Marketing ROI & Effectiveness Analysis

How does marketing spend drive purchase value and profitability?

Name: Afolasewa Duduyemi

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EXECUTIVE SUMMARY

Marketing represents a major discretionary cost for organisations, yet increased spending does not always result in proportional revenue growth or improved profitability. Decision-makers therefore require evidence on whether marketing budgets are both effective and efficient. This analysis evaluates how marketing spend drives purchase value and profitability, using Return on Marketing Investment (ROMI) to assess efficiency alongside revenue outcomes. Transactional marketing data was analysed using descriptive analysis, visualisation, regression modelling, and ANOVA. Purchase value was used as the primary revenue KPI, while ROMI measured marketing efficiency.

The findings show that marketing spend is positively associated with purchase value; however, the relationship is modest and highly variable. Differences in total revenue across campaigns, products, and buyer segments are driven primarily by transaction volume rather than higher per-transaction value. Twitter delivers the highest marketing efficiency (average ROMI ≈ 53.15%), outperforming other campaigns. At the same time, higher marketing spend is strongly associated with declining ROMI, providing evidence of diminishing marginal returns. Promotional activity is negatively associated with purchase value after controlling for other factors, suggesting that discounts may reduce transaction value rather than enhance revenue performance.

These results demonstrate that revenue growth alone can mask inefficiencies in marketing investment. A more effective evaluation of marketing performance requires combining revenue outcomes with efficiency metrics. Based on the analysis, the following strategic actions are recommended:

- Shift focus from revenue growth to efficiency-adjusted performance, using ROMI alongside purchase value to guide decisions.
- Reallocate marketing budgets toward higher-ROMI campaigns, particularly those that deliver strong returns without requiring higher spend.
- Monitor diminishing returns before scaling marketing investment, ensuring additional spend contributes to profitability rather than eroding efficiency.
- Reassess promotional strategies that may increase volume but reduce transaction value.

- Use experimental testing (e.g. A/B testing) to validate the causal impact of marketing changes before expanding budgets.

In conclusion, marketing activity does contribute to purchase value, but profitability depends critically on how efficiently budgets are allocated. By integrating revenue and efficiency metrics and adopting a disciplined, evidence-based approach to budgeting, organisations can improve both top-line performance and long-term returns.

BUSINESS CONTEXT

Marketing expenditure represents one of the largest discretionary investments for many organisations and is frequently increased with the expectation of driving higher sales. However, increased marketing spend does not always translate into proportional revenue growth or improved profitability. As budgets grow, organisations face increasing pressure to justify marketing investments and demonstrate measurable returns.

In this context, decision-makers must understand not only whether marketing spend contributes to higher purchase value, but also whether this spend is efficient and sustainable. Marketing effectiveness is influenced by multiple factors, including campaign strategy, promotional activity, and sales incentives, all of which can lead to variations in revenue contribution and return on investment across different segments.

The objective of this analysis is to evaluate how marketing spend and related marketing levers drive purchase value and to assess marketing efficiency using Return on Marketing Investment (ROMI). Using transactional marketing data, this project examines revenue performance across campaigns, products, and buyer segments, while also identifying whether higher levels of marketing spend result in diminishing returns.

This analysis supports data-driven budget allocation decisions by identifying which marketing activities generate the highest revenue and profitability, and by highlighting opportunities to optimise marketing spend for improved return on investment.

DATA AND KEY PERFORMANCE INDICATOR (KPI'S)

This analysis is based on transactional marketing data capturing marketing activity, customer characteristics, and resulting purchase outcomes across multiple time periods. Each observation represents a marketing exposure linked to a purchase value, enabling evaluation of both revenue performance and marketing efficiency.

The dataset includes key financial variables such as purchase value**,** marketing spend**,** and commissions, alongside categorical variables describing campaign type**,** product category**,** promotion status, and buyer segment. A continuous time variable is also included and grouped into quarters to assess temporal trends in purchasing behaviour.

To assess marketing effectiveness, two primary Key Performance Indicators (KPIs) are used: Purchase Value and Return on Marketing Investment (ROMI)**.**

Purchase Value is used as the primary revenue KPI. It represents the monetary value generated from customer purchases and serves as a direct measure of sales performance. Analysing purchase value across campaigns, products, and buyer segments helps identify which marketing activities contribute most to revenue generation.

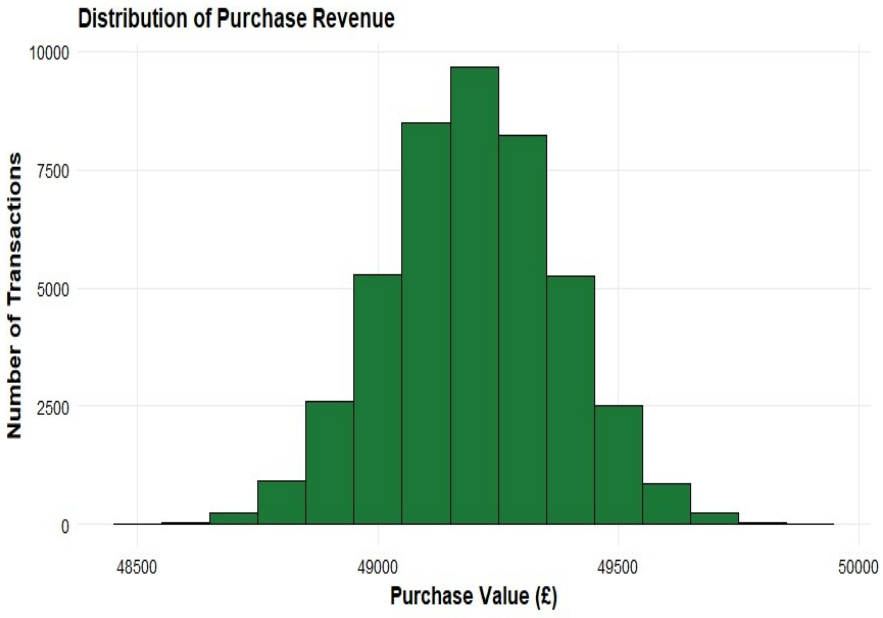

Figure 1 Distribution of Purchase value

Figure 1 shows that purchase values are tightly distributed around a central range, indicating relatively stable transaction values across observations. The distribution appears approximately symmetric, with most transactions clustered near the mean. This supports the use of purchase value as a stable revenue KPI with limited variability at the individual transaction level. Consequently, variation in total revenue is more likely driven by transaction volume rather than large swings in individual purchase amounts.

Return on Marketing Investment (ROMI) is used to measure marketing efficiency and profitability. ROMI is defined as:

$$ROMI = \frac{\text{Purchase} - \text{Marketing Spend}}{Marketing\ Spend}$$

ROMI evaluates how much incremental revenue is generated for each unit of marketing spend and provides insight into whether increased spending leads to profitable returns or diminishing efficiency.

Supporting variables including campaign, promotions, product category, buyer type, commissions, and marketing spend are analysed to explain variation in these KPIs and to identify which marketing levers drive both revenue growth and efficient returns. Together, these KPIs provide a balanced view of marketing performance by capturing both value creation (purchase value) and spend efficiency (ROMI), enabling data-driven evaluation of marketing effectiveness and budget allocation.

REVENUE INSIGHTS

This section examines purchase value as the primary revenue metric to understand how revenue is distributed across campaigns, products, buyer types, and time, as well as how marketing spend is associated with purchase outcomes.

Purchase and Marketing Spend

This subsection examines whether higher marketing spend is associated with higher purchase revenue at the transaction level.

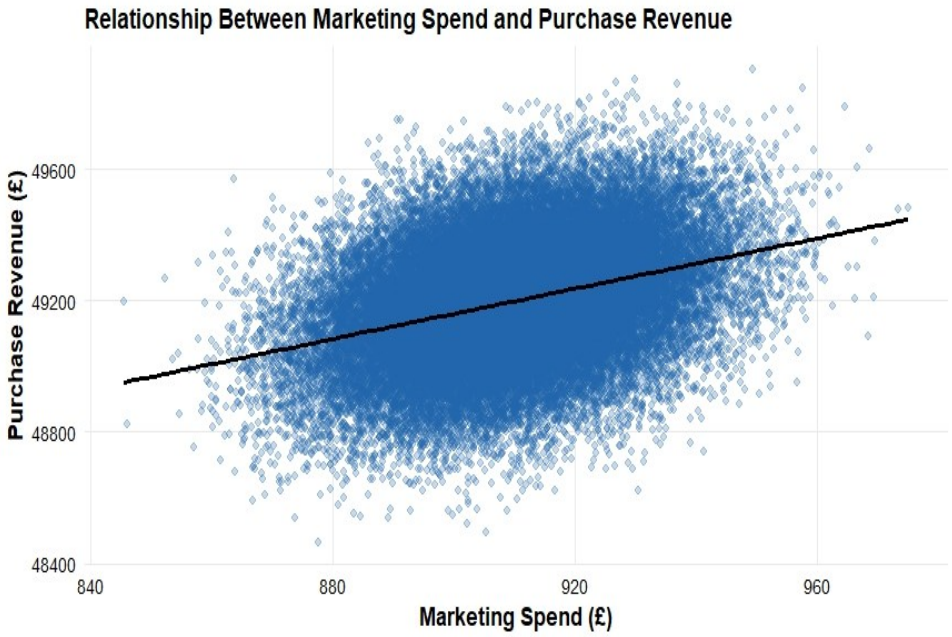

Figure 2: Purchase and Marketing Spend

Figure 2 illustrates the transaction-level relationship between marketing spend and purchase revenue. Purchase revenue shows a clear positive association with marketing spend, as indicated by the upward-sloping fitted line. As marketing spend increases from roughly £850 to £970, purchase revenue generally rises from about £48,800 to £49,600. The substantial spread of points around the trend line indicates considerable variability in revenue at any given spend level. This suggests a positive association between marketing spend and purchase revenue rather than a causal effect.

Purchase Performance by Campaign

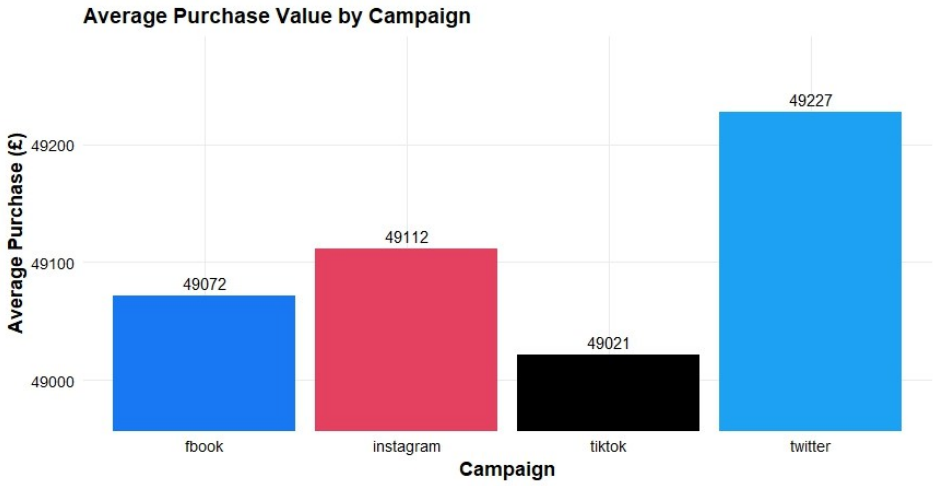

Figure 3A Average Purchase by Campaign

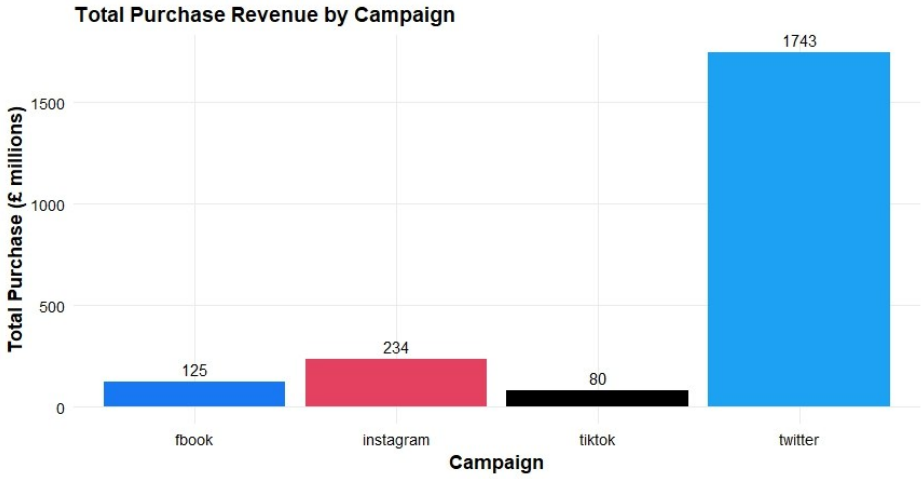

Figure 3B Total Purchase by Campaign

Figure 3A and 3B shows the analysis of average and total purchase value across campaigns which highlights a clear distinction between revenue *per transaction* and overall revenue contribution.

- Average purchase values are highly similar across campaigns, ranging narrowly from approximately **£49,021 to £49,227**, indicating minimal variation in individual transaction values by platform.
- Despite similar averages, total purchase revenue varies substantially across campaigns, driven by differences in scale and volume.
- Twitter contributes the highest total purchase revenue, far exceeding other campaigns, suggesting stronger reach or higher transaction frequency.

- TikTok and Facebook generate considerably lower total revenue despite comparable average purchase values, indicating more limited scale or engagement.

Insight: Campaign performance differences are driven primarily by volume rather than transaction size.

Purchase Performance by Product

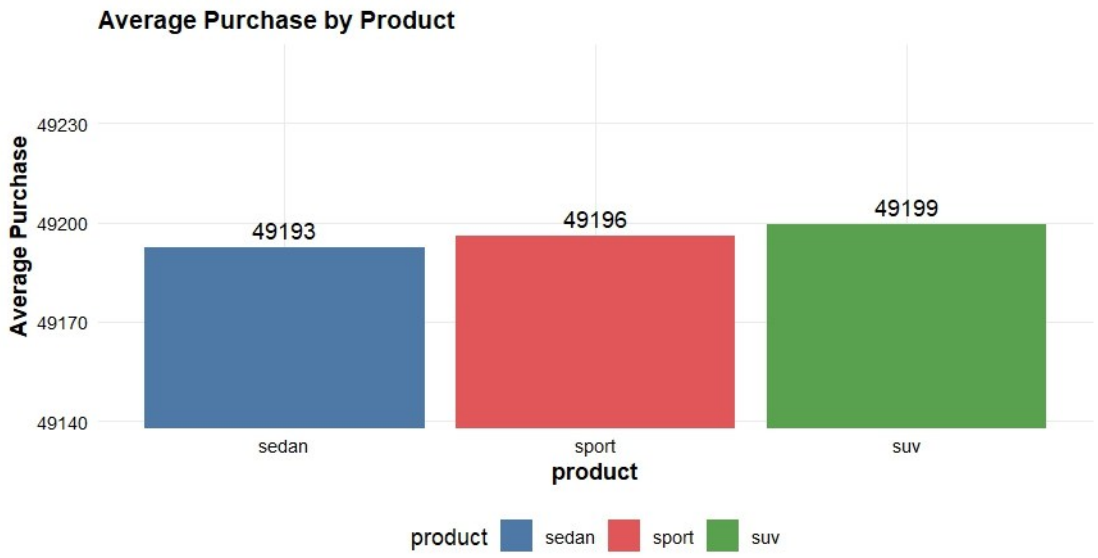

Figure 4A Average Purchase by Product

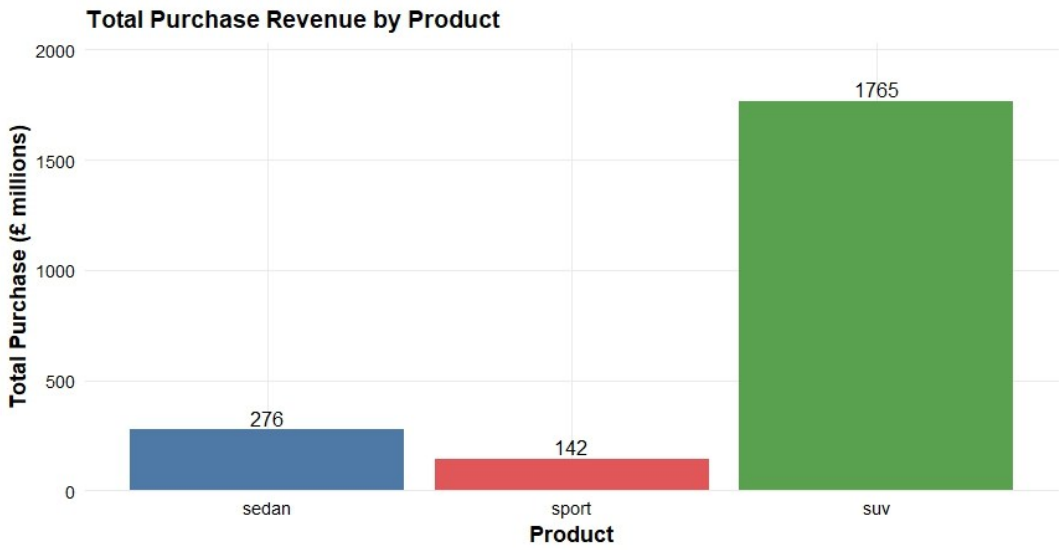

Figure 4B Total Purchase by Product

Figure 4A and 4B shows purchase performance by product which highlights a similar pattern of stable averages but highly uneven total revenue contributions.

- Average purchase values across SUV, Sedan, and Sport products are nearly identical, clustering around £49,200.
- In contrast, SUVs generate substantially higher total purchase revenue than other product categories.
- Sedan and Sport products contribute far less total revenue, despite comparable average purchase values.

Insight: SUVs dominate revenue due to higher sales volume rather than higher per-transaction value.

Purchase Performance by Buyer Type

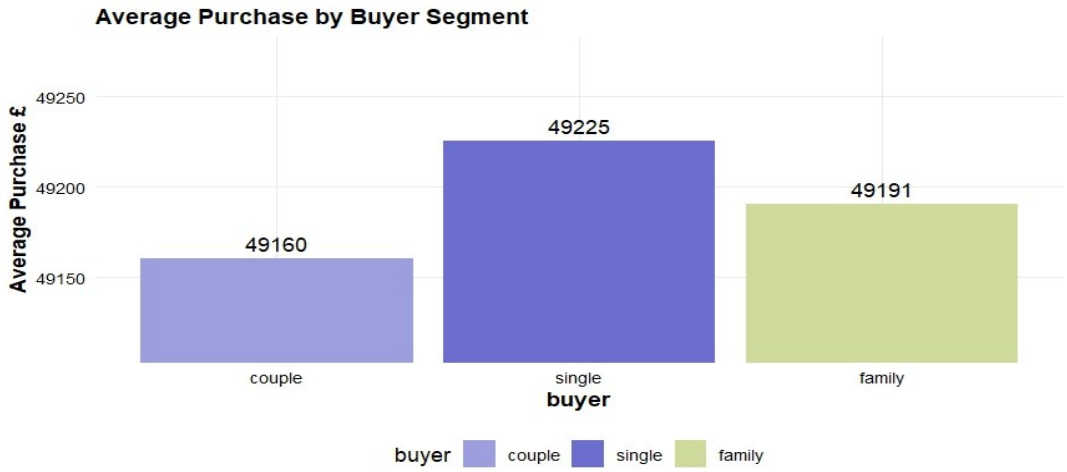

Figure 5A Average Purchase by Buyer Segmentation

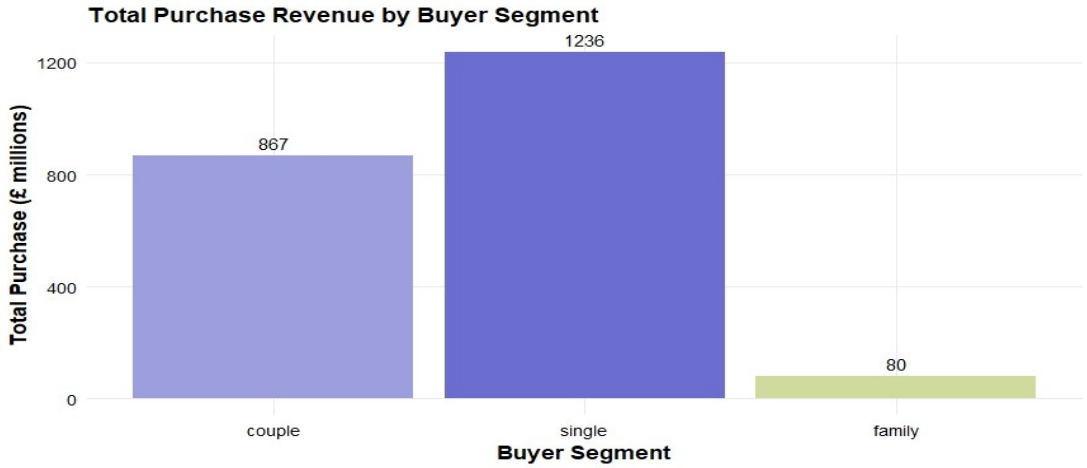

Figure 5B Total Purchase by Buyer Segmentation

The figures above reveal that buyer segmentation highlights meaningful differences in revenue contribution that are not apparent from averages alone.

- Average purchase values are again tightly clustered across buyer types, with only marginal differences between singles, couples, and families.
- Single buyers generate the highest total purchase revenue, followed by couples, while family buyers contribute the least.
- This indicates that singles account for a larger share of transactions, even though they do not spend significantly more per purchase.

Insight: Revenue concentration is driven by buyer frequency rather than higher individual spend.

Purchase Trends over Time

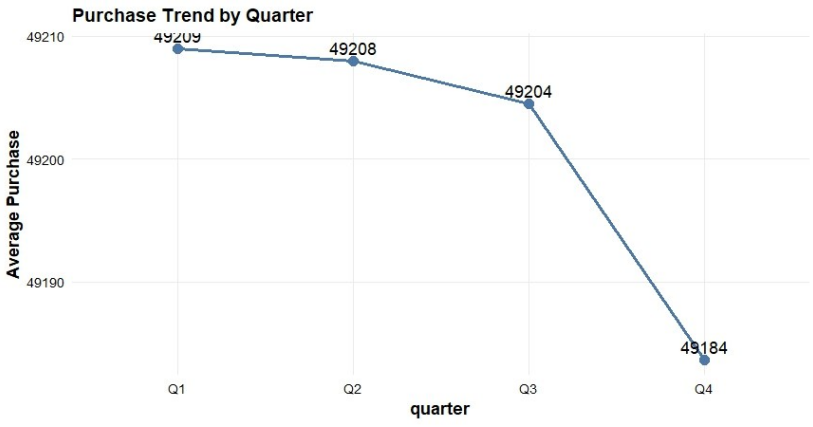

Figure 6 Purchase trend by Quarter

Quarterly analysis provides insight into revenue stability across the year.

- Average purchase values remain relatively stable across all quarters, with a slight decline observed in Q4.
- The narrow range of quarterly averages suggests limited seasonality in purchase value.
- The small dip toward year-end may indicate mild demand softening rather than a structural shift.

Insight: Purchase revenue is broadly stable over time, with no strong seasonal effects.

MARKETING EFFICIENCY (RETURN ON MARKETING INVESTMENT – ROMI)

While revenue analysis highlights where purchase value is generated, evaluating marketing efficiency is essential to determine whether marketing spend is delivering profitable returns. To assess efficiency, this analysis uses **Return on Marketing Investment (ROMI)**, defined as:

$$ROMI = \frac{\text{Purchase} - \text{Marketing Spend}}{Marketing\ Spend}$$

ROMI captures the return generated per unit of marketing spend and provides a clearer basis for comparing campaign performance beyond total revenue outcomes.

ROMI Performance by Campaign

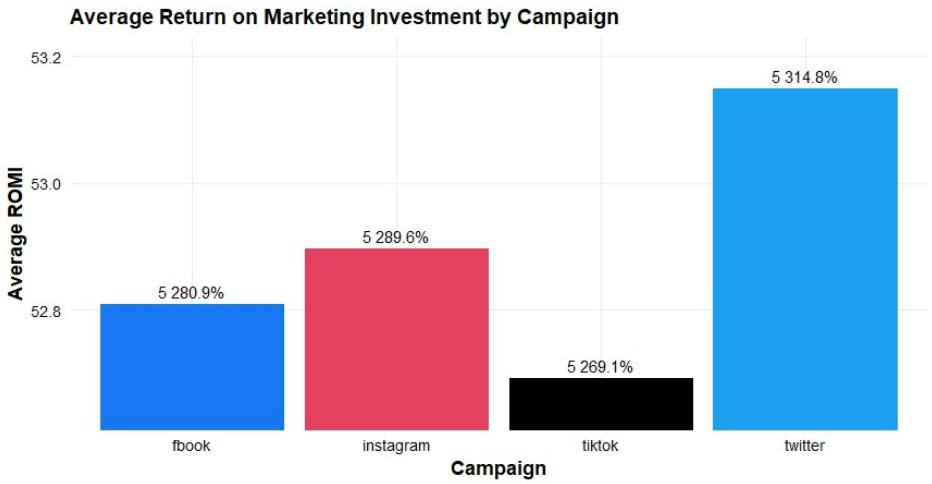

Figure 6 ROMI Performance by Campaign

The analysis shows that all campaigns generate positive average ROMI, indicating that marketing investments are profitable overall. However, efficiency differs slightly across platforms:

- **Twitter** records the highest average ROMI (≈ 53.15%), making it the most efficient campaign in terms of return per unit of spend.
- **Instagram** and **Facebook** follow closely with average ROMI values around 52.9% and 52.8% respectively.
- **TikTok** shows the lowest average ROMI (≈ 52.7%), despite having comparable revenue performance to other campaigns.

Although the differences are relatively small, they are meaningful from a budget allocation perspective. These results indicate that campaigns generating similar revenue can vary in efficiency, reinforcing the importance of evaluating returns rather than revenue alone.

Insight: Campaigns delivering similar revenue outcomes can differ meaningfully in efficiency, making ROMI essential for budget allocation decisions.

Relationship between Marketing Spend and ROMI

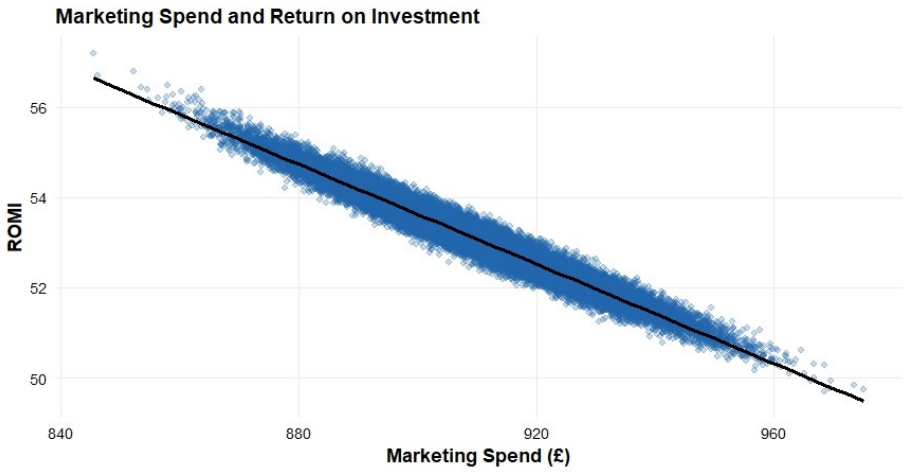

Figure 7 ROMI by Marketing Spend

Examining the relationship between marketing spend and ROMI reveals a negative association**.** As marketing expenditure increases from approximately 840 to 960 units, ROMI declines from around 56% to just above 51%.

The downward-sloping regression line suggests the presence of diminishing marginal returns**,** where additional marketing spend continues to generate revenue but at a decreasing efficiency

rate. This implies that higher marketing budgets do not necessarily translate into proportionally higher profitability.

- Marketing activities are profitable overall, as indicated by positive ROMI across all campaigns.
- Twitter delivers the highest marketing efficiency, achieving strong returns with comparatively lower spend.
- Increasing marketing spend is associated with declining ROMI, suggesting diminishing returns.
- Revenue performance alone may mask inefficiencies in budget allocation.

Insight: Increasing marketing spend raises revenue but reduces efficiency, indicating diminishing marginal returns.

Implication for Decision-Making

These findings suggest that marketing effectiveness should be assessed using both revenue outcomes and efficiency metrics. While increasing spend can boost purchase value, optimising budget allocation toward more efficient campaigns may yield higher overall profitability. ROMI therefore provides a critical lens for guiding smarter, evidence-based marketing investment decisions.

STATISTICAL EVIDENCE

This section provides statistical validation for the descriptive and visual findings, testing whether observed relationships between marketing activity, revenue, and efficiency are statistically significant and economically meaningful.

Effect of Marketing and Commissions on Purchase Value

A multiple linear regression model was estimated with purchase value as the dependent variable and marketing spend and commissions as predictors.

Results show that both marketing and commissions have statistically significant positive effects on purchase value ($p < 0.001$).

- A one-unit increase in marketing spend is associated with an average increase of approximately £4.8 in purchase value, holding commissions constant.
- A one-unit increase in commissions is associated with an average increase of approximately £3.5 in purchase value, holding marketing constant.

The model explains approximately 45% of the variation in purchase value ($R^2 = 0.45$), indicating that marketing and commission structures are important drivers of revenue, though not the sole determinants. These results provide statistical confirmation that marketing activity contributes meaningfully to revenue generation.

Marketing Spend and Efficiency (ROMI)

To assess whether higher marketing spend affects efficiency, a regression model was estimated with ROMI as the dependent variable and marketing spend as the predictor.

The results indicate a strong and statistically significant negative relationship between marketing spend and ROMI ($p < 0.001$).

- As marketing spend increases, ROMI decreases, confirming the presence of diminishing marginal returns.
- The model explains a very large proportion of the variation in ROMI ($R^2 \approx 0.96$), indicating a consistent and systematic relationship between spend level and efficiency.

This statistical evidence supports earlier visual findings that increasing marketing budgets may reduce efficiency even when revenue continues to rise.

CAMPAIGN-LEVEL DIFFERENCES IN PURCHASE VALUE (ANOVA)

A one-way ANOVA was conducted to test whether average purchase values differ across marketing campaigns.

The ANOVA results show a statistically significant difference in mean purchase value across campaigns ($F = 1801$, $p < 0.001$), rejecting the null hypothesis that all campaigns perform equally.

Post-hoc Tukey tests reveal that:

- Twitter significantly outperforms all other campaigns in average purchase value.

- TikTok consistently underperforms relative to Facebook, Instagram, and Twitter.
- All pairwise campaign differences are statistically significant ($p < 0.001$).

These results confirm that observed campaign-level differences are not due to random variation but reflect meaningful differences in performance.

COMBINED PREDICTIVE MODEL

A final multivariate regression model was estimated including marketing spend, commissions, campaign, promotions, and product type.

Key findings include:

- Marketing and commissions remain strong, positive, and statistically significant predictors of purchase value.
- Campaign effects persist after controlling for spend and commissions, with Twitter showing a substantial positive effect and TikTok a negative effect relative to the baseline.
- Promotions show a statistically significant negative association with purchase value, suggesting that discounts or promotions may reduce transaction value.
- Product effects are relatively small, indicating that marketing and campaign strategy play a larger role than product category alone.

The model explains approximately 52% of the variation in purchase value ($R^2 \approx 0.52$), demonstrating strong explanatory power for a transactional dataset.

Summary of Statistical Findings

Overall, the statistical analysis confirms that:

- Marketing and commissions significantly drive purchase value.
- Higher marketing spend is associated with lower efficiency (ROMI).
- Campaign choice has a significant and measurable impact on revenue outcomes.
- Observed patterns in earlier exploratory analysis are statistically robust.

These results provide a solid quantitative foundation for evidence-based marketing and budget allocation decisions.

EVIDENCE-BASED RECOMMENDATIONS

Based on the analysis of revenue performance, marketing efficiency (ROMI), and statistical evidence, the following recommendations are proposed to improve marketing effectiveness and optimise budget allocation.

1. Prioritise Marketing Efficiency, Not Just Revenue Growth

While marketing spend has a statistically significant positive effect on purchase value, the analysis shows clear evidence of diminishing returns**,** with higher marketing expenditure associated with lower ROMI.

Recommendation:

- Avoid uniform increases in marketing budgets across all campaigns.
- Evaluate proposed budget increases against expected marginal returns rather than total revenue impact alone.

Rationale:

- Although higher spend continues to drive revenue, efficiency declines as spend increases.
- Focusing on ROMI ensures that additional investment contributes to profitability, not just top-line growth.

2**.** Reallocate Budget toward More Efficient Campaigns

Campaign-level analysis reveals meaningful differences in both revenue contribution and marketing efficiency.

Recommendation:

- Prioritise Twitter, which consistently delivers the highest average ROMI and strong purchase performance.
- Review and potentially limit incremental spend on TikTok, which shows lower efficiency despite comparable revenue outcomes.

- Maintain or selectively optimise spend on Facebook and Instagram rather than scaling aggressively.

Rationale:

- Campaigns generating similar revenue can differ materially in efficiency.
- Reallocating spend toward higher-ROMI campaigns is likely to increase overall profitability without increasing total budget.

3. Use Volume-Driven Campaigns Strategically

Revenue analysis shows that differences in total purchase value across campaigns, products, and buyer segments are largely driven by transaction volume rather than higher average purchase values.

Recommendation:

- Use high-volume campaigns to drive reach and scale, but pair them with efficiency monitoring to prevent overspending.
- Avoid interpreting high total revenue as a signal of superior performance without considering ROMI.

Rationale:

- High volume can mask inefficiencies.
- Combining volume metrics with ROMI provides a more balanced view of performance.

4. Leverage Buyer Segments with High Revenue Contribution

Buyer-level analysis indicates that single buyers contribute the largest share of total purchase revenue, despite similar average purchase values across segments.

Recommendation:

- Tailor marketing strategies to retain and engage high-frequency buyer segments.
- Use targeted campaigns to increase transaction frequency rather than attempting to increase per-transaction spend.

Rationale:

- Revenue growth in this dataset is driven more by frequency than by higher individual purchase values.
- Segment-focused strategies may deliver better returns than blanket marketing approaches.

5. Review the Role of Promotions in Revenue Generation

The multivariate regression model indicates that promotional activity is associated with a negative effect on purchase value, after controlling for other factors.

Recommendation:

- Reassess the use of promotions and discounts, particularly where the objective is revenue maximisation.
- Test alternative promotional strategies focused on customer acquisition or retention rather than immediate sales uplift.

Rationale:

- Promotions may increase transaction volume but reduce average purchase value.
- Their effectiveness should be evaluated in the context of long-term profitability rather than short-term revenue spikes.

6. Adopt an Evidence-Based Budgeting Framework

Overall, the findings support the adoption of a structured, data-driven approach to marketing investment.

Recommendation:

- Incorporate both purchase value and ROMI as core performance metrics in ongoing marketing evaluation.
- Regularly monitor diminishing returns as spend increases and adjust budgets dynamically.

- Use controlled experiments (e.g., A/B testing) to validate the causal impact of marketing changes before scaling.

Rationale:

- Combining revenue and efficiency metrics enables smarter budget allocation.
- Continuous measurement reduces reliance on assumptions and improves decision quality.

Summary

The analysis demonstrates that marketing activity does drive purchase value, but profitability depends critically on how efficiently budgets are allocated. Campaign choice, spend level, and buyer segmentation all influence outcomes, and revenue performance alone is insufficient to guide optimal decision-making. By reallocating spend toward more efficient campaigns, monitoring diminishing returns, and adopting a disciplined, evidence-based approach to budgeting, organisations can improve both revenue and profitability.

LIMITATIONS & NEXT STEPS

Limitations

While this analysis provides valuable insights into marketing effectiveness and return on investment, limitations should be acknowledged.

- Observational data**:** The analysis is based on historical, observational data rather than controlled experiments. As a result, relationships identified between marketing variables and purchase outcomes should be interpreted as associations rather than definitive causal effects.
- Data reduction from cleaning: The original dataset contained approximately 49,287 observations, which was reduced to 44,359 observations after data cleaning and transformation. Records were removed due to missing values, invalid entries, or inconsistencies in key variables such as purchase value, marketing spend, and commissions. While these steps improved data quality and reliability, the reduction in sample size may limit the representativeness of the results and introduce potential bias if excluded observations differ systematically from retained records.

- Limited customer-level detail**:** The dataset does not include detailed customer demographics or behavioural attributes (e.g. age, income, preferences). This limits the ability to explain *why* certain buyer segments or products outperform others.
- Short-term focus: Purchase value and ROMI are measured at the transaction level, without accounting for longer-term outcomes such as customer lifetime value, retention, or repeat purchasing behaviour.
- Unobserved external factors: External influences such as seasonality beyond the observed period, competitive activity, or macroeconomic conditions are not captured and may affect purchase behaviour.

Next Steps

To build on the findings of this analysis and support more robust decision-making, the following next steps are recommended:

- Introduce experimental testing: Implement controlled experiments (e.g. A/B testing) to measure the causal impact of marketing spend changes, campaign strategies, or promotions before scaling budgets.
- Incorporate customer lifetime value (CLV): Extend the analysis to include customer-level data to assess whether marketing investments drive long-term profitability rather than short-term revenue alone.
- Refine budget optimisation: Use marginal ROMI analysis to identify optimal spend thresholds for each campaign, enabling more precise allocation of marketing budgets.
- Enhance segmentation analysis: Combine transactional data with demographic or behavioural data to better understand the drivers of product and buyer segment performance.
- Monitor performance dynamically: Develop dashboards that track purchase value and ROMI over time to detect shifts in efficiency and adjust strategy proactively.

Despite these limitations, the analysis provides a robust, data-driven assessment of how marketing spend influences revenue and profitability. By combining revenue metrics with efficiency measures and statistical validation, this project offers actionable insights while also identifying clear opportunities for deeper and more targeted future analysis.

CONCLUSION

This analysis demonstrates that marketing spend does drive higher purchase value, but the relationship is modest and characterised by substantial variability. While increased marketing investment raises revenue, it also leads to declining marketing efficiency, as evidenced by diminishing ROMI at higher spend levels. Campaign choice and budget allocation therefore matter as much as total spend, with some campaigns delivering superior returns at lower cost. Overall, marketing effectiveness is best evaluated using both purchase value and ROMI, enabling organisations to grow revenue while maintaining profitability through more efficient, evidence-based investment decisions.