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AN EMPIRICAL STUDY ON THE FACTORS OF THE PROFITABILITY OF PHARMACEUTICAL COMPANIES IN INDIA

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ABSTRACT

The aim of the empirical study is to identify the factors that influence the profitability of the companies in the pharmaceutical sector listed on the National Stock Exchange (NSE) and Bombay Stock Exchange (BSE) of India. The research is based on purely secondary data from top 6 pharmaceutical companies listed on the National Stock Exchange (NSE) and Bombay Stock Exchange (BSE) of India over 15 years from 2010-2024. To fulfill the objective of the study Quick Ratio (QR), Inventory Turnover Ratio (ITR) Working capital Ratio (WC), and Debt-Equity (DE) are considered independent variables, Price Book Value Ratio (PBV) is regarded as the control variable and Return on Assets (ROA)(Profitability) considered as dependent variable. To identify the factors, that influence the profitability of pharmaceutical companies, the study employees Pearsons Correlation test, Hadri LM Test, Kao and Pedroni test, Hausman test, Breusch-Pagan/Cook-Weisberg test and for the final result apply Random Effect model with the help of Statistical tool Stata-17.00. The result depicts that Inventory Turnover Ratio (ITR), Debt- Equity (DE), and Price Book Value ratio (PBV) are the factors that have a significant impact on the profitability (ROA) of the pharmaceutical companies listed in India.

The empirical result also suggested that Inventory Turnover Ratio (ITR) and Price Book Value ratio (PBV) have a positive influence on the profitability (ROA) but Debt- Equity (DE) has a negative influence on the profitability (ROA) of the pharmaceutical companies listed in India.

KEYWORDS: Profitability, Quick Ratio (QR), Inventory Turnover Ratio (ITR), Debt-equity (DE), Price to Book Value ratio (PBV), Return on Assets ratio (ROA)

I. INTRODUCTION

1. Background

Profitability is the capacity of a firm, company or enterprise to earn profit. Profitability shows how a

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company efficiently manages the resources available in the market to make profit. Howard and Upton (1961)[1] provided that the profitability of a company is the ability to earn a return on its investment. India is extensively viewed as a growth engine and an important player in the global economy. In this regard, the Indian Pharmaceutical Industry plays an important role in the global healthcare and pharmaceutical market. The production and supply of generic drugs are the key components of the Indian Pharmaceutical Industry. It is not only meeting the domestic demand for drugs and pharmaceuticals but also supplying countries across the globe. Over the last few years, the Indian Pharmaceutical industry has seen a huge expansion and is expected to grow about 13% of the size of the global pharma and healthcare market. During the financial year 2024, the Indian Pharmaceutical sector exported a huge number of drugs, and pharmaceuticals recorded a strong growth of 9.7% on the year-over-year basis. In the Financial Year 2023, the Indian hospital market was valued at US$ 98.98 billion, and it has also been projected to grow by 8% CAGR and reach US$ 193.59 billion by the Financial Year 2032[2].

By analyzing fundamental factors like financial statements, profitability ratios, and other key performance indicators, the study seeks to provide a comprehensive evaluation of the industry's financial health. The analysis will consider company-specific variables to offer insights into the determinants of financial success in the industry. The study's objective is to identify the factors that influence the profitability of the companies in the pharmaceutical sector listed on the National Stock Exchange (NSE) and Bombay Stock Exchange (BSE) of India. The research is based on purely secondary data from the top 6 pharmaceutical companies listed on the National Stock Exchange (NSE) of India over 15 years from 2010-2024. To fulfill the objective of the study Quick Ratio (QR), Inventory Turnover Ratio (ITR) Working capital Ratio (WC), and Debt-Equity (DE) are considered independent variables, and Price Book Value Ratio (PBV) are considered control variables and Return on Assets (ROA)(Profitability) considered as dependent variable. The result of this study will provide knowledge to the existing body by identifying key trends and challenges in the financial performance of the Indian pharmaceutical sector, highlighting valuable recommendations to the stakeholders.1.2. Literature Review

Gowd, T. N., Kiran, C. B., & Rao, C. R. P. (2013) studied Profitability performance analysis of the Indian Pharma sector. The study attempted to measure the profitability performance and to analyze the impact of selected profitability ratios on the ROE of the sample company of Dr. Reddy's Laboratory Limited. With the help of the multiple correlation coefficient, the study concluded that Return on Equity is much affected by the selected profitability ratios of the companies.

[1]) Howard, B.B. and Upton, M. (1961) Introduction to Business Finance, McGraw Hill, New York.
[2]) India Exports (tradingeconomics.com)

Tyagi, S., & Nauriyal, D. K. (2017) intend to highlight the Firm level of profitability determinants in Indian drugs and pharmaceutical industry. The study concluded that export intensity, A&M intensity, the firm's market power, and stronger patent regime dummy have a positive influence on the profitability of pharmaceutical companies. Statistically significant and the negative influence of R&D intensity and raw material import intensity on the profitability of the companies. And study also suggested that suitable investment strategies have to be taken.

Swadia, B. U. (2018) studied the comparative profitability of the top 5 Pharmaceutical companies in India. The analysis found that the performance of the pharma companies in India was well in the year 2008, but companies performed very badly in the financial year 2015. The study also highlighted that the gross profit and the net profit ratios of the companies differed in the case of selected pharmaceutical companies.

Rajan D. Parikh (2020) studied the profitability of selected pharmaceutical sectors in India and it has been compared within the five years of study 2015-16 to 2019-20. In this study, they calculated various profitability ratios as per the data collected for five years of study. The study found that the ratios differ from company-to-company basis as well as Y-O-Y basis. The study also found that Sun Pharmaceutical Industries and Dr. Reddy's Laboratories Ltd. are good in terms of Profitability Ratios. So, Sun Pharmaceutical Industries and Dr. Reddy's Laboratories Ltd. both have very good prospects in terms of profitability and expansion in the future.

Vinod Kumar Yadav, and Dr. Abhinav K. Raina (2024), studied the financial performance, in terms of profitability and market presence in the pharmaceutical companies in India. The study concludes that the Indian pharmaceutical companies have reflected strong financial performance, especially in terms of profitability and market presence. However, the analysis also reveals several challenges in an increasingly competitive global environment. To defend the key challenges need for enhanced R&D investment, the complexities of regulatory compliance, and the importance of strategic market diversification.

3. Research gap:

A few studies have been done on the factors of the profitability of the pharmaceutical companies listed in India. Yet, there is no indisputable explanation of the factors influencing the profitability of the pharmaceutical companies listed on the National Stock Exchange (NSE) and Bombay Stock Exchange (BSE) in India.

i. This study seeks to fill an existing gap in the literature of the firms listed on NSE and BSE in India.
ii. The study provides new empirical evidence employing different statistical tools for analysis the data as a methodological contribution and includes new variables.

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iii. Finally, the present study brings significant insights and empirical evidence on the factors that influence the profitability of companies in pharmaceutical sectors, which are beneficial for both internal and external stakeholders.

4. Objective

The objective of the study is to

i. Identify the factors that influence the profitability of the pharmaceutical companies listed on the National Stock Exchange (NSE) and Bombay Stock Exchange (BSE) of India. And,

ii. Examine the significant influence of the factors on the profitability of the companies of pharmaceutical companies in India listed on the National Stock Exchange (NSE) of India and Bombay Stock Exchange (BSE) of India.

5. Significance of the study

This study emphasizes the comprehensive analysis of the financial performance of Indian pharmaceutical companies, a sector that plays an important role in the domestic market as well as global healthcare markets. The insights of this research are crucial for the stakeholders of this sector like Investors, creditors, policy makers, etc.

II. METHODOLOGY

6. Data collection and Study design

The objective of the study is to identify the factors that influence the profitability of the pharmaceutical companies listed on the National Stock Exchange (NSE) and Bombay Stock Exchange (BSE) of India.

I) The research is based on purely secondary data from top 6 pharmaceutical companies listed on the National Stock Exchange (NSE) and Bombay Stock Exchange (BSE) of India over 15 years period of time from 2010-2024.

II) To fulfill the objective of the study Quick Ratio (QR), Inventory Turnover Ratio (ITR) Working capital Ratio (WC), and Debt-Equity (DE) are considered independent variables, and Price Book Value Ratio (PBV) are considered control variables and Return on Assets (ROA)(Profitability) considered as dependent variable.

III) The study is based on purely Secondary data collected from the Annual Reports of the companies and the data sources: www.moneycontrol.com

IV) The nature of the study is Static Panel Data analysis.

V) The data analysis through STATA 17.00.

6.1. Steps for the Analysis:

- Diagnostic test-

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i. For testing the Collinearity -: Pearsons' Correlation
ii. For the stationary test: Hadri LM test
iii. For cointegration test: Kao and Pedroni test.
iv. To Examine the Heteroskedasticity- Bruesch-Pagan/Cook-Weisberg test.

- Model Selection-

To select the appropriate model: the Hausman test.

- Regression Analysis - **Random Effect Model**

6.2. Hypothesis

H0:H0……H0n. The null hypothesis assumed that the factors do not influence on the profitability of the companies.
H1: H1…….H1n. The alternative hypothesis assumed that the factors influence on the profitability of the companies.

6.3. Multiple Regression model

The multiple regression model used in this research can be written as:

$$ROA\ it = \beta 0 + \beta 1QRit + \beta 2ITRit + \beta 3WCit + \beta 4DEit + \beta 5PBVit + \varepsilon i$$

Where ROA= Return on Assets of the firm i in period t
QR= Quick Ratio
ITR=Inventory Turnover Ratio
WC= Working Capital Ratio
DE=Debt-Equity Ratio
PBV=Price to Book Value Ratio
εi = Standard Error

6.4. The variables are summarized in the following table

Name of Variables	**Definition**		**Hypothesis Impact**
Dependent Variable			
ROA= Return on Assets	ROA=Net profit/ Total Assets	Profitability	
Independent Variables			
QR=Quick Ratio	QR=Quick Assets/ Quick Liabilities	Liquidity	'+' Positive
ITR= Inventory Turnover Ratio	ITR=Cost of Goods Sold/Average Stock	Efficiency	'+' Positive
WC= Working Capital Ratio	WC=Current Assets-Current Liabilities/ Total Assets	Liquidity	'+' Positive

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DE-Debt-Equity Ratio	DE=Debt/ Equity	solvency	'-'Negative
PBV= Price to Book Value	PBV= Current Market Value / Book value	Value of the firm	'+' Positive

III. RESULT AND DISCUSSION

7. Descriptive Statistics: Descriptive statistics that deals with the summarization and description of collected data. It simplifies and present data in a manner that is easy to understand often through visual or numerical methods.

Table-1: Summarization

```
sum ROA QR ITR WC DE PBV
```

Variable	Obs	Mean	Std. dev.	Min	Max
ROA	90	12.97833	6.529364	-.84	31.89
QR	90	1.536889	.8473881	.55	4.07
ITR	90	3.710333	2.014962	.8	10.06
WC	90	7.198333	1.32658	2.6	9.4
DE	90	.2898889	.3214975	0	1.16
PBV	90	4.618111	2.591913	1.1	13.78

Sources: Author's calculation through STATA-17.00

Discussion: The mean value of Return on Assets (ROA) is 12.98 variable was the highest at 31.89 and the lowest value was -0.84. The standard deviation is 6.53 implying the ROA variation.

8. Diagnostic Test: -

8.1. Multicollinearity test: Multicollinearity is the situation where a high correlation exists between exploratory variables causing loss of precisions, which means the value of R-square will be high but the individual coefficients exist high standard errors and inference are not reliable (*Brooks. C. 2014*)[3] If an absolute correlation value exceeding 0.8 which indicates that there is a strong correlation exists and this circumstance does not desirable.

[3]) Brooks, C. (2014) Introductory Econometrics for Finance. 3rd Edition, Cambridge University Press, Cambridge

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Table-2. Pearson's' Co-relation

```
. correlat ROA QR ITR WC DE PBV
(obs=90)

             |      ROA       QR      ITR       WC       DE      PBV
-------------+------------------------------------------------------
         ROA |   1.0000
          QR |   0.2213   1.0000
         ITR |   0.5979   0.1607   1.0000
          WC |  -0.1297   0.5897  -0.3680   1.0000
          DE |  -0.3462  -0.5978  -0.1014  -0.5358   1.0000
         PBV |   0.5782   0.0104   0.3571  -0.1498  -0.1227   1.0000
```

Sources: Author's calculation through STATA-17.00

Discussion: Table 2 shows that the correlation between the independent variables used in the model is less than 80%. The highest correlation coefficients exist between the DE and QR (59.78%), followed by WC and QR variables (58.97%). We can conclude from the result table that there is no collinearity exists in the exploratory variables.

8.2. Stationary Test

Table no. 3: Hadri LM test – At level

```
H0: All panels are stationary                Number of panels  =      6
Ha: Some panels contain unit roots           Number of periods =     15

Time trend:           Not included           Asymptotics: T, N -> Infinity
Heteroskedasticity: Not robust                            sequentially
LR variance:        (not used)
```

Variables	Statistic(z)	P-value
ROA	4.4566	0.0000
QR	8.3348	0.0000
ITR	10.3989	0.0000
WC	15.5419	0.0000
DE	11.0920	0.0000
PBV	4.7901	0.0000

Sources: Author's calculation through STATA-17.00

Discussion: The result of the Hadri LM test reveals that the P-value of all the variables is less than 0.05, at a 5% significant level. It indicates that the Null hypothesis is rejected. The result depicts that the series contains non-stationary at a level.

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Table - 4. Hadri LM test (First difference)

```
H0: All panels are stationary                Number of panels   =       6
Ha: Some panels contain unit roots           Number of periods  =      14

Time trend:           Not included           Asymptotics: T, N -> Infinity
Heteroskedasticity: Not robust                            sequentially
LR variance:        (not used)
```

Variables	Statistic(z)	P-value
D.ROA	-1.0522	0.8536
D.QR	-0.5526	0.7097
D.ITR	0.2905	0.3857
D.WC	-0.8259	0.7956
D.DE	-01103	0.5439
D.PBV	-0.1417	0.5563

Sources: Author's calculation through STATA-17.00

Discussion: The result of the first difference shows that the P-value of all the variables is greater than 0.05 at a 5% significant level. It implies that the Null hypothesis is accepted. The result depicts that the series contains stationary at first difference.

8.3. Cointegration Test: The pre-condition of the co-integration test is that the model should be non-stationary at level but stationary at first difference. Since the conditions are fulfilled from the unit root test and it allows to run the Cointegration test.

i. Kao test

Table no - 5. Kao test

```
. xtcointtest kao ROA QR ITR WC DE PBV

Kao test for cointegration
--------------------------

H0: No cointegration                         Number of panels     =       6
Ha: All panels are cointegrated              Number of periods    =      13

Cointegrating vector: Same
Panel means:          Included               Kernel:              Bartlett
Time trend:           Not included           Lags:                1.50 (Newey-West)
AR parameter:         Same                   Augmented lags:      1
------------------------------------------------------------------------------
                                             Statistic            p-value
------------------------------------------------------------------------------
 Modified Dickey-Fuller t                      -0.9234              0.1779
 Dickey-Fuller t                               -2.7575              0.0029
 Augmented Dickey-Fuller t                     -0.7504              0.2265
 Unadjusted modified Dickey-Fuller t           -6.5539              0.0000
 Unadjusted Dickey-Fuller t                    -5.4512              0.0000
------------------------------------------------------------------------------
```

Sources: Author's calculation through STATA-17.00

Discussion: Result of Kao test in table -5. Shows that p- value of three statistical tests above are significant at 5% level out of five Statistical tests, implies that Null hypothesis is rejected. The result

suggests that there is a long run association among the variables.

ii. Pedroni test

Table -6: Pedroni test

```
. xtcointtest pedroni ROA QR ITR WC DE PBV

Pedroni test for cointegration
----------------------------------------------------------------------------------
H0: No cointegration                              Number of panels       =      6
Ha: All panels are cointegrated                   Number of periods      =     14

Cointegrating vector: Panel specific
Panel means:          Included                    Kernel:                Bartlett
Time trend:           Not included                Lags:                  2.00 (Newey-West)
AR parameter:         Panel specific              Augmented lags:        1
----------------------------------------------------------------------------------
                                                  Statistic              p-value
----------------------------------------------------------------------------------
 Modified Phillips-Perron t                         2.2780               0.0114
 Phillips-Perron t                                 -6.6521               0.0000
 Augmented Dickey-Fuller t                         -6.3713               0.0000
----------------------------------------------------------------------------------
```

Sources: Author's calculation through STATA-17.00

Discussion: Result of Pedroni test on above shows that all the statistical tests are significant at 5% level. It implies that the Null hypothesis is rejected, suggests that the there is a long run association among the variables.

8.4. Hausman test: To select the appropriate model for data analysis between Fixed Effect and Random Effect Model, the study demands Hausman test.

Table -7: Hausman test

```
. hausman fe re

                 ---- Coefficients ----
             |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
             |      fe           re          Difference       Std. err.
-------------+----------------------------------------------------------------
          QR |   -.0148962     .4099129      -.4248091        .6006165
         ITR |    1.669479     1.217237       .4522414        .1112629
          WC |    1.175757    -.6005712       1.776329         .847766
          DE |   -3.115811    -5.968316       2.852505         1.81513
         PBV |    .9880046     .9804336        .007571        .0850512
------------------------------------------------------------------------------
                          b = Consistent under H0 and Ha; obtained from xtreg.
           B = Inconsistent under Ha, efficient under H0; obtained from xtreg.

Test of H0: Difference in coefficients not systematic

    chi2(5) = (b-B)'[(V_b-V_B)^(-1)](b-B)
            =   3.73
Prob > chi2 = 0.5882
(V_b-V_B is not positive definite)
```

Sources: Authors' computation through STATA-17.00

Discussion: Hausman test result table reveals that chi2 (5) =3.73 (Positive) and Prob> chi2=0.5882, i.e., > 0.05 at 5% significant level. It Indicates that **Random Effect Model** is applicable for the data analysis.

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8.5. Heteroscedasticity test: The Breusch-Pegan/ Cook-Weisberg test has been run to examine the heteroscedastic problem in the data series.

Table no-8: Breusch-pagan/ Cook-Weisberg test for heteroskedasticity

```
. estat hettest

Breusch-Pagan/Cook-Weisberg test for heteroskedasticity
Assumption: Normal error terms
Variable: Fitted values of ROA

H0: Constant variance

    chi2(1) =   0.00
Prob > chi2 = 0.9957
```

Sources: Author's calculation Through STATA 17.00

Discussion: The result table above reveals that Chi2(1) = 0.00 (positive) and Prob>chi2=0.9957; >0.05. It suggests that there is no heteroscedastic problem in the data series.

9. Regression Analysis [Random Effect Model]

Random Effect Model has been apply to identify the Factors that influence the profitability of the company under the pharmaceutical sectors listed on the National Stock Exchange (NSE) and Bombay Stock Exchange (BSE) of India. To fulfill the objective of the study Quick Ratio (QR), Inventory Turnover Ratio (ITR), Working Capital (WC), and Debt-Equity (DE), are considered independent variables, and Price Book Value Ratio (PBV) considered as control variable and Return on Asset (ROA)(Profitability) considered as dependent variable.

Table-9: Regression analysis: -

```
. xtreg ROA QR ITR WC DE PBV, re

Random-effects GLS regression                   Number of obs      =        90
Group variable: Company                         Number of groups   =         6

R-squared:                                      Obs per group:
     Within  = 0.5473                                         min =        15
     Between = 0.7573                                         avg =      15.0
     Overall = 0.5790                                         max =        15

                                                Wald chi2(5)       =    115.51
corr(u_i, X) = 0 (assumed)                      Prob > chi2        =    0.0000

------------------------------------------------------------------------------
         ROA | Coefficient  Std. err.      z    P>|z|     [95% conf. interval]
-------------+----------------------------------------------------------------
          QR |   .4099129   .8171288     0.50   0.616    -1.19163    2.011456
         ITR |   1.217237   .3044923     4.00   0.000     .6204434    1.814031
          WC |  -.6005712   .5666376    -1.06   0.289    -1.711161     .5100181
          DE |  -5.968316   1.940317    -3.08   0.002    -9.771268   -2.165364
         PBV |   .9804336   .1935956     5.06   0.000     .6009931    1.359874
       _cons |   9.357496   4.665656     2.01   0.045     .2129769    18.50201
-------------+----------------------------------------------------------------
     sigma_u |          0
     sigma_e |  4.1119997
         rho |          0   (fraction of variance due to u_i)
------------------------------------------------------------------------------
```

Sources: Author's Calculation through STATA-17.00

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9.1. Interpretation

The result table:9, depicts that the overall R2 value is 57.9% and Prob> chi2=0.0000 which is > 0.05, significant at the 5% level, indicates that the model is fitted well.

(i) H01(QR): The value of P is (0.616), (>0 .05) at a 5% significant level implying that the null hypothesis (H01) is accepted. It indicates that QR has no significant impact on Profitability (ROA) of the companies in this study, if the other things remain unchanged.

(ii). H02(ITR): The value of P is (0.000), (<0.05) at the 5% significant level implying that the null hypothesis (H02) is rejected. It indicates that ITR has a significant impact on the Profitability (ROA) of the companies in this study if the other things remain unchanged. The coefficient value of ITR suggests that if the ITR increased by 1 unit, the ROA increased by 1.22%.

(iii). H03(WC): The value of P is (0.289), (>0 .05) at a 5% significant level implying that the null hypothesis (H03) is accepted. It indicates that WC has no significant impact on the Profitability (ROA) of the companies in this study if the other things remain unchanged.

(iv). H04(DE): The value of P is (0.002), <;0 .05) at the 5% significant level implying that the null hypothesis (H04) is rejected. The result depicts that DE has a significant impact on the Profitability (ROA) of the companies in this study if the other things remain unchanged. The coefficient value of DE suggests that if the DE increased by 1 unit, the ROA decreased by 5.97%. This result is supported by Jackling and Johl (2009), Charumathi (2012) and Omondi and Muturi (2013).

(v). H05(PBV): The value of P is (0.000), (<0.01) at the 1% significant level implying that the null hypothesis (H05) is rejected. It indicates that PBV has a significant impact on the Profitability (ROA) of the companies in this study if the other things remain unchanged. The coefficient value of PBV suggests that if the PBV increased by 1 unit, the ROA increased by 0.98%.

IV. CONCLUSION AND RECOMMENDATION

10.1. Conclusion:

The present study attempts to identify the factors that influence the profitability of pharmaceutical companies in India over 15 years from 2010 to 2024. From the regression analysis, it has been observed that the Inventory Turnover Ratio (ITR), Debt-equity (DE), and Book Value (PBV) are the factors that influence the profitability (ROA) of pharmaceutical companies listed in India.

The empirical result suggested that: -

i. Inventory Turnover Ratio (ITR) have a positive influence on the profitability (ROA) of the companies. High Inventory Turnover Ratio (ITR) reduces waste, improves sales efficiency, transitioning products faster from expenses to sales and ultimately positive impact on profit.

ii. Price to Book Value (PBV) have a positive influence on the profitability (ROA) of the companies. High Price to Book Value ratio (PBV) indicates high growth potential, high expectation of the investors, increases confidence of the investors brings financial stability of the company leads to positive impact on the profitability.

iii. Debt-Equity (DE) has a negative influence on the profitability (ROA) of the pharmaceutical companies listed in India. High Debt Equity Ratio (DE) increases the financial risk and negatively impact on the profitability of the company because high level of debt leads to higher interest payments.

iv. **Finally, the Return on Assets (ROA)= 9.357+1.217(ITR)-5.968 (DE) +.980 (PBV) + Ɛ**

10.2. Recommendation:

The main implication of this study is that the creditors and investors can use the key factors that impact on the Return on Assets (ROA) of the Companies to decide which Companies will have the chance to go up the value of profitability and give the credit facilities accordingly. Also, the managers can use the significant factors to enhance the Profitability to set appropriate financial policies for the company.

10.3. Limitation: i) A generalization of the results is limited because of the small sample size.

ii) The secondary data have been taken from the Journals, Trade Magazines, and the Internet which may vary with the actual position of the company.

10.4. Scope of further study: In this study, the independent variables explain 68% of the dependent variable (ROA) but 42% remain unexplained. Thus, there is ample scope for further study in this area as there are several internal and external factors not considered in this study.

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