CHAPTER II

THEORETICAL REVIEW

This chapter is presenting some previous studies examining the importance of R&D expenditure in relation to economic development and some concepts which are employed to help the researcher in analyzing research problems.

2.1 Previous Studies

There has been growing of studies examining the significance of investment on R&D to drive economic development. However, there are few researches examining why a country allocates small spending on R&D activity. This study has reviewed some researches which have proven the significance of R&D spending.

1. Mario Coccia (2012)

On his study of *Political Economy of R&D to Support the Modern Competitiveness of Nations and Determinants of Economic Optimization and Inertia*, Coccia analyzes the association between R&D expenditure (as % of GDP) and labor productivity across leading geo-economic players. The purpose of this paper is to investigate the economic issues, mainly across European countries and other geo-economic players over the periods of 1990s and 2000s, by analyzing the relationship, between R&D intensity, treated as an investment rather than as an expense, and labor productivity growth.

The results suggest that current market forces inefficient national systems of innovation, governed by university, industry and government linkages (Triple Helix) should support R&D expenditure by business enterprise sector to support labor productivity growth. It may advice that an effective political economy of R&D should foster industrial research. Its proximity to manufacturing processes transforms scientific and technical knowledge in new products and services. Accordingly, it will stimulate the increase competitiveness in global markets.

2. Inekwe (2015)

This research of *The Contribution of R&D Expenditure to Economic Growth in Developing Economies* examines the role of R&D spending on economic growth of developing economies between the periods of 2000 and 2009. There are sixty-six developing countries being studied grouped into lower middle-income and upper middle-income developing economies based on classification of countries by income level.

This research applied econometric method to estimate income growth across countries due to research and development spending. The results suggest that R&D spending in developing countries produce a positive effect on economic growth in developing countries. It also has a beneficial effect on growth of upper middle-income economies. However, R&D spending has no significant impact on growth in lower middle-income economies at conventional levels. This implies that the beneficial effect of R&D spending in developing countries could stem from the positive effect of R&D in upper middle-income economies. Growth promotion is an important aim for every

developing country and as a result, R&D remains vital in enhancing growth in these countries.

3. Freire-seren (2001)

Freire-seren's research on *R&D-Expenditure in an Endogenous Growth Model* By was conducted by using cross-country data. The aim of the study is to theoretically and empirically analyze the role that aggregate R&D-expenditures play in determining the growth of per capita income. It empirically analyzes how R&D-expenditure affects productivity growth using cross-country data. The study has estimated the coefficient corresponding to the R&D-expenditure regressor by using econometric method. The findings reveal a strong positive relationship between the growth of total R&D-expenditure and the growth of the GDP.

4. Mingqian & Yanyun (2004)

On the study of *R&D and Economic Growth-Panel Data Analysis in ASEAN+3 Countries,* Mingqian and Yanyun examined the relation between R&D expenditure and economic growth on 8 ASEAN countries and Korea, Japan and China for the period 1994-2003 by using panel data set. The results found out that there is an interactive relationship between R&D expenditures and economic growth that every country must aim to increase its competitive power and achieve sustainable economic growth by increasing its R&D expenditures.

5. Guellec & Potterie (2001)

The study on *R&D and Productivity Growth: Panel Data Analysis of 16 OECD Countries* as conducted by Guellec and Potteire points the similar result on the significance of technical change on driving growth. The analysis

is performed at the aggregate (macroeconomic) level for 16 OECD countries over the period 1980-98 using annual data. The final results point to the importance of technology for economic growth. Be it developed by business, by the public sector or coming from foreign sources. However, as these institutional arrangements differ substantially across countries, country-specific studies would be needed for drawing more robust conclusions.

The findings of these studies provide insight about the importance of R&D expenditure to drive economic development of a country. The government holds a significant role in defining the political economy to distribute resources to develop and utilize S&T through R&D activity. It is then imperative to examine the reasons of low public R&D expenditure in Indonesia as each country has different institutional arrangement.

2.2 Public Policy

There are various definitions of public policy. Dewey (as in Pearson, 1997) explained that public policy focuses on "the public and its problem". It concerns with how issues and problems come to be defined and constructed and how they are placed on the political and policy agenda.

Political scientist David Easton defines public policy as "the authoritative allocation of values for the whole society" but it turns out that only the government can "authoritatively" act on the "whole" society, and everything the government chooses to do or not to do results in the "allocation of values". Meanwhile, Harold Lasswell and philosopher Abraham Kaplan define policy as "a projected program of goals, values, and practices," and Carl Friedrick says, "It is

essential for the policy concept that there be a goal, objective, or purpose." These definitions imply all government actions and an overall program of action toward a given goal can be labeled as "policy" (as in Dye 2013).

Of this explanation, Dye (2013) defines public policy simply as whatever governments choose to do or not to do. It focuses not only on government action but also on government inaction, that is, what government chooses not to do. Government inaction is considered to have as great an impact on society as government action.

It can be supposed that governments do many things. They regulate conflict within society. They organize society to carry on conflict with other societies. They distribute a great variety of symbolic rewards and material services to members of the society. And they extract money from society, most often in the form of taxes. Therefore, public policies may regulate behavior, organize bureaucracies, distribute benefits, or extract taxes--or all of these things at once.

Recently many scholars have paid attention to policy studies. Public policy is studied for purely scientific reasons to examine the cause and effect of the policy taken by the government. It is also learned to find solution over problems faced within society. Lastly, public policy is studied for political purposes (Thoha, 2008).

Political science is also the study of public policy, about description and explanation of the government activities. While "traditional" political science focuses primarily on the institutional arrangements of government the "modern" political science concerns on the process and content of the government

activities. Overall, the study of public policy comprises the political process of the policy as well as its substance (Dye, 2013).

In addition, Lasswell as in (Pearson, 1997), argued that policy science concerns with explaining the policy making and policy executing process, and with locating data and providing interpretations which are relevant to the policy problems of a given period. The policy approach does not imply that energy is to be dissipated on a miscellany of merely topical issues, but rather that the fundamental and often neglected problems which arise in the adjustment of man in society are to be dealt with. The policy frame of reference makes it necessary to take into account the entire *context* of significant events in which the ultimate goal is the realization of human dignity in theory and practice. The policy science therefore includes contextual, multi-method and problem-oriented (p.18-19).

2.2.1. Policy Process

The policy process explains on how policies are made. The study of how policies are made generally considers a series of activities, or processes that occur within a political system. It includes identification of problems and agenda setting, formulating policy proposals, legitimating policies, implementing policies, and evaluating their effectiveness (Dye, 2013).

The policy process model proposes a logical sequence of activities that affect the development of public policies. It depicts the policy-making process and the broad relationship among policy actors within each stage. The model can also be helpful in understanding the flow of events and decisions within different cultures and institutional settings (Sabatier 2007).

The policy process is a series of political activities as described by the following figure.
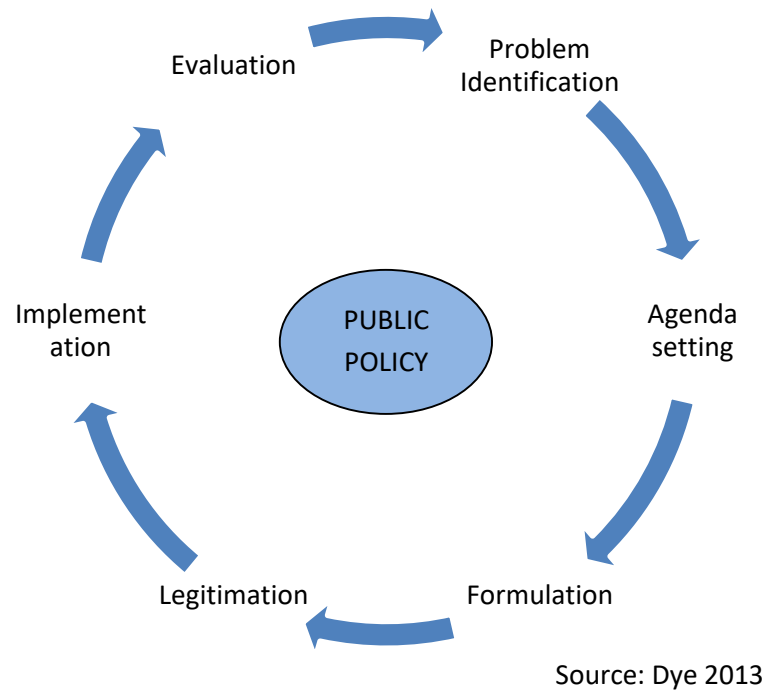

Source: Dye 2013

Figure 2.1. The Policy Process

Problem Identification. The identification of policy problems through demand from individuals and group for government action.

Agenda Setting. Focusing attention of the mass media and public officials on specific problems to decide what will be decided. It is needed to capture the attention of policymakers.

Policy Formulation. The development of policy proposals by interest groups, congressional committees and think tanks.

Policy Legitimation. The selection and enactment of policies through actions by congress, the president, and the courts. This stage is crucial to develop political support to win congressional or court approval.

Policy Implementation. The implementation of policies through government bureaucracies, public expenditures, regulations, and other activities of executive agencies.

> *Policy Evaluation.* The evaluation of policies by government agencies themselves, outside consultants, the media, and the general public.

2.2.2. Policy Substance

The study on policy substance focuses on a description of the content of public policy. It analyzes of the impact of social, economic, and political forces on the content of public policy; an inquiry into the effect of various institutional arrangements and political processes on public policy; and an evaluation of the consequences of public policies on society, both intended and unintended. The substance of public policy to be analyzed can be in the area of civil rights, education, welfare policies, health care policies, criminal justice, taxation, spending and deficits, defense policies, and homeland security (Dye, 2013).

For more detail, the analysis of the policy substance can be explained as the following:

Description

Policy analysis begins with finding out what government is doing. The annual budget is the most comprehensive document representing government's policy priorities. It sets out political debate between government and House of Representatives over fiscal capacity and expenditure. In this research, it will describe the low spending of government for public R&D.

Causes

It is imperative to inquire about the causes, or determinants, of public policy in doing policy analysis. Why is public policy? What it is? Why do governments do what they do? We might inquire about the effects of political institutions, processes, and behaviors on public policies. For example, What is the impact of lobbying by the special interests on Public Policy? We can also

inquire about the effects of social, economic, and cultural forces in shaping public policy. In scientific terms, when studying the causes of public policy, policies become the dependent variables, and their various political, social, economic, and cultural determinants become the independent variables.

Consequences

Lastly, policy analysis should concern about consequences, or impacts, of public policy. Learning about the consequences of public policy is often referred to as policy evaluation. We might inquire about the effects of public policy on political institutions and processes. For example, what is the impact of economic policies on the president's popularity? We also want to examine the impact of public policies on conditions in society. In scientific terms, when studying the consequences of public policy, policies become the independent variables, and their political, social, economic, and cultural impacts on society become the dependent variables.

The following diagram will explains the policy analysis as Dye (2013) refers to "system model".
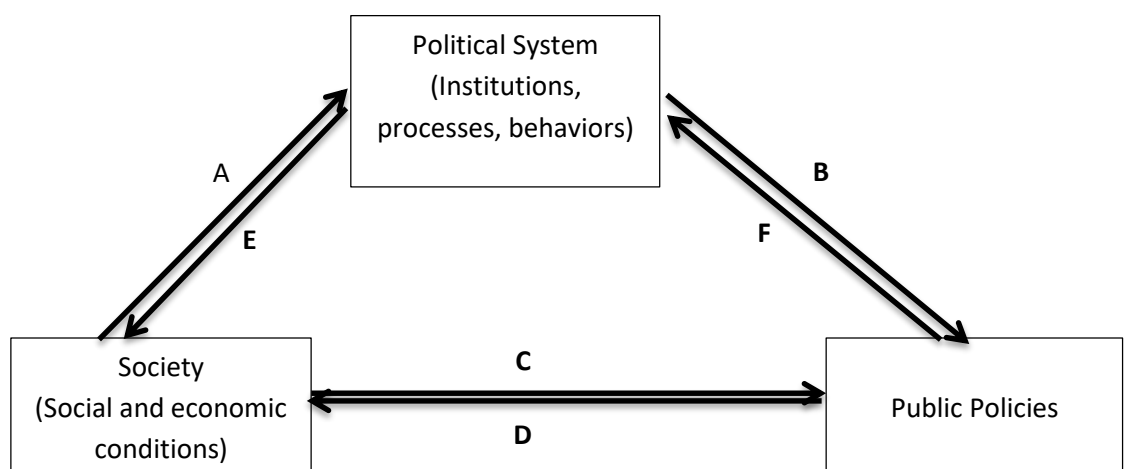

Figure 2.2. The System Model of Policy Analysis

The details of the coverage of those variables are as the following:

Society	Political System	Public Policies
Wealth and income	Federalism	Civil rights
Inflation, recession, unemployment	Separation of powers	Educational policies
Educational achievement	Checks and balances	Welfare policies
Environmental quality	Parties	Health care policies
Poverty	Interest Groups	Criminal justice
Racial composition	Voting behavior	Taxation
Religious and ethnic make-up	Bureaucracy	Spending and deficits
Health and longevity	Power structures	Defense policies
Inequality, discrimination	Congress, president, courts	Homeland security

The linkage of the three variables can be explained as follow:

Linkage A : What are the effects of social and economic conditions on political and governmental institution, processes and behaviors?

Linkage B: What are the effects of political and governmental institutions, processes, and behaviors on public policies?

Linkage C: What are the effects of social and economic conditions on public policies?

Linkage D: What are the effects (feedback) of public policies on social and economic conditions?

Linkage E: What are the effects (feedback) of political and governmental institutions, processes, and behaviors on social and economic conditions?

Linkage F: What are the effects (feedback) of public policies on political and governmental institutions, processes, and behaviors?

As public interests are becoming more demanding, the process of public policy should be well examined to answer the problems. This way, the present of policy analysis is very important. Policy analysis begins by finding out what the government is doing. Quade (1982) explains that public analysis comes resulting from the unsatisfying policy. When the process of policy formulation isn't ideal, the practice will be unsuccessful eventually. Therefore, policy analysis is trying to examine the practice of public policy of each phase in the whole cycle.

Dunn (1999) defines policy analysis as applied social science using multiple methods of inquiry and argument to produce and transform policy-relevant information that may be utilized in political setting to resolve policy problems. Policy analysis is then aimed to replace politics and develop technocratic elites. It is laid in the context of policy system. The main element in the policy analysis is to find out problem solution. It needs to consider some related variables: cause and effect of policy analyzed and performance of the policy.

Dunn's concept on policy analysis is similar to Dye's, which defines it as a process to find out what governments do, why they do it, and what difference it makes. However, along the process, it is important to distinguish policy analysis from policy advocacy. *Explaining* the causes and consequences of various policies is not equivalent to *prescribing* what policies governments ought to pursue. Learning *why* governments do what they do and what the consequences of their actions are is not the same as saying what governments *ought* to do or bringing about changes in what they do. It is rather *policy analysis* encourages scholars to attack critical policy issues with the tools of systematic inquiry. There is an implied assumption in policy analysis that developing scientific knowledge

about the forces shaping public policy and the consequences of public policy is itself a socially relevant activity. And that policy analysis is a *prerequisite* to prescription, advocacy, and ativism (Dye, 2013).

2.3 Deliberative Policy

"Deliberative Policy Analysis," turns to the role of argumentation, rhetoric, and narratives in the policy-analytic process. Deliberative policy analysis emerges in large part as an epistemological alternative to the neopositivist, technocratic tendencies that have had a strong influence on the discipline. In this approach the focus is on language and argumentation rather than evidence narrowly conceived. In particular, the orientation stresses the enlightenment functions of policy analysis. It emphasizes the need to attend to particular audiences in the construction and presentation of policymaking (Fischer, 2007).

The "emerging network society" is being stimulated by "technological developments, globalization, individualization, and emancipation". In the new "decentered world of governance," a new of policy making with these characteristics:

1. New political practices have emerged between institutional layers of the state and between state institutions and societal organization. According to Hajer and Wagenaar (2003), these "often transient and informal arrangements….produce solutions, not conventions among states, directives, or authoritative decisions" (p.1). These solutions come from practical needs that drive the development of cooperative efforts among new groups of actors (p.2).

2. These new inter-organizational activities "reshape what politics and policymaking are about" (p.2).

3. Traditional hierarchical institutions of government "must now increasingly compete with open-ended, often unusual, ad hoc arrangements that demonstrate remarkable problem solving capacity and open up opportunities for learning and change in exactly those circumstances where classical modernist institutions have failed to deliver" (p.3)

The results of these changes, society is experiencing a shift in language from institutions to networks. This shift is important because institutional language implies stability and networks imply fluidity. It also notes a shift in vocabulary from words associated with government (state, power, and authority) to governance (networks, complexity, trust, interdependence). The networks are eroding the power of previously powerful institutions (Hajeer & Wagenar 2003).

Due to these political and societal changes, policy making and politics are interchanging. In the new regime, politics and policy making occur in new locations and they operate in conditional of "radical uncertainty" in which "difference" and "interdependencies" are increasingly important. In these new spaces of politics, trust and identity are important among "mutually interdependent actors" (p.12).

Hence, deliberative policy analysis seeks to address two very different questions about the new network society. First is a social science question: "What kind of policy analysis might be relevant to understanding governance in the emerging network society?" (p.13) This question is more about governance

than policy analysis. This question is answered by understanding how politics work ands and how decisions are made in the new "network society" context.

The second question is "What kind of knowledge is politically relevant to society and in the network society, what counts as good evidence?" (p.16). This question has to do with practice of policy analysis and research and it is concerned with methods used in the profession to provide advice and information to assist with decision making.

In the network society, the national government changed to an "interactive strategy", giving people more opportunities to be involved in deliberation in the early stages of considering a policy. Solutions to difficult problems are found outside of official governmental institutions. They engage large numbers of groups, agencies, and sectors with different interest and levels of power. Politics and definition of self-interest sometimes follow policy making rather than precede it and that in those situations it is better for government to involve more people in deliberation (Hajeer & Wagenar 2003).

The approach is designed to help the analyst and other participants to better understand the structure of the policy argument—as a complex blend of factual statements, norms, interpretations, opinions, and evaluations—than does the empirical approach to policy analysis. At the same time, it also more closely links the analytical task to the ordinary-language policy argumentation of real world politicians and policy makers. Indeed, the argument here is that the approach is a more accurate representation of how politicians, policy analysts, and citizens actually argue and deliberate about policy in the real world of politics. It offers, as such, an approach better suited to real world policy making than the conventional positivist model which emphasizes empirical analysis at the

expense of normative investigation. By demonstrating how both the empirical and normative concerns that emerge in policy argumentation are interrelated, the model is offered as way forward in the search for a more socially relevant postpositive alternative (Fischer, 2007).

2.4 Theory of Public Finance

Public finance is destined to play a strategic role in economic development. It refers to the government process of revenue-expenditure. It concerns with problems of resource allocation, the distribution of income, full employment and price-level stability and growth (Musgrave, 1959). Moreover, Dalton (1970) argues that public finance lies on the border line between Economics and Politics. It is concerned with the income and expenditure of public authorities and with the adjustment of one to the other.

2.4.1 Budget Policy

In order to maintain efficient standard public economy, the government formulates budget policy as fiscal instrument. The evolution of budgeting over the past 100 years has influenced the practice of resource allocation and use in all countries. Not only developing countries are different, but all countries need effective fiscal discipline, a capacity to allocate resources to strategic priorities and to use resources efficiently and effectively.

Budget policy is determined as the result of three interdependent plans, each of which involves different objectives and principles of action. It is then cleared and consolidated into a net budget involving but a single set of tax and expenditure measures. The three objectives of budget policy comprise:

1. to secure adjustments in the allocation of resources

2. to secure adjustments in the distribution of income and wealth

3. to secure economic stabilization (Musgrave, 1959).

However, in preparing fiscal policy, developing countries face different problems from developed countries. The low income countries which still in its quite early stages of development, such aggregative analysis in terms of consumption, saving and investment, may well miss the crucial part of the problem. Caiden (as in The World Bank 1998) identifies some obstacles for developing countries in regards to their budgeting policy:

1. There is a common pattern of budgeting that will fit all circumstances

2. The aim of budgeting is economic planning

3. Improved budgeting depends on adequate resources

4. Budget decisions can be separated from policy decisions

5. Whatever is best coordinated is best.

6. Comprehensive decisions are superior to partial decisions, and complex solutions are better than simple solutions.

7. The prerequisites of budgeting are a matter of technique and will, rather than the product of environmental conditions.

8. Politics are not as important as economics.

9. Good budgeting is a matter of regulation.

10. Budgeting is relevant to development.

2.4.2 Balanced Budget Dynamic

To meet the aim of budget policy, the government should be able to choose among alternatives use of resources to secure the allocation resources. If

resources are to be used for the satisfaction of certain public wants, they will not be available for the satisfaction of other public or private wants. In this sense of opportunity cost, the budget of the allocation must be balanced. The amount of resources withdrawn from private use must be equal to the resources added to public use. This way, financial equality between expenditures and tax receipts must be balanced. The financial balance merely expresses the underlying real balance between the benefits derived from the satisfaction of public wants and the opportunity cost of withdrawing resources from satisfaction of public wants (Musgrave, 1959).

In formulating the budget allocation, there exists a desired or proper state of distribution to begin with. The distribution of income and wealth in a market economy depends on a number of factors including the laws of inheritance, the distribution of innate talent, the availability of educational opportunities, social mobility and the structure of markets. As a result of these factors, a state of distribution, with a given degree of equality or inequality comes about. This state will seem appropriate to some, while others will prefer a greater or lesser degree of equality (Musgrave, 1959).

Moreover, Dalton (1970) introduced "The Principle of Maximum Social Advantage" that the state ought to maximize social advantage or benefit from the allocated resources. The principles of maximum social advantage are applied to determine whether the tax or the expenditure has proved to be of the optimum benefit. Attainment of maximum social advantage requires that:

a) Both public expenditure and taxation should be carried out up to certain limits and no more.

b) Public expenditure should be utilized among the various uses in an optimum manner, and

c) The different sources of taxation should be so tapped that the aggregate scarifies entailed is the minimum.

This principle assumes the public revenue consists of only taxes (and not of gifts, loans, fees etc.) and the state has no surplus or deficit budgets. Also, public expenditure is subject to diminishing marginal social benefits and the taxes are subject to increasing marginal cost or disutility.

Musgrave (1959) calls Dalton's principle as "Maximum Welfare Principle of Budget Determination". According to Dalton, maximum social advantage is at a point where the Marginal Social Sacrifice (MSS) of taxation and Marginal Social Benefit (MSB) are equal. The point of equality between MSS and MSB is referred to as the point of maximum social advantage or least aggregate social sacrifice.

2.4.3 Public Expenditure

J.M. Keynes as in (Musgrave 1959) introduces the role of public expenditure in the determination of level of income. Besides to improve income distribution, public expenditure can be used to direct the allocation of resources in the desired lines and to influence the composition of national product. Thus, the role of public expenditure is highly significant both in the developed and developing countries. Furthermore, in the developing countries, the variation in public expenditure is not only to ensure economic stability but also to generate and accelerate economic growth, to promote employment opportunities, and to alleviate poverty.

Public expenditures are generally classified as "capital" and "current" expenditures. Capital expenditures involve non-recurring costs arising from investment and creating the socioeconomic infrastructure in the form of roads, bridges, power generation, agricultural production, industrial expansion, communication infrastructure, among others (Aronson 1985).

Current expenditures are also called "revenue" expenditures which are considered as non-investment, exhaustive and recurrent in nature and as such hardly create productive assets which generate returns to government. Hence they are categorized into "consumption" and "transfer" expenditures. Consumption expenditures relate to the day to day expenses of governments in the form of administration, maintenance, employment and debt-related costs. Meanwhile transfer expenditures are payments for which no goods or services are exchanged. It comprises costs in the form of subsidies, educational grants, state pensions, social benefits, unemployment benefits, sickness benefits and old-age pensions (Aronson 1985, Musgrave 1959).

2.5 The Importance of R&D

2.5.1. Scope of R&D

Research and Development (R&D) is main source of technical change by resulting in new goods, new process and new knowledge. Frascati Manual defines Research and Development (R&D) comprising creative work undertaken on a systematic basis in order to increase the stock of knowledge and the use of this stock of knowledge to devise new applications (OECD, 1993).

There are four types of R&D activities: basic research, applied research process and product development. Basic research is an original experimental

work with no specific commercial purpose and this occurs in most universities'
and governmental institutions' R&D. Applied research has a specific aim as an
original experimental work. Product development is concerned with the
improvement and extension of existing products. And the generation of new or
improved processes is process development (UNCTAD 2005).

Meanwhile, R&D is also different on the party conducting it. R&D can be
performed by public (government institutions and universities), private sectors,
and nonprofit organizations.

R&D performed by business results in new goods and services, in higher
quality of output and in new production processes. These are factors of
productivity growth at the firm level and at the macroeconomic level. The effect of
business R&D on productivity has been investigated in many empirical studies
and performed at all aggregation levels. Business R&D may bring a different
effect on productivity depending on its source of funds (Guellec & Potterie, 2001).

Government and university research, on the other side, have a direct
effect on scientific knowledge and public missions. Public R&D aims to generate
basic knowledge and enhances the stock of knowledge of the society. Results of
public R&D do not have direct impact on productivity. New knowledge is not
considered as an output in the current system of national accounts. It is different
from physical investment and another tangible investment. Hence the direct
outcome of basic research is overlooked. However, basic research may open
new opportunities to business research, which in turn affects productivity (Guellec
& Potterie, 2001).

Moreover, public sector is considered as an integral part of research
system in a country. In most developing countries government takes most

portions of the R&D activities as well as the funding. On one side, it is beneficial to make implementation of programming techniques more feasible. Government as the policy maker can identify areas for technology improvement particularly to overcome economic and societal problems, not merely industrial market oriented. In this case, government takes its role to manage the inclusion of spillover in cross-country research sectors and also between public and private sectors to maximize growth attainment and development achievement (Park, 1998).

2.5.2 R&D Expenditure

World Bank[1] (2015) defines expenditures for research and development are current and capital expenditure (both public and private) on creative work undertaken systematically to increase knowledge, including knowledge of humanity, culture and society, and the use of knowledge for new application. It includes resources actually spent on R&D activities, rather than only budgeted.

The measurement of R&D expenditure can be divided into two types. It is basic measure, "intramural expenditures", which includes all expenditures for R&D performed within a statistical unit or sector of the economy. Another measure is "extramural expenditures" covering payments for R&D performed outside the statistical unit or sector of the economy[2].

R&D expenditures are used to finance current costs and capital expenditures. The details of each need can be explained as the following:

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[1] See http://data.worldbank.org/indicator/GB.XPD.RSDV.GD.ZS, browse at 10 December 2015 at 10 a.m.

[2] "Measuring R&D Expenditure", presented by Zahia Salmi on behalf of UNESCO at the occasion of *South East Asian Regional Workshop on Science, Technology and Innovation Statistics*, Hanoi, Viet Nam on 5-8 December 2011

1. *Current costs*, which are composed of: labour costs of R&D personnel, annual wages and salaries and all associated costs or fringe benefits. The other current costs involve materials, supplies and equipment (incl. water, gas and electricity); books, journals, reference materials, subscriptions; materials for laboratories; costs for on-site consultants; administrative and other overhead costs; costs for indirect services; and labour costs of non-R&D personnel. Current costs may be prorated if necessary to allow for non-R&D activities within the same statistical unit.

2. *Capital expenditures,* which comprise annual gross expenditures on fixed assets, used in the R&D programmes of statistical units (land and buildings, instruments and equipment, computer software).

Share of R&D in 'Capital expenditure' and 'other current costs' could be estimated (by the institutes) on the basis of intended use. If intended use is not feasible as a criterion, the same distribution coefficients as for labour costs may be used.

Of the functions of R&D expenditure, it is then important to measure national total of R&D expenditure of a country. There are two different presentations describing overall spending in R&D activity.

- *Gross Domestic Expenditure on R&D (GERD),* which presents total intramural expenditure on R&D performed on the national territory during a given period. It includes R&D performed within a country (which financed by national institutions and also funded from abroad) but excludes payments for R&D performed abroad. It is also constructed by

adding together the intramural expenditures of the four performing sectors.

- *Gross National Expenditure on R&D (GNERD)*, represents total expenditure on R&D financed by a country's institutions during a given period. It includes R&D performed abroad but financed by national institutions or residents; it excludes R&D performed within a country but funded from abroad. It is constructed by adding the domestically financed intramural expenditures of each performing sector and the R&D performed abroad but financed by domestic funding sectors.

2.6 The Political Economy

The political economy approach is an examination of the ways in which institutional structures are formed and the political and economic choices of governments and citizens are made and influenced (Adam and Dercon 2009). It concerns with the distribution of and struggle for power and resources and analyses the attributes of underlying formal structures to identify and understand interest and incentives.

Political economy approach broadens perspective beyond a technical view to include an emphasis on stakeholders, institutions and process by which the reforms is negotiated and played out (Tolentino 2010 in Luttrel 2014). To extend the analysis on political economy, there are three levels of political and institutional analysis as Luttrel (2014) quoted from Conway (2003) and Bratton and van de Walle's (1997):

1. Political traditions, which concerns with long-standing cultural traditions underpinning political and social institutions;

2. Political regimes, relates to the set of procedures determining the distribution of power;

3. Political institutions, rules of the game, players, organizations, and expected patterns of behavior.

Understanding political economy approach is relevant in this study because the production of scientific research and technological innovation depends on national system structure and strongly supported by human and economic resources (Coccia, 2007).

Modern economy needs an effective political economy of R&D that fosters competitiveness by emerging technologies and innovation to support the long run of economic. In this context, the political economy of R&D can further be defined as a set of rules that support rational economic decisions by policy makers to efficiently allocate public and private economic resources to attain technological and scientific performance through R&D for the benefit of national welfare. The objectives of political economy of R&D depend much on the social welfare function of a country, which considers the preferences of the society and the structure of driving industries of the economic system (Coccia, 2012).

As a matter of fact, it leads to debates on how to allocate economic resources on R&D to support science and technology improvement to spur patterns of economic development. Understanding the dynamic of political tradition, regime changing and the patterns of political institutions is important as foundation to analyze budgeting process through which distribution of fiscal policy is politically negotiated.

2.7 Public Private Partnership on R&D Results Utilization

2.7.1 Theory of Public Private Partnership

Public private partnership (P3) refers to any collaborative engagement between public, private, and/or voluntary actors or organizations. No one standard model exists for P3s. They should be viewed as a process that allocates risk and reward on an equitable basis among key stakeholders. A true public-private partnership (P3) must involve the sharing of authority, risk, responsibility, accountability and benefit. P3s are not a contracting out of government services, nor are they a privatization of government services as the public sector retains an active role in the management of P3s. There are few true legal joint-liability partnerships as this contradicts the requirement for government accountability regarding the use of public funds. Therefore, the majority of P3s involve some form of collaboration between the public and/or private and/or voluntary sectors with varying levels of the sharing of risks and benefits (Allan 2000).

The new governance paradigm of "network society" is challenging the structure and process of government in four ways. First, individually, new actors, and collectively, new interest groups are demanding to be a part of the governing process. This desire for participation is most evident in the area of science and technology. The desire by citizens to be a part of the decision-making process accelerates the transfer of regulatory power away from government and to the voluntary/civil sector and the citizen. Second, the policy issues generated by science and technology exceed the technical capability of government to manage, giving rise to the need to procure expertise from non-governmental organizations (NGOs). Third, the rise of independent research organizations, foundations and think tanks, further the transfer of regulatory governance to the

civil sector while simultaneously providing the knowledge to both government and citizen alike required by the advent of the governance paradigm. Fourth, the diminution of government has led to the development of spatial oriented policy making conducted through shareholder networks (Lindquist 2006, Hajer 2003).

The state is being transformed into a developer of human capital and social capital, with an emphasis of using this capital to develop links between individuals and organizations to facilitate the formation of networks. The objective of governments in this environment is the transfer of state responsibilities to individuals and NGOS through the innovative use of P3s as learning organizations. Governance in the new institutional environment is focused on problem solving through the exchange of knowledge and resources between the public, private and volunteer sectors (OECD, 2000).
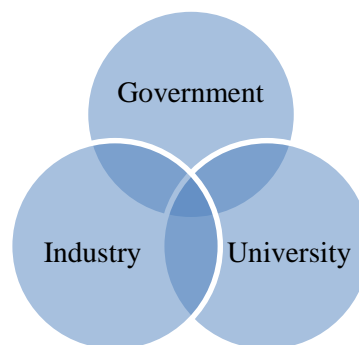
2.7.2 The Triple Helix Model

The transfer, exploitation and commercialization of public research results are critical areas of science, technology and innovation policy. Public R&D in developing countries is usually managed under the idea of "business-as-usual" without any attention to special qualifications or distinctive requirements. Furthermore, under the current budgeting system for public institutional research, there is no strong motivation for public research institutions to build cooperation with other sector for technology development. It accordingly leads to weak linkage between public R&D institutions and industries (Ynalvez and Shrum 2011).

This constrain has developing countries which have resources constrain particularly in economy to develop collaboration in R&D activity and utilization.

Among plausible research collaboration, one is neo-institutional Triple Helix Model that has been adopted by the Government of Indonesia. To see the efficiency of this policy, concept of triple helix is presented in this chapter to comprehend the ideal model.

Triple Helix model represent networked relations among universities, industries and governments (U-I-G). This model can provide with a neo-evolutionary interpretation as three selection environments operating upon one another: market, organization and opportunity for technological progress. Furthermore the three selections also fulfill social functions: wealth creation, organization control and organized knowledge production. Within this network, it opens opportunities to encourage and optimize innovation in a knowledge-based economy (Leydesdorff, 2000).

Source: Leydesdorff, 2000

Figure 2.3. The Triple Helix Model

Indirect R&D policies, including I-U-G networking can lead to innovation improvement despite limitation of low economic resources in R&D intensity (Nishimura and Okamuro in Lee and Kim, 2015). This networking occurs when universities, industries, and government R&D institutions interact to find solution over problems faced by public research. This interaction is known as an innovation process that includes knowledge creation and knowledge transfer.

In the collaboration of triple helix, the knowledge, which is transformed to the value in business sectors and markets, can be created when institutional actors play their roles properly and interact actively with the others. Public R&D as conducted by universities and governmental institutions can create new knowledge or technology, which can stimulate ideas for new industrial products or processes. However it is not easy for industries in some cases, to directly adopt those new knowledge or technologies into their products or manufacturing processes due to not well maturity for practical technologies or lack of skilled human resources. On this problem, government R&D institutions can solve technological problems for industries' commercialization with their better R&D resources and experiences to be transformed by industries into value using products or process innovations (Betz, 2010).

These theories are employed to help analyze the research questions based on its relevancies. Firstly, to examine and to analyze the State Budget formulation process in Indonesian central government, the concept of public finance will give insight about the balance budget dynamic and the position of expenditure. It is analyzed by using deliberative policy and political economy theories which explains about involvement of actors and the interchange between policy and politics in the policymaking process.

Secondly, to investigate the causes of low public R&D expenditure in Indonesia, it refers to the analysis of the first research question. Public expenditure is part of the study of policy substance. It analyzes about the cause and consequence of the policy substance. The explanation about resource

distribution in the budgeting process, particularly to finance public R&D, leads to find out the reasons underpinning this low allocation.

Lastly, to examine the utilization of public R&D results in the Indonesian industries, theories of deliberative policy and public private partnership of triple helix model are explored thoroughly in data analysis. Besides the involvement of some actors in the network society, public policy and public private partnership is interrelated in the deliberative democracy.