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## 3 N Effects Towards R & D of Selected Pharmaceutical Companies in India

Patel Khushbu Narendrakumar, Vigna Oza

### Abstract:

*These days, technological innovation and marketing prowess are crucial tools used by businesses to strengthen their competitive edge. Within the pharmaceutical industry, new medical breakthroughs are mostly created and introduced through research and development, or R&D. Each year, life science businesses invest billions of dollars in research and development; because to the pandemic, this sum has surged recently. Pharma R&D trends like virtual engagement and insights management are already having an impact on how this crucial role will develop and evolve in the future. This article examined the link between R&D expenses and financial characteristics of a selected pharmaceutical business in India using samples of listed pharmaceutical companies over the test period of 2018–2022. In this research study, we employed ratio analysis and ANOVA Analysis to determine the influence of R&D expenses. The results show that these expenses have a substantial negative link with net profit, net sales, and net worth.*

**Keywords:** Research & Development, Pharmaceutical Company, Net profit, Net Sales, Net Worth.

### Introduction:

The pharmaceutical business creates many novel medications with beneficial health effects each year. The cost of many of those medications means that both the public and private sectors must contribute more to healthcare. Lawmakers have considered bills that would reduce prescription drug costs as well as government drug spending. These rules would likely lessen the industry's incentive to produce new medications.

The Congressional Budget Office evaluates funding trends for research and development (R&D) and new drug releases in this study. The CBO also considers variables such as anticipated global drug sales, the expense of creating a new medication, and federal laws that affect the availability of new medications, the need for drug therapy, or both. The amount that pharmaceutical businesses invest in R&D may be impacted by several factors.

### What Factors Influence Spending for R&D?

Three primary factors influence the R&D spending decisions of pharmaceutical companies:

Lifetime worldwide earnings from a novel medication;

Projected growth expenses; and

Policies and initiatives that have an impact on the supply and demand for prescription drugs.

### R & D Spending in Pharma Industry:

The pharmaceutical industry spends a lot of money on research and development (R&D) for many reasons, such as the following:

**Creation**, or research and discovery of new drugs;

**Progress**, or clinical testing, creating and submitting FDA approval applications, and designing new medication production procedures;

**Small-scale innovation**, involves the creation of novel dosage forms and delivery systems for currently available medications as well as the investigation of such medications' potential uses;

**distinction in products**, or comparative clinical trials comparing a novel drug against an established competitor to demonstrate the superiority of the novel drug; and

**Observation of Safety**, or clinical studies, which are carried out after a medication is on the market and are mandated by the FDA to find side effects that would not have been noticed in shorter trials during the drug's development.

Small and large corporations alike frequently focus on specific R&D activities, even if overall drug company investment has been increasing. Research resources at small, non-pharmaceutical businesses are more often allocated to the creation and testing of innovative drugs, many of which are subsequently purchased by larger corporations. However, clinical trials, small-scale "line extension" Larger pharmaceutical companies (like Pharma) spend the majority of their research and development budgets on post-approval testing for marketing or safety monitoring, as well as upgrades (like new doses, delivery systems, or combinations of two or more existing pharmaceuticals).

### Literature Review:

- Jaya Prakash Pradhan (Jaya Prakash Pradhan) (2007) "His study topic was "Global Competitiveness of Indian Pharmaceutical Industry: Trends and Strategies." What are the current developments in the Indian pharmaceutical industry's ability to compete globally? Where does this industry fare in terms of productivity, R&D, trade performance, and value-added in the pharmaceutical sector in comparison to its global counterparts? What creative strategies are Indian pharmaceutical businesses using to become more well-known worldwide? The purpose of this study is to try and answer these issues. It was discovered that the primary causes of the Indian pharmaceutical industry's transformation from a straightforward importer and distributor of medications to a resourceful, innovative manufacturer of premium pharmaceuticals were deliberate government initiatives. With rising exports and trade surpluses, India's pharmaceutical industry is among the fastest-growing in the world.
- Ogburn (2009) Research indicates that the pharmaceutical industry will need to invest a significant amount of resources in the coming years to identify new medicinal substances. The pharmaceutical companies' financial status can be negatively impacted by this.
- Sarkar and Bhunia (2011) discovered that a small number of financial parameters can be utilized to forecast the Indian pharmaceutical companies' financial stability.
- Karthikeyan and Sheil (2012) investigated the pharmaceutical Indian businesses' financial performance. They found Cipla to be the best of all the selected companies, with the strongest

financial performance. They also found that the most comprehensive measures of a business's profitability are ROI and ROE.

- Vataliya (2012) Also investigated the financial success and performance of Indian pharmaceutical firms. He also discovered that, among the chosen companies, Cipla had the best performance. They also mentioned Cipla's performance constancy.
- Karamchic (2013) examined the pharmaceutical industry's financial results in the US. He predicted that in the near future, financial performance will decline.

### Research Methodology:

#### ➤ Research Statement:

3N Effect towards R&D of selected Pharmaceutical Companies in India

#### ➤ Objectives of the study:

- To examine the effect of R& D Cost of selected pharmaceutical companies in India.
- To Study the relationship between financial performances indicators like Net profit, Net Sales, Net Worth and R &D Score of the Pharmaceutical Companies in India.

#### ➤ Hypothesis:

H<sub>1</sub>: There is no significant difference in effect of R&D on Net Profit, Net Sales, and Net worth of selected pharmaceutical companies in India.

H<sub>0</sub>: There is significant difference in effect of R&D on Net Profit, Net Sales, and Net worth of selected pharmaceutical companies in India.

#### ➤ Sample size:

The research has been focused on top five companies on the basis of market capital.

### Following companies were selected

| Rank | Company                               | Market Capitalization June 2020 (INR crores) |
|------|---------------------------------------|----------------------------------------------|
| 1    | SUN PHARMACEUTICAL INDUSTRIES LIMITED | 1,164,151                                    |
| 2    | DR. REDDY'S LABORATORIES              | 66,596                                       |
| 3    | DIVI'S LABORATORIES LIMITED           | 61,282                                       |
| 4    | CIPLA LIMITED                         | 51,645                                       |
| 5    | AUROBINDO LIMITED                     | 46,043                                       |

#### ➤ Tools and Techniques:

Obtaining data was crucial to the study's completion because secondary data acted as its primary information source. As part of the planning phase of the data collection design process, obtaining the necessary data from reliable sources is necessary. The researcher

examined secondary data sources for this study, including corporate websites, journals, and annual reports. A range of statistical techniques, such as data tabulation and regression, together with additional financial ratios, will be employed for data analysis.



➤ **Duration of the Research:**

Present Study is taken for the period of five year commencing from 2018 to 2022.

➤ **Research variables:**

The main variable used in the study is R&D spent by selected pharmaceutical companies during the period of the study. Along with R&D spent also examined. To measure impact of R&D activities and spending on financial performance and profitability below mentioned variables have been used.

- Net Profit
- Net Sales
- Net Worth

**Data Analysis & Findings:**

The following regression linear model must be used to test the hypothesis in accordance with the study's objectives and design:

$$a. RD = \beta_0 + \beta_1 \text{Net Profit} + \epsilon$$

$$b. RD = \beta_0 + \beta_1 \text{Net Sales} + \epsilon$$

$$c. RD = \beta_0 + \beta_1 \text{Net Worth} + \epsilon$$

Where, Net Profit, Net Sales and Net Worth have been taken as independent variable whereas R&D treated as dependent variable and  $\epsilon$  is serving as an error term in the equation of the study.

**Regression Analysis:**

➤ **Sun Pharma Company Ltd.:**

**Table: (i) Overview of Results:**

| Multiple R  | Square R    | R Squared Adjusted | Normal Error | Observations |
|-------------|-------------|--------------------|--------------|--------------|
| 0.744854989 | 0.554808954 | -0.780764182       | 172.7306968  | 5            |

The Multiple R indicates a strong correlation amongst R&D and NP, NS, NW. The multiple R-squared value of the regression line or model indicates how well it "fits" the data. It displays the percentage of the dependent variable's (R&D) variance that the

independent variables can account for (NP, NS, NW). In this model of Sun Pharma Ltd, Multiple R is 55%. R-Squared indicates 55% of the independent variables account for variation in the dependent variable.

**Table: (ii) ANOVA Evaluation:**

|            | df | SS       | MS          | F          | F Significance |
|------------|----|----------|-------------|------------|----------------|
| Regression | 3  | 37182.29 | 12394.09546 | 0.41540889 | 0.781428964    |
| Residual   | 1  | 29835.89 | 29835.89362 |            |                |
| Total      | 4  | 67018.18 |             |            |                |

From Table 2, it can be seen that the relation between R&D and NP, NS and NW. However, considering 5% level of significance, of multiple regression model is greater than 0.05 i.e., 0.78. It indicates that multiple regression model does not hold good. Alternative hypothesis is rejected. Null hypothesis is failed to

reject that there is no significant relationship between dependent & independent variables. Furthermore, P-values for T-statistics are higher than 0.05, indicating that there is no correlation between R&D and NP, NS, or NW.

➤ **Dr. Reddy's Laboratories:**

**Table: (i) Synopsis of Results:**

| R Multiple | R Square | R-squared adjusted | Error Standard | Remarks |
|------------|----------|--------------------|----------------|---------|
| 0.882217   | 0.778307 | 0.113228           | 110.7094       | 5       |

The Multiple R indicates a strong correlation amongst R&D and NP, NS, NW. In this model of Dr. Reddy's Laboratories, Multiple R is 77%. R-Squared indicates

11% of the independent factors' explanation of the dependent variable's fluctuation.

**Table: (ii) Analysis of ANOVA:**

|            | df | SS       | MS       | F        | F Importance |
|------------|----|----------|----------|----------|--------------|
| Regression | 3  | 43029.71 | 14343.24 | 1.170248 | 0.576543     |
| Residual   | 1  | 12256.58 | 12256.58 |          |              |
| Total      | 4  | 55286.29 |          |          |              |

From Table 2, it can be seen that the relation between R&D and NP, NS and NW. However, considering 5% level of significance, p-value of multiple regression model is greater than 0.05 i.e., 0.57. It indicates that

multiple regression model does not hold good. Alternative hypothesis is rejected. P-values of T-statistics are also greater than 0.05 which indicates there is no relationship between R&D and NP, NS and NW.

➤ **Divi's Laboratories Limited:**

**Table: (i) Summary Result:**

| Multiple R | Square R | Adjusted RSquare | Error Standard | Observations |
|------------|----------|------------------|----------------|--------------|
| 0.992311   | 0.98468  | 0.938721         | 219.0891       | 5            |

The Multiple R indicates a strong correlation amongst R&D and NP, NS, NW. How well the regression line or model "fits" the data is shown by its multiple R-squared value. It shows the percentage of the variance in the dependent variable (R&D) that can be accounted

for by the independent variables. (NS, NW, NP). Multiple R in this Divi's Laboratories Limited model is 99%. R-Squared shows that the independent variables account for 98% of the variation in the dependent variable.

**Table: (ii) ANOVA Analysis:**

|            | df | SS       | MS       | F      | Significance F |
|------------|----|----------|----------|--------|----------------|
| Regression | 3  | 3085201  | 1028400  | 21.425 | 0.15719        |
| Residual   | 1  | 48000.02 | 48000.02 |        |                |
| Total      | 4  | 3133201  |          |        |                |

From Table 2, it can be seen that the relation between R&D and NP, NS and NW. However, considering 5% level of significance, p-value of multiple regression model is greater than 0.05 i.e., 0.15. It indicates that multiple regression model does not hold good.

Alternative hypothesis is rejected. Null hypothesis is failed to reject that there is no significant relationship between dependent & independent variables. There is no correlation between R&D and NP, NS, and NW, according to T-statistics P-values that are likewise bigger than 0.05.

➤ **Cipla Limited:**

**Table: (i) Summary Output:**

| Multiple R | R Square | Adjusted Square R | Standard Error | Observations |
|------------|----------|-------------------|----------------|--------------|
| 0.883362   | 0.780329 | 0.121317          | 103.3001       | 5            |

The Multiple R indicates a strong correlation amongst R&D and NP, NS, NW. In this model of Divi's Laboratories Limited, Multiple R is 99%. R-Squared

indicates 98% of the independent variables account for variation in the dependent variable.

**Table: (ii) ANOVA Evaluation:**

|            | df | SS      | MS      | F        | Significance F |
|------------|----|---------|---------|----------|----------------|
| Regression | 3  | 37905.9 | 12635.3 | 1.184089 | 0.574124       |
| Residual   | 1  | 10670.9 | 10670.9 |          |                |
| Total      | 4  | 48576.8 |         |          |                |

From Table 2, it can be seen that the relation between R&D and NP, NS and NW. However, considering 5% level of significance, p-value of multiple regression model is greater than 0.05 i.e., 0.57. It indicates that multiple regression model does not hold good. Alternative hypothesis is rejected. Null hypothesis is

failed to reject that there is no significant relationship between dependent & independent variables. T-statistics P-values are likewise higher than 0.05, indicating that there is no correlation between R&D and NP, NS, and NW.



➤ Aurobindo Limited:

Table: (i) Summary Result:

| R Multiple | Square R | R Adjusted Square | Error Standard | Observations |
|------------|----------|-------------------|----------------|--------------|
| 0.991388   | 0.98285  | 0.931399          | 106.3821       | 5            |

The Multiple R indicates a strong correlation amongst R&D and NP, NS, NW. In this model of Divi's Laboratories Limited, Multiple R is 99%. R-Squared

indicates 98% of change in the dependent variable that the independent factors account for.

Table: (ii) ANOVA Analysis:

|            | df | SS       | MS       | F        | Significance F |
|------------|----|----------|----------|----------|----------------|
| Regression | 3  | 648567.6 | 216189.2 | 19.10281 | 0.166264       |
| Residual   | 1  | 11317.14 | 11317.14 |          |                |
| Total      | 4  | 659884.8 |          |          |                |

From Table 2, it can be seen that the relation between R&D and NP, NS and NW. However, considering 5% level of significance, p-value of multiple regression model is greater than 0.05 i.e., 0.16. It indicates that multiple regression model does not hold good. Alternative hypothesis is rejected. Null hypothesis is failed to reject that there is no significant relationship between dependent & independent variables.

**Conclusion:**

In this present study shows the effect of R&D on financial performance indicators like Net profit, Net Sales and Net worth in selected Pharma companies in India with the help of regression analysis over the period 2017-18 to 2021-22. The present study concludes that there is no significant difference in the R&D analysis of all five selected pharmaceutical companies in India.

As such in general industry are thinking about that there are some effect of R&D on financial parameter because its cost but from this analysis, researcher can conclude that there is no significant difference of effect on R&D on Net Profit, Sales and Net worth. So basically we can say that its positive relationship between R&D cost and this parameters.

Other things, we can conclude from this is that sometime if R&D cost will increase defiantly profit and sales would be increased because at last by the help of R&D company will get some improvement, innovation of new drug and new technique also so We may conclude that R&D and 3N have a good association.

**Recommendation & Scope for Further Research:**

- From this research work recommend to selected pharmaceutical companies that they must be increase their investment in R&D sector because its ultimately positive towards financial performance of companies.
- By the help of new innovation in drug and new techniques in medication companies will help to society also.

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