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Impact of Research and Development on Firm Performance

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Abstract

This study has been conducted to see the impact of research and development budget on the performance of the firms. Research and development is an increasingly important concept in order to have success in this era. The paper finds out the relationship between research and development and firm performance. Firm performance is measured through the ratios of return on assets, return on equity and the earnings per share of the firms. The data analyzed by using SPSS. Results confirmed the positive correlation between the dependent and the independent variables. Limitations of the study were shortage of time and studying of a single sector. In future, different other sectors can be studied to see the impact of research and development on their performance.

Keywords: Research and development (R&D), firm performance, return on assets (ROA), return on equity (ROE), earnings per share (EPS)

1. Introduction

Research and development is an emerging concept which is required by almost each and every firm in one manner or another. To succeed in this competitive and tough environment, there is an increased demand for research and development. Research and development affect the performance of the firms and is a means for improving performance.

The firms which allocate higher R&D expenditure are expected to earn more than those that do not. (Chao-Hung Wang, 2011). The performance of a firm will outweigh the costs of research and development. After reaching equilibrium, costs on R&D will be compensated by the benefits received.

Research and development is a must needed activity for survival in this increasingly competitive environment. R&D expenditures allows the firms to prevent imitation by the rivals and earn supra normal or above average returns. (Erickson and Jacobson, 1992)

Performance level of a firm will be a function of its resources of research and development activities. These are the means of improving performance in this era of technology. The aim of this study is to find out the effect of research and development on the performance of the firm with special context to the pharmaceutical sector of Pakistan. Although there is some work done to find the impact but there is lack of research with reference to Pakistan. The study aims to see that how the research and development activities can influence the performance of the pharmaceutical sector of Pakistan. Performance of the firms is being measured through the ratios of return on assets (ROA), return on equity (ROE) and earnings per share (EPS). The pharmaceutical companies listed on KSE are being studied in this paper.

2. Literature Review

2.1 Impact of research and development on firm performance

Prior studies have linked the relationship of research and development with the performance of the firms. Chao-Hung Wang (2011) explains that the organizations have to work hard for their survival in a competitive environment. For this, they have to efficiently allocate their assets. The resource based view theory suggests that the firms which have valuable resources and capabilities which are not possible to imitate and are and non-substitutable will have an advantage over other firms in terms of increased performance. Investment in valuable resources like research and development (R&D) plays a strong role in it. Millions of dollars are spent for R&D activities by the firms. The expense of this R&D is outweighed by the benefits it generates in the form of internal capability of innovation and enhanced performance.

The level of performance of a firm will be a function of its resources of R&D activities. These are the means of improving performance in this era of technology. The firms which allocate higher R&D expenditures are expected to earn more than those that do not. (Chao-Hung Wang, 2011)

Peter Drucker (2005) wrote in his seminal work that the basic function of a business is to bring innovation to earn profits. Thus, in order to gain a competitive edge, more resources should be spent on the research and development (R&D) activities.

Hayes and Abernathy (1980) explain their point of view that in order to succeed, the firms have an organizational commitment to compete on technological grounds. The firms therefore should offer superior products to earn profits in the long run.

Research and development play a significant role to gain an edge over current and potential competitors of the firms. The specific nature of R&D expenses would determine its advantage. R&D expenditures allows the firms to prevent imitation by the rivals and earn supra normal or above average profits. (Erickson and Jacobson, 1992)

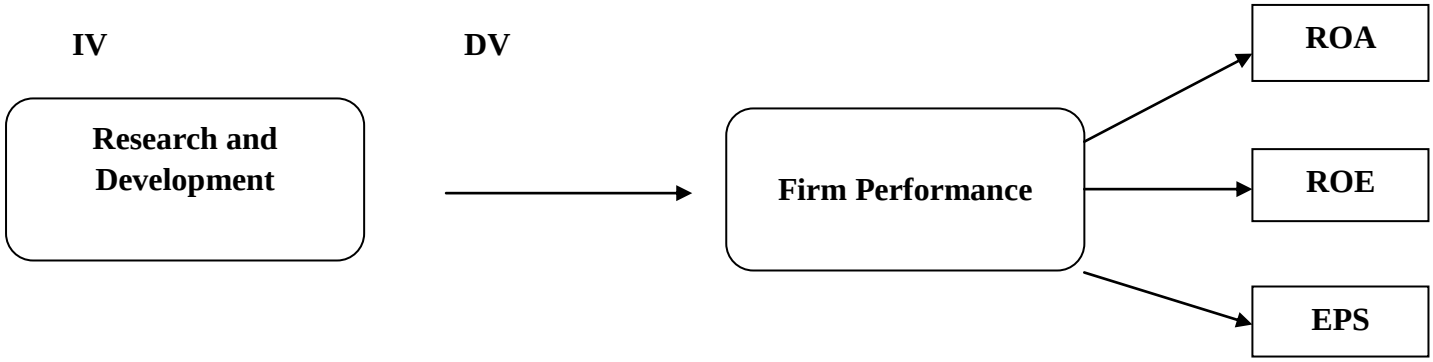
Donelson and Resutek (2012), on the other hand, are opposite to this view. They say that the level of research and development and the changes in it are not related to the profits. From the perspective of an investor, R&D costs are thought of as an expense whereas in reality, these are the investments which will generate future revenues in the form of profits. Cooper (2008) contradicts this view and explained that, in accounting, a positive relation is present between R&D investments and firm earnings but finance predicts a negative relationship between them.

A positive relation between investment in R&D and future returns is seen in accounting literature. Most studies in accounting and finance explained a positive relationship between investment in R&D and future returns (Michael, 2008)

Chao-Hung Wang (2011) explained it more clearly that the performance of a firm will outweigh the costs of research and development. After reaching equilibrium, costs on R&D will be compensated by the benefits received. He further explained it that innovative ideas do not have tremendous effects. But eventually they prove to be firm specific assets. In the same way, R&D activity will result in a better performance of the firm.

Effects of research and development on earnings of pharmaceutical firms have been studied separately. Bhagwat et. al. (2001) experienced that a one percent increase in research and development investment resulted in one-quarter percent increase in earnings per share (EPS) for publicly traded pharmaceutical companies for the period 1989-98 in USA.

3. Theoretical Framework



3.1 Variables

After the developed theoretical framework, the independent and dependent variables of the study are:

3.1.1 Independent variable:

The independent variable of the study is Research and Development (R&D)

3.1.2 Dependent variable:

The dependent variable of the study is firm performance. It will be measured through the ratios of Return on Assets (ROA), Return on Equity (ROE) and Earning per share (EPS).

3.2 Research Hypotheses

R&D and ROA

H_0 There is no relationship between R&D and ROA

H_1 There is a relationship between R&D and ROA

R&D and ROE

H_0 There is no relationship between R&D and ROE

H_1 There is a relationship between R&D and ROE

R&D and EPS

H_0 There is no relationship between R&D and EPS

H_1 There is a relationship between R&D and EPS

4. Research Methodology

4.1 Population

Population is the list of all members or entities about which the researcher studies and concludes (Huysamen, 1994). The population should be identified before selecting the sample size (Wilson, 2010). The population of the current study consists of the pharmaceutical industry of Pakistan.

4.2 Sample

Sample is the part of population from which the data is collected in reality (Moore; 2009). The sample is selected on the basis of pharmaceutical companies which are listed on the KSE (Karachi Stock Exchange). The companies listed on KSE are Abbott Laboratories Pakistan Limited, Ferozsons Laboratories Limited, GlaxoSmithKline Pakistan Limited, Highnoon Laboratories Limited, Otsuka Pakistan Limited, Sanofi-Aventis Pakistan Limited, Searle Pakistan Limited and Wyeth Pakistan Limited.

4.3 Data collection and tools

Research depends on the tools or instruments used for collecting data. The data used in this study is of secondary nature. Thus it is collected from the annual reports of the companies. The ratios and research and development budget is calculated from these annual reports from the year 2007-2012.

5. Data Analysis

Data was analyzed by using the statistical tool of SPSS version 16. Different statistical techniques were used to test the hypotheses. The statistical method used for analysis is correlation and regression.

The following tables explain the results:

Correlations

		ROA	ROE	EPS	FP	DDR
ROA	Pearson Correlation	1	.897**	.736	.961**	.464
	Sig. (2-tailed)		.006	.059	.001	.294
	N	7	7	7	7	7
ROE	Pearson Correlation	.897**	1	.824*	.976**	.685
	Sig. (2-tailed)	.006		.023	.000	.090
	N	7	7	7	7	7
EPS	Pearson Correlation	.736	.824*	1	.859*	.900**
	Sig. (2-tailed)	.059	.023		.013	.006
	N	7	7	7	7	7
FP	Pearson Correlation	.961**	.976**	.859*	1	.660
	Sig. (2-tailed)	.001	.000	.013		.107
	N	7	7	7	7	7
DDR	Pearson Correlation	.464	.685	.900**	.660	1
	Sig. (2-tailed)	.294	.090	.006	.107	
	N	7	7	7	7	7

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

*. Correlation is significant at the 0.05 level (2-tailed).

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-.001	.001		-.608	.570
	FP	9.380E-005	.000	.660	1.962	.107
a. Dependent Variable: DDR						

5.1 R&D and ROA

The first hypothesis relates to research and development budget and return on assets. It postulates that research and development budget will have an effect on the profitability ratios of return on assets (ROA) of Pharmaceutical industry. The proposed hypothesis is:

H_0 There is no relationship between R&D and ROA

H_1 There is a relationship between R&D and ROA

Correlations						
		ROA	ROE	EPS	FP	DDR
ROA	Pearson Correlation	1	.897**	.736	.961**	.464
	Sig. (2-tailed)		.006	.059	.001	.294
	N	7	7	7	7	7
**. Correlation is significant at the 0.01 level (2-tailed).						
*. Correlation is significant at the 0.05 level (2-tailed).						

The correlation results suggest that a weak correlation is present between the two variables and the value in not significant. Thus our null hypothesis is rejected and the alternate hypothesis is accepted.

Thus a relationship is seen between R&D and ROA

5.2 R&D and ROE

The first hypothesis relates to research and development budget and return on equity. It postulates that research and development budget will have an effect on the profitability ratios of return on equity (ROE) of Pharmaceutical industry. The proposed hypothesis is:

H_0 There is no relationship between R&D and ROE

H_1 There is a relationship between R&D and ROE

Correlations

		ROA	ROE	EPS	FP	DDR
ROE	Pearson Correlation	.897**	1	.824*	.976**	.685
	Sig. (2-tailed)	.006		.023	.000	.090
	N	7	7	7	7	7

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

*. Correlation is significant at the 0.05 level (2-tailed).

The correlation results suggest that a strong correlation is present between the two variables and the value in not significant. Thus our null hypothesis is rejected and the alternate hypothesis is accepted.

Thus a relationship is seen between R&D and ROE

5.3 R&D and EPS

The first hypothesis relates to research and development budget and return on assets. It postulates that research and development budget will have an effect on the profitability ratios of return on assets (ROA) of Pharmaceutical industry. The proposed hypothesis is:

H_0 There is no relationship between R&D and EPS

H_1 There is a relationship between R&D and EPS

Correlations						
		ROA	ROE	EPS	FP	DDR
	N	7	7	7	7	7
EPS	Pearson Correlation	.736	.824*	1	.859*	.900**
	Sig. (2-tailed)	.059	.023		.013	.006
	N	7	7	7	7	7
**. Correlation is significant at the 0.01 level (2-tailed).						
*. Correlation is significant at the 0.05 level (2-tailed).						

The correlation results suggest that a strong correlation is present between the two variables and the value in not significant. Thus our null hypothesis is rejected and the alternate hypothesis is accepted.

Thus a relationship is seen between R&D and EPS

5.4 Regression Results

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-.001	.001		-.608	.570
	FP	9.380E-005	.000	.660	1.962	.107
a. Dependent Variable: DDR						

The regression results of the study confirm the significant positive relation between Research and Development (R&D) and the Firm Performance of the Pharmaceutical Industry. The value of regression coefficient is (β= 0.660) and it is significant at $p < 0.000$.

This positive relation between research and development and the firm performance shows that with the increase in R&D budget, the performance of the firms will also be increased.

6. Findings

The purpose of this paper was to find out the impact of research and development (R&D) budget on the performance of the pharmaceutical industry of Pakistan. After studying the details of all the variables, following conclusions can be made:

The first hypothesis relates research and development budget with the ratio of return on assets. The results of the study show that if research and development budget will increase, there is a chance of increase in the ratio of return on assets. This is because of the positive relationship between the two variables. Thus the performance will also be increased.

The second hypothesis relates research and development budget with the ratio of return on equity. The results confirmed that if the R&D budget is increased, the ratio of return on equity will be high. It also concludes with an increase in firm performance.

The third hypothesis relates research and development budget with earnings per share of the firm. The study finds out that they have a positive correlation and firm performance will be increased if there is an increase in research and development budget.

7. Suggestions and Recommendations

- There should be increase in awareness regarding research and development
- More spending should be done on research and development activities
- Some sort of benefits should be given for encouragement to the firms who have contributed towards research

8. Limitations

- There was shortage of time
- The data collected was of normal time, it may differ in the times of financial crisis
- Only one sector was studied

9. Future Implications

- Research done on more than one sector
- A comparison can be made between developed and developing nations

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