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A STUDY ON E-COMMERCE STRATEGY OPTIMIZATION FOR SELLING VEHICLE LUBRICANTS ON FLIPKART

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Abstract: This paper examines the growing significance of online platforms specifically Flipkart to the sale of motor vehicle lubricants in India. With increasing digital commerce, conventional motor vehicle sales models are increasingly being complemented or substituted with digital strategies consistent with changing consumer behavior. The study investigates the impact of price, flash sales, product exposure, customer ratings, and online trust on lubricant buying behavior in online shopping. A quantitative method involving stratified sampling and descriptive statistics was utilized to test consumer behavior. The findings indicate that an overwhelming majority of respondents have purchased lubricants from Flipkart, motivated primarily by offer prices, competitive pricing, and product ratings. Strong correlations were also established between purchasing frequency and factors of trust such as authenticated reviews, reputation, and visibility during search. Regression and Anova statistical measures show that strategies such as price personalization, improved product descriptions, and engagement of customers yield significant improvements in repeat buys as well as in total sales. The research advises sellers to adopt dynamic pricing, enhance customer satisfaction, and deploy digital marketing so as to engage and enhance profitability. These findings contribute to the comparatively understudied area of e-commerce optimization within the automotive lubricants industry.

Keywords: E-commerce, Vehicle Lubricants, Flipkart, Online Sales, Strategic Framework

I.INTRODUCTION

The fast pace of e-commerce development has revolutionized the manner in which consumers engage with products and services, including in traditionally offline industries like the automotive sector. Among the prominent categories experiencing this change is the vehicle lubricant category, where digital channels are increasingly playing a pivotal role in influencing customer buying behavior. With the growth of online marketplaces like Flipkart, vehicle lubricant brands are now shifting their marketing, pricing, and distribution strategies to align with the evolving needs of digitally empowered consumers. Cars have traditionally been sold in the automobile sector through physical retail stores and service centers. Yet, progress in logistics, online consumers' trust in websites, and the comfort of doorstep delivery have driven a healthy movement towards online shopping. Customers increasingly look to be transparent, price competitive, highly rated by trusted reviewers, and easy to compare before they make a purchase decisions advantages that websites are best capable to provide.

This study aims to realize the effect of e-commerce especially by way of Flipkart on consumer purchase behavior in the car lubricant market. It assesses the impact of promotional campaigns, online product catalogues, customer reviews, and pricing strategies on purchasing behavior and driving sales and customer loyalty. As digitalization keeps transforming the automotive aftermarket industry, this study offers evidence-based insights into maximizing online efforts to enhance sales performance and customer satisfaction in the highly competitive vehicle lubricant market.

STATEMENT OF PROBLEM:

E-commerce has fundamentally transformed consumer patterns in the automotive lubricant industry, with the likes of Flipkart propelling alterations in merchandise marketing and sales. Hitherto dependent on service stations and retail stores, the sector is presently adopting web sales owing to augmented logistics, secure sites, and the advantage of doorstep delivery. This transformation has led firms to modify their pricing, promotion, and distribution strategies to better meet digitally empowered consumers' needs. The research examines how online advertising, virtual catalogs,

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customer opinions, and comparative pricing affect purchase decisions, selling performances, and customer loyalty, providing insights into how to maximize digital channels in the changing automotive aftermarket.

OBJECTIVE OF THE STUDY:

- To analyze and optimize e-commerce strategies for effectively selling engine oil on Flipkart , focusing on improving visibility, customer engagement, and sales performance.
- To understand consumer behavior, preferences, and key factors influencing the online purchase of engine oil.
- To evaluate the impact of pricing strategies, discounts, and promotional campaigns on customer purchase decisions.
- To provide strategic recommendations for engine oil brands to enhance their presence, optimize product listings, and improve profitability on Flipkart.
- To examine the role of customer reviews, ratings, and brand trust in purchasing vehicle lubricants on Flipkart

II. REVIEW OF LITERATURE

Literature review indicates an increasing number of studies aimed at maximizing e-commerce strategies within the context of digital transformation, with particular relevance to the automotive lubricant industry. Thinesh Kumar et al. (2024) highlight the need to incorporate cutting-edge technologies like data analytics, machine learning, augmented reality (AR), and virtual reality (VR) into e-commerce platforms to enhance personalization, boost brand loyalty, and enhance marketing campaign precision. While the technologies have promising potential, the research also brings to light prevailing issues such as privacy and reduced accessibility that need to be dealt with to continue being relevant within the digital marketplace. Supporting this, Gautam and Kale (2020) offer a wide-ranging examination of cost optimization for the Indian e-commerce sector, outlining main strategies like dynamic pricing, promotion offers, and operation cost minimization to ensure profitability in a very competitive market. Murdiana and Hajaoui (2020) examine strategic adjustments in the Industry 4.0 era, suggesting a nine-e-commerce-strategy framework—ranging from designing customer experiences to utilizing customer data through technological synergy—to ensure market responsiveness and business sustainability. Discussing logistical issues, Janjevic and Winkenbach (2020) examine last-mile delivery solutions in developed and emerging economies alike, emphasizing the importance of region-specific strategies to enhance delivery performance and customer satisfaction—particularly pertinent to physical products such as automotive lubricants. Also, a comparative analysis by Kappagantu et al. (2024) between Amazon and Flipkart shows that diversified marketing strategies adopted by Amazon like the use of social media, influencer advertising, and entertainment services far outweigh the more conventional methods adopted by Flipkart and reflect a disadvantage in competition. Overall insights from these researches highlight the need for e-commerce participants, especially those with niche industries such as automotive lubricants, to adopt cutting-edge technology, real-time pricing, customer-focused promotion, and delivery innovations in order to gain market share, instill trust, and propel internet sales effectively.

RESEARCH GAP:

In spite of the strong growth in e-commerce and increasing online buying trend for automotive lubricants, most existing research focuses on general e-commerce strategies that do not specifically tackle the channel challenges and features of the auto product category especially engine oils. There is limited understanding about the particular buyer behavior, supply chain intricacies, and marketplace dynamics that drive lubricant sales through online channels such as Flipkart. Key areas like dynamic pricing models, tailored offers, optimized product listings with full specifications, compatibility features, and the use of verified customer reviews in trust-building are under researched. Additionally, whereas various studies touch on digital marketing, few of them adapt strategies to the high-involvement purchase of engine oil, where quality, reliability, and technical fit are important. This disparity signifies an urgent call for targeted research that not only investigates these variables but also offers data-supported strategies specifically tailored to increase visibility, interaction, and profitability for engine oil brands in the online retail market.

III. RESEARCH METHODOLOGY

A descriptive research design was adopted, using structured surveys to measure perceptions numerically

SAMPLING TECHNIQUE:

A stratified sampling method was applied, categorizing the population into separate subgroups according to specific attributes. The participants were randomly chosen from every subgroup in relation to their proportion in the entire population. The approach helped in ensuring every subgroup was properly represented. It was meant to enhance the accuracy and reliability of data gathered.

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DATA COLLECTION:

- Instrument : Structured Questionnaire
- Format: Likert Scale

DATA ANALYSIS:

- Software: SPSS
- Microsoft Excel

TESTS:

- Reliability analysis
- Correlation
- Regression
- One-way Anova

CORRELATION:

		TOTPS	TOTCR	TOTPC	TOTCE	TOTSV
TOTPS	Pearson Correlation	1	.674**	.698**	.633**	.678**
	Sig. (2-tailed)		.000	.000	.000	.000
	N	201	201	201	201	201
TOTCR	Pearson Correlation	.674**	1	.683**	.613**	.628**
	Sig. (2-tailed)	.000		.000	.000	.000
	N	201	201	201	201	201
TOTPC	Pearson Correlation	.698**	.683**	1	.723**	.689**
	Sig. (2-tailed)	.000	.000		.000	.000
	N	201	201	201	201	201
TOTCE	Pearson Correlation	.633**	.613**	.723**	1	.687**
	Sig. (2-tailed)	.000	.000	.000		.000
	N	201	201	201	201	201
TOTSV	Pearson Correlation	.678**	.628**	.689**	.687**	1
	Sig. (2-tailed)	.000	.000	.000	.000	
	N	201	201	201	201	201

**. Correlation is significant at the 0.01 level (2-tailed).

STATEMENT:

The Pearson correlation matrix below shows the linear relationships between the variables: Pricing Strategies, Customer Reviews and Ratings, Promotional Campaigns, Customer Engagement, and Sales Volume. All correlations are significant at the 0.01 level (2-tailed), based on 201 observations.

INTERPRETATION:

Correlation matrix indicates that all the variables are significantly correlated with each other at the 0.01 level, denoting strong associations among them. Pearson correlation coefficients vary from 0.613 to 0.723, denoting moderate to strong associations. This means that when one variable increases, the others also increase, hence internal consistency among the constructs.

IV. RESULTS

Correlation analysis indicates that all variables have positive and significant correlation at 0.01 level (N = 201). Promotional Campaigns correlates the most strongly with Customer Engagement (r = 0.723), then with Sales Volume (r = 0.689) and Customer Reviews (r = 0.683). Customer Engagement also has the highest correlation with Sales Volume (r = 0.687). Pricing Strategies and Customer Reviews both demonstrate moderate to strong correlations with the other variables (0.613 to 0.698). These findings reflect that coordinated marketing activities are significantly linked with increased customer involvement and greater sales.

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REGRESSION

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	TOTPC, TOTCR, TOTPS[b]	.	Enter

a. Dependent Variable: TOTSV
b. All requested variables entered.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.752[a]	.565	.559	1.46687

a. Predictors: (Constant), TOTPC, TOTCR, TOTPS

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	551.426	3	183.809	85.424	.000[b]
	Residual	423.887	197	2.152		
	Total	975.313	200			

a. Dependent Variable: TOTSV
b. Predictors: (Constant), TOTPC, TOTCR, TOTPS

STATEMENT:
Multiple linear regression was used to determine the effect of Promotional Campaigns, Customer Reviews, and Pricing Strategies on Sales Volume. The model was significant statistically ($F(3, 197) = 85.424$, $p < .001$), accounting for 56.5% of the variance in sales volume ($R^2 = 0.565$, Adjusted $R^2 = 0.559$) with a standard error of 1.46687. The findings suggest that the combined influence of marketing and pricing strategies has a significant and meaningful effect on sales performance.

INTERPRETATION:
The regression equation indicates that TOTPC, TOTCR, and TOTPS significantly explain TOTSV (dependent variable) with an R-square of 0.565, which implies that approximately 56.5% of the variation in TOTSV is explained by the predictors. The results of ANOVA are significant ($F = 85.424$, $p < 0.001$), which implies that the model is a good fit. The standard error of estimate is 1.46687, which implies moderate prediction accuracy.

RESULTS
The multiple regression analysis reveals that Promotional Campaigns, Customer Reviews and Ratings, and Pricing Strategies have a significant impact on Sales Volume, with the overall model being statistically significant ($F(3, 197) = 85.424$, $p < .001$). The model explains about 56.5% of the variation in sales volume ($R^2 = 0.565$), reflecting a very high explanatory power. The Adjusted R^2 of 0.559 reaffirms the model's strength, adjusting for the number of predictors.

ONE WAY ANOVA
Age Group on Sales Volume
ANOVA

TOTSV

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	45.870	3	15.290	3.241	.023
Within Groups	929.444	197	4.718		
Total	975.313	200			

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STATEMENT:
A one-way ANOVA was run to test whether or not there are significant differences among Sales Volume (TOTSV) by different age groups. The test was significant, F(3, 197) = 3.241, p = .023, meaning that at least one age group is significantly different from the others in sales volume.

HYPOTHESES:
From the given One-Way ANOVA results evaluating the impact of Age Group on Sales Volume (TOTSV), the following is the correct set of hypotheses:
Null Hypothesis (H_0): There is no significant variation in the mean sales volume (TOTSV) among various age groups.
Alternative Hypothesis (H_1): There is a significant variation in the mean sales volume (TOTSV) among at least one pair of age groups.

- F-value: 3.241
- p-value (Sig.): 0.023 (which is less than 0.05)

Because the p-value is less than 0.05, we reject the null hypothesis and conclude that the alternative hypothesis, i.e., age group has a statistically significant effect on sales volume.

INTERPRETATION:
One-way ANOVA indicates that there is a significant difference in Sales Volume (TOTSV) between age groups (F = 3.241, p = 0.023), suggesting that age has an effect on sales volume. The Tukey HSD post-hoc test indicates that the 18-24 age group has significantly lower mean sales volume than the 25-34 age group (p = 0.024). None of the other age groups had significantly different sales volumes.

RESULTS:
The ANOVA one-way test showed there was a significant difference in sales volume among age groups (F (3, 197) = 3.241, p = .023). Post hoc tests indicated that the 25–34 age group had significantly greater sales volume than the 18–24 age group (p = .024), but other group differences were not statistically significant. This serves to emphasize the need to target the 25–34 age groups in sales efforts. ONE WAY ANOVA- Employment Status on Sales Volume

ANOVA

TOTSV

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	25.303	3	8.434	1.749	.158
Within Groups	950.010	197	4.822		
Total	975.313	200			

STATEMENT:
One-way ANOVA was applied to investigate whether Sales Volume (TOTSV) significantly varies across various employment status categories (Student, Employed, Unemployed, Others). The result of the analysis was not significant, F(3, 197) = 1.749, p = .158, which means that there are no statistically significant differences in sales volume by employment status.

HYPOTHESES:
Null Hypothesis (H_0): There is no significant difference in the mean sales volume (TOTSV) by employment status.
Alternative Hypothesis (H_1): There is a statistically significant difference in the mean sales volume (TOTSV) between at least one pair of employment statuses.

- F-value: 1.749
- p-value (Sig.): 0.158

Because the p-value is larger than 0.05, we cannot reject the null hypothesis. This indicates that there is no statistically significant difference in sales volume by employment status.

INTERPRETATION:
The one-way ANOVA test indicated that there is no significant difference in sales volume (TOTSV) between respondents according to their employment status (F = 1.749, p = 0.158). Post-hoc Tukey HSD tests also showed that there is no significant difference between any of the employment groups in sales volume, which suggests that employment status does not significantly affect sales volume in this research.

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RESULTS:

The one-way ANOVA indicated that there was no significant difference in sales volume between employment status groups (F(3, 197) = 1.749, p = .158). Follow-up post hoc comparisons ensured that none of the differences between the groups were statistically significant. Employment status does therefore not seem to impact sales volume meaningfully in this case.

ANOVA

TOTSV

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	58.034	4	14.508	3.100	.017
Within Groups	917.280	196	4.680		
Total	975.313	200			

STATEMENT:

The one-way ANOVA was used to assess if Sales Volume (TOTSV) varies significantly according to vehicle lubricant purchase frequency. ANOVA was significant statistically, F(4, 196) = 3.100, p =.017, which means purchase frequency significantly impacts sales volume.

HYPOTHESES:

Null Hypothesis (H_0): There is no significant variation of the mean sales volume (TOTSV) in different purchase frequency groups.

Alternative Hypothesis (H_1): There is a significant difference in the mean sales volume (TOTSV) for at least one pair of purchase frequency groups.

- F-value: 3.100
- p-value (Sig.): 0.017

Because the p-value is less than 0.05, we reject the null hypothesis. This means that the frequency of buying vehicle lubricants has a statistically significant impact on sales volume.

INTERPRETATION:

One-way ANOVA demonstrates that the frequency of purchases affects sales volume significantly (F = 3.100, p = 0.017). Post-hoc Tukey analyses indicate that "purchase rarely" has much smaller sales volume in comparison to both "purchase once every 3 months" (p = 0.017) and "purchase once every 6 months" (p = 0.044) groups. The implication here is that purchases of greater frequency equate with larger sales volume.

RESULTS:

The one-way ANOVA indicated that purchase frequency has a significant impact on sales volume (F (4, 196) = 3.100, p =.017). Post hoc tests showed significant differences between the "Rarely" group and both the "Once every 3 months" and "Once every 6 months" groups, suggesting that consumers who buy more frequently have greater sales volume. Significant differences were not observed between the other purchase frequency groups.

V. FINDINGS

1. Most of the participants (49.3%) belong to the age group 25–34, pointing towards the fact that young adults are the major buyers of vehicle lubricants from e-commerce websites such as Flipkart.
2. 80.1% of the participants were male, reflecting that males are the largest demographic segment in online buying of vehicle lubricants.
3. 93% of the participants own a vehicle, which is directly related to the greater interest and frequency in buying lubricants online.
4. 96% of the respondents have bought lubricants from Flipkart, establishing the platform's prominent position in car lubricant sales.
5. A total of 63.2% of the respondents attested that special offers and discounts impact their buying decisions on vehicle lubricants on Flipkart.
6. 72.7% of the respondents depend on customer ratings and reviews when purchasing lubricants online, highlighting their role in establishing trust and influencing buying behavior.
7. Statistical modeling revealed high inter-correlations between variables such as price, customer reviews, promotional campaign, customer engagement, and sales volume—indicating they are driving lubricant sales together.

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8. Product content, customer reviews, and pricing tactics account for 56.5% of the variation in sales volume, demonstrating these are high predictors of success on Flipkart.
9. ANOVA tests revealed a statistically significant difference between sales volume by age groups, specifically between the 18–24 and 25–34 brackets.
10. More than 73% of those surveyed concur that flash sales, combo sales, and promotion offers raise the chances of lubricant purchases, attesting to their effectiveness as promotional tools.

VI. SUGGESTIONS

• Highest sales volume was recorded among the 25–34 age group. This segment must be given priority in marketing with customized messages and appropriate product offerings to yield maximum returns.
• As higher purchase frequency (every 3 or 6 months) was linked to higher sales, companies should induce repeat purchases through rewards for loyalty, subscription plans, or time-based promotions.
• Since advertising campaigns have a significant impact on sales, businesses need to invest in attention-grabbing advertisements, influencer partnerships, and holiday promotions to create consumer interest.
• Customer relationships are the best sales volume predictor. It is worth investing in solid after-sales support, value communication, and rapid response customer service to drive interaction and loyalty.
• Price is an important driver of customer decision. Firms need to maintain prices competitive, experiment with dynamic pricing tactics, and offer value-for-money propositions.
• With high inter-correlations among variables, businesses should pursue an integrated strategy across social media, retail, email, and mobile channels to guarantee consistent brand communication and achieve high reach.
• The employment status did not have any effect on sales and thus cannot be a major consideration for customer segmentation. Instead, behavioural and demographic factors should be prioritized.
• Because reviews guide purchasing decisions, companies should actively solicit feedback, show testimonials, and engage reviewers to establish credibility, as well as social proof.
• Product quality improvement facilitates customer satisfaction and repeat business. Continuous innovation and quality audits can lead to better customer retention.
• As demographic and behavioural information is vital, companies need to utilize data analytics in order to offer personalized experiences, promotions, and content to the right customer segments.

VII. CONCLUSION

In conclusion, the study confirms that the research model is reliable and valid, with high internal consistency and strong correlations between key variables. Key predictors like pricing policies, customer relationships, and promotion policies are important in influencing sales volume. Moreover, demographic variables like age and purchase frequency significantly affect sales performance, which supports the significance of targeted marketing efforts. Employment status, however, has a negligible effect on sales volume and may be pushed to the background in strategic planning. Overall, the findings underscore the importance of placing customer behaviour patterns and demographic data at the forefront in order to attain improved sales results.

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