



Quantium Virtual Internship

Experimentation and Uplift Testing

Executive Summary

This report evaluates whether a new store layout was introduced in three trial stores. Stores 77, 86, and 88 had a meaningful impact on chip sales and customer counts between February and April 2019. The analysis was led by Julia, the chip category manager, to inform a decision on whether to roll out the layout to other stores in the network.

To measure impact fairly, each trial store was matched with a similar "control store" that did not change its layout during the same period. By comparing what happened in the trial stores against what we would have expected based on the control stores, we can isolate the effect of the layout change from broader market trends.

How We Tested

Methodology Note

We identified the best-matching control store for each trial store by comparing historical sales trends and customer counts from July 2018 to January 2019, the period before the trial began. We then used statistical confidence intervals to determine whether any differences observed during the trial were genuinely caused by the new layout or simply due to normal variation.

Key Findings:

- Store 77 (paired with Control Store 233): The new layout had a positive and statistically significant impact on both sales and customer numbers in 2 out of 3 trial months.
- Store 86 (paired with Control Store 155): Sales did not increase significantly, but customer numbers rose above the expected range in all 3 trial months, a strong signal that the layout attracted more shoppers.
- Store 88 (paired with Control Store 237): The new layout produced the strongest results of the three stores, with sales and customer numbers both significantly above expectations in 2 out of 3 trial months.
- Overall, the evidence supports rolling out the new layout more broadly, with confidence based on the results from Stores 77 and 88.

Trial Store	Control Store	Sales Impact	Customer Impact
Store 77	Store 233	Positive (2/3 months)	Positive (2/3 months)
Store 86	Store 155	No significant uplift	Positive (all 3 months)
Store 88	Store 237	Positive (2/3 months)	Positive (all 3 months)

Approach & Methodology

Before examining what happened during the trial, it is important to understand how the analysis was structured and why the approach is reliable. This section explains the logic in plain terms.

Why Do We Need a Control Store?

We cannot simply compare a trial store's sales before and after the layout change. Many factors can affect seasonal sales patterns, including local conditions, promotions and shifts in broader consumer behaviour—and these would affect all stores, not just those with a new layout. A control store is a store that is as similar as possible to the trial store but does not change its layout. Any difference in performance between the trial and control stores during the trial period can therefore be attributed to the layout change rather than to external factors.

Analogy: Think of it like a medical trial: to test whether a new treatment works, you compare patients who received it against a similar group who did not. The control group tells you what would have happened without the treatment.

How Were Control Stores Selected?

For each trial store, we calculated two similarity scores against every other store in the network using data from July 2018 to January 2019 (the pre-trial period):

- **Sales correlation:** How closely did the store's monthly sales move in the same pattern as the trial store?
- **Magnitude similarity:** How similar was the absolute level of sales to that of the trial store?

These two scores were combined into a single ranking, and the store with the highest combined score was selected as the control store for each trial location. This method ensures we are comparing like with like.

How Are the Results Interpreted?

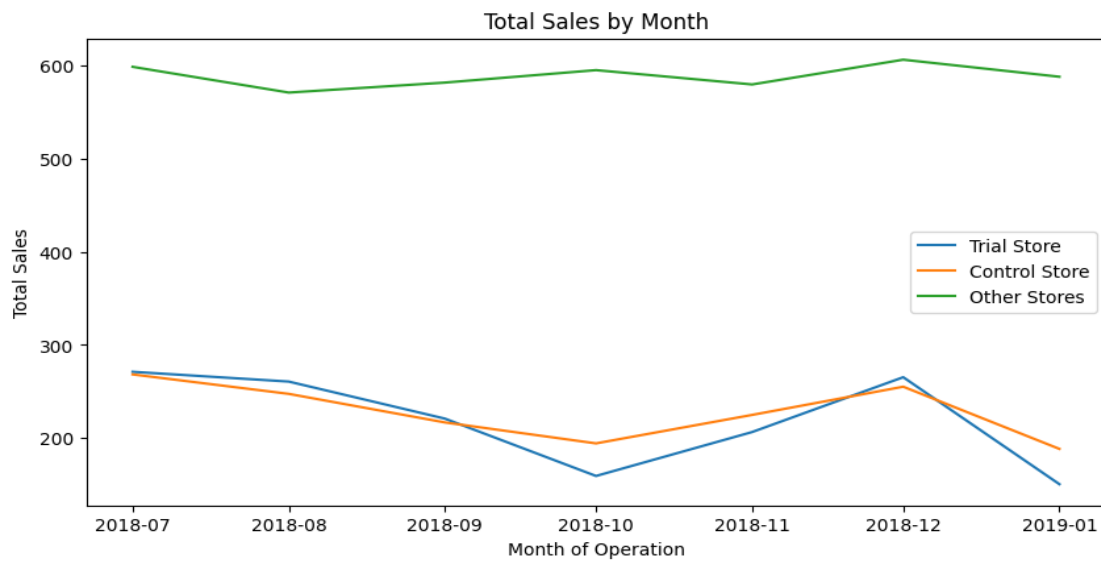
Once a control store is identified, we scale the control store's sales proportionally to match the trial store's sales and construct a 95% confidence interval, a range within which we expect the trial store to perform, based solely on its historical relationship with the control store. If the trial store's actual performance falls outside this confidence interval during the trial months, we can conclude that the difference is statistically significant, indicating that the new layout is the most likely explanation.

Store 77 – Trial Store Analysis

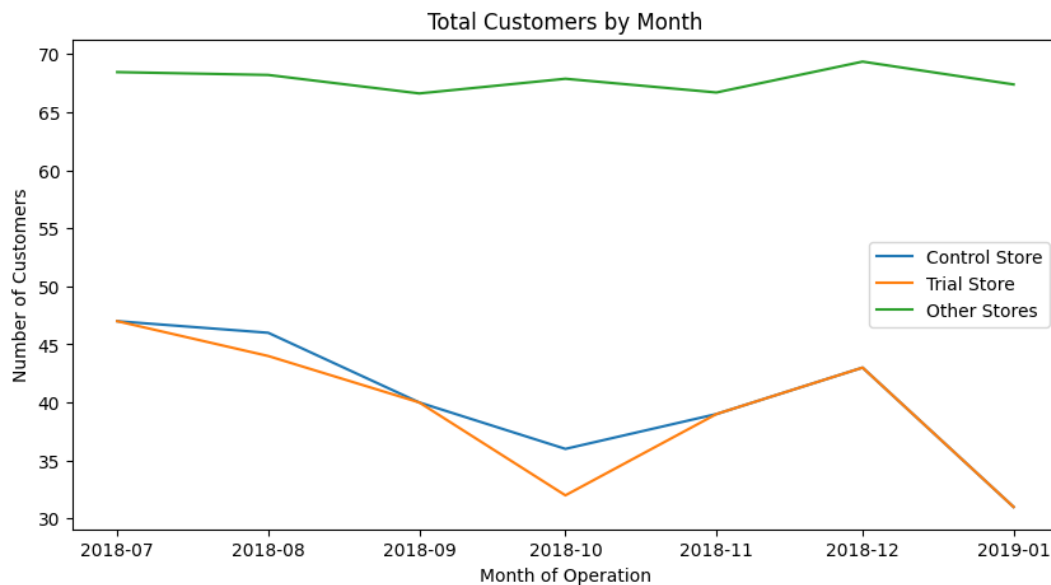
Store 77 was paired with Store 233 as its control. The two stores showed very similar sales patterns and customer volumes in the pre-trial period, making Store 233 an ideal comparison.

Pre-Trial Comparison: Establishing a Baseline

The charts below confirm that Store 77 and Store 233 tracked each other closely from July 2018 through to January 2019, the period before the new layout was installed. This alignment makes the comparison meaningful: any divergence after February 2019 is more likely to be due to the layout change than to pre-existing differences between the stores.



Monthly total chip sales for Store 77 and Control Store 233 during the pre-trial period (Jul 2018 – Jan 2019). Both stores track closely.

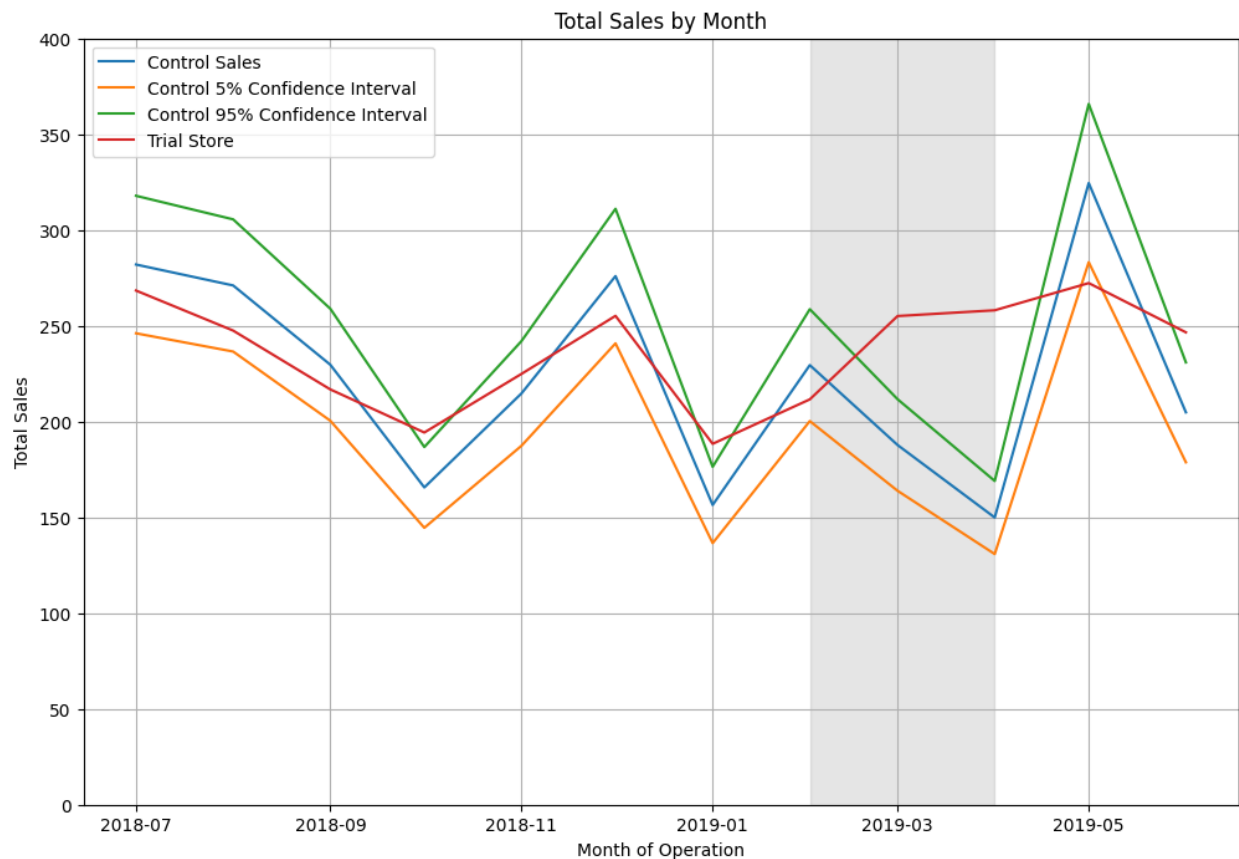


Monthly customer numbers for Store 77 and Control Store 233 during the pre-trial period. Customer volumes are well-matched

Trial Period Results: February – April 2019

Total Sales

The chart below shows the full 12-month sales comparison, including the trial period. The grey-shaded area covers February to April 2019, when the new layout was active.

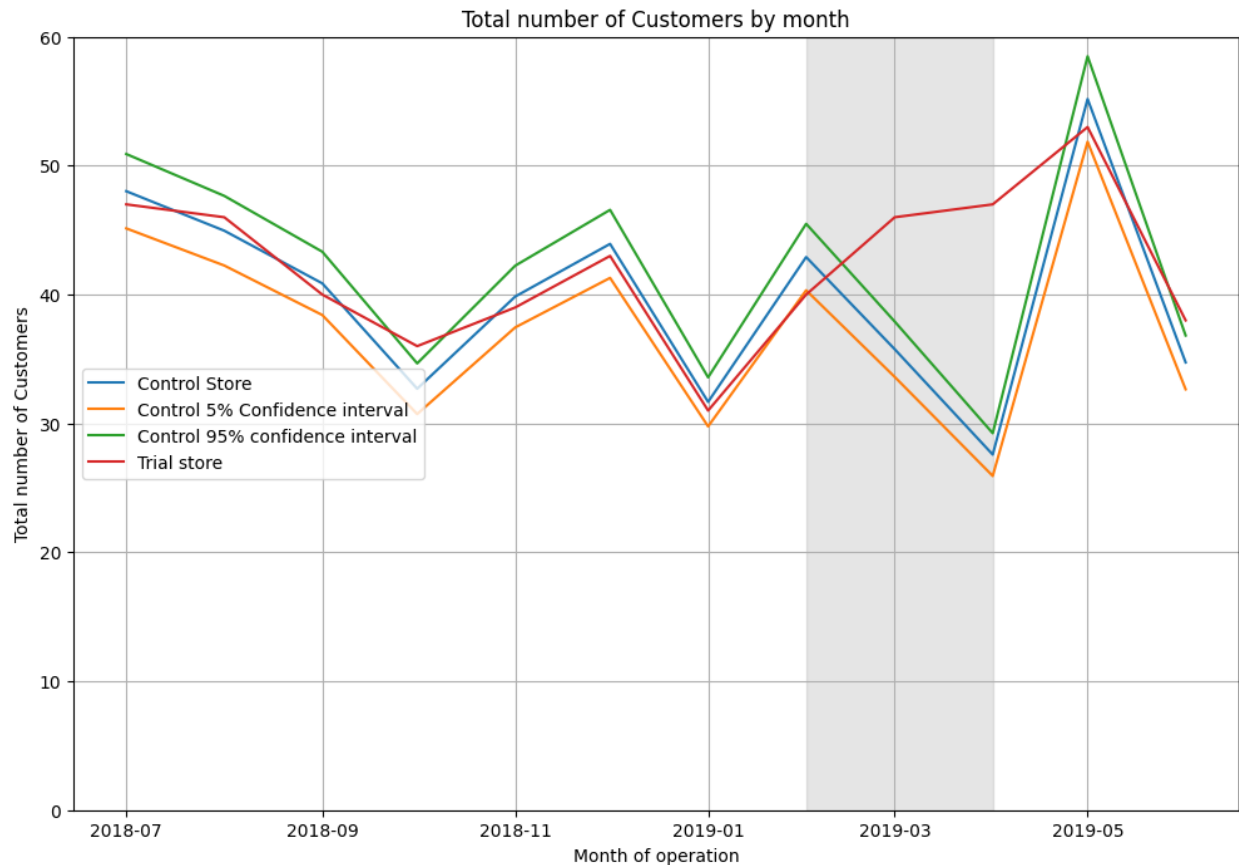


During March and April 2019, Store 77's actual sales clearly exceeded the upper confidence interval boundary, indicating its performance was significantly better than we would have predicted based on Store 233. February 2019 showed a smaller positive movement but remained within the expected range. Overall, 2 out of 3 trial months produced a statistically significant sales uplift.

Metric	Feb 2019	Mar 2019	Apr 2019
Total Sales vs Expected	Within CI	Above CI (significant)	Above CI (significant)
Conclusion	No effect	New layout likely caused uplift	New layout likely caused uplift

Number of Customers

The new layout not only encouraged existing customers to spend more but also attracted additional customers to the chip aisle.



In February and March 2019, customer counts exceeded the upper confidence interval, indicating that the new layout drew more people into the chip section. April also showed a positive trend, though just within the boundary. The consistent lift in customer numbers, even in February when sales were still within the normal range, suggests customers were engaging with the new layout from the first month it was installed.

Store 77 Verdict: New Layout Worked

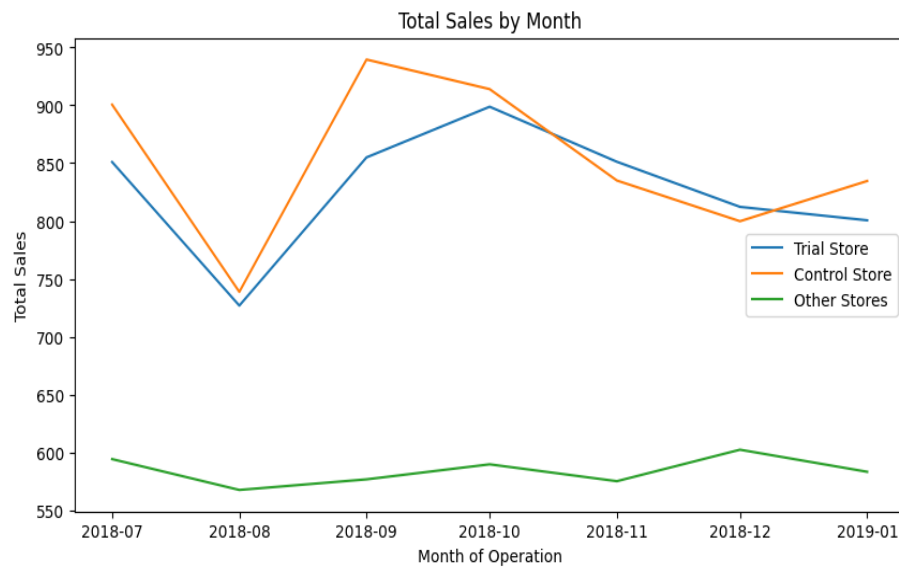
The new store layout had a statistically significant positive effect on both chip sales and customer counts in 2 of the 3 trial months. The results support adopting this layout at Store 77 permanently and considering a wider rollout.

Store 86 – Trial Store Analysis

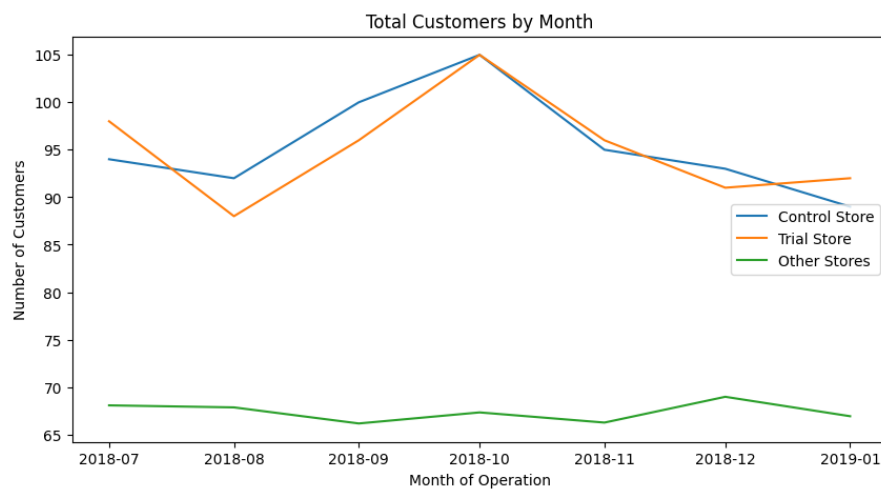
Store 86 was paired with Store 155 as its control. Of all stores evaluated as potential matches, Store 155 showed the strongest combination of sales correlation and magnitude similarity to Store 86 in the pre-trial period.

Pre-Trial Comparison: Establishing a Baseline

The charts below confirm that Store 86 and Store 155 were well-matched throughout the pre-trial period. Their sales and customer volumes consistently moved together, giving us a reliable baseline for measuring the trial's effect.



Monthly total chip sales for Store 86 and Control Store 155 during the pre-trial period. The two stores track closely.

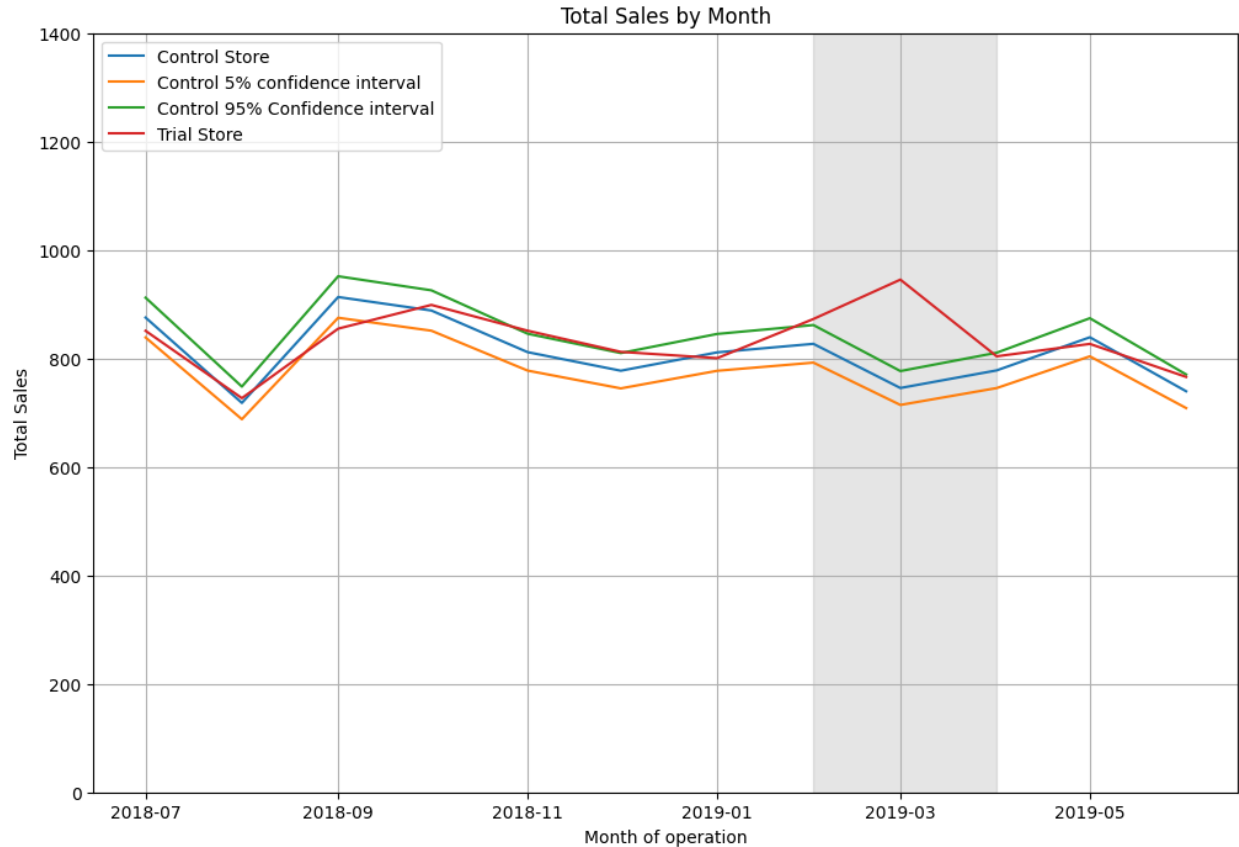


Monthly customer numbers for Store 86 and Control Store 155 during the pre-trial period. A strong baseline match.

Trial Period Results: February – April 2019

Total Sales

The chart below shows the full-year data for Store 86, along with its control, with the trial period highlighted.



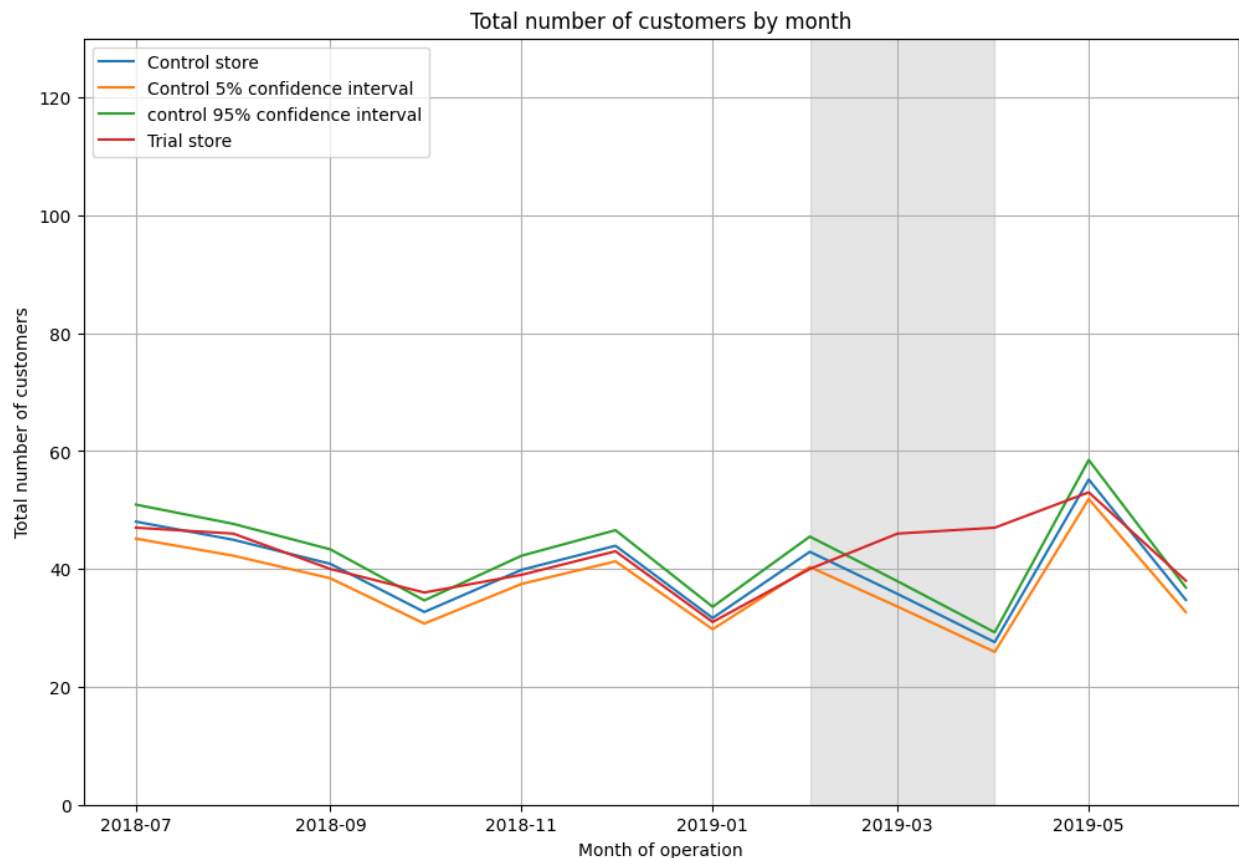
Unlike Store 77 and Store 88, Store 86's total chip sales during the trial months did not exceed the upper confidence interval boundary. In all three months of the trial, sales performance remained within the range we would have expected based on Store 155. This means we cannot conclude the new layout caused a significant increase in chip sales at Store 86.

One possible explanation is that Store 86 operates in a different location type or has a different customer base that was less responsive to the specific layout changes. The layout may still have improved other aspects of the shopping experience not captured in chip sales figures alone.

Metric	Feb 2019	Mar 2019	Apr 2019
Total Sales vs Expected	Within CI	Within CI	Within CI
Conclusion	No significant effect	No significant effect	No significant effect

Number of Customers

While sales did not show a significant uplift, the customer data tells a more encouraging story for Store 86.



In all three months of the trial period, Store 86 attracted more customers to the chip section than we would have predicted based on Store 155. This is a meaningful finding: the layout consistently brought more people into the category, even if those additional customers were not necessarily spending more per visit than existing shoppers.

This pattern may suggest that the new layout is effective at attracting customer attention and increasing foot traffic to the chip aisle, but other factors—such as promotional pricing, product range, or store-specific demographics—may be needed to convert that increased traffic into higher sales.

Key Insight for Store 86: The new layout successfully drew more customers to the chip aisle in all three trial months, even though total sales did not rise significantly. To convert increased foot traffic into incremental revenue, consider pairing the new layout with targeted in-store promotions or additional product facings.

Store 86 Verdict: Mixed Results

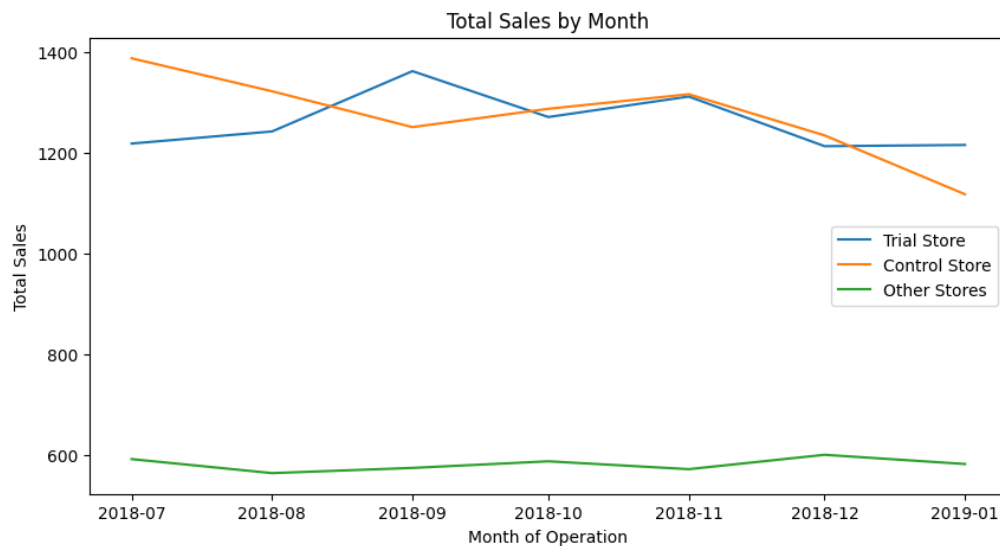
The new layout attracted significantly more customers in all 3 trial months but did not produce a statistically significant increase in chip sales. The customer uplift is a positive signal; pairing the layout with complementary promotions may unlock the full sales potential.

Store 88 – Trial Store Analysis

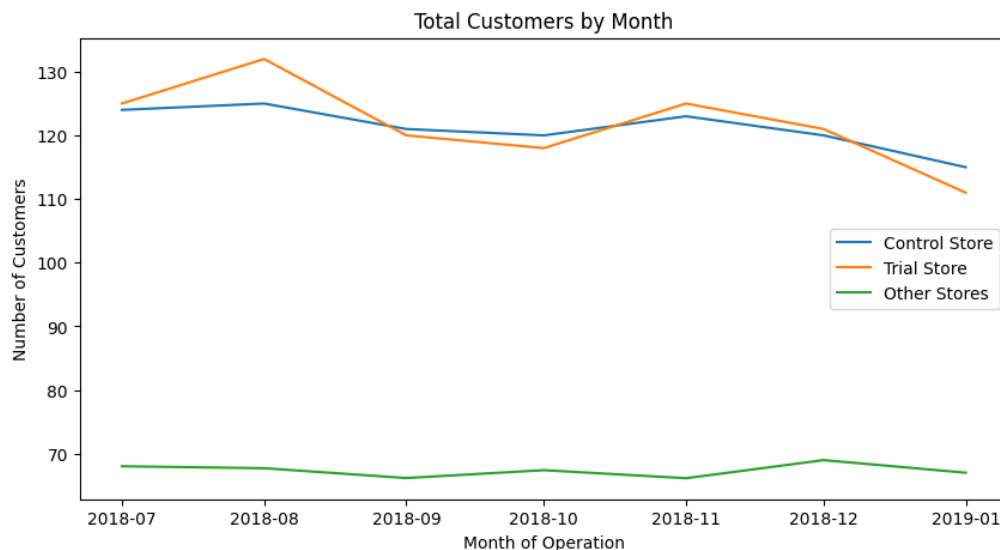
Store 88 was paired with Store 237 as its control, after evaluating Store 237 against several other candidates. Store 237 was selected because it most closely mirrored Store 88's pre-trial sales trajectory and customer count patterns.

Pre-Trial Comparison: Establishing a Baseline

As with the other trial stores, we first verified that Store 88 and Store 237 were a reliable match before the layout change. The charts below show the pre-trial period from July 2018 to January 2019.



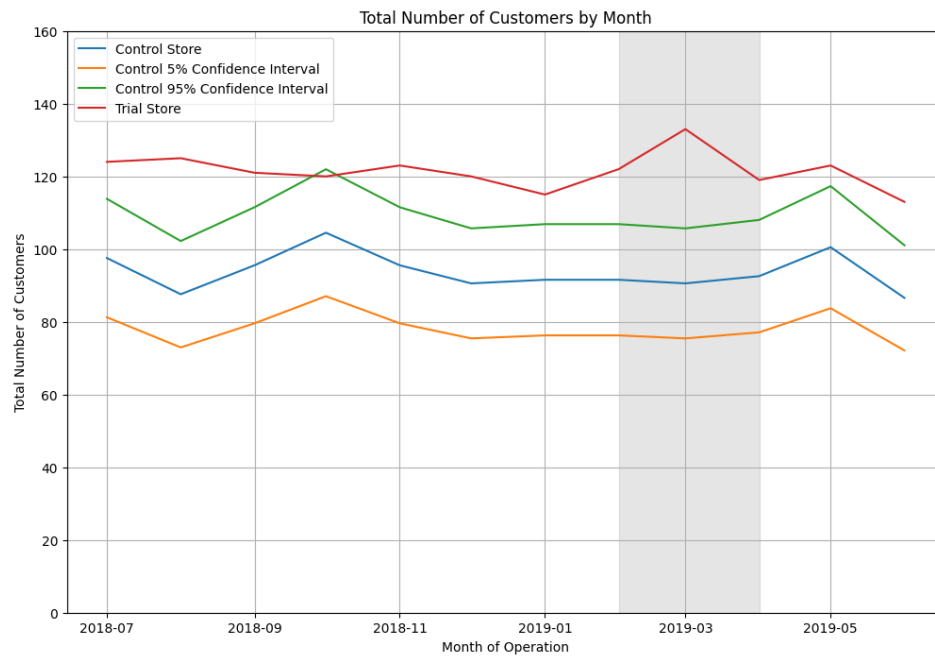
Monthly total chip sales for Store 88 and Control Store 237 during the pre-trial period. The stores track each other closely.



Monthly customer numbers for Store 88 and Control Store 237 during the pre-trial period. A strong and consistent pre-trial match.

Number of Customers

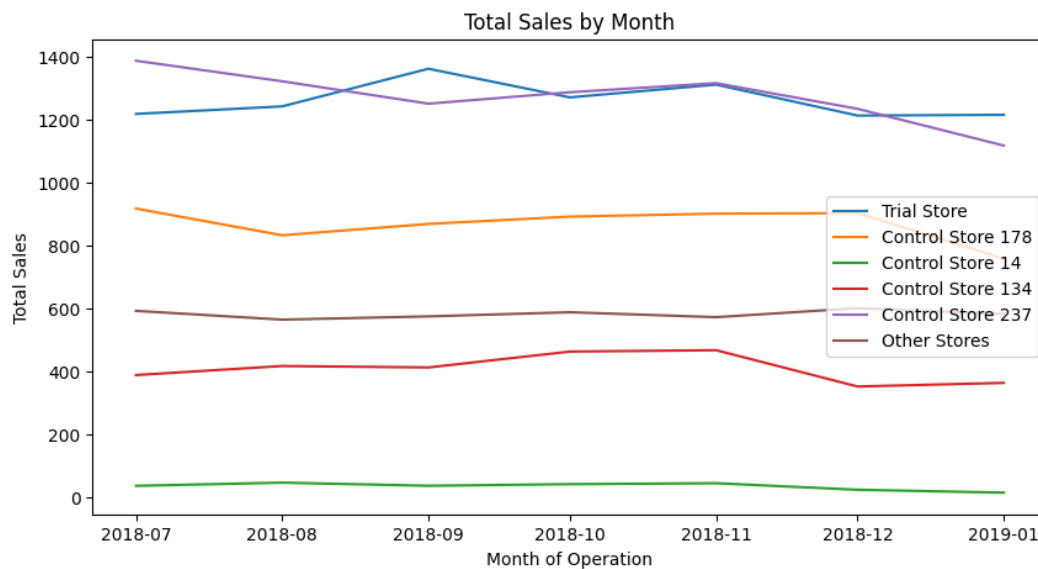
Store 88 also recorded its strongest-ever customer numbers during the trial period, with all three months exceeding expectations.



Trial Period Results: February – April 2019

Total Sales

Store 88 produced the strongest sales response of the three trial stores. The chart below shows a clear and substantial divergence between Store 88 and its control during the trial period.



Store 88 total sales vs Control Store 237 across all 12 months. Sales clearly exceeded the upper confidence interval in 2 out of 3 trial months.

In February and March 2019, Store 88's chip sales rose dramatically above the upper confidence interval. The magnitude of the uplift is notably larger than that seen in Store 77 and Store 88, which appear to have benefited more from the same layout change. April 2019 showed continued elevated sales, though the result was just within the expected range by that point, possibly reflecting a natural levelling off as customer novelty with the new layout reduced. The customer uplift at Store 88 was consistent and substantial across all three trial months. February, March, and April all showed customer counts that significantly exceeded what we would have expected based on Store 237. This is the strongest evidence across all three trial stores that the new layout changed customer behaviour in a meaningful way, driving more people to purchase chips.

Store 88 Verdict; new Layout Clearly Worked

Store 88 produced the most compelling results of the three trial stores. Sales exceeded the expected range in 2 out of 3 months, and customer numbers were significantly above expectations in all 3 months. This store represents the strongest case for a full rollout of the new layout.

Overall Conclusions & Recommendations

Across the three trial stores, the evidence points clearly in one direction: the new store layout has a positive effect on chip category performance, and the business should consider rolling it out more broadly. Below is a summary of the findings and the recommended actions.

Summary of Results

Store	Control	Sales Result	Customer Result	Overall Verdict
Store 77	Store 233	2/3 months significant	2/3 months significant	Roll out
Store 86	Store 155	No uplift detected	All 3 months are significant	Pair with promotions
Store 88	Store 237	2/3 months significant	All 3 months are significant	Roll out

Recommendations

Recommendation	Supporting Evidence
Permanently adopt the new layout at Stores 77 and 88	Both stores showed significant sales and customer uplifts. The trial period results are strong enough to justify making the change permanent.
Roll out the new layout to additional stores	With 2 out of 3 trial stores showing positive results, and all 3 showing improved customer numbers, the network-wide case for rollout is compelling.
Prioritise stores with similar profiles to Store 88 for rollout	Store 88 showed the strongest results. Identify other stores in the network with comparable size, location type, and customer demographics to maximise the benefit.
At Store 86, combine the new layout with promotions	The layout brought more customers in but did not lift sales at Store 86. In-store promotions, bundle deals, or an additional product range could convert increased foot traffic into revenue.
Monitor performance for 3 additional months post-trial	Trial effects can diminish over time as customer novelty wears off. Track performance against the control store benchmarks through to July 2019 to confirm results hold.
Investigate Store 86's customer demographics	Understanding why Store 86's customers responded differently may reveal whether certain store types or locations are better suited to this layout format than others.

The analysis provides a clear and statistically grounded basis for decision-making. The new store layout has demonstrated the ability to drive meaningful improvements in chip category performance, and the recommendation to roll it out more broadly is well supported by the evidence.