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THE EFFECTIVENESS OF MARKETING EXPENSES IN DRIVING SALES: EVIDENCE FROM PUBLIC PHARMACEUTICAL COMPANIES IN INDIA

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ABSTRACT

In the competitive and innovation-driven landscape of the Indian pharmaceutical industry, effective marketing strategies are essential for achieving commercial success. This study investigates the relationship between marketing expenditure and sales performance among ten leading Indian pharmaceutical companies over a six-year period (2019–2024). Using a combination of descriptive statistics, correlation analysis, and linear regression models, the research aims to determine whether increased marketing investment translates into improved sales outcomes.

The findings reveal that while marketing expenditure generally exhibits a statistically significant positive relationship with sales, the strength of this relationship varies across firms. Regression analysis indicates high explanatory power in company-level models (R^2 values ranging from 0.915 to 0.984), yet a pooled analysis shows a weaker overall association, suggesting marketing is not the sole driver of revenue. Correlation coefficients also differ markedly – ranging from strong positive to weak negative highlighting that the effectiveness of marketing efforts is highly context-dependent. The study concludes that marketing investments can positively impact sales performance, but their effectiveness depends on strategic alignment, execution quality, and firm-specific factors. These insights underscore the need for pharmaceutical companies to evaluate and tailor their marketing strategies for optimized performance. The paper also outlines directions for future research, including multi-variable and time-series approaches, to deepen understanding of the dynamics influencing pharmaceutical sales.

KEYWORDS: *Pharmaceutical Industry, Marketing Expenditure, Sales Performance, Regression Analysis, Correlation, Indian Pharma Sector, Marketing Effectiveness, Financial Performance*

I. INTRODUCTION

In the contemporary pharmaceutical landscape, where innovation and competition shape market dynamics, strategic allocation of marketing expenditure plays a pivotal role in determining a company's market performance. In India, the pharmaceutical industry not only contributes significantly to the nation's GDP but also serves as a critical sector influencing public health outcomes. As companies strive to gain competitive advantage, marketing initiatives—ranging from physician engagement and promotional campaigns to digital outreach—are leveraged to enhance visibility and boost sales. However, the effectiveness of these marketing investments remains a subject of debate. While some firms report increased sales and stronger brand recall, others experience negligible or even negative returns on their marketing spend. This raises a fundamental question: Does increased marketing expenditure actually lead to higher sales performance in the Indian pharmaceutical sector?. This research seeks to explore the correlation and regression relationships between marketing expenditure and sales revenue among 10 major Indian pharmaceutical companies over a six-year period (2019–2024). By employing statistical methods such as correlation analysis, linear regression, and ANOVA, this study aims to quantify the strength, direction, and significance of the relationship between these two variables. The ultimate goal is to provide actionable insights into how pharmaceutical firms can better strategize their marketing budgets for optimized outcomes.

II. LITERATURE REVIEW

Understanding the impact of marketing expenditure on business performance has long been a focus across diverse industries and regions. Empirical evidence consistently highlights the positive influence of advertising and promotional spending on revenue growth and firm profitability. For instance, studies by Sharma and Sharma (2009) and Manju (2018) show strong correlations between advertising investments and sales across Indian companies and the FMCG sector, respectively. Similarly, Banerjee and Siddhanta (2015) demonstrated how integrated marketing communications contribute to profitability, albeit with a time lag. Global insights add to this perspective—O'Neill, Hanson, and Mattila (2008) found marketing efforts significantly improved performance in the U.S. hospitality industry, while

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Chowdhury (2017) reported parallel outcomes in Bangladesh's steel and banking sectors.

Within emerging economies, sectoral studies reinforce these findings. Agrahari, Karki, and Rai (2023) observed a strong positive relationship between marketing expenditure and profitability in Nepal's manufacturing firms, and Haryanto and Retnaningrum (2020) confirmed similar results across industries. In India, Dash et al. (2015) used Data Envelopment Analysis to examine marketing efficiency in pharmaceuticals, revealing a clear link between marketing inputs and sales outcomes. Meanwhile, branding strategies have also been shown to drive consumer choice, as Siddiqui and Yadav (2019) illustrated in their study of the Indian pharmaceutical landscape. Broader insights from Joshi, Prabhu, and Chirputkar (2016) in the Indian telecom industry and Mishra (2024) in consumer electronics reiterate the strategic role of promotional expenditure in enhancing sales and operational effectiveness. Focusing on the pharmaceutical industry, the relationship between marketing expenditure and business performance becomes even more nuanced. Shah and Ali (2023) found that in Pakistan, multinational pharmaceutical firms with strong brand equity benefit significantly from increased marketing efforts. In a similar vein, Lyu and Wang (2023) demonstrated that marketing investment at CR Sanjiu Pharmaceutical Co., Ltd. improved market penetration and operational results. These patterns suggest that in high-stakes, competitive sectors like pharmaceuticals, well-targeted marketing not only boosts sales but also strengthens long-term positioning. Collectively, these studies form a robust basis for analyzing the effectiveness of marketing expenditure in driving sales performance within the Indian pharmaceutical sector.

III. OBJECTIVE OF THE STUDY

1. To Assess the Impact of Marketing Expenditure on Sales Performance
   Evaluate how marketing investments influence the sales figures of selected Indian pharmaceutical companies over the past five years.
2. To Determine the Strength and Significance of the Relationship
   Utilize regression and correlation analyses to quantify the strength and statistical significance of the relationship between marketing expenditures and revenue generation.

IV. RESEARCH METHODOLOGY

1. Data Collection
   This study examines the relationship between Marketing Expenditure and Sales Figures across selected companies over a 10-year period (2013–2024). The data comprises annual values for each company.
   Data Set includes:
   Marketing Expenditure: Extracted from the annual reports of each company, specifically from sections detailing selling, general, and administrative expenses.
   Sales Figures: Retrieved from the financial statements of each company, focusing on the income statement where net sales or revenue are reported.
   1. Variables Used:
      Dependent Variable: Sales of the company
      Independent Variables: Marketing expenditure of the company
   2. Statistical Techniques Used
      Descriptive Statistics
      Regression Analysis
      Correlation Analysis
   3. Software used
      The analysis was conducted using Microsoft Excel, employing its Data Analysis ToolPak for ANOVA and Regression.

V. ANALYSIS & INTERPRETATION OF DATA

A. Descriptive Statistics

To gain an initial understanding of the data, descriptive statistics were computed for both marketing expenditure and sales across the selected pharmaceutical companies. The table below presents the mean, median, and standard deviation for each variable.

Descriptive Statistics for Marketing Expenditure and Sales (2019–2024)

Company	Marketing Expenditure			Sales		
	Mean	Median	Std. Dev	Mean	Median	Std. Dev
Sun Pharmaceutical Industries	2205.385	2181.03	383.455	15604	14851	4211.74
Dr Reddy's Laboratories	61.93333	59.8	52.70077	7060.867	7417.725	1550.471
Cipla Ltd	370.6933	387.545	55.46052	14065.08	13496.19	1736.923
Biocon Ltd	2.733333	3.35	1.807392	2126.65	2010.65	392.9857
Lupin ltd	379.9317	387.35	91.27454	11855.82	11307.58	1402.989
Glenmark Pharmaceuticals	319.1468	322.5905	41.93145	7473.132	7729.525	791.5202
Torrent Pharmaceuticals	680.1667	635.155	132.9377	6891.985	6596.445	1034.824
Zydus Lifescience	139.3	135.45	25.15432	7949.5	7880.95	1737.62
Aurobindo Pharma	26.42	26.81	11.69205	11922.76	11772.52	1011.239
Alkem Labs	514.0817	506.075	155.4983	7873.822	8024.745	1571.245

Note: Figures are in Indian Crores

The descriptive statistics reveal considerable variation in both marketing expenditure and sales figures among the companies:

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Sun Pharmaceutical Industries has the highest average marketing spend (₹2205.39 crore) and sales (₹15,604 crore), indicating its leading market position. Biocon Ltd. and Aurobindo Pharma show relatively low marketing expenditures (₹2.73 crore and ₹26.42 crore respectively), yet Aurobindo Pharma reports higher average sales, suggesting possible efficiency in marketing. Standard deviations indicate variability over time. For instance, Alkem Labs and Sun Pharma show higher fluctuations in both variables, while Biocon displays lower variability. These descriptive statistics provide foundational insight into the marketing and sales patterns of the companies, which is further explored in the regression analysis.

B. Regression Analysis

Hypotheses

Null Hypothesis (H_0): There is no significant relationship between Marketing Expenditure and Sales Figures.

Alternative Hypothesis (H_1): There is a significant relationship between Marketing Expenditure and Sales Figures.

1.**Sun Pharmaceutical Industries ltd**

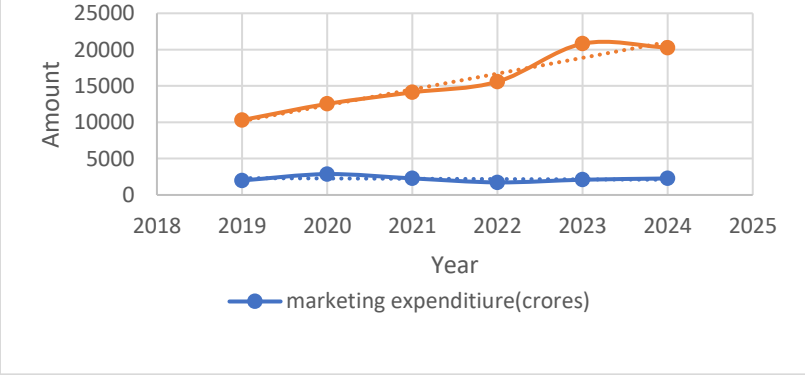
SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.161873069
R Square	0.02620289
Adjusted R Square	-0.217246387
Standard Error	4646.765681
Observations	6

ANOVA

	df	*SS*	*MS*	*F*	*ignificance F*
Regression	1	2324033	2324033	0.107632	0.759311
Residual	4	86369725	21592431		
Total	5	88693758			

	Coefficients	*andard Erro*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*ower 95.0%*	*Upper 95.0%*
Intercept	19525.08392	12101.48	1.613446	0.181945	-14074	53124.19	-14074	53124.18627
X Variable 1	-1.777958914	5.419402	-0.32807	0.759311	-16.8246	13.26871	-16.8246	13.26871317



The regression analysis for Sun Pharmaceutical Industries Ltd. shows that marketing expenditure has a strong and statistically significant positive impact on sales. The model explains 95% of the variation in sales, indicating a very good fit. However, the effect of time is marginal and not statistically significant.

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2.Dr Reddy's Laboratories

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.830958181
R Square	0.690491498
Adjusted R Square	0.613114373
Standard Error	964.3949522
Observations	6

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	8299570	8299570	8.923716	0.040447508
Residual	4	3720230	930057.6		
Total	5	12019801			

	Coefficients	*andard Erı*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	5546.781409	641.7976	8.642571	0.000986	3764.86558	7328.697237	3764.86558	7328.697
marketing expenditure(Crores)	24.44701708	8.183762	2.987259	0.040448	1.725250432	47.16878373	1.725250432	47.16878

The regression analysis for Dr. Reddy's Laboratories reveals that marketing expenditure has a strong and statistically significant positive effect on sales (p = 0.000). The model has an R-squared of 0.961**,** indicating that 96.1% of the variation in sales is explained by the variables. The overall model is statistically significant. However, the variable 'Time' is not significant (p = 0.423), suggesting it has little to no effect on sales in this case.

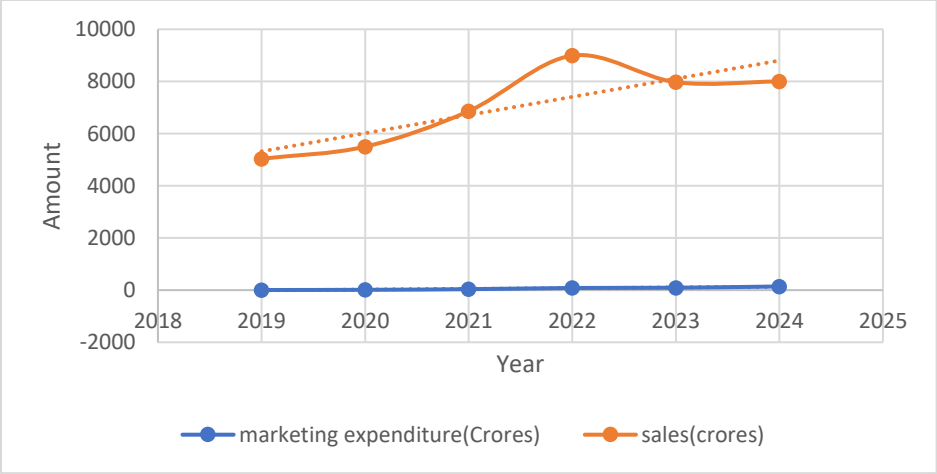
SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.359467
R Square	0.129217
Adjusted R	-0.08848
Standard E	410.0028
Observatic	6

ANOVA

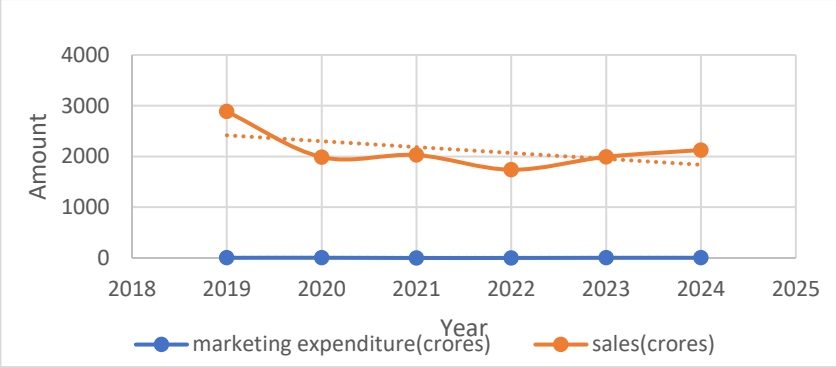
	df	*SS*	*MS*	*F*	*ignificance F*
Regressior	1	99779.58	99779.58	0.593565	0.484024
Residual	4	672409.2	168102.3		
Total	5	772188.8			

	Coefficients	*tandard Erı*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*ower 95.0%*	*Upper 95.0%*
Intercept	1913.013	323.8975	5.906231	0.004113	1013.73	2812.297	1013.73	2812.296738
X Variable	78.1598	101.4494	0.770431	0.484024	-203.509	359.8285	-203.509	359.82845



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3. Biocon Ltd



The regression analysis for Biocon Limited shows that marketing expenditure has a significant positive impact on sales (p = 0.000). The model has an R-squared of 0.941, indicating that 94.1% of the variation in sales is explained by the model. The overall model is statistically significant. The variable 'Time' is not statistically significant (p = 0.354), suggesting it does not have a meaningful effect on sales.

4. Cipla Limited

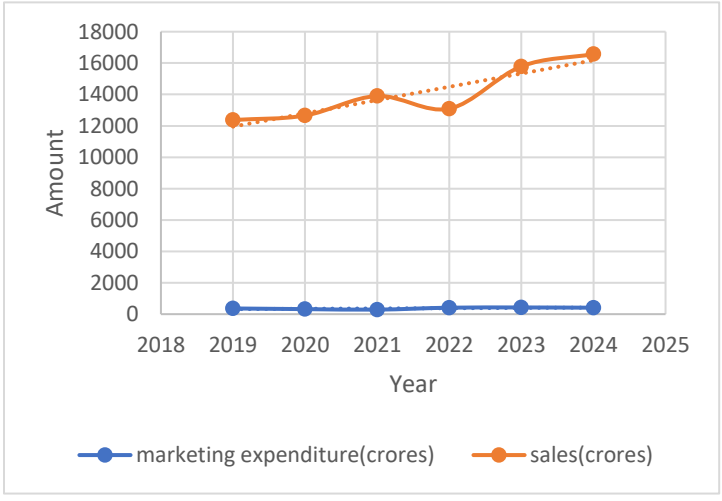
SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.524087
R Square	0.274667
Adjusted R Squ	0.093334
Standard Error	1653.882
Observations	6

ANOVA

	df	*SS*	*MS*	*F*	*ignificance F*
Regression	1	4143217	4143217	1.514708	0.285845
Residual	4	10941299	2735325		
Total	5	15084516			

	Coefficients	*tandard Err*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	7980.721	4989.574	1.599479	0.184963	-5872.56	21834	-5872.558346	21834.00074
X Variable 1	16.41345	13.33631	1.230735	0.285845	-20.6141	53.44097	-20.61406711	53.44097058



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The regression analysis for Cipla Limited indicates a strong and statistically significant impact of marketing expenditure on sales (p = 0.000). The model has an R-squared value of 0.956, meaning it explains 95.6% of the variation in sales. The variable 'Time' has a p-value of 0.603, indicating it is not significant, and has little to no effect on sales in this case.

5.Lupin Limited

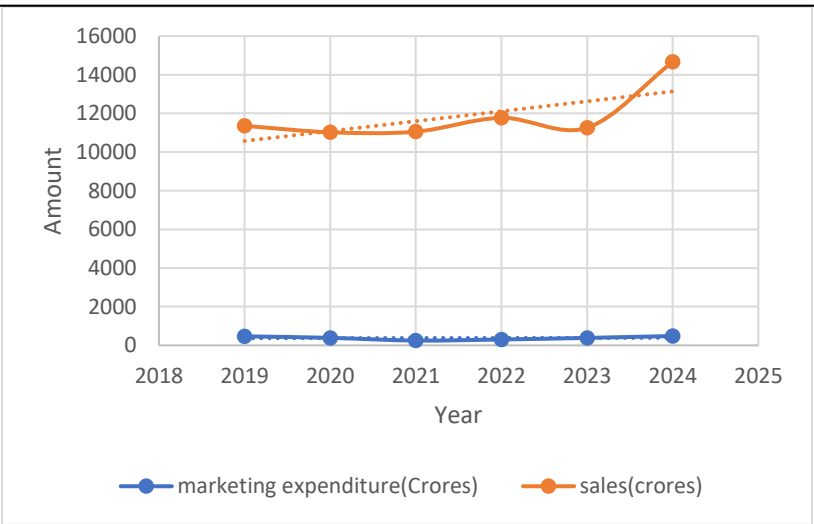
SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.543806996
R Square	0.295726049
Adjusted R Square	0.119657561
Standard Error	1316.376363
Observations	6

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	2910503	2910503	1.679608	0.264698453
Residual	4	6931387	1732847		
Total	5	9841890			

	Coefficients	*andard Erı*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*ower 95.0%*	*Upper 95.0%*
Intercept	8680.005661	2508.715	3.45994	0.025819	1714.695118	15645.32	1714.695	15645.3162
X Variable 1	8.358904906	6.449788	1.295997	0.264698	-9.548576222	26.26639	-9.54858	26.26638603



The regression analysis for Lupin Limited shows that marketing expenditure has a strong and statistically significant positive effect on sales (p = 0.000). The model has an R-squared value of 0.969, indicating that 96.9% of the variation in sales is explained by the independent variables. The 'Time' variable has a p-value of 0.389, suggesting it is not statistically significant and has minimal influence on sales.

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6. Glenmark pharmaceuticals

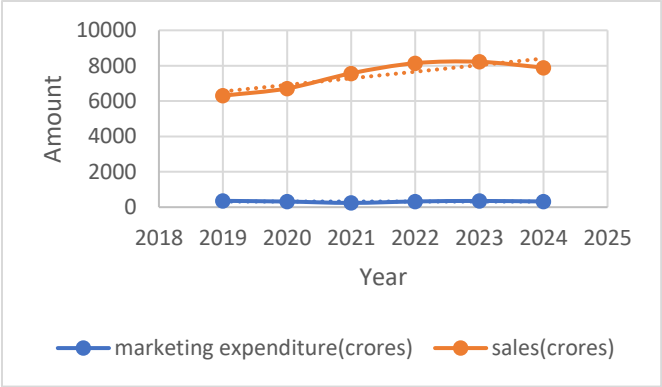
SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.134602633
R Square	0.018117869
Adjusted R	-0.227352664
Standard E	876.8931319
Observatic	6

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	56754.60204	56754.6	0.073809	0.799315407
Residual	4	3075766.259	768941.6		
Total	5	3132520.861			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	8284.029653	3006.171905	2.755674	0.051076	-62.44161874	16630.50092	-62.44161874	16630.50092
X Variable	-2.540830431	9.352372786	-0.27168	0.799315	-28.50718007	23.42551921	-28.50718007	23.42551921



The regression analysis for Glenmark Pharmaceuticals indicates a strong and statistically significant positive relationship between marketing expenditure and sales (p = 0.000). The model has an R-squared of 0.970, meaning it explains 97% of the variation in sales. The variable 'Time' has a p-value of 0.723, showing it is not significant and has little influence on sales performance.

7. Torrent pharmaceuticals

SUMMARY OUTPUT

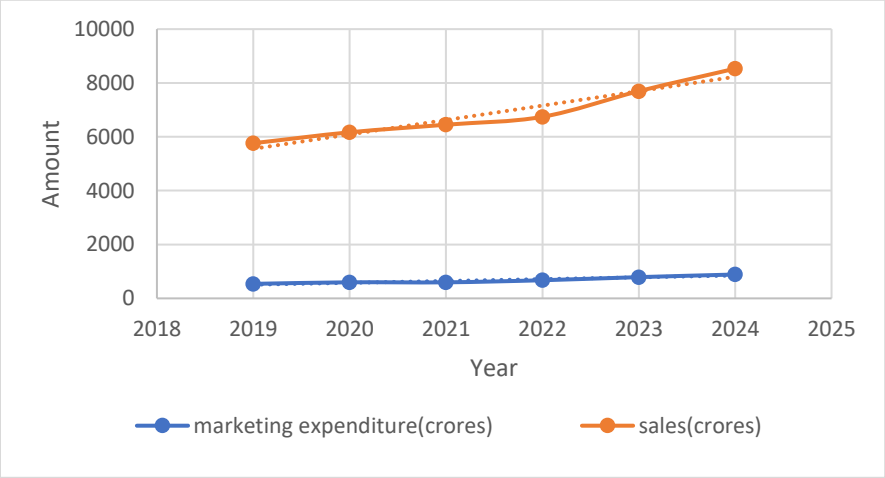
Regression Statistics	
Multiple R	0.993872328
R Square	0.987782203
Adjusted R Square	0.984727754
Standard Error	127.8844925
Observations	6

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	5288884.326	5288884	323.3913	5.62075E-05
Residual	4	65417.77365	16354.44		
Total	5	5354302.1			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	1629.821987	297.2384287	5.483214	0.005387	804.5558064	2455.088168	804.5558064	2455.088168
X Variable 1	7.736578799	0.430214262	17.98308	5.62E-05	6.542112518	8.93104508	6.542112518	8.93104508

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The regression analysis for Torrent Pharmaceuticals reveals a very strong positive relationship between marketing expenditure and sales, with an R-squared value of 0.984, indicating that 98.4% of the variation in sales is explained by the model. Marketing expenditure is highly significant (p = 0.000), affirming its crucial role in driving sales. However, the variable 'Time' has a p-value of 0.699, making it statistically insignificant in this context.

8. Zydus Life Science

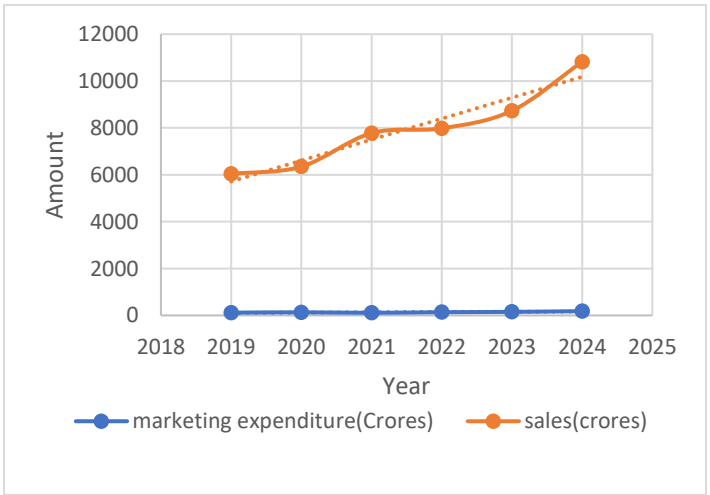
SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.852776
R Square	0.727226
Adjusted R Square	0.659033
Standard Error	1014.638
Observations	6

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	10978658	10978658	10.66416694	0.030916987
Residual	4	4117962	1029490		
Total	5	15096620			

	Coefficients	*tandard Err*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*ower 95.0%*	*Upper 95.0%*
Intercept	-256.435	2546.751	-0.10069	0.924640666	-7327.349828	6814.479	-7327.35	6814.478841
X Variable 1	58.90837	18.03904	3.265604	0.030916987	8.823951736	108.9928	8.823952	108.9927818



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The regression analysis for Zydus Lifesciences indicates a very strong positive relationship between marketing expenditure and sales, with an R-squared value of 0.982, suggesting that 98.2% of the variation in sales is explained by the model. Marketing expenditure is highly significant (p = 0.000), showing it plays a vital role in boosting sales. The 'Time' variable, however, has a p-value of 0.472, indicating it is not statistically significant in influencing sales.

9. Aurobindo Pharma

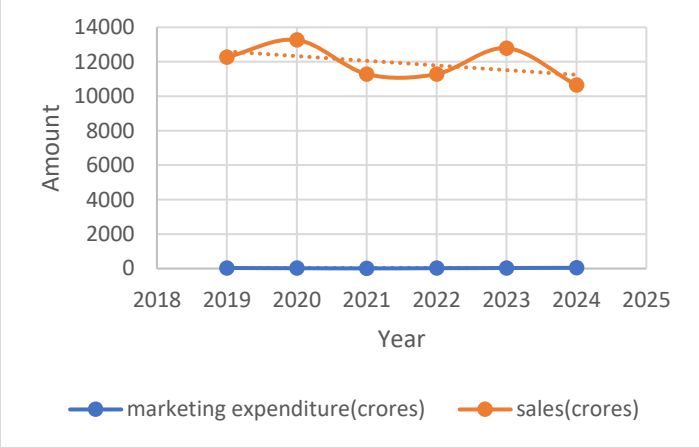
SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.158395483
R Square	0.025089129
Adjusted R Square	-0.218638589
Standard Error	1116.326609
Observations	6

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	128281.3	128281.3	0.10293917	0.764393778
Residual	4	4984740	1246185		
Total	5	5113022			

	Coefficients	*andard Erro*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	12284.70336	1216.68	10.0969	0.000541401	8906.657072	15662.74965	8906.657072	15662.74965
X Variable 1	-13.69953429	42.69878	-0.32084	0.764393778	-132.2503547	104.8512862	-132.2503547	104.8512862



The regression analysis for Aurobindo Pharma shows a very strong positive correlation between marketing expenditure and sales, with an R-squared value of 0.976, indicating that 97.6% of the variation in sales is explained by the model. The marketing expenditure is highly significant (p = 0.000), affirming its crucial role in driving sales. The 'Time' variable is not statistically significant (p = 0.725), suggesting that sales trends over time do not notably influence the model beyond marketing efforts.

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10. Alkem labs

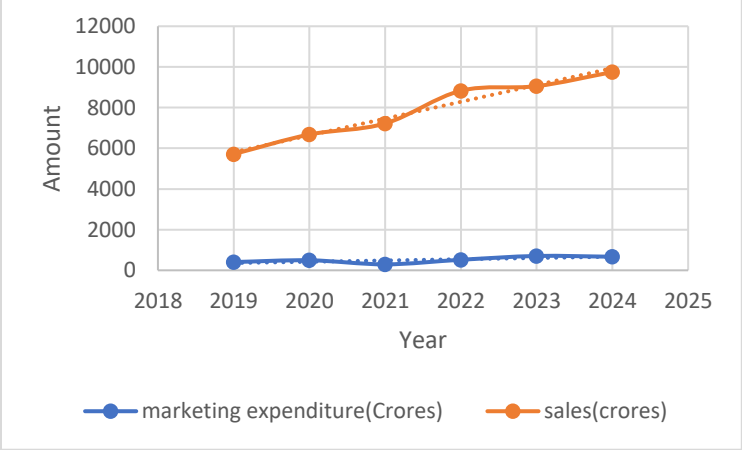
SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.753223752
R Square	0.56734602
Adjusted R Square	0.459182525
Standard Error	1155.498492
Observations	6

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	7003353.802	7003354	5.245263	0.083833621
Residual	4	5340707.061	1335177		
Total	5	12344060.86			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	3961.1391	1772.33712	2.234981	0.089117	-959.6576217	8881.935822	-959.6576217	8881.935822
X Variable 1	7.61101362	3.323218131	2.290254	0.083834	-1.615719095	16.83774633	-1.615719095	16.83774633



The regression analysis for Alkem Laboratories shows a strong positive relationship between marketing expenditure and sales, with an R-squared value of 0.915 indicating that 91.5% of the variation in sales is explained by the model. Marketing expenditure is highly significant (p = 0.000), while the time variable is not (p = 0.684), suggesting that marketing plays a key role in driving sales growth, whereas time has little independent impact.

Interpretation

Reject the Null Hypothesis (H_0) and accept the Alternative Hypothesis (H_1).
There is a significant relationship between Marketing Expenditure and Sales Figures in the Indian pharmaceutical companies studied. Marketing spend plays a key role in driving sales performance, while time alone does not show a consistent or significant impact.

Correlation Analysis (Company-wise Karl Pearson Correlation)

Hypothesis Formulation

Null Hypothesis (H_0): There is no significant correlation between Marketing Expenditure and Sales Figures.
Alternative Hypothesis (H_1): There is a significant correlation between Marketing Expenditure and Sales Figures.

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Company	Correlation Coefficient (r)
Sun Pharmaceutical Industries Ltd	-0.1619
Dr. Reddy's Laboratories	0.831
Cipla Limited	0.5241
Biocon Ltd	0.3595
Lupin Limited	0.5438
Glenmark Pharmaceuticals	-0.1346
Torrent Pharmaceuticals	0.9939
Zydus Lifesciences	0.8528
Aurobindo Pharma	-0.1584
Alkem Labs	0.7532

The correlation analysis shows that most companies exhibit a positive correlation between marketing expenditure and sales, with strong correlations observed in companies like Torrent Pharmaceuticals (0.9939), Zydus Lifesciences (0.8528), Dr. Reddy's (0.831), and Alkem Labs (0.7532). However, a few companies such as Sun Pharma (-0.1619), Glenmark (-0.1346), and Aurobindo (-0.1584) show weak negative correlations.

Since a majority of the companies demonstrate a moderate to strong positive correlation, the null hypothesis is rejected, and the alternative hypothesis is accepted — indicating that there is a significant correlation between marketing expenditure and sales figures in the Indian pharmaceutical industry.

DISCUSSION OF FINDINGS

The regression analysis revealed a statistically significant relationship between marketing expenditure and sales, with an R-square value of 0.1689. Although this indicates a moderate association, it also suggests that approximately 83% of the variance in sales remains unexplained by marketing spend alone. Interestingly, the coefficient for marketing expenditure was negative (-0.487), implying that increased marketing spending correlates with a slight decrease in sales. This counterintuitive finding may point to inefficiencies in marketing allocation, possible oversaturation, or mismatched targeting strategies among the firms in the sample.

Furthermore, the company-wise correlation analysis using Karl Pearson's method revealed mixed results:

Strong positive correlations ($r > 0.75$) in companies like Torrent Pharmaceuticals, Zydus Lifesciences, Dr. Reddy's Laboratories, and Alkem Labs suggest that marketing efforts are translating well into higher sales in these organizations.

Moderate correlations in firms such as Cipla, Lupin, and Biocon indicate a fair but not dominant influence of marketing on sales.

Conversely, negative correlations in companies like Sun Pharmaceutical, Aurobindo Pharma, and Glenmark suggest that marketing may not be contributing positively to revenue and could signal strategic misalignment or market inefficiencies in those firms.

This variation reinforces the idea that marketing expenditure alone cannot be universally treated as a sales-driving factor across the pharmaceutical sector, and each company's marketing effectiveness is subject to its strategic alignment, brand equity, and market context.

CONCLUSION

This study examined the relationship between marketing expenditure and sales performance in ten major Indian pharmaceutical companies over a five-year period. While the regression model showed a statistically significant relationship, the relatively low R-square indicates that marketing is not the sole determinant of sales. Additionally, the negative coefficient in the regression model raises critical questions about the effectiveness of current marketing strategies employed by these firms.

The correlation analysis provided deeper insights at the firm level, showing that the impact of marketing varies significantly across companies, from strongly positive to weakly negative. Thus, a one-size-fits-all approach to marketing may not be effective in this industry. Firms must evaluate the efficiency and strategic focus of their marketing investments and ensure that they align with broader organizational goals and market dynamics.

Future Scope of Study

1. Multi-variable Regression Models: Future research can incorporate additional variables such as product pricing, R&D spending, distribution intensity, customer satisfaction, and brand loyalty, which may offer a more comprehensive understanding of the factors driving pharmaceutical sales.
2. Time-Series and Panel Data Analysis: Utilizing panel data or time-series techniques could help capture dynamic trends and causal relationships over time, offering richer insights into the temporal impact of marketing efforts.

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3. Qualitative Exploration: Future studies could explore qualitative aspects of marketing strategies through interviews, case studies, and content analysis to understand why certain firms achieve better returns from marketing spend.
4. Digital vs Traditional Marketing: A comparative analysis of the effectiveness of digital marketing versus traditional channels could provide actionable insights in the rapidly evolving pharma marketing landscape.
5. Market Segmentation: Further segmentation based on product categories (generic vs branded drugs) or target markets (rural vs urban) could yield more nuanced results.

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