

## CHAPTER II

### THEORETICAL REVIEWS

#### A. Literature Review

##### 1. Research and Development (R&D)

Under paragraph 8 of Indonesian Accounting Standard (PSAK) No.19: *Intangible Asset*, research can be defined as original and planned investigation undertaken with the prospect of gaining new scientific or technical knowledge and understanding. Development can be defined as the application of research findings or other knowledge into a plan or design for the production of materials, devices, products, processes, systems or services prior to the commencement of commercial production or consumption.

Although the nature of activities covered in the research and development in general can be understood, but in practice, it is difficult to identify them specifically. Although the definition above can help the company, often the identification of research and development activities depends on the type of business, how business is organized and the types of projects undertaken.

Examples of research activities are:

- a) Laboratory research that aim to discover new knowledge;

- b) Further research on the possibility of applying the research results or other knowledge;
- c) Research to find alternative products and processes; and
- d) The formulation and design of possible alternatives to products and processes new or enhanced.

Examples of development activities are:

- a) Design, construction, and testing of prototypes and models prior to production;
- b) Equipment design, mold, and staining involving new technology;
- c) Design, construction, and operation of pilot scale plant is not economical for commercial production, and
- d) Modifications of design, construction testing of alternative raw materials, equipment, product, processes systems, or services those are new or repaired.

The search for new deposits of natural resources is important to companies in extractive industries. These industries include oil, natural gas, metals, coal, and nonmetallic minerals (Wild et al, 2007).

For the purpose of this study, exploration & development in Mining, Oil, & Gas Industry is treated as R&D expenditure as their definition is similar to R&D. Accounting for the mining industry is stated in PSAK 33 and accounting for oil and gas industry which is stated in PSAK 29. According to PSAK 33 and PSAK 29 Research and Development, activities showed on the following table.

**Table 1**  
**Research and Development Activities on Mining Sector Company**

<b>Activity</b>	<b>PSAK 33 Mining Industry</b>	<b>PSAK 29 Oil and gas Industry</b>
Research	<p>Description of Activities</p> <ul style="list-style-type: none"> <li>- General Survey (general geological or geophysical survey conducted on land, on sea and/or from the air) for the purpose of drawing general geological maps or verifying the existence of mineral resources.</li> <li>- Permission and Administrative</li> <li>- Geology and Geophysical analyses.</li> </ul>	<p>Exploration activities include</p> <ul style="list-style-type: none"> <li>- obtaining a license to start the exploration activity in specific areas;</li> <li>- performing field geological and geophysical survey activities;</li> <li>- interpreting data obtained from survey;</li> <li>- obtaining and building fixed assets related to the above activities; and</li> </ul>
Development	<p>The development and construction phase consists of:</p> <ul style="list-style-type: none"> <li>- administrative and technical permission to mine and to support the implementation of development and construction activities, and;</li> <li>- technical activities include planning activities and stripping activities to gain access to the mineral reserves as part of the preparation for production activities</li> </ul>	<p>Reserve development includes the following activities:</p> <ul style="list-style-type: none"> <li>- procurement of equipment and inventory;</li> <li>- mining, distribution, collection and storage of oil and gas; and</li> <li>- procurement of secondary recovery system.</li> </ul>

## 2. Accounting for R&D

Research and Development Costs should include all costs directly attributable to research and development activities or that can allocate according to a reasonable basis in the activity. The costs associated with R&D activities and the accounting treatments accorded them are as follows (Warfield et al, 2010):

- 1) *Materials, equipment, and facilities.* Expense the entire costs, unless the items have alternative future uses (in other R&D projects or otherwise). If there are alternative future uses, carry the items as inventory and allocate as consumed, or capitalize and depreciate as used.
- 2) *Personnel.* Expense as incurred salaries, wages, and other related costs of personnel engaged in R&D.
- 3) *Purchased Intangibles.* Recognize and measure at fair value. After initial recognition, account for in accordance with their nature (as neither limited-life nor indefinite-life intangibles).
- 4) *Contract Services.* Expense the costs of services performed by others in connection with the R&D as incurred.
- 5) *Indirect Costs.* Include a reasonable allocation of indirect costs in R&D costs, except for general and administrative costs, which must be clearly related in order to be included in R&D.

Accounting for R&D in Indonesia is under the rule of Indonesian Accounting Standard (PSAK) No. 19; Research and Development Cost. Under this rule, in financial statement, R&D expenditures shall recognize as an expense in a period incurred. Research and Development expense consists of all expense that is directly attributable to R&D activities or that can allocated on a reasonable and consistent basis to such activities. Cost of research should recognize as an expense in the period incurred and should not recognized as an asset in subsequent periods. Costs related to a project recognized as an expense in the period incurred unless they met the criteria for recognition as intangible assets if it fulfills the following criteria:

- (a) The product or process clearly defined and the costs attributable to the cost of the product or process identified separately and measured reliable;
- (b) The technical feasibility of the product or process can be demonstrated;
- (c) The company intends to produce and market, or use the product or process;
- (d) The existence of a market for the product or process, or if you want to use their own usefulness to the company can be given.
- (e) There are enough resources, or availability can be demonstrated, to complete the project and market or use the product or process.

There are three difficulties arise in accounting for R&D expenditures:

- (1) High uncertainty of ultimate benefits deriving from R&D activities,

- (2) An often significant lapse of time between initiation of R&D activities and determination of their success, and
- (3) Evaluation problems due to the intangible nature of most R&D activities (Wild et al, 2007).

Because of these latter uncertainties, the FASB has simplified the accounting practice in this area. Companies must expense all research and development cost when incurred (Warfield et al, 2010). Only costs of materials, equipment, and facilities having *alternative future uses* (in R&D projects or otherwise) are capitalized as tangible assets (Wild et al, 2007).

### **3. Accounting for Extractive Industry**

The cost of research and development activities are unique to companies in the extractive industry (ie, search, acquisition of mineral rights, exploration, drilling, mining and minerals related development).

Under IFRS 6: *Exploration for and Evaluation of Mineral Resources* paragraph 9, an entity shall determine an accounting policy specifying which expenditures are recognized as exploration and evaluation assets and apply the policy consistently. In making this determination, an entity considers the degree to which the expenditure can be associated with finding specific mineral resources. The following are examples of expenditures that might be included in the initial measurement of exploration and evaluation assets:

- (a) acquisition of rights to explore;

- (b) topographical, geological, geochemical and geophysical studies;
- (c) exploratory drilling;
- (d) trenching;
- (e) sampling; and
- (f) activities in relation to evaluating the technical feasibility and commercial viability of extracting a mineral resource.

Under paragraph 8 IFRS 6, exploration and evaluation assets shall be measured at costs. While under paragraph 10 IFRS 6, expenditures related to the development of mineral resources shall not be recognized as exploration and evaluation assets. The *Framework* and IAS 38 *Intangible Assets* provide guidance on the recognition of assets arising from development.

Exploration and evaluation expenditure relates to costs incurred on the exploration and evaluation of potential mineral reserves and resources and includes costs such as exploratory drilling and sample testing and the costs of pre-feasibility studies. Exploration and evaluation expenditure for each area of interest, other than that acquired from the purchase of another mining company, is carried forward as an asset provided that one of the following condition is met:

- Such costs are expected to be recouped in full through successful development and exploration of the area of interest or alternatively, by its sale; or

- Exploration and evaluation activities in the area of interest have not yet reached a stage which permits a reasonable assessment of the existence or otherwise of economically recoverable reserves, and active and significant operations in relation to the area are continuing, or planned for the future.

***Classification of exploration and evaluation assets under paragraph 15 and 16 of IFRS 6***

An entity shall classify exploration and evaluation assets as tangible or intangible according to the nature of the assets acquired and apply the classification consistently. Some exploration and evaluation assets are treated as intangible (drilling rights), whereas others are tangible (eg vehicles and drilling rigs). To the extent that a tangible asset is consumed in developing an intangible asset, the amount reflecting that consumption is part of the cost of the intangible asset. However, using a tangible asset to develop an intangible asset does not change a tangible asset into an intangible asset.

An exploration and evaluation asset shall no longer be classified as such when the technical feasibility and commercial viability of extracting a mineral resource are demonstrable. Exploration and evaluation assets shall be assessed for impairment, and any impairment loss recognized, before reclassification.



As a form of convergence of IFRS in Indonesia, then drafted PSAK 64 adopting IFRS 6, which regulates the activity if the exploration for and evaluation of mineral resources. Accordance with IFRS 6 in PSAK 64 exploration and evaluation assets shall be measured at costs. Then, expenditures related to the development of mineral resources shall not be recognized as exploration and evaluation assets. The *Framework* and PSAK 19 *Intangible Assets* provide guidance on the recognition of assets arising from development.

According to Indonesia Accounting Standard, accounting for the mining industry is stated in PSAK 33 and accounting for oil and gas industry which is stated in PSAK 29. According to PSAK 33 and PSAK 29 Research and Development accounting treatment showed on the following table.

**Table 2**  
**Accounting Treatment for Research and Development Expenditure on Mining Sector Company**

<b>Expenditure</b>	<b>PSAK 33 Mining Industry</b>	<b>PSAK 29 Oil and gas Industry</b>
Research	Costs incurred in connection with exploration and evaluation activities in an Area of Interest should be expensed in the current period, except when one of the following conditions is met, then the costs can be deferred:	Exploration activities cover the survey on topography, geology and geophysical conditions, exploration well drilling and stratigraphical test well drilling.

Expenditure	PSAK 33 Mining Industry	PSAK 29 Oil and gas Industry
Research (cont')	<p>(a) permission to conduct exploration in the Area of Interest is still valid and exploration activities have not been completed at the balance sheet date, as well as significant exploration activities in the Area of Interest are still in progress, which up to this point no determination can be made as to whether the exploration will result in the discovery of proven reserves; or (b) permission to conduct mining activities in the Area of Interest is still valid and it can be proven that the exploration costs incurred will be recovered through the production of Proven Reserves or through transferring the mining rights to another party.</p>	<p>Exploration expenses can be accounted for using either the full cost or successful efforts method.</p> <p>According to the full cost method, all expenses are capitalized as part of the oil and gas assets as a country cost center.</p> <p>According to the successful efforts method, all exploration expenses except the expenses allocated to exploration wells which have proven reserves, are treated as period expense. Moreover, except land with economic value, exploration well drilling expenses, both intangible and tangible, are capitalized when the proven reserves are found, or treated as expenses if reserves are not found.</p>

<b>Expenditure</b>	<b>PSAK 33 Mining Industry</b>	<b>PSAK 29 Oil and gas Industry</b>
Development	Costs incurred in connection with development activities in a certain Area of Interest, either directly or indirectly, are deferred as Deferred Development Costs.	<p>Development activities include the procurement of equipment and facilities for extracting, drifting, gathering and storing the oil and gas, and provision of repaired secondary recovery systems.</p> <p>Under either the full cost method or successful efforts method, all development expenses are capitalized as a part of the oil and gas assets including well assets and equipment</p>

The variety of acceptable methods of treating exploration and development costs in extractive industries hampers our comparison of results across companies. Accounting this industry continues to exhibit diversity. The two methods in common use, and the variations on these methods, can yield significantly different results. Successful efforts accounting requires a direct relation between costs incurred and specific reserves discovered before these exploration and development costs are capitalized. In contrast, full-cost accounting permits companies to label unsuccessful exploration and development activities as assets (Warfield et al, 2010).

#### 4. R&D Intensity

The R&D on a company is usually measured by R&D intensity, where the R&D expenditures of the companies are represented as a proportion of some measure of firm size.

R&D intensity in this study is measured by the ratio of R&D expenditure relative to total assets. Xu and Zhang (2004) used total assets as the denominator as it reflects innovation better. There are other possibilities of normalization in defining the R&D intensity. For example, besides using total assets, Chan et al (2001) also use market value of equity, sales or earnings as a denominator.

According to Xu and Zhang (2004), using total assets, however, seems more appropriate for the following reasons. First, the decision on how much will be spent on R&D should be more or less independent of how funds are obtained. This rationale is basically the same as the one that sets apart the investment decisions and financing decisions. The R&D intensity should not depend on capital structure too much, which gives R&D expenditure relative to book value equity, or market value of equity. Second, R&D expenditure is relatively stable, reflecting a relatively long-term strategy of the firm, while sales and earnings are more changeable over time. Using sales and earnings as denominator to normalize R&D expenditure will make the resultant variables of the R&D intensity too volatile than it actually is.

R&D does not have immediate effect on profitability. Because the research and development is a process, and it needs a long time to initiate a project from the research and development to the success of the product. Therefore, it is difficult to appear the effect of R&D in the year of R&D investment. The impact of R&D on profitability of a company is examined with one-year, three year time lags or more year time lags. The examination of longer time lags is not possible since there is not enough R&D data available.

In this study, the effects of R&D on company's profitability examined with longer time lags than one year, in order to better observe the causalities. The one-year R&D intensity is the exact value of R&D intensity of company  $i$  at year  $t$ , where as the three-years lag is the exact value of R&D intensity of company  $i$  at year  $t-3$ , and five-year R&D is R&D intensity of company  $i$  at year  $t-5$ .

## **5. R&D and Company Performance**

### **5.1. Company performance and Profitability**

The word performance described as a level implementation task of the organization. In a performance measurement company, required appropriate measuring instruments. Basic philosophy that used in planning the performance measurement system should tailored to company strategy. Effective performance measurement system is a measurement system that

can facilitate the management to implement control processes and provide motivation to management to improve and enhance performance.

Understanding the performance according to IAI (2009:17), is the company's performance, especially profitability information needed to assess the changes of potential economic resources that may be controlled in the future. Information fluctuations in performance are important in this connection. Information useful for predicting performance in the company's capacity to generate cash flow from existing resources. In addition, information is also useful in the formulation of considerations about the effectiveness of the company in utilizing additional resources.

Financial performance to date is the financial benchmark in evaluating performance because of financial benchmarks considered practical and still relevant in the short term. In the measurement of financial performance be expected to gain optimum management within a specified period. Some financial measures that available used by the management are:

a. Liquidity Ratio

Ratios used to determine the ability of the company to meet its short term obligations with maturities

b. The Ratio of Activity

Ratios used to determine the number of estimates into sales or cash

c. Leverage Ratio

Ratios used to measure how much a company uses debt.

d. Profitability Ratio

Ratios used to measure the rate of return associated with company sales, assets, capital, and stocks value.

5.1.1. Measuring Profitability

Profitability, according to Hofstand (2009) is measured with an “income statement”. This is essentially a listing of income and expenses during a period of time (usually a year) for the entire business. An Income Statement is traditionally used to measure profitability of the business for the past accounting period.

Measuring profitability is the most important measure of the success of the business. A business that is not profitable cannot survive. Conversely, a business that is highly profitable has the ability to reward its owners with a large return on their investment.

According to Hokkanen (2006), profitability is the primary goal of all business ventures. Without profitability, the business will not survive in the long run. Therefore, measuring current and past profitability and projecting future profitability is very important. Profitability of the company measured by profit margin. The Profit margin calculated by dividing earnings before interest and taxes (*EBIT*) by the sales of the company at the end of year. The use of EBIT in the calculation of profit

margin considered to make the profit margin reflect the basic operations of a company better. This way calculated profit margin might also be more appropriate measure of a company's performance than e.g. ROA or ROE since it measured before interest and tax payments. Ratios (ROA,ROE) using net income to value profitability face the most obvious problems since the tax system has a great impact in the net income. But also other regulations have significant impact for example providing special deductions, allowances, or incentives (Hokkanen, 2006).

Profitability ratios have been developed to measure operational performance. The numerator of the ratios consists of profits according to a specified definition (gross margin, operating income, net income); the denominator represents a relevant investment base (Woelfel, C. J, 1990).

#### 5.1.2. Operating Profit Margin

The operating profit margin ratio or return on sales indicates the operating earnings or profitability that can be expected from one dollar of sales. Operating earnings rather than net income used to compute return on sales because operating earnings had better reflect the resources than managers can control. (Williams et al, 2010). Phrased more simply, it is the return achieved from standard operations, excludes non-operating items, such as interest income and interest expense, gains and losses on disposal of discontinued operations, and extraordinary items (Woelfel, C. J, 1990).



The operating profit margin ratio formula calculated simply using:

$$\text{operatingprofitmargin} = \frac{\text{EBIT}}{\text{sales}}$$

The meaning of operating profit margin varies slightly, although the basics stay the same across all industries. This makes it a common and important metric. Operating profit margin ratio analysis measures a company's operating efficiency and pricing efficiency with its successful cost controlling. The higher the ratio, the better a company is. A higher operating profit margin means that the larger the net income available to support increases in assets, hence the lower the need for external financing. (Brigham, et al, 2005).

## **5.2. Relation between R&D and Company Performance**

### **5.2.1. Previous Research**

Numerous studies have discussed the interaction of R&D expenditures and company performance. Some of these studies have been also based on the assumption that companies investing in R&D will be able to execute the innovation and gain benefits from the investments. However, it is difficult to actually measure the inputs and outputs of innovation. Moreover, it is even troublesome to generate relation between company performance and measures of innovation.

According to Tidd (2001), innovation can have substantial benefits on company competitiveness, but it is not easy to find the empirical

connection between innovation and performance. R&D includes high uncertainty, it does not have a clear rate of return and it is difficult to manage. However, if a new technology was successfully and rapidly brought to markets, it can possibly lead to larger market share, higher prices and dominant design. Ultimately, success in R&D can lead to competitive advantage in the markets. There are two separate groups of innovation measures that are used. The first deals with financial and accounting performance, such as profitability and share price. The second concentrates on market performance, generally share or growth.

On the Jaruzelski et al (2005) study, the quest for innovation has long been a faith-based initiative: Spend more, and profit will come. The study, which believe is the most comprehensive effort to date to assess the influence of R&D on corporate performance. However, the results shows that spent the most on research and development may provoke a crisis of faith. The major finding explained that there is no relationship between R&D spending and the primary measures of economic or corporate success, such as growth, enterprises profitability, and shareholder return.

R&D account is one significant account that could influence investors' decision in investing in the companies. Investor may want to invest in a company that has a very good prospect and performance, such as high profit and dividend. On companies' side, one way to earn high profit and have capability to pay high dividend is by conducting R&D activities. Therefore, it could be induced that companies that have higher

R&D activities are expected to earn high profits and have capability to pay high dividend. This will affect investors' decision-making, which will influence the movement of share price eventually (Hutagaol and E. Natasha, 2009).

It has been suggested that R&D expenses do not have immediate effect on growth or profitability. However, the effects of R&D investments can be observed after a time lag. From the previous study (Hokkanen, 2006) the effects of R&D expenses on company growth and profitability also examined with longer time lags than one or two years, in order to better observe the causalities. Related to R&D activities are essential for companies in order to maintain the current competitive position and to reach for new competitive advantages in the fast changing environment, the result shows that R&D expenditures was found have a positive and significant effect on firm profitability, measured by profit margin. The used profitability measures have been different in the studies, three-year-lagged R&D intensities were found to have highest effect on profit margin according to both R&D intensity measures used.

As was the researcher mentioned before there are numerous studies that express contradictive findings related to the R&D on company performance. Other researcher like Hokkanen revealed that there is positive correlation between R&D activity and company performance, while the other researchers like Tidd, Jaruzelski, and Hutagaol – Natasha

revealed the opposite findings. The detailed differences can be seen in the following table:

**Table 3**  
**Previous Research Findings**

<b>Researcher</b>	<b>Object</b>	<b>Findings</b>
Tidd (2001)	Review research on innovation together with relevant studies from organizational behaviour and strategic management	Innovation can have substantial benefits on company competitiveness, but it's not easy to find empirical correlation between innovation and performance.
Jaruzelski et al (2005)	Asses the influence of R&D on corporate performance.	There is no relationship between R&D spending and the primary measures of economic or corporate success, such as growth, enterprise profitability, and shareholder return.
Hokkanen (2006)	Concentrates on the impacts that firm's R&D investments have on firm performance.	The study indicates that firm's R&D have positive effect on firm growth and profitability.

Researcher	Object	Findings
Hutagaol and E. Natasha (2009)	Examines the relationship between R&D with firm's operation and market performances	The study's results shows that there is imply that there is no relationship between R&D and firms's operation and market performance.

#### 5.2.2. Linkage Between R&D and Company Performance

Companies pursue R&D projects with expectations of positive returns. Companies often have specific return expectations, and their realization or no realization can be monitored and estimated as R&D project progress. A policy of deferral of R&D costs affords managements and their independent auditors, who regularly work with uncertainties and estimates, an opportunity to convey useful information of R&D outlays. Currently, R&D outlays treated as if they have no future benefits (Wild et al, 2007).

Research and Development account is one of the significant accounts that could influence investor's decision making in investing the companies. Investor may want to invest in a company which has very good prospect performance, such as high profit and dividend. On firm's

side, one way to earn high profit and have capability to pay high dividends. This will affect investors' decision making.

The nature of the linkage between R&D and company performance would be expected to vary substantially between sectors. Clear links with performance would be expected only for sectors where R&D is a major competitive factor and would not necessarily be expected for the many sectors where R&D is much less significant than capital equipment, marketing or other input expenditures. Examples of the latter include oil & gas producers, mining, industrial metals, utilities and many food producers or telecom companies. However, even in companies where R&D is a key competitive factor, it will be a necessary but not sufficient condition because success will also depend on excellence in other areas. For example, successful R&D will have much less effect on the performance of a company that makes a large and ill-chosen acquisition or has poor marketing. Equally, a company that under-invests in R&D relative to its principal sector competitors will see a decline in the relative competitiveness of its products and services and this will soon be reflected in its business performance.

For companies with a high R&D intensity (R&D as percent of sales) for their sector, there will also be a point at which further increases in R&D give diminishing returns, but this will depend on sector, size and other factors

It would appear to be fairly easy to demonstrate a link between R&D and business performance by searching for a statistically significant association between an R&D measure and a business performance measure using all the companies in R&D over a 2-5 year period. However, this is not easy in practice since there are complicating factors which can partially or wholly invalidate studies of this type. These are:

- Sectoral differences.--There are many sectors but only about one-third of them have R&D intensity. A strong R&D/performance link would thus be expected for only a minority of sectors.
- Size effect.--Within any one sector, the R&D intensity is normally larger for the smaller companies. The reason for this is that a smaller company is likely to have to invest a comparable amount in developing a new product family but will be able to spread this investment over smaller sales than a much larger competitor with operations around the world. A growing small company may also be investing heavily in a completely new product family that is not yet contributing to sales.
- Business cycle.--A comparison of R&D and business performance will depend on whether it is made during a recession, an upturn or averaged over both. Some companies invest more during a recession to grow faster in an upturn, but this policy would increase R&D intensity during the recession when, for example, sales growth may well be small or negative.

- **Product development times.**--In some sectors, product development times may be very long so that current business performance may be related to the R&D investment of prior years. This factor is particularly important for companies for which R&D intensity has increased or decreased markedly during the preceding few years.

## **B. Hypothesis Development**

The research hypothesis introduced and tested in this study is based on the previous studies and empirical evidence. As the researcher mentioned before there are numerous studies that express contradictive findings related to the R&D on company performance. Other researcher like Hokkanen revealed that there is positive correlation between R&D activity and company performance, while the other researchers like Tidd, Jaruzelski, and Hutagaol – Natasha revealed the opposite findings. Based on prior studied, this study argues that R&D activities are intended to enhance companies' profitability. According to Hokkanen (2006), profitability is the primary goal of all business ventures. Without profitability, the business will not survive in the long run. Therefore, measuring current and past profitability and projecting future profitability are very important.

The R&D on a company is usually measured by R&D intensity, where the R&D expenditures of the companies are represented as a proportion of some measure of firm size. R&D intensity in this study is measured by the ratio of R&D expenditure relative to total assets. Xu and Zhang (2004) used



total assets as the denominator as it reflects innovation better. Companies pursue R&D projects with expectations of positive returns. Companies often have specific return expectations, and their realization or no realization can be monitored and estimated as R&D project progress.

In this study, company performance defined as operational performance, measured by operating profit margin. The operating profit margin ratio or return on sales indicates the operating earnings or profitability that can be expected from one dollar of sales. The profit margin calculated by dividing earnings before interest and taxes (EBIT) by the sales of the company at the end of year. The use of EBIT in the calculation of profit margin considered to make the profit margin reflect the basic operations of a company better. Phrased more simply, it is the return achieved from standard operations, excludes non-operating items, such as interest income and interest expense, gains and losses on disposal of discontinued operations, and extraordinary items. The higher the ratio, the better a company is. A higher operating profit margin means that the larger the net income available to support increases in assets, hence the lower the need for external financing.

R&D does not have immediate effect on profitability. Research and development is a process, and it needs a long time to initiate a project from the research and development to the success of the product. Therefore, it is difficult to appear the effect of R&D in the year of R&D investment. The impact of R&D on profitability of a company is examined with one-year, three year time lags or more year time lags. The effects of R&D on company's

profitability are examined with longer time lags than one years, in order to better observe the causalities. The examination of longer time lags is not possible since there is not enough R&D data available.

This study posits a hypothesis that formulated below:

**Hypotheses: R&D intensity affects the companies' profitability, measured by the operating profit margin.**

