

Management Control Systems For R&D Activities In Government Sector: A Case Of Indonesia

Parulian Silaen* and Robert Williams**

*Research and Development (R&D) organisation has different activity, employee's characteristics, goals, and planning system from a non-R&D organisation. It requires Management Control Systems (MCS) that fit R&D activities. The study proposes four important core elements of MCS particularly for a R&D organisation: **desired ends, actors, control implementation, and control tools**. The study investigates the existence and the use of those core elements in R&D project from the Government units and the control systems implemented by three government units. The study finds the existence of desired ends to have qualitative characteristics and to use it to control the project direction and to limit the scientific boundary. The actor is found to be treated differently, and therefore the use of decision space to reduce domination of the actor over the controller is found to be implemented. The MCS is found to be implemented in three stages: Input, Process, and Output stage. All of the three government units use a formal control type with different control tools, control dimension, and value of representation.*

Field of research: Management Accounting, Management Control System, R&D.

1. Introduction

Research and Development (R&D) organisation has different activity and employee's characteristics from a non-R&D. These differences in turn require a Management Control Systems (MCS) that differ from the one that fit for a non-R&D organisation. The purpose of this paper is to propose four important core elements that need to be considered in designing a Management Control Systems particularly for a R&D organisation (Silaen and Williams, 2007). They are *desired ends, actors, control implementation, and control tools*. Finally, this paper presents an investigation of MCS applied in three government units in Indonesia.

* Parulian Silaen, School of Accounting and Finance, University of Wollongong, email: parulian@uow.edu.au

** Robert Williams, School of Accounting and Finance, University of Wollongong, email: bobwil@uow.edu.au.

2. Literature Review

2.1. R&D Activities

Place (1977) considered R&D activities as a learning process that consists of two types of learning. Type I learning is the extension of present areas of knowledge which is more certain and predictable. The program of type I can be scheduled and budgeted though if it requires a longer time and larger investment. This learning may be found in applied research but more likely is in product development (Place, 1977). The objective of type I learning is to fuel societal change by the creation of new scientific knowledge as well as the utility of that knowledge to the society. Type II learning in contrast requires an intuitive leap away from the present areas of knowledge, that is a brand new knowledge. It is more uncertain and unpredictable. It has a significant level of uncertainty and unpredictability and it is difficult to be kept on schedule and budget. The type II learning is exciting, rapid, and requires a relatively small investment. It is likely to occur during the basic up to the applied research. However, the emphasis of the effort of applied research may vary along the way from basic research to product development. When the applied research effort is closest to basic research, the emphasis would be on type II learning, whereas if the effort were closest to product development, the emphasis would be on type I learning. In order to understand more about R&D activities, the next section will present the characteristic of scientists or researchers in R&D organisation.

2.2. Employees In R&D Organisation

The R&D operation is clearly a learning process to transform the unknown to the known. However, it needs innovative scientists and management to interpret and translate it into viable business projects. As the scientists are the most important assets of R&D units (Twiss, 1992; Jain & Triandis, 1990), a good understanding of their behaviour is needed. The behaviour of the scientists might require a fair degree of autonomy (Abernethy & Stoelwinder, 1991), and specific (Jain & Triandis, 1990, p. 21). Gibson (1981, p. 35) indicated five individual characteristics of scientists as; creativity, judgment, analytic ability, communication ability and energy, while Root-Bernstein (1989, p. 36) mentioned that they "*hate bureaucracies and they abhor administrators*. Considering the nature of R&D unit as a learning process and has different employees' characteristics, it seems that the R&D units require neither a very tightly nor a loose control model, otherwise, it may reduce employees innovative capabilities. Further, since it is a learning process which has difficulties in defining relatively accurate standards would require the control function to be different from the one that emphasise on comparison process. The next section discusses a new framework of management control systems that may be suitable particularly for R&D activities.

3. The Concept of Management Control Systems

The study proposed four broad core elements of MCS; *desired ends*, *actors*, *control implementation*, and *control tools*. The ***desired ends*** refer to expected ends or the final destination. This element may have two sub-elements; a *direction* to describe where to go, rather than what to achieve and a *yardstick* to measure the progress or the result of an action. The ***actors*** are individuals who are being controlled. The actors consist of five aspects, *behavioural* (Flamholtz, 1983; Birnberg & Snodgrass, 1988), *domination* and *power* (Chua et al., 1989), *decision space* (Birnberg and Snodgrass, 1988) and *motivation* (Newman, 1951 cited in Giglioni & Bedeian, 1974). The *behavioural* refers to a preferred

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behaviour. *Domination* refers to the ability to influence others in making decisions, and *Power* refers to the degree of strength of the influencing capacity. *Decision space* refers to the degree of authority, which is given by the systems to an individual. *Motivation* is an aspect to encourage the actor to act within the preferred behaviour.

The **control implementation** consists of two main aspects; *control types* and *control implementation stages*. Two *control types* may be applied; *formal* and *informal control type*. The *formal control type* refers to an explicit process (Hopwood, 1974; Birnberg & Snodgrass, 1988), while the *informal control type* refers to an implicit process to influence actors in making decisions. Two types of informal control may exist. Firstly, *Surveillance control* that come from written norms and values and have been internalised. Secondly, *Cultural control* which is the accumulation of norms and values from common norms, beliefs, and shared values among the actors. The study proposes three *stages of control implementation: input, process and output control*. *Input control* is the stage of the selection and provision of input. *Process control* is the implementation of control system to monitor the action, and *Output control* is to assess the achievement. The element of **control tools** are the instruments of the control function, which consists of *dimensions* and *values*. *Dimension* refers to the criteria that are used as by the control tools. Four dimensions are proposed, *Directional, Bureaucratic, Scientific and Financial*. *Directional dimension* refers to qualitative characteristics that represent the general directions to be followed. The *bureaucratic dimension* refers to quantitative or qualitative characteristics that represent technical tasks. The *scientific dimension* contains the control tools that are used particularly to measure R&D activities and *financial dimension* is monetary measurement.

As an agent to mediate desired ends and actual performance, the *tools* should ideally, represent values of these two extreme points in which the study proposes; *external, internal, and social values*. *External values* refer to values that are developed by an external party (Ouchi, 1979; Lebas & Weigenstein, 1986). *Internal values* refer to values that are developed by an internal party by reference to the internal condition of the organisation such as setting rules, standard operating procedures and policies, and standard costs (Ouchi, 1979, Lebas & Weigenstein, 1986). *Social values* refer to values from social interaction among members of a group of individuals. These values are not set by force; rather, the members accept it willingly. The social values are not disturbed by clear or unclear boundaries of desired ends, and have a chance to change over time.

4. Research Methodology

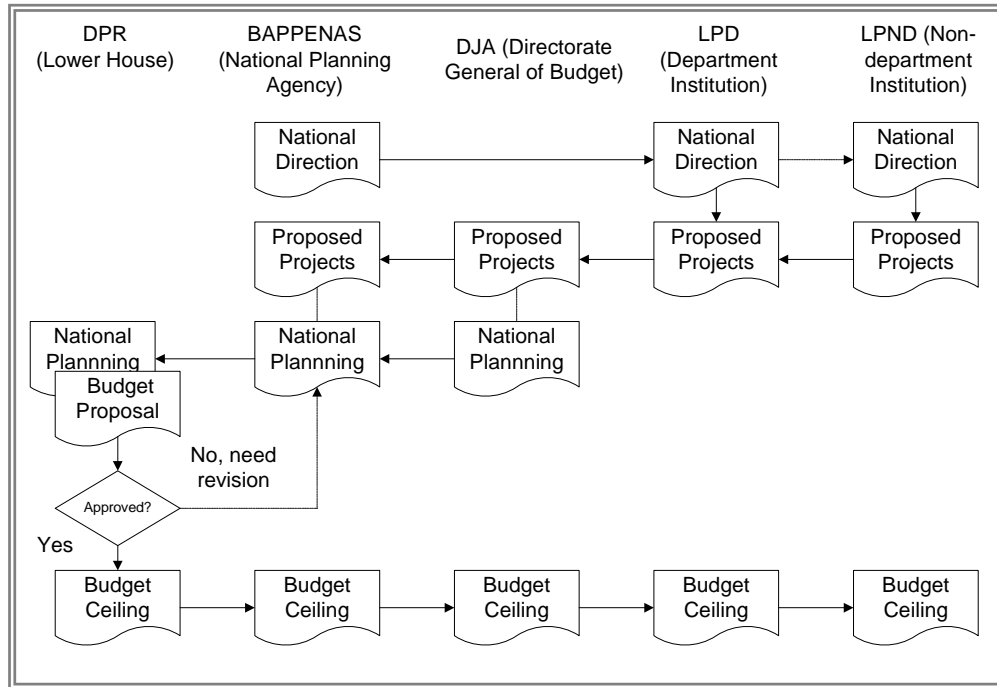
This study uses case study research (Yin, 2003; Humphrey and Scapens, 1996; Eisenhardt, 1989; Hagg and Hedlund, 1979) on multiple sites in the government sector in Indonesia. The investigations were done by visiting the site, conducting observation, interview and documentation as well as telephone interviews as its data collection technique on three government units in Indonesia. They were The National Planning Agency, The Agency for Research and Development in Industry (BPPI) and the Directorate General of Budget.

5. The Findings

Three government institutions are involved in controlling the project that arise from two types of government institutions, Departmental Government units (LPD) or ministries and Non-departmental units (LPND). Any project proposal arise from these units must follow through three major phases *Preliminary phase, the Project proposal selection phase, and*

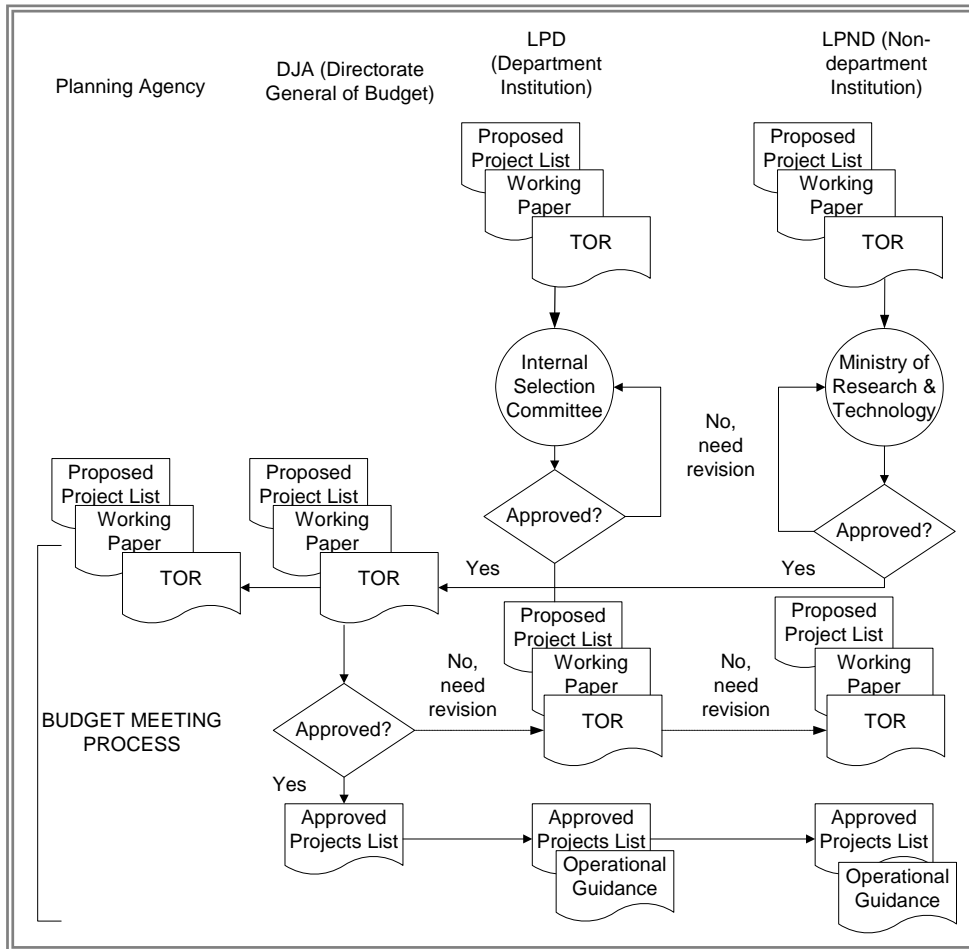
the *Project budget selection phase*. The *Preliminary phase* (Figure 1) starts with the Ministry for Finance issuing a memorandum to require all institutions to propose for the following year annual program and budget with regard to the National Guidelines.

Figure 1: Preliminary Phase of Project Proposal



The proposed projects are then used by the National Planning Agency to generate an Annual Operational Plan, and by the Directorate of Budget to develop a National Budget Proposal. These documents are sent to the Lower House in Parliament to obtain approval. When they are approved, these two documents become the Annual National Plan and the Annual National Budget. At this phase, the National Plan only describes the projects in general, and the National Budget only describes the total budget allocated to every institution (a Budget Ceiling). Each institution will use the two documents as a basis to propose the projects in detail. The *Project selection phase* starts with the development of a project proposal in detail and will be examined and selected internally by a committee then is sent to National Planning Agency, and the Directorate of Budget. Then, the *budget selection phase* begins with the Directorate of Budget arranging a budget meeting with the Planning Agency and the R&D project. The output of this process is called the Approved Development Budget that endorsed by the Directorate of Budget and that is attached by Operational Guidance form which is issued by the Minister or chairperson of the unit. These documents are sent to the Planning Agency, the Indonesian Audit Board, the Financial and Development Supervisory Agency, the National Accounting Bureau, the Accounting Information Processing Centre, the State's Treasury, Project's institution, and the Project's leader.

Figure 2: Project Proposal and Budget Selection



5.1. The National Planning Agency

The National Planning Agency is an institute to assist the President to determine policies regarding the national development plan, and to give an appraisal of the execution of the national development plan. According to a head of the bureau of the Agency, it is difficult to connect the output of a R&D project with National Planⁱ. He mentioned that publication of the finding of the project in a scientific journal, probability of success, technological advances, time frame, and budget may also be used to assess the projectⁱⁱ. He also mentioned that the use of budget is ineffective since there is too much subjectivity. It makes the budget selection process as just a formal requirement to justify that the procedure has been followedⁱⁱⁱ. A discussion with a group of staff of the Agency indicated that they experienced difficulties in selecting proposals in some areas. The difficulties were related to defining the technical suitability of a research project, the appropriateness of the project regarding the budget required, and difficulties in relating the expected benefit from the R&D operation with the objective of the national development. In addition, this institution was also having problems in controlling and monitoring the operation of the project. It was mentioned that a bureaucratic mode of control would not be enough and a controller needs to have a certain degree of knowledge of the discipline to be able to assess the achievement adequately^{iv}. The above data indicates that the use of goals to select the project was difficult and may be far from accurate particularly for a basic research project; therefore, the goals in terms of directional qualities seemed to play an important role. The involvement of independent scientists as a selection committee to

screen the project also played an important role for control. This practice indicates the importance of the scientific dimension as a complementary element to the practice that emphasised the bureaucratic and financial aspects.

5.2. The Agency for Research and Development in Industry

The Agency for Research and Development in Industry is a unit under the Ministry of Industry that is responsible for encouraging and coordinating the R&D activities within the ministry. The agency performs evaluation and selection tasks for all R&D project proposals. In an interview with the head of the agency, it was mentioned that the project proposals are evaluated and selected based on two main criteria: priority rank and objectives^v. The priority rank criterion refers to the task and function of the ministry such as to develop a new technology process or a new product that directly or indirectly increases exports from the industrial sector^{vi}. Through an observation on the selection process, it was indicated that the agency focused its criteria on new technology with low environmental impact, or a new technology to reduce waste from industry. Though the agency postulates that it is difficult to define the progress quantitatively and in physical terms, the progress may be indicated by various qualitative factors, particularly the use of directional dimension.

During the project duration, the control system applied may consist of directional and financial dimensions. The use of the directional dimension is indicated by the evaluation of the project progress in relation to the project's goals that have been set in advance. The use of the financial dimension alone cannot be used to reflect the project achievement accurately; rather it is limited to providing a critical signal regarding the project's financial position. The achievement of project goals such as an implementation of the R&D output may indicate a focus on the use of qualitative criteria that leads to a directional dimension rather than a quantitative dimension. Although the Agency was also found to use the budget to postpone or drop the project, a further investigation on the project's condition that may lead to the provision of more funds indicated the emphasis on the directional dimension.

5.3. Observation on Budget Meeting of the Project Evaluation Process

The Directorate of Budget is a unit of the Ministry of Finance, and is lead by a Director General who is accountable to the Minister of Finance. All of the proposed projects' budget must go through a budget meeting, which is led by the Directorate of Budget. A budget meeting dealing with a R&D project from the Agency for National Atomic Energy was observed by this study. At the beginning of the meeting, it was noticed that the staff member from the Planning Agency held a list of questions, and a summary of the project proposal. It gave the impression that he had reviewed the proposal before the meeting. The meeting started by the person from the Planning Agency disagreeing with one research topic listed in the proposal. It was mentioned that the research topic was not essential for the current development planning, and therefore it was rejected. The personnel from the project argued that it had been reviewed and approved by the Ministry of State for Research and Technology and it will affect the total budget ceiling of the Agency. The person from the Planning Agency persisted with the request; otherwise, the meeting would have been cancelled. When the request was accepted then the meeting was continued.

An interview with the personnel from the project indicated that they felt unsatisfied with the meeting. They felt that the Directorate of Budget and the Planning Agency could dictate to

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the project because they had power to do that. It should be noted that during the meeting most of the topic discussed were on the working paper in relation to the project's budget items. In addition, there was no attachment of recommendations from the scientist on the project proposals. From an interview with the person from the Directorate of Budget, it was mentioned that there was a difficulty to link the output of a R&D project with the budget^{vii}, The existence of the three dimensions of control tools as directional, financial, and scientific appropriateness reflects a mutual interaction that feeds information from one to another. However, the different dimensions used by each party seem to be misunderstood by the other party and finally create conflict.

6. Conclusion

To obtain a budget, a R&D project must proceed through three phases: the preliminary phase, the project selection phase, and the budget selection phase. The output of the preliminary phase is the Annual National Operation Plan and budget ceiling. The project proposal selection phase starts with developing a detail proposal for R&D project and using the annual plan and budget ceiling as guidance. The proposal then is sent to the Planning Agency and the Directorate of Budget to be examined in the budget selection phase. The role of the Planning Agency in selecting a R&D project is based on a directional dimension by using the Annual National Operation Plan as a broad criterion. Although scientific dimensions were used by the internal committee of the project and Ministry of State for Research and Technology, the Planning Agency seems to require more emphasis on the directional dimension and questioned the independency of the existing committee.

The Agency for R&D in Industry was found to use a directional dimension in selecting the project. The directional dimension was related to the goals of the ministry rather than national goals as used by Planning Agency. This practice was indicated on the use of priority rank and objectives to select the R&D project. The Directorate of Budget applied the bureaucratic and financial dimensions to control the R&D project. This was found during the observation and interview. However, it was also indicated from interviews that the personnel of the Directorate of Budget had limited knowledge of the essence of the project and had difficulty in being connected to the financial dimension. The role of financial dimension in this case is limited to ensure the project remained within the budget. Therefore, the role of directional, bureaucratic, scientific, and financial dimension seem to be important and complementary one to another when taken as a total. In practice each had varying degrees of prominence.

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End notes

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- ⁱ An interview with the head of the bureau
- ⁱⁱ An interview with the head of the bureau
- ⁱⁱⁱ An interview with the head of the bureau
- ^{iv} An interview with the head of the bureau
- ^v Interview with Head of the agency
- ^{vi} Interview with Head of the agency
- ^{vii} Interview by telephone with a staff member at Budget C4, DJA.