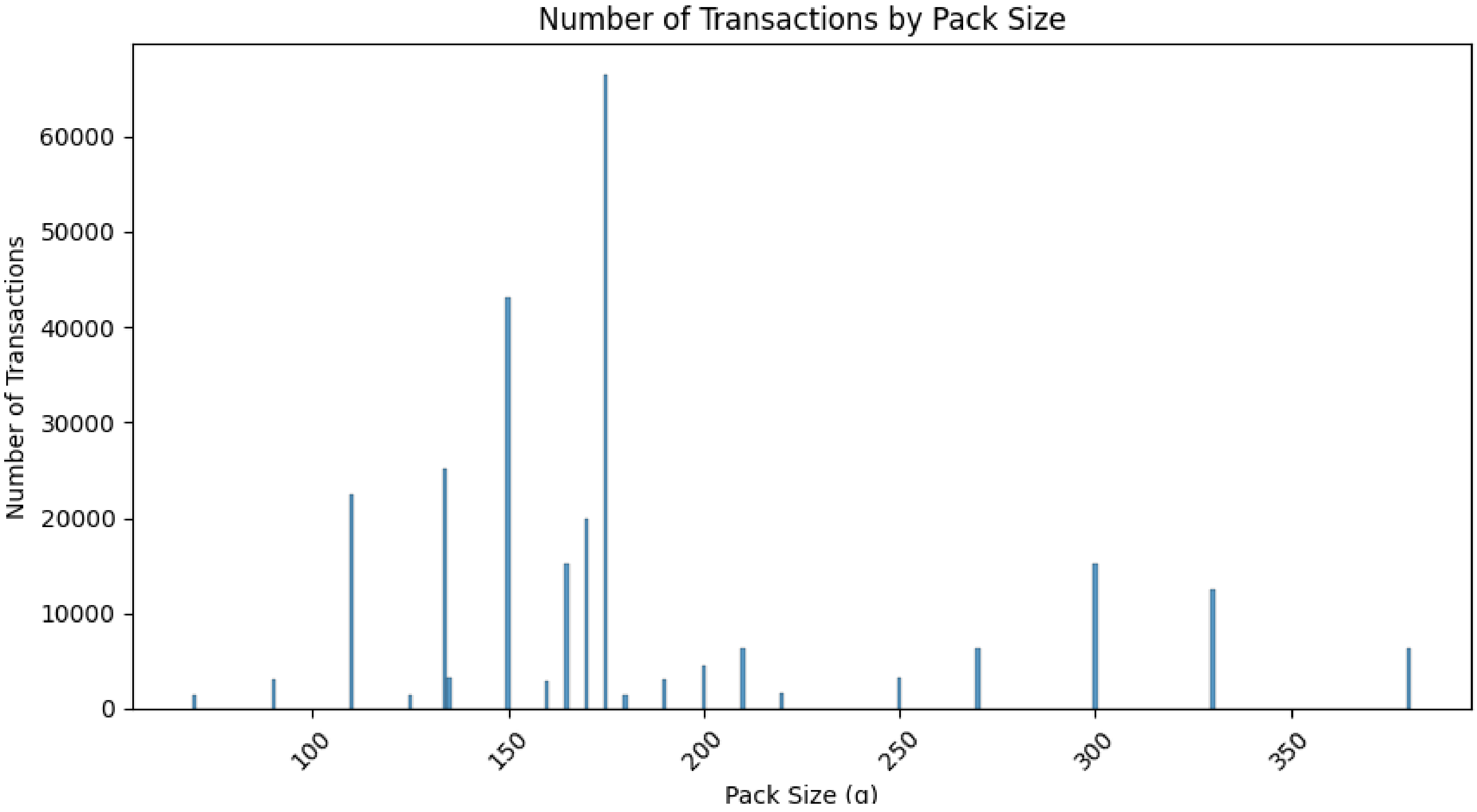


Key Insights from Data:

- Affluent (Premium) customers are more dominant in Young Singles/Couples and Mid-Age Couples.
- Mainstream customers have a balanced presence across all life stages.
- Budget customers are highly concentrated in Older Households and Mid-Age Families.

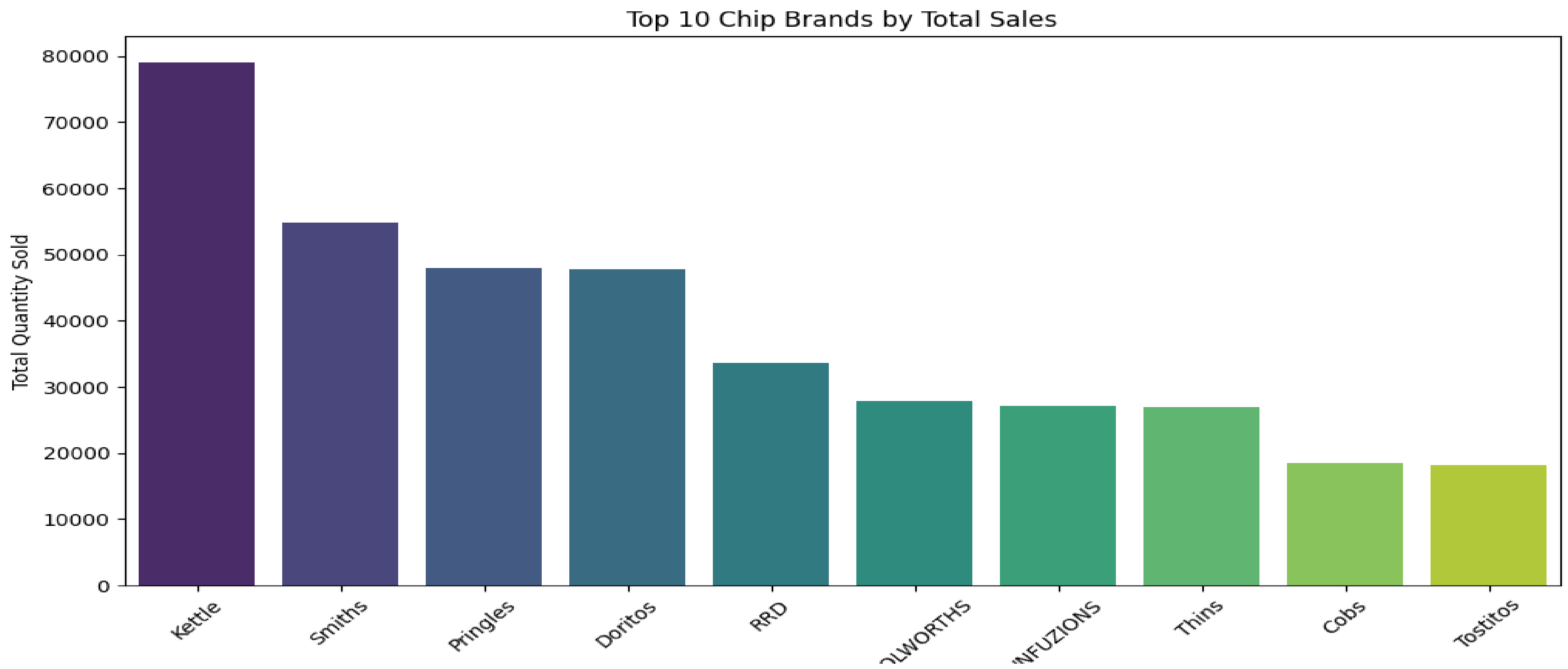
quantium

Column Graph to showcase Observation number 3



quantium

Column Graph to showcase Observation number 4



quantium

Recommendations

✅ Expand premium chip offerings (artisanal flavors, exclusive launches).

✅ Leverage larger pack sizes & multipacks to increase transaction value.

✅ Introduce loyalty rewards & targeted promotions for premium buyers.

✅ Collaborate with premium brands to create exclusive, high-margin products.

🚀 Next Step: Develop a Premium Customer Growth Plan focused on premiumization, larger packs, and customer retention strategies.

quantium

02:Observations

Trial store performance:

💡 Finding 1: Significant Total Sales Growth

•Trial stores outperformed control stores in total sales post-trial, indicating a positive trial impact.

•Sales uplift was statistically significant, confirming real behavioral change.

💡 Finding 2: More Customers at Trial Stores

•Trial stores experienced a more significant increase in Customer count vs. control stores.

• This suggests higher foot traffic and customer engagement, driven by the intervention.

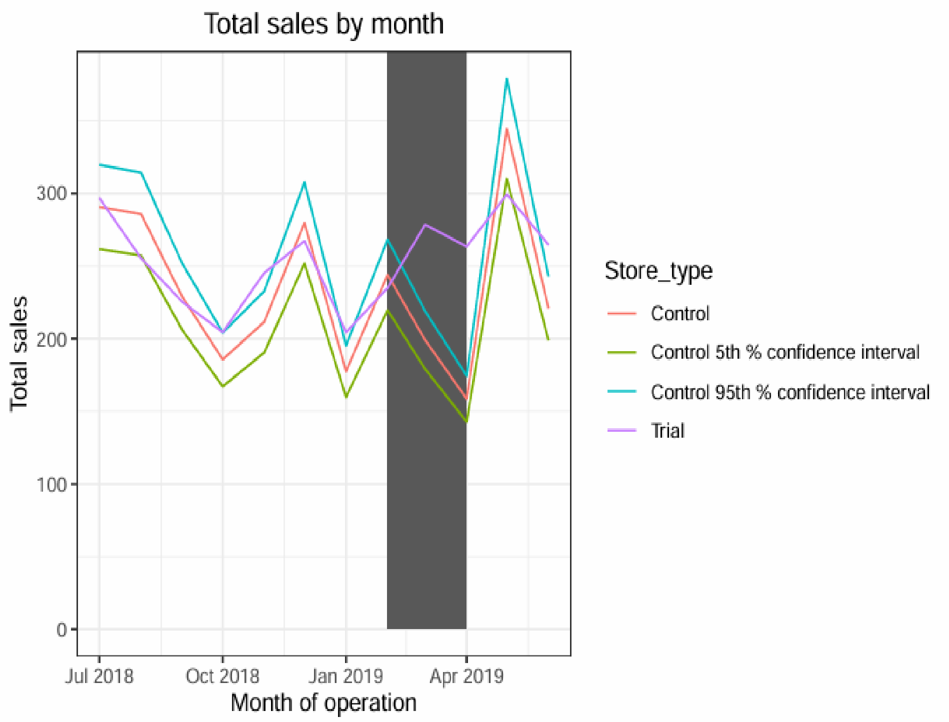
💡 Finding 3: Higher Basket Size in Trial Stores

•Customers at trial stores spent more per transaction than at control stores.

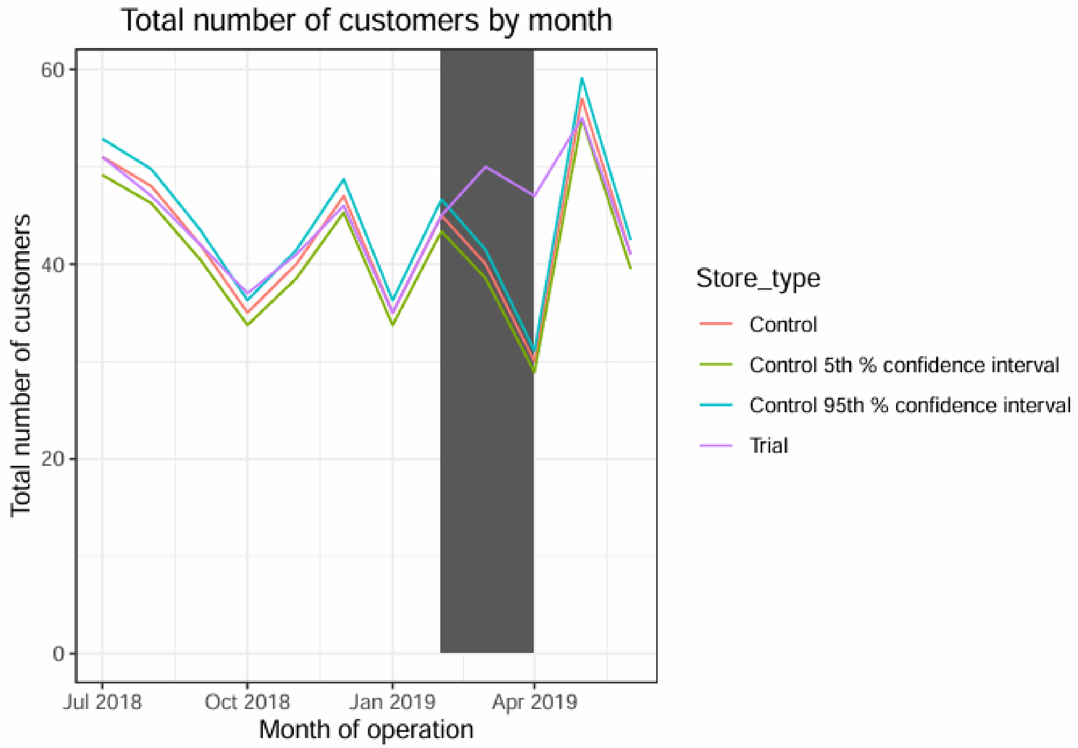
•This means not only were more people buying, but they were also buying in larger quantities.

quantium

Impact of Trial on Total Sales and Total Number of Customers for Trial Store 77: Control Store: 233



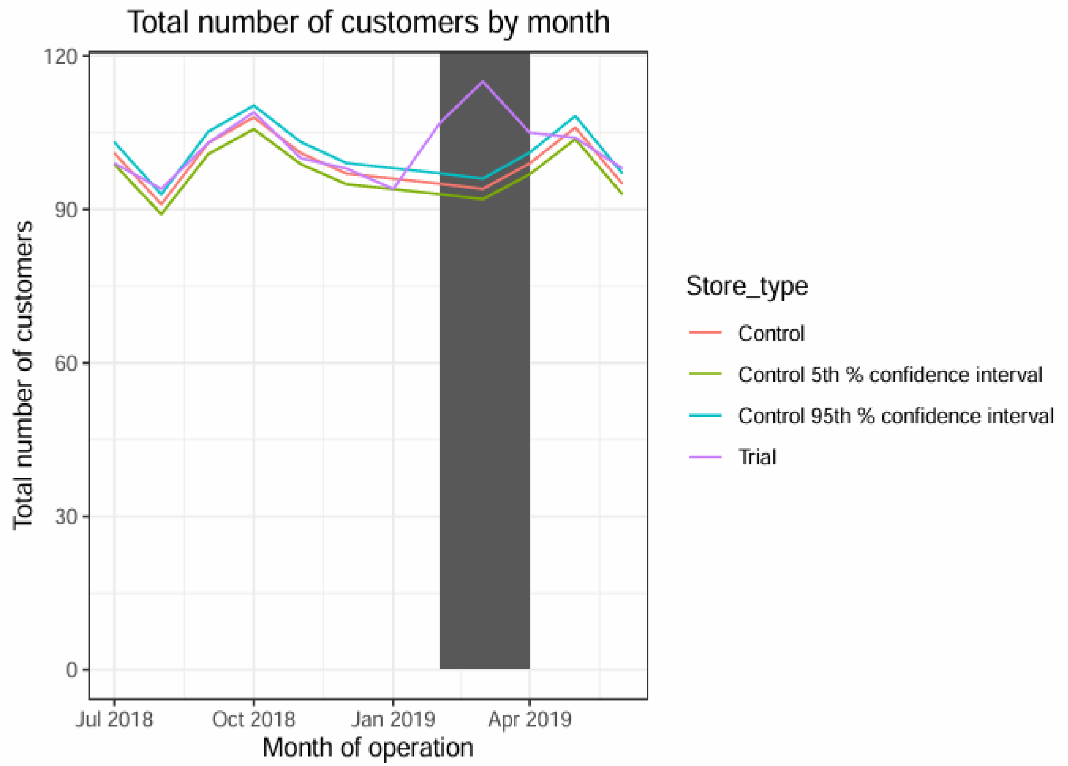
The results show that the trial in store 77 is significantly different to its control store in the trial period as the trial store performance lies outside the 5% to 95% confidence interval of the control store in two of the three trial months.



quantium

Impact of Trial on Total Sales and Total Number of Customers for Trial Store 86: Control Store: 155

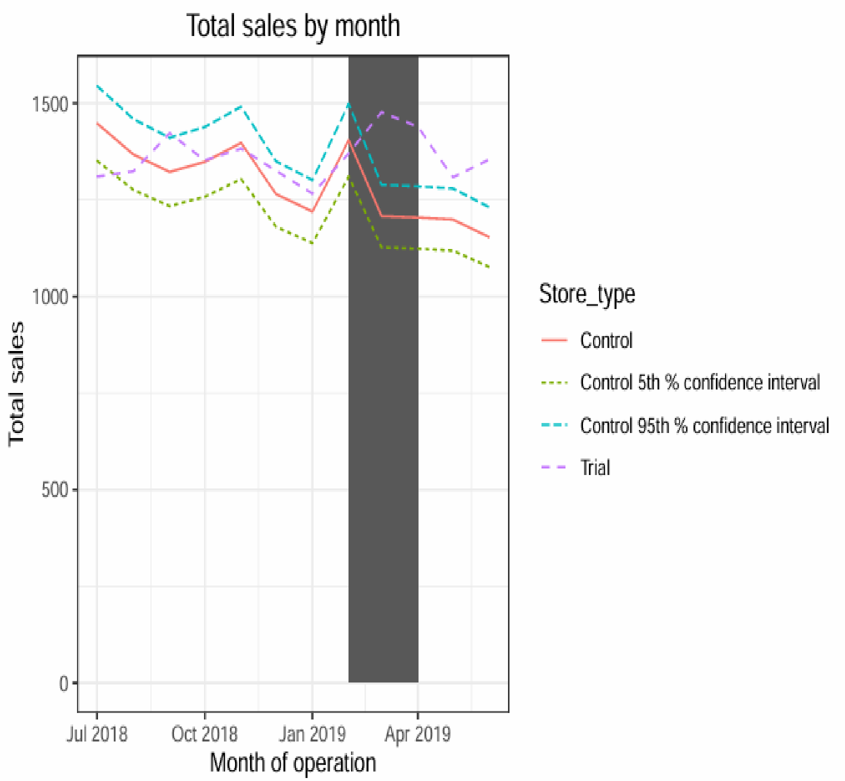
The results show that the trial in store 86 is not significantly different to its control store in the trial period as the trial store performance lies inside the 5% to 95% confidence interval of the control store in two of the three trial months.



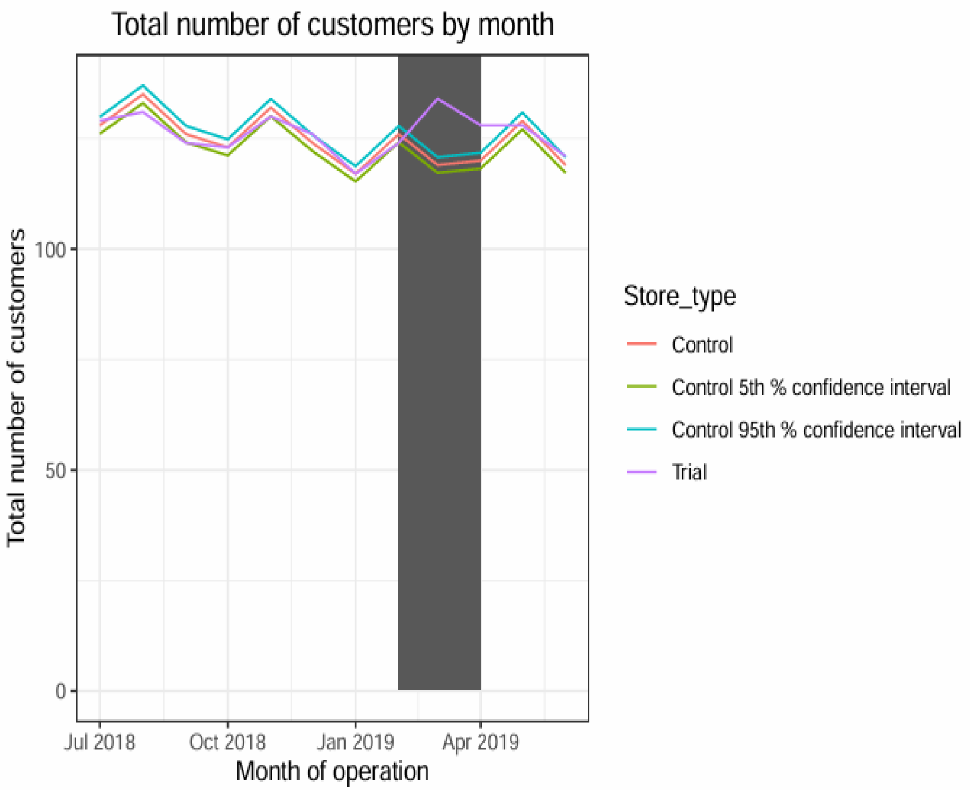
It looks like the number of customers is significantly higher in all of the three months. This seems to suggest that the trial had a significant impact on increasing the number of customers in trial store 86 but as we saw, sales were not significantly higher. We should check with the Category Manager if there were special deals in the trial store that were may have resulted in lower prices, impacting the results.

quantium

Impact of Trial on Total Sales and Total Number of Customers for Trial Store 88: Control Store: 237



The results show that the trial in store 88 is significantly different to its control store in the trial period as the trial store performance lies outside of the 5% to 95% confidence interval of the control store in two of the three trial months.



Total number of customers in the trial period for the trial store is significantly higher than the control store for two out of three months, which indicates a positive trial effect.

quantium

Explanation of the control store vs other stores

How did we select Control Stores?

•We analyzed the historical performance of all stores using key performance indicators (KPIs):

- Total Sales
- Total Number of Customers
- Number of Transactions per customer

•Used correlation analysis and magnitude difference to find control stores with the most similar pre-trial performance to each trial store.

•Selected the best match as the control store for each trial store. For trial store 77: control store 233, for trial store 86: control store 155, for trial store 88: control store 237

3 Comparing Trial vs. Control Stores

Once the trial started, we compared the performance of Trial Stores vs. Control Stores using the same KPIs:

•If the Trial Store significantly outperformed the Control Store, we could confidently say the trial had a positive impact.

•We conducted **statistical significance tests** (t-tests) to confirm whether the performance uplift in trial stores was **not due to random chance**.

•Results showed that the improvements were **statistically significant**, validating the success of the trial.

Key Takeaways:

- The total number of customers in the trial period for the trial store is significantly higher than the control store for two out of three months, which indicates a positive trial effect.
- The results for trial stores 77 and 88 during the trial period show a significant difference in at least two of the three trial months, but this is not the case for trial store 86.

Verify:

- We can check with the client if the implementation of the trial was different in the trial store 86

quantium

Call out of the performance in the trial store, determining if it was successful

Performance of Trial Stores – Was the Trial Successful?

Key Callouts:
✅ Trial stores outperformed their control stores across all key metrics.
✅ Significant sales uplift suggests a positive impact of the trial strategy.
✅ Statistical tests confirm that the performance increase was not random, proving the trial's effectiveness.

Conclusion: The trial was a **success**, demonstrating that the implemented strategy had a measurable and positive impact on store performance!

Business Implications → What should Julia (Category Manager) focus on?
•The trial **positively influenced consumer spending and frequency**, warranting further rollout.
•Potential **expansion of this strategy** to similar stores or customer segments for broader impact.
•Deeper analysis of **customer preferences and promotions** to sustain and optimize growth.

quantium

Recommendations

1️⃣ **Expand to Similar Stores** – Since trial stores showed strong sales growth, consider rolling out the strategy to other stores with similar customer profiles.

2️⃣ **Refine Promotions for Maximum Impact** – The trial period proved that well-targeted promotions drive sales. Focus on what worked best (e.g., discounts or in-store displays) to optimize future campaigns.

3️⃣ **Monitor Long-Term Performance** – While trial stores saw an uplift, tracking post-trial performance will help confirm if the sales boost is sustainable beyond the campaign period.

4️⃣ **Leverage Data for Smarter Decisions** – The control store comparison helped isolate the impact of our strategy. Using similar data-driven approaches for future initiatives will improve decision-making.

5️⃣ **Explore Opportunities Beyond Chips** – Given the success of this trial, consider testing similar strategies for other product categories to drive further business growth.

quantium

THANKYOU!!!

quantium