

Impact of R&D Expenditure on Financial Performance: Jordanian Evidence

Abdel Razaq Farah Freihat* Raed Kanakriyah

Associate Professor of Accounting, Al-Balqa Applied University, Faculty of Business, School of Accounting,
Jordan-Al Salt, P.O. Box 7075 Al Salt 19117

Abstract

The purpose of this study is to investigate whether expenditure on research and development (R&D) has an impact on the performance of Jordanian pharmaceutical companies listed on the Amman Stock Exchange in Jordan. It is believed that there is no Jordanian study to date that has examined the impact of R&D expenditure on company performance. Therefore, this study contributes significantly to the limited literature on this topic in relation to developing countries. For this purpose, we used a quantitative approach to study data on the whole population, which consists of six firms, for the period 2006 to 2015. Data about R&D were collected over the period 2006-2010 and about performance over the period 2011-2015. We conducted an empirical study using simple linear regression analyses to discover the effect of R&D on company performance. We used return on assets (ROA), return on equity (ROE) and earnings per share (EPS) as a proxy to measure company performance, and to measure R&D expenditure we considered the following items: research, experiments, studies, and courses. This research found that there is a significant impact of R&D expenditure on company performance as measured by (ROA, ROE and EPS), which is consistent with the results for developed countries. Also R&D expenditure in the current year leads to future benefit such as larger market share, higher share price, better reputation in current and subsequent year's. These results imply that it is very important for companies to change their policy with respect to investment in R&D activities.

Keywords: R&D expenditure, company performance, pharmaceutical sector, Jordan

1. Introduction

Improving the performance of firms has many positive benefits for both the micro and the macro economy. Accordingly, the performance of companies is of great interest and has been widely considered from various perspectives in the literature. However, each company and sector has different characteristics that influence its performance. For instance, several researchers have proved that R&D activities have a positive influence on company performance (Rao and Coad, 2008; Sasidharan and Adamou, 2007; Lin and Yang, 2007; Autio et al., 2007; Schreyer, 2000; Mitchell and Banbury, 1995).

However, many such studies have not taken the temporal aspect into consideration. Therefore, in this research study we aim to reveal how the temporal structure of company characteristics can affect performance, particularly in relation to the influence of the cost of research and development (R&D) activities. Regarding the development of a company's performance in terms of its temporal structure, there are some characteristics that make the R&D activities an important topic worthy of investigation. First, such activities require a long time to affect the growth and effectiveness of a company in economic terms. The correct utilization of R&D activities should lead to improvements in coming years and consequently increase a company's sales and market share. Second, these activities should lead to a difference between tangible and intangible investment being observed. Usually, tangible expenses occur over a large timeframe compared with intangible expenses. In the literature, capital expenditure is regarded as a tangible expense as is R&D expenditure. The third point to make is that many companies emphasize that these activities indicator of complete stability. This implies that research-intensive companies are active companies, whereas those that do not partake in R&D activities are inactive. It is very important to fully understand the effects of R&D activities that occur within a short period of time and the long-term effects. Lastly, a company's characteristics might have an important influence on the temporal structure of its R&D activities.

In order to investigate the last point mentioned above, we analyzed the data on a sample of six firms operating in the Jordanian pharmaceutical sector that are listed on the Amman Stock Exchange. The data were derived from the Amman Stock Exchange for the period from 2006 to 2015. The collected data provide details on the firm names as well as information on R&D expenditure, performance, return on assets (ROA), return on equity (ROE) and earnings per share (EPS). We employed a regression analysis to determine whether company/firm performance is associated with specific factors. Especially, we studied the impact of R&D expenditure on firm performance and the corresponding time lag in terms of the benefit thereof.

1.2 Importance of this study

In the current environment of rapid technological change, R&D has proven to be an important factor in ensuring economic growth and performance. Indeed, R&D is one of the most-used measures of innovation and it is also

taken into account in performance assessment. Different studies have shown that investment in R&D is necessary source of productivity growth (see Griliches, 1981). Investment in R&D reduces production costs, facilitates the effective transformation of inputs into outputs and alters output characteristics, thereby enabling companies to launch new products in the marketplace (Bernstein and Mamuneas, 2004). Accordingly, the promotion of investment in R&D activities has become a basic requirement in most business organizations. Therefore, the importance of this study lies in its discovery of the extent of the impact of R&D expenditure on the performance of Jordanian pharmaceutical companies listed on the Amman Stock Exchange and also to illustrate the various aspects of the R&D process, we will discuss and clarify R&D definition, its objectives, importance, its main forms, and the methods used to measure its.

2. Literature Review

2.1 *The concept of research and development*

The concept of R&D can be broken down into two parts. Generally speaking, "research" is conducted in order to achieve a new scientific breakthrough and to increase knowledge and understanding, while "development" involves the translation of the results of research and other information into an improved design or plan for a new product or service, where the components, materials, systems, processes or devices are revised before starting commercial production (Kesio 2015; Zhao, 2002). It is very difficult to know whether a service or product in the research phase will actually lead to some future economic benefits. Consequently, international accounting standard IAS 38 Intangible Assets" specifies that all expenses incurred in the research phase should be recorded in the income statement as an expense when incurred, and should not be capitalized as an intangible asset, but an intangible asset resulting from the development maybe capitalized.

The importance of R&D stems from its ability to foster a company's economic growth as it leads to the innovation and application of new technologies that can enhance a company's competitive advantage and prolong its life and improve its position in the market. Which is considered the basis for generating new products, processes and services, particularly in the industry and technology sectors, It is a critical component in the process of innovation that can provide a company with a competitive advantage (Orian and Hall, 2006) enabling it to become a market leader.

2.2 *The definitions of research and development*

Research and development expenditure is the most important ongoing expenditure related to the expansion of information. Research and development includes experimental development, applied analysis and basic analysis (Seraina, 2008). In every country, the total domestic expenditure on R&D is defined as the total expenditure (current and capital) on R&D by all companies, institutes, and university and government laboratories. It is often measured in millions of US dollars (USD) (Shuling et al., 2012). Also, utter and Gitman (2012) describe R&D as the outcome of creative activities (such as those undertaken in an organization) over a certain period of time. One of the objectives of any organization is to achieve profits not only for the institution but also for shareholders, employees and consumers; it is not enough for the institution to devote all its energy to research or to rely on new technology while the rest of the institution is deficient and a severe decline. The fact that this may be more damaging to the institution than to the fact that the R&D concept makes spending is just as important expenditure on individuals, equipment and raw materials, therefore, the research and development projects needed by the foundation and its external environment.

2.3 *Previous studies*

Some researchers have discussed the relationship between R&D expenditure and company performances in developed countries. For instance, Oztürk and Zeren (2015) examined the impact of R&D expenditure on firm performance in the manufacturing industry in Turkey. Their results indicate that R&D expenditure has a positive effect as it increases sales of manufacturing companies. In another study, Geoffrey (2015), tested the impact of R&D expenditure on corporate financial performance and detected a high positive impact of R&D on the value of companies. In a similar vein, Yanni and Weiguo (2014), demonstrated that multiple types of R&D investment have an impact on the value of listed companies in China. Particularly, companies that depend on financed R&D investment always have a higher return and stock price.

Konak and Kendirli (2014), also investigated the impact of R&D expenditure on firm performance, but they found no evidence of a relationship between R&D and corporate performance. In contrast, Ayaydin and Karaaslan (2014), tried to discover the factors that affect financial performance and found that the intensity of R&D does have an effect on the performance of companies. Further, Antje (2014) examined the impact of R&D investment on sales growth and company growth and found that R&D activities have, on average, a positive impact on both. Also, Rao et al., (2013), attempted to ascertain the effect of R&D on company performance. They found that R&D investment has a significant effect on a company's operational performance, which is considered an important step in conducting innovative technology. Moreover, Jannine (2013) indicated that

technological capabilities positively affect the performance of R&D abroad. Jannine (2013), also found that R&D activities and dividends each have a positive impact on the value of companies, but with a different effect.

Seraina (2013) undertook comprehensive assessment of the results of R&D investment with the aim of producing a useful guide for decision-makers in companies and showed that R&D should be considered a strong indicator of high performance. On the other hand, Also, Kamran et al. (2011), found that the intensity of R&D influences company's market value positively, while Yuan and Michel (2010), revealed that R&D activities play an important role in improving the future financial performance and development of companies.

Nevertheless, Bouaziz (2016) found that there is no relationship between R&D and firm performance. Similarly, German Bet (2017) concluded that there is no relation between futures expected productivity, current productivity, and R&D investment (nonlinear relationship) the same result achieved by Jian and Zhenji (2016). However, Yanni Wang et al. (2016), indicated that firms that choose to invest in R&D have a higher market value, implying that companies should focus on creating policies that support long-term development.

Lastly, Zhaohui Zhu and Feng Huang (2012), found that investment in R&D is the main factor in achieving a competitive advantage; Selvarajah and Sheena (2017) detected a strong association between R&D and firm performance in the case of technology companies; and Serap and Kenan (2016) identified a significant relationship between R&D expenditure and operational profit.

Hence, from previous studies we discovered two important yet contradictory themes. The first is the existence of a strong relationship between R&D and performance and the other is that R&D does not have an impact on performance. Therefore, in this study we tried to ascertain the nature of this relationship in a different environment, namely that of Jordan, a developing country.

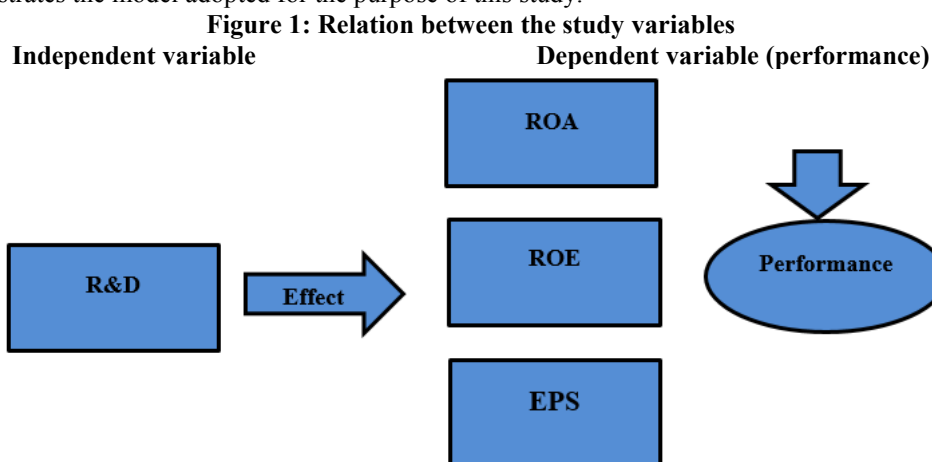
3. Research Design and Methodology

3.1 Data collection and sample

The main purpose of this study was to examine whether R&D expenditure has an impact on the performance of Jordanian pharmaceutical companies listed on the Amman Stock Exchange over time. As mentioned in the introduction the research and development activities require a long time to affect the growth and effectiveness of a company in economic terms. Consequently R&D activities should lead to improvements in coming years and consequently increase a company's sales and market share. Therefore to achieve the objective of the study and aligning with R&D nature, data about R&D were collected for the period from 2006 to 2010, then to investigate the impact of R&D on performance data about performance indicators were collected for the period 2011 to 2015. The study sample consists of all Jordanian pharmaceutical companies listed on the Amman Stock Exchange during ten years period (2006-2015). The final number of companies included in the analysis is 6 companies. Data about R&D were collected from the annual reports for the pharmaceutical companies listed on ASE, While the data necessary to compute firm performances collected from the ASE companies Guide and the firms performance were calculated using ROA, ROE, and EPS Formulas (Bouaziz 2016).

3.2 Research model

Figure 1 illustrates the model adopted for the purpose of this study.



3.3 Measurement of company performance

Most performance measurement tools assess

Company performance according to one or more of the following:

1. Effectiveness: The extent to which the process output (work product) complies with the requirements (are we doing the right things?);

2. Efficiency: The extent to which produce the product necessary with the lowest resources (are we doing things right?);
3. Quality: The degree to which a product or service is in line with customer wants and expectations.
4. Timeliness: Whether works is functioning correctly and in a timely manner. Criteria must be developed to determine what should be done in time for a given unit of work, and usually the standard is based on customer requirements.
5. Productivity: The value added by the process divided by the value of the labor and the capital used.
6. Safety: The measures taken to ensure the general health of the organization and the work environment of its employees.

However, some organizations may develop a customized instrument to measure performance in line with the organization's mission (Pugna and Boldeanu, 2014).

3.4 Variables and measures used

The independent variable is:

R&D expenditure: This covers the expenditure one efforts aimed at the development of products or services or at resolving current or future problems, where $R\&D\ expenditure = R\&D\ expenditure / Net\ sales$ (Konak and Kendirli, 2014; Wang, 2011). In order to measure the results of research and development activities, researchers use a number of measures as follow: R & D to sales ratio: It measures the total expenditure on research and development relative to Sales, Percentage of staff in R&D to total staff, or the results of the "R&D " activity achieved (number of patents, quantity of new product sales), spending on R&D

It should be noted that while collecting data of R&D expenditure, we noticed that some companies disclose their investment in R&D under the heading "R&D expenditure, "but others do not disclose this expenditure explicitly. Therefore, we calculated R&D expenditure for such companies on the basis of the following items: research, experiments, studies, courses expenses.

In this study, ROA, ROE and EPS are used as a proxy to measure company performance (the dependent variable):

- **ROA:** This is a ratio that is calculated by dividing net income by the average total assets, i.e. $ROA = Net\ Income / Average\ Total\ Assets$.
- **ROE:** This is the ratio of net profit to shareholders' equity (also called book value, net assets or net worth) which is expressed as a percentage and calculated as $ROE = Annual\ Net\ Income / Average\ Stockholders'\ Equity$.
- **EPS:** This refers to the portion of a company's profit allocated to each outstanding share of common stock. The EPS serves as an indicator of a company's profitability, and is calculated as $EPS = Net\ income - preferred\ Dividends / Average\ Common\ Shares$.

These are discussed in turn below.

3.4.1 Return on assets

The ROA is defined as the proportion of annual net income over the average total assets of the business during the financial year. This measure used to determine the level of business efficiency when using its assets to generate net income (Zutter and Gitman, 2012). The formula to calculate ROA is:

$ROA = Annual\ Net\ Income / Average\ Total\ Asset$, where net income refers to income after payment of income tax.

This percentage is calculated on the basis of net profit after tax divided by the total assets. This process determines the operational efficiency of the company depending on the profits of the company of total assets. The calculation of the average of the assets is made by dividing the total assets at the beginning and at the end of the financial year (Kabajehet al., 2012).

The ROA represents the number of cents obtained from each dollar of assets. Therefore, a higher ROA value indicates that a company is more profitable. This ratio is often used to compare the performance of companies operating in the same industry. This is because companies in some industries are not interested in assets, for example: They need for expensive equipment and factories to achieve income compared with other companies. It is natural that the ROA is lower than other companies, which are not interested in assets. An increase in the ROA over time shows that the profitability of accompany is increasing, whereas a decrease means that profitability is deteriorating (Kabajehet al., 2012).

3.4.2 Return on equity

The ROE is a percentage that is defined as the ratio of net profit to the equity of shareholders (also known as net assets, net worth or book value), Brigham and Besley (2008) state that ROE is a measure of how a company can benefit from the funds of shareholders in order to obtain profit.

Also, ROE has been described as the financial ratio that determines the returns that have been achieved on value of stockholders'/shareholders' equity, which describes what the company achieved over the years from shares issued plus the earnings retained by the company, (Zutter and Gitman, 2012).

The formula used to calculate ROE is:

$ROE = \text{Annual Net Income} / \text{Average Stockholders' Equity}$,

Where net income refers to income after payment of income tax

The ROE is considered as an important measure of the profitability of a company. A higher ROE value means that the company is performing effectively in terms of generating income from new investment. The return on equity measures the company's profit to its total shareholders' equity. This ratio is calculated by dividing the net profit of the company by the total shareholders' equity. This measure shows the profit return on the amounts invested by the shareholders and demonstrates the efficiency of the company in generating profits from each unit of equity. This is an important indicator of profitability for investors as it shows the return on equity. This ratio gives a clear view for the investor in shares to compare between companies. The lower value of this percentage which mean a bad indicator of the company's performance, and when this ratio become higher that's mean a better using of company's wealth (Zutter and Gitman, 2012).

3.4.3 Earnings per share

The EPS is the part of the profit of the company that is assigned to each shares suspended in securities. The profitability of the arrow is considered as an indicator of the profitability of the company (Zutter and Gitman, 2012). The EPS is calculated as:

$EPS = (\text{Net Income} - \text{Preferred Dividends}) / \text{Average Common Shares}$.

When calculating the EPS, it is better in terms of accuracy to use the weighted average of the quantity of existing stocks throughout the report amount because the quantity of existing stocks will modify with the passage of time. However, the EPS is usually considered to be the most significant variable in determining company's worth, the profit per share represents its share of the net profit, in other words the net profit of the company divided by the number of shares. Companies usually distribute a portion of their net profit to shareholders or equity holders by a certain percentage representing the share profits.

The stock market price is usually compared to the profit per share, which is known as the "profit repeater." Which consider the most important criterion used to measure the extent of the price of a stock to any company in the market, so as to motivate people to invest in it in the hope to making profits, to calculate the price-to-earnings ratio (P / E), the market price of the company's share is divided by its share price It is an important indicator for making an investment decision in a particular company because it indicates how long it is possible to return the money invested in a certain share of a company. It is important that investors in a company are aware that the manipulation of profits might have an effect on the quantity of profits. (Zutter and Gitman, 2012).

3.5 Data analysis techniques

In this study we conducting a normal distribution test to verify the appropriateness of data for study, and for the purpose of hypotheses testing, one statistical analysis technique was used, namely simple linear regression analysis.

3.6 Study hypotheses

Three null hypotheses were formulated and tested in this study:

H01: R&D does not have an impact on the performance of Jordanian pharmaceutical companies listed on the Amman Stock Exchange, as measured by ROA.

H02: R&D does not have an impact on the performance of Jordanian pharmaceutical companies listed on the Amman Stock Exchange, as measured by ROE.

H03: R&D does not have an impact on the performance of Jordanian pharmaceutical companies listed on the Amman Stock Exchange, as measured by EPS.

4. Data Analysis and Results of Hypothesis Testing

4.1 Data analysis

Based on the methodology outlined in the previous section, we analyzed the gathered data to determine the influence of R&D expenditure on the performance of Jordanian pharmaceutical companies listed on the Amman Stock Exchange, for the period 2006–2015 and tested the above-mentioned three hypotheses.

First, we provide details on the verification of the validity of the data for further statistical analysis. Lastly, we explain how the distribution of the data was determined so that, if necessary, we could apply the required treatment to allow us to rely on the results to test the hypotheses.

4.1.1 Validity of the data for statistical analysis

Before testing the hypotheses, we identified the characteristics of the data in order to verify the appropriateness it for study. We did this by conducting a normal distribution test, which necessary for applying linear regression assumptions on the distribution of views regarding dependent and independent variables have normal distribution, The results of the test showed that the data are suitable for the application of regression analysis and

correlation, which will be applied in this study The following figures, which are in the form of histograms show the distribution of the variables of the study.

Figure 2: Normal distribution of ROA
Normal P-P Plot of Regression Standardized Residual

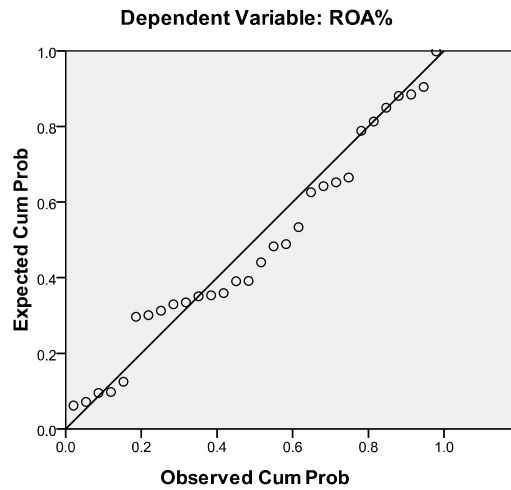


Figure 3: Normal distribution of ROE
Normal P-P Plot of Regression Standardized Residual

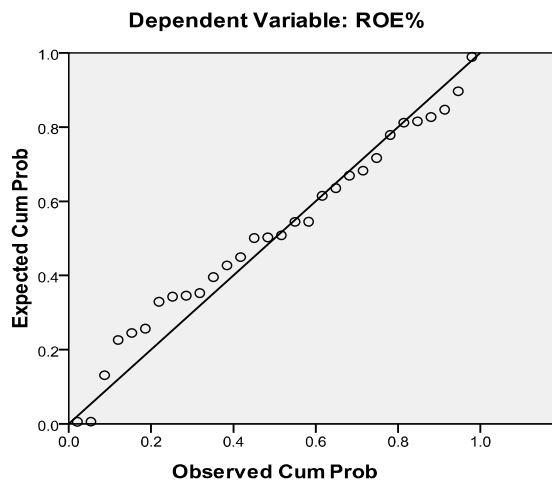


Figure 4: Normal distribution of EPS
Normal P-P Plot of Regression Standardized Residual

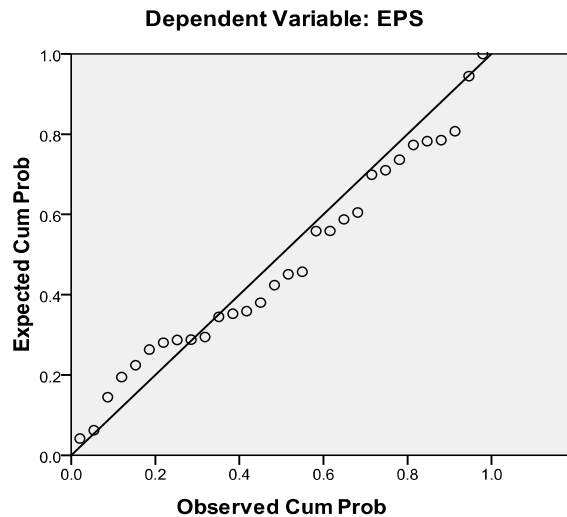
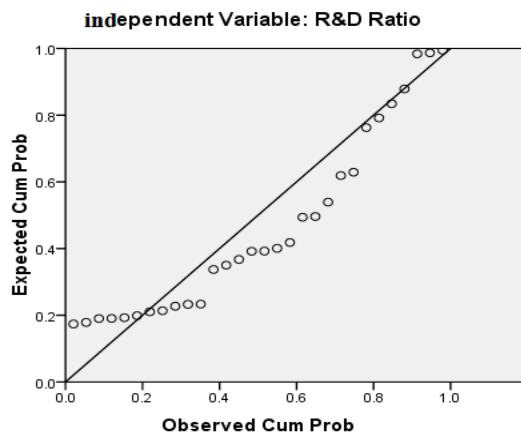


Figure 2 show that the dependent variable ROA has a normal distribution, while Figures 3 and 4 shows the same for ROE and EPS. Therefore these variables can be used in parametric tests to discover the impact of R&D expenditure on the performance of Jordanian pharmaceutical companies listed on the Amman Stock Exchange.

We also tested the distribution of the independent variable of the study, namely R&D expenditure. The result is illustrated in Figure 5.

Figure 5: Normal distribution of R&D

Normal P-P Plot of Regression Standardized Residual



As can be seen from the figure, the independent variable is also distributed normally.

Based on previous results, it is noted that all the results and statistical tests has indicated that the data that follow a normal distribution, which shows the subordination of the study data the normal distribution. Therefore, we were able to proceed to the hypothesis testing stage of the study.

4.2 Results of hypothesis testing

We applied the simple linear regression method to accept or reject the research hypotheses. We adopted the value to accept or reject hypotheses, where the P-value should be <0.05 to reject the null hypothesis and accept the alternative hypothesis. We also relied on the value of the coefficient of determination (adjusted R square) to explain the degree of accuracy in interpreting the dependent variable through each of the independent variables. Table (1) provides the results of hypothesis testing.

Table 1: Simple Regression Test of the Impact of R&D on Performance

H01	R&D does not have an impact on the performance of Jordanian pharmaceutical companies listed on the Amman Stock Exchange. as measured by ROA					Reject H ₀
	P-Value	F Model	Coefficient	R Square	Adjusted R Square	
	0.000	6.245	0.434	0.148	0.174	
H02	R&D does not have an impact on the performance of Jordanian pharmaceutical companies listed on the Amman Stock Exchange. as measured by ROE					Reject H ₀
	P-Value	F Model	Coefficient	R Square	Adjusted R Square	
	0.012	6.506	0.396	0.156	0.062	
H03	R&D does not have an impact on the performance of Jordanian pharmaceutical companies listed on the Amman Stock Exchange. as measured by EPS					Reject H ₀
	P-Value	F Model	Coefficient	R Square	Adjusted R Square	
	0.047	4.311	0.105	0.011	0.031	

First, we discuss the results with respect to the impact of the independent variable (R&D) on company performance as measured by ROA. Table (1) shows that coefficient value is 0.434, which indicates that there is a positive correlation between the dependent and independent variables. Also, note that the value of the adjusted R square is 0.084, which indicates the degree of accuracy in interpreting the dependent variable through ROA. Further, the P-value is 0.000, which is <0.05. According to the decision rule, which states that null hypothesis should be rejected if the value of P is <0.05, this means that R&D has an impact on performance as measured by ROA. Therefore the null hypothesis (H01) can be rejected and the alternative hypothesis, which states: "R&D has an impact on the performance of Jordanian pharmaceutical companies listed on the Amman Stock Exchange as measured by ROA," can be accepted.

As for the impact of the independent variable (R&D) on company performance as measured by ROE, the results in Table (1) show that the value of the coefficient is 0.396, which denotes a positive correlation between the dependent and independent variables. Also, the value of the adjusted R square is 0.156, which indicates the degree of accuracy in interpreting the dependent variable through ROE. In addition, the P-value is 0.012, i.e. it is <0.05. Therefore the null hypothesis (H02) can be rejected and we can accept the alternative hypothesis, namely that: "R&D has an impact on the performance of Jordanian pharmaceutical companies listed on the Amman Stock Exchange as measured by ROE," can be accepted.

Finally, as regards the impact of the independent variable (R&D) on performance as measured by EPS, Table (1) illustrates that the coefficient value is 0.105, which means that there is a positive correlation between the dependent and independent variables. Further, the value of the adjusted R square is 0.093, which indicates the degree of accuracy in interpreting the dependent variable through EPS. Finally, the P-value is 0.047, which again is <0.05. This means that R&D has an impact on performance as measured by EPS and, consequently, the null hypothesis (H03) can be rejected and the alternative, which states that: "R&D has an impact on the performance of Jordanian pharmaceutical companies listed on the Amman Stock Exchange as measured by EPS," can be accepted.

5. Discussion and Recommendations

5.1 Discussion of the results

From the above results it is clear that there is strong, positive relationship between R&D and the performance of Jordanian pharmaceutical companies listed on the Amman Stock Exchange, as measured by ROA, consistent with results of (Yanni Wang et al. 2016; Serap and Kenan 2016; Geoffrey 2015; Yanni and Weiguo 2014; Jannine 2013; Seraina 2013; Kamran et al. 2011; Yuan and Michel 2010). We believe that the reason for this may be due to the nature of the companies under study. Pharmaceutical manufacturing is classed as an intensive industry and it requires a lot of capital. Large pharmaceutical companies need to invest in a lot of projects to produce innovations. Through using their assets effectively, for instance in R&D activities, this then enables them to gain a high market share, which is reflected in sales and which in turn increases the ROA. One of the main aims of companies in this sector is to improve the people's lives and such companies are committed to persevering to make new discoveries and innovations in order to produce reliable products and services. Thus there is a need to focus on spending on R&D activities, technological solutions and products and services that will guarantee, facilitate and improve people's life around the world and that will also optimize the utilization of the company's resources. It has been shown that this type of expenditure can lead to increased sales and reduce resource wastage, which is reflected in increased profits, and hence improved ROA.

As regards the impact of R&D as measured by ROE, the results showed that R&D has a strong, positive impact on company performance, exactly agree with results of (Serap and Kenan 2016; Yanni Wang et al. 2016; Oztürk and Zeren 2015; Geoffrey 2015; Yanni and Weiguo 2014; Antje 2014; Rao et al., 2013; Jannine 2013; Seraina 2013) results. This effect may have occurred because R&D expenditure is recognized in the income

statement as an expense to generate profit, so this expenditure has a positive impact on net profit in the same period, which is reflected in the rate of the ROE for the same period. The marginal productivity of capital and labor is also affected by technical growth (R&D). One of the positive effects of technical development is that the shortage of labor or capital may be compensated for by technical development. In addition, inter-economic relations between different sectors of the economy are affected by available technology, although the various sectors do not benefit equally from technical developments. Total gross domestic product may grow continuously if there is technical development and no growth in capital or labor increases. Therefore, the adoption of economic growth on labor and capital alone will not bring about the sustained growth of the economy due to the decline in marginal productivity. Thus, investment in technology, which is part of R&D expenditure, must take place in order to maintain or increase the rate of return on capital and labor.

Lastly, R&D has a strong, positive impact on the performance of Jordanian pharmaceutical companies, as measured by EPS. We would suggest that the reason for this result is that investment in R&D generates future benefits, and these benefits have a positive impact on net profit for the same period, which is reflected in the rate of return per share for the same period. One of the main strategies of pharmaceutical companies is targeting investment in R&D to achieve future not short-term goals. It should be noted that long-term investment in R&D in this sector is not only crucial for the health of consumers, it is also important for the companies themselves as it leads to higher profits and a higher stock price. This outcome been seen in the case of companies in other sectors, such as Samsung Electronics, Volkswagen Group, Alphabet and Intel. Simply put, R&D activities create value for companies, this result consistent with (Yanni Wang et al. 2016; Serap and Kenan 2016; Geoffrey 2015; Başgoze and Sayin 2013; Seraina 2013; Jannine 2013; Kamran et al. 2011; Yuan and Michel 2010). Causing a competitive advantage for the company, as a differentiation strategy which are hard to be easily imitated by the competitors and that has a positive effect on market stock price. This result is consistent with the study by Mehdi and Mohammad (2014) on the effect of R&D expenditure on the profitability and stock market value of firms conducted in Iran, a country that is considered to be broadly similar to Jordan.

5.2 Recommendations

In light of the findings of this study, we recommend that:

1. Companies clarify the value of their investment in R&D by reporting it as a separate item in the income statement. This is because R&D expenditure plays an important role in achieving and sustaining competitive advantage.
2. Regulatory bodies for the pharmaceutical sector and other policy-makers consider formulating laws and regulations to govern the process of spending on R&D by the companies operating in that sector. This is because of the key contribution that R&D makes in this sensitive sector and in achieving competitive advantage at the local and global level.
3. Companies be made aware of the importance of investing in R&D. This is because R&D expenditure has a direct impact on the improvement and development of production lines and methods of work, and there is a beneficial payoff to be gained, if not in the same period, then in the near future.

To conclude, investment in R&D is one of the most important drivers of company growth and the rationalization of strategic decisions to achieve the desired economic stability. Investment in R&D at all technical and social levels can lead to an increase in the level of efficiency in companies and thence the wider economy. It can also result in improvements in productivity, which can in turn help companies to avoid problems that may arise from poor performance or irrational decisions. It also supports the decision-maker in the necessary studies that contribute to clarity of vision, in light of local and international changes. Research and development is fundamental to global growth, excellence and global leadership, as several studies have shown a link between economic growth and R&D expenditure,

References

- Adamou, A. and Sasidharan, S. (2007), "The impact of R&D and FDI on firm growth in emerging-developing countries: evidence from Indian manufacturing industries", *Working Paper 37/2008*, Madras School of Economics, Chennai.
- Antje, B. (2014), "The role of R&D investments in highly R&D-based firms", *Studies in Economics and Finance*, Vol. 31, Iss. 1, Pp. 3 – 45.
- Autio, E., Kronlund, M. and Kovalainen, A. (2007), High-Growth SME Support Initiatives in Nine Countries: Analysis, Categorization, and Recommendations, Report Prepared for the Finnish Ministry of Trade and Industry, Edita Publishing Ltd, Helsinki.
- Ayaydin, H. and Karaaslan, I. (2014), the Effect of Research and Development Investment on Firms' Financial Performance: Evidence from Manufacturing Firms in Turkey, *The Journal of Knowledge Economy & Knowledge Management*, Vol. IX, No. 1.
- Banbury, C. and Mitchell, W. (1995), "The effect of introducing important incremental innovations on market

- share and business survival”, *Strategic Management Journal*, Vol. 16, pp. 161-182.
- Besley, S., & Brigham, E. F. (2008). *Essentials of managerial finance*. Thomson South-Western.
- Bernstein, J I and Mamuneas, T P (2004) ‘R&D depreciation, stocks, user costs and productivity growth for US knowledge intensive industries.
- Boldeanu, N and Pugna, I, (2014), The analysis of the influence factors affecting the performance of pharmaceutical companies, *Theoretical and Applied Economics*, Vol.(XXI), No (7).
- Coad, A. and Rao, R. (2008), “Innovation and firm growth in high-tech sectors: a quintile regression approach”, *Research Policy*, Vol. 37 No. 4, pp. 633-648.
- Donald E. Kieso, Jerry J. Weygandt, Terry D. Warfield.(2015), "*Intermediate Accounting: IFRS Edition*, 2nd Edition"
- Emmanuel, A and Ovayioza, S, (2015), Effects of Debt usage on the Performance of Small Scale Manufacturing Firms in Kogi State of Nigeria, *International Journal of Public Administration and Management Research*, Vol 2, No 5.
- Geoffrey, A, (2015), Impact of R&D Expenses and Corporate Financial Performance, *Journal of Accounting and Finance*, Vol. 15, No. 7.
- Germán Bet. (2017), the Productivity Effects of Corporate Diversification, Northwestern University, Job Market Paper
- Gitman and Chad J. Zutter, (2012), "Principles of Managerial Finance.
- Griliches, Z (1981) ‘R&D patents and productivity’, NBER, The University of Chicago Press.
- Guellec D., Ioannidis E., (1997) »Causes of fluctuation in R&D expenditures a quantitative analysis. « *OCED Economic Studies II*, no. 29.
- Hall, B.H. and Oriani, R. (2006), “Dose the market value R&D investment by European firms? Evidence from a panel of manufacturing: firms in France, Germany, and Italy”, *International Journal of Industrial Organization*, Vol. 24 No. 5, pp. 971-993.
- IAS 38, (1998) Intangible Assets was issued by the International Accounting Standards Committee in September
- Jannine, H, (2013), "R&D and dividend payments as determinants of corporate value in the UK", *International Journal of Managerial Finance*, Vol. 4, Iss. 1, Pp. 76 – 91.
- Jian and Zhenji , (2016), Research on the Impact of R&D Investment on Firm Performance in China's Internet of Things Industry, *Journal of Advanced Management Science* Vol. 4, No. 2
- Jungeun, W, and Kim, O, (2014), "Factors Affecting on the Performance of Overseas R&D", *Asian Journal on Quality*, Vol. 10, Iss. 2, Pp. 43 – 56.
- Kabajeh, M A., Al Nu’aimat, M., and Dahmash, N., (2012), “The Relationship between the ROA, ROE and ROI Ratios with Jordanian Insurance Public Companies Market Share Prices”, *International Journal of Humanities and Social Science*, Vol. 2, No. 11, PP 115-120.
- Kamran, A, John, H, and Elisabeth, T, (2011), "R&D profitability, intensity and market-to-book: evidence from Australia", *Accounting Research Journal*, Vol. 24 Iss. 2 Pp. 150 – 177.
- Konak, F, and Kendirli, S, (2014), Impact of R&D Expenses on Firm Performance: Empirical Evidence from the BIST Information Technology Index, *International Journal of Education and Research*, Vol. 2, No. 3, Pp 5-18.
- Mehdi Elhaei Sahar and Mohammad Reza Yalali, (2014) Effect of R&D Spending on Firm Profitability and Stock Market Value, *Management and Administrative Sciences Review*, Volume: 3, Issue: 4 (Special Issue), Pages: 657-664
- Merkley, (2010), more than Numbers: R&D-related Disclosure and Firm Performance, *Multinational Business Review*, Vol. 14, Iss. 2, Pp. 61 – 88.
- National Science Foundation (2010), “NSF History: Nifty Fifty
- N. Serap Vurur and Kenan Ilarslan, (2016), Analysis of the Relationship between R & D Expenditure and Profitability: A Sample Application from BIST, *Journal of Multidisciplinary Developments*. 1(1), 103-112
- Öztürk and Zeren, (2015), the Impact of R&D Expenditure on Firm Performance in Manufacturing Industry: Further Evidence from Turkey,, *Int.J.Eco. Res*, Vol. 6, No. 2.
- Pinar Başgoze and, H. Cem Sayin, (2013), The Effect Of R&D Expenditure (Investments) On Firm Value: Case Of Istanbul Stock Exchange, *Journal of Business, Economics & Finance*, Vol.2 (3)
- Rao, J, Yu, Y, and Cao, Y, (2013), the effect that R&D has on company performance: comparative analysis based on listed companies of technique intensive industry in China and Japan, *International Journal of Education and Research*, Vol. 1, No. 4, Pp 1-8.
- Schreyer, P. (2000), “High growth firms and employment”, STI Working Papers, DSTI/DOC (2000)3, OECD, Paris.
- Seraina C, (2013), "R&D expenses and firm valuation: a literature review", *International Journal of Accounting & Information Management*, Vol. 16 Iss. 1, Pp. 5 – 24.
- Selvarajah Krishnan and Sheena Sara Suresh Philip. (2016), "Innovation Investment: An Empirical Study of

- Technology Public Listed Companies in Malaysia" *Scientific & Academic Publishing*,7(1): 15-24. doi: doi:10.5923/j.economics.20170701.02
- Shuling, C, Picheng, L, and Asokan, A, (2012), The effect of R&D tax credit on innovation: A life cycle analysis. *Innovation: Management, Policy & Practice* 14, 510-523.
- Sung, C. Bae Bell J. C. Park Xiaohong Wang, (2012),"Multinationality, R&D Intensity, and Firm Performance: Evidence from U.S. Manufacturing Firms", *Multinational Business Review*, Vol. 16, Iss. 1, Pp. 53 – 78.
- SYRS.(2003). Statistical Yearbook of the Republic of Slovenia.Teague, P.E. "Surprise, innovation is key to success!"*Design News*, April 15, 1999: 15
- Wang, C, (2011), Clarifying the Effects of R&D on Performance: Evidence from the High Technology Industries,*Asia Pacific Management Review*, Vol. 16, No. 1.
- Xu, B., Magnan, M. L. and Andre, P. E. (2007) The stock market valuation of R&D information in biotech firms, *Contemporary Accounting Research*, 24, 1291- 1318.
- Yanni, W, Weiguo, F, (2014),"R&D reporting methods and firm value: evidence from China", *Chinese Management Studies*, Vol. 8, Iss. 3, Pp. 375 – 396.
- Yuan, D, and Michel, T, (2010),"R&D productivity: an exploratory international study", *Review of Accounting and Finance*, Vol. 6, Iss. 1, Pp. 86 – 101.
- Zied, Bouaziz, (2016) The Impact of R&D Expenses on Firm Performance: Empirical Witness from the Bist Technology Index, *Journal of Business Theory and Practice*, Vol. 4, No. 1
- Zhao, R. (2002) Relative value relevance of R&D reporting: An international comparison, *Journal of International Financial Management and Accounting*, 13, 153-174.
- Z. Zhu and F. Huang.(2012), "The Effect of R&D Investment on Firms' Financial Performance: Evidence from the Chinese Listed IT Firms," *Modern Economy*, Vol. 3 No. 8, pp. 915-919. doi: 10.4236/me.2012.38114.
- Yang, Ch. and Lin, Ch. (2007), "Developing employment effects of innovations: micro econometric evidence from Taiwan", *The Developing Economies*, Vol. 46, pp. 109-134.