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Management control systems for R&D activities in government sector: a case of Indonesia

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Abstract
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Keywords
Management Accounting, Management Control System, R&D

Disciplines
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Management Control Systems for R&D Activities in Government Sector: A case of Indonesia

Parulian Silaen and Robert Williams

Abstract

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 Management

INTRODUCTION

Research and Development (R&D) organisation is different from a non-research and development organisation. The differences refers to various organisational components including; its activity, employees characteristics, goals, and planning system. These differences in turn require a Management Control Systems (MCS) that differ from the one that fit for a non-R&D organisation.

This paper proposes 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. Every element contains various sub-elements that will be used differently along different level of environmental uncertainty deal with by the organisation, as well as in different stages of control implementation.

Finally, this paper presents an investigation of MCS applied to R&D organisation in government units in Indonesia by using the proposed MCS framework. Three units of government institution were investigated regarding how and why they apply such control practice along input, process and output stage of R&D projects.

LITERATURE REVIEW

R&D activities

Place (1977) considered R&D activities as a learning process and classified them into two types; type I and type II learning. Type I learning is the extension of present areas of knowledge, it is more certain and predictable. The program of Type I learning can be scheduled and budgeted for even if it requires a longer time and larger investment. This learning may be found in applied research but more likely is in product development that uses a variety of inputs to support the operation (Place, 1977). In addition, 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. Therefore, it is more uncertain and unpredictable compare to type I learning. Since it has a significant level of uncertainty and unpredictability then, type II learning is difficult to be kept on schedule and budget. The type II learning is exciting and rapid, and it requires a relatively small investment. Type II learning is likely to occur during the basic up to the applied research program. 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.

Employees in R&D organisation

The R&D operation is clearly a learning process to transform the unknown to the known. The utilization of this new knowledge needs innovative scientists and management to interpret the expertise and translate it into viable business projects. As the scientists are the most important assets of R&D units (Twiss, 1992; Jain & Triandis, 1990), more understanding of their behaviour is needed to be able to manage the task in the R&D organisation.

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To be successful a R&D unit needs its employees to have innovative behaviour. Innovation in this case is not limited to the development of the existing product, but also a breakthrough in new knowledge to benefit the entire business. The behaviour may be different from those assumed by administrative behaviour that tends to be bounded by rigid rules and procedures. The scientists might require a fair degree of autonomy (Abernethy & Stoelwinder, 1991) to give them a space for innovation.

Some authorities described specific character required to be a successful scientist in R&D unit. Jain & Triandis (1990, p. 21) for example indicated analytical, curious, independent, intellectual, introverted, enjoy scientific and mathematical activities, complex, flexible, self-sufficient, task-oriented, tolerant of ambiguity, have high needs for autonomy and change, and a low need for deference are those who are likely succeed in a R&D activity.

Gibson (1981, p. 35) indicated five individual characteristics that are highly sought by the managers when selecting their members as; creativity, judgment, analytic ability, communication ability and energy. However, the scientist may not be an ideal employee from bureaucratic point of view because they *"hate bureaucracies and they abhor administrators* (Root-Bernstein, 1989, p. 36)*".*

Considering the learning process and the employees' characteristics such as impatience with routine, disdainful of regulations, dislike of bureaucracies and abhorrence of administrators, 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.

THE CONCEPT OF MANAGEMENT CONTROL SYSTEMS

Through a review of literature on definitions of management control systems, the study proposed four broad core elements that need to be considered in designing the MCS they are; *desired ends*, *actors*, *control implementation*, and *control tools*. The element of ***desired ends*** refers to expected ends or the final destination of an action at the end of an operational cycle. 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 of an action or the result of an action. One may argue that the desired ends may be similar to those of organisational goals. However, this study prefers to use the desired ends as being able to cover comprehensively the notions that are embodied in organisational objectives, rather than goals that comprise disagreement among authorities (Lindblom, 1959; Cohen et al, 1972; Georgiou, 1973; Cooper et al, 1981).

When the organisation deals with a highly certain environment, the *desired ends* can be translated into precise and reliable quantitative figures and therefore can be used as a *yardstick* to measure performance. In a certain situation however, when the means-ends relationships are unclear, the prediction of future events and consequences cannot be made relatively accurate, and the *desired ends* cannot be translated reliably into quantitative features, the *desired ends* may only contain the *direction* without being able to be described in quantitative figures. Being a *direction* only, the *desired ends* cannot be used accurately to measure the performance as in the case of quantitative measurement. Rather *desired ends* can only be used to guide the action toward the desired direction.

The element of ***actors*** refers to the individuals who are involved in the control system that is relevant to a decision-making situation. In this context, *actor* will refer to individuals or groups of individuals within a system as the objects being controlled. Five aspects are embodied on the element of *actors,* they are; *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; Anthony, 1989).

The *behavioural* aspect in this case refers to a behaviour that is preferred by the systems where the actors operate. *Domination* refers to the ability to influence others in making decisions, and *Power* refers to the degree of strength of the influencing capacity. Though it is difficult to distinguish *domination* from *power*, this study considers them distinct. An individual within the organisation may have an ability to dominate others, however, the strength of dominating ability will relate to the degree of power the individual has in hand. In other words, the magnitude of the dominating ability is power. Though this study does not intend to measure the degree of power, it is plausible to suggest that the degree of power may be measured. Therefore, keeping these two aspects distinct will enable a more detailed analysis of the elements embodied in the concept of management control. *Decision space* refers to the degree of authority, which is given to an individual to enable the individual to act within the system. As a formal authority, this element will deal with formal rules and procedures embodied in the control system. *Motivation* is another important aspect in the element of actors. The subject that exercises the control function should be able to identify potential factors that can be used to motivate the actor to remain within a 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 to influence actors in making a decision toward desired ends that is similar to administrative control (Hopwood, 1974) and explicit control (Birnberg & Snodgrass, 1988). The *formal* control type carries out with regard to written norms such as accounting reports, job description, employee appraisal system, budget, rules, standards, statistical reports, and diagrams such as PERT and CPM. The *informal control type* refers to an implicit process that is carried out to influence actors in making decisions toward desired ends and is implemented with regard to norms and values that are accumulated to form a belief among a group(s) of individuals within an organisation. Two types of informal control may exist: *surveillance* and *cultural* control. *Surveillance* control may come from written norms and values that have been internalised by the actors, and applied to the actors who perform the tasks by watching and guiding them toward the proper way in performing the tasks. *Cultural* control is the accumulation of norms and values from common norms, beliefs, and shared values among the actors in a group without having any relationship with written norms. Since the accumulation of the norms and values has been internalised by the member, it may construct an informal control that will bind the individual mind to behave toward the committed behaviour namely self-control (Hopwood, 1974; Jaworsky, 1988).

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 to be used for an operation. *Process control* is the control system executed during the process of operation to monitor how tasks are performed. Output control is the execution of control after the operation has been completed to monitor what outputs have been achieved.

The element of ***control tools*** refers to instruments that are used in performing the control function. The fundamental role of the *control tools* is to represent both the value of the desired ends and the effort, so the control function can monitor, compare and evaluate how far the effort is performed concerning the desired ends. Moreover, the uses of *control tools* may be multiple, and may often be substituted for one another; therefore, the appropriate control tools chosen may influence the success of the control systems (Merchant, 1985; Bisbe and Otley, 2004; Tatikonda & Rosenthal, 2000). Two elements of control tools may be considered: *dimensions* and *values.*

Dimension refers to the solid characteristics of the criteria that are used by the control systems regarding the result that is expected to be attained. The control tools may contain

various dimensions that can be classified into four groups: *Directional, Bureaucratic, Scientific* and *Financial*. *Directional dimension* refers to control tools that contain qualitative characteristics that represent the general directions to be followed by the action such as system goals and general policy guidelines. The *bureaucratic dimension* refers to the control tools that contain either quantitative or qualitative characteristics which represent the technical tasks, such as standard operating procedures, quality control, inventory control, and scheduling including PERT, CPM, and production scheduling. The *scientific dimension* contains the control tools that are used particularly to measure ideas and innovations such as new or improved processes, products or techniques, patents and patent applications, scientific publications, membership of professional organisations and so forth. The *financial dimension* refers to the control tools that contain monetary measurement. This dimension is very familiar in accounting literature and includes budgets, cost effectiveness report, standard costs, and return on investment and so forth.

As an agent to mediate desired ends and actual performance, the *control tools* should contain *values* that ideally represent these two extreme points. Three values of representation are proposed: *external values*, *internal values*, and *social values*. *External value* refers to values that are developed by an external party. For example, the use of the market mechanism to define a fair price for transfers (Ouchi, 1979; Lebas & Weigenstein, 1986) can be considered to contain external values. *Internal values* refer to values that are developed by an internal party by reference to the internal condition of the organisation. An example of internal values can be seen in the bureaucratic control (Ouchi, 1979, Lebas & Weigenstein, 1986) that is commonly labelled by setting rules, standard operating procedures and policies, standard costs, and so forth. The value setting process of internal values may be done by force and be dominated by the dominant party within the organisation. This type of value setting would have a greater chance for dysfunctional behaviour if it is used in a high uncertainty and low goal congruence situation

Social values refer to values that result from social interaction among the members of a group of individuals. The existence of social values may be reflected by the organisational culture. The value setting process in this circumstance is not done by force; rather, it is accepted by the members willingly. The social values are not disturbed by clear or unclear boundaries of desired ends, because they are set by the social interactions that have a chance to change over time.

THE FINDINGS

There are two types of government institutions in Indonesia, Departmental Government units (LPD) or ministries and Non-departmental units (LPND). The Non-departmental unit consists of two entities; the Ministry of State, and the Bodies or Institutions. R&D projects may arise from these two types of government institutions that will follow a slightly different selection procedure. As the study was conducted on the ministry of Industry, therefore the study is limited to only the project from the Departmental Government units

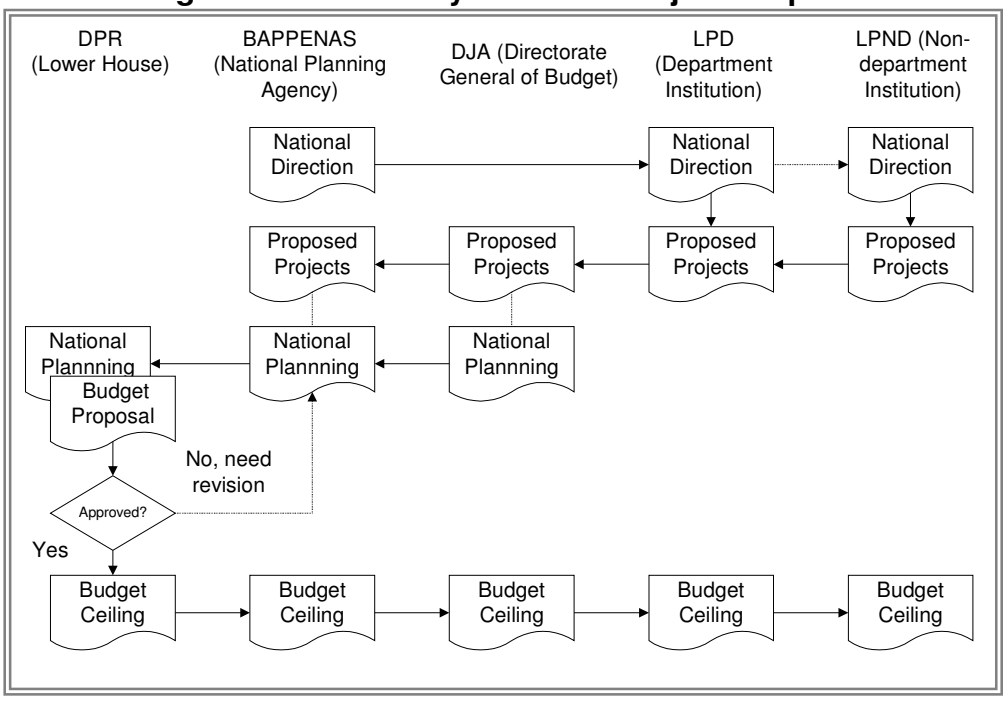
A R&D project proposal in government sector in Indonesia will go through an internal and external selection process before it is funded by the government. Several government institutions are involved in controlling the project, and this study investigated three of them: the National Planning Agency, the Agency for R&D in Industry, and the Directorate General of Budget. The investigation was conducted by visiting the sites, observing the practice, collecting documents, and interviewing relevant authorities.

Three major phases must be carried out before a project is approved: the *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 government institutions to propose for the following year, an annual program and budget with regard to the National Guidelines. The preparation of the preliminary

projects' activity plan is supervised and compiled by the National Development Planning Agency and the preliminary budget is supervised and compiled by the Ministry of Finance through the Directorate General of Budget.

The project proposal should be presented in three forms; *Terms of Reference* (TOR), Working Paper and List of Proposed Projects. The TOR is a form that contains a brief qualitative description of the project. Each TOR consists of four items: Research Topic, Research Background, Research Purpose and Target, and Research Time Table. The *Working Paper* (WP) is a form that contains a computation of the project's budget and consists of four items: the Sub-project, the Activities within the sub project, the Substance within the activities, and the Budget items. The Proposed Project List contains the summary of the project.

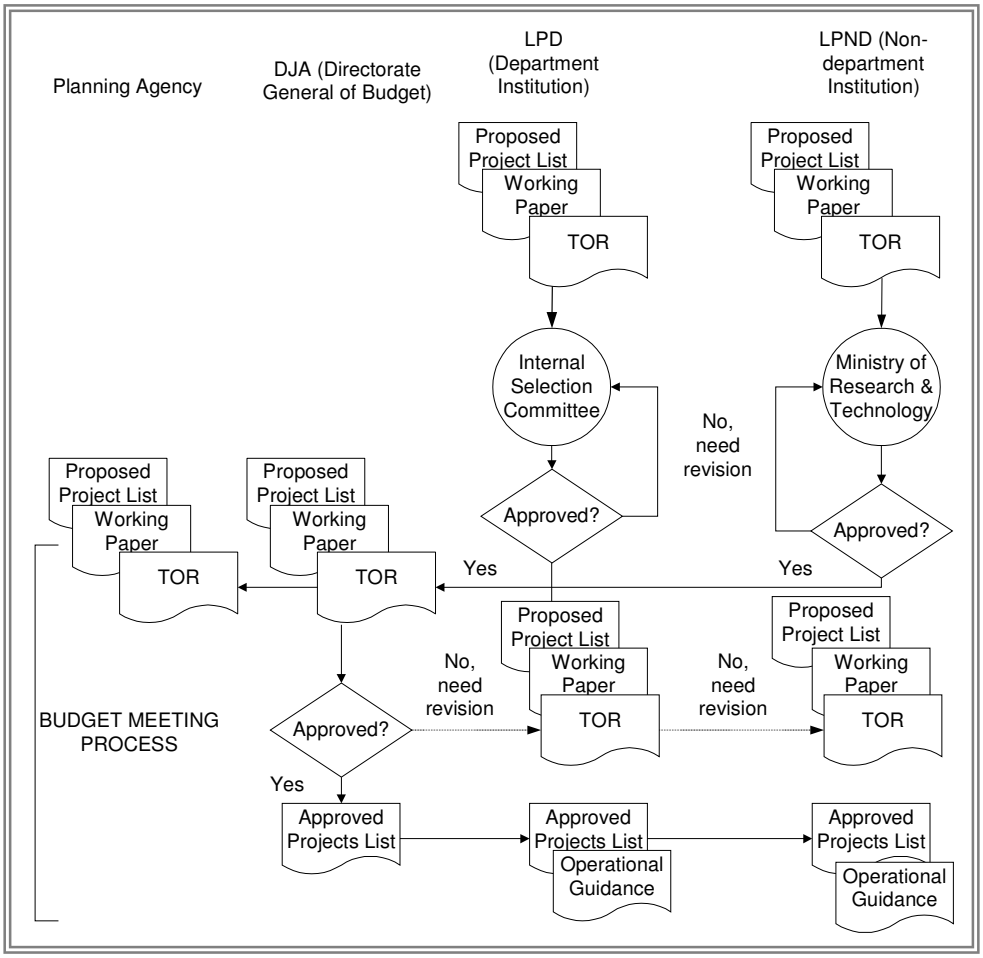
Figure 1: Preliminary Phase of Project Proposal



The proposed projects are then summarised and sent to the National Planning Agency to generate an Annual Operational Plan and to the Directorate General of Budget to compile the budget and develop a National Budget Proposal. These documents are sent to the Lower House in Parliament to obtain approval. When the annual Operational Plan and the Budget Proposal approved by the parliament, these two documents become the Annual National Plan and the Annual National Budget. However, in this phase the content of the National Plan and the National Budget are more general in terms. The National Plan only describes the projects listed in general terms rather than in detail, and the National Budget only describes the amount of budget allocated to every government body called a Budget Ceiling. Finally, these two documents are distributed to related government bodies to be used as a basis to propose the projects in detail.

The *Project proposal selection phase* starts with the development of a project proposal in detail by using the Budget Ceiling as guidance (Figure 2). A project proposal from a Departmental unit must be examined and selected internally by a committee within the department. A project from a Non-departmental unit however, will be assessed by an internal committee and by the Ministry of State for Research and Technology. When the project is approved the three forms then are sent to two institutions; the Directorate of Culture, Science and Technology of the National Planning Agency, and to the Directorate General of Budget of the Ministry of Finance.

Figure 2: Project Proposal and Budget Selection



Having these documents, the *budget selection phase* begins with the Directorate of Budget arranging a budget meeting with personnel from the Planning Agency and the R&D project. The budget meeting is called "c*osting"* to discuss the appropriateness of the budget figures on each project's items. The output of this process is called the Approved Development Budget that endorsed by the Directorate of Budget and will be attached to a form called Operational Guidance. The operational guidance is issued by the head of the institution, such as the Minister or the chairperson of the institute. These documents then will be sent to various related institutions such as: 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.

The investigations were done by conducting observation, interview and documentation on the three government units.

The National Planning Agency

The National Planning Agency is a Non-departmental government institute that is responsible to the President of The Republic of Indonesia. One of the functions and tasks of the agency is 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. One of the bureaus that are involved with controlling R&D projects is the Directorate of Culture, Science and Technology, formerly called the Science, Technology, Aerospace, and Maritime Bureau.

As presented in Figure 1, the national development plan plays an important role in selecting a R&D project. However, as the output of an R&D project is a report about new know how it is difficult to identify the connection of the R&D project's goals and the National Plan, which measured by income per capita[1]. Since many of the proposals were inappropriate, it indicates that the current practice of project selection by internal committees within each of government institutions is ineffective[2]: Therefore, there is a need for qualified personnel who are capable to give recommendation about the proposal[3:]. The qualified personnel refer to an expert team who base the selection on scientific criteria[4]. Though the quality of basic research is difficult to measure, at least publication of the finding in a scientific journal may be used as an indicator. In addition, probability of success, technological advances, time frame, and budget may also be used though each would be applied differently to different types of research[5]. According to the head of the bureau, the budget selection is also ineffective as there is too much subjectivity that makes the budget selection process as just a formal requirement to justify that the procedure has been followed[6].

A discussion was also undertaken with a group of staff of this unit who were involved in the budget meetings. They 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.

Apart from the problem in the project and selection process, this institution was also having problems in controlling and monitoring the operation of the project. Since the output is a non-physical product, a bureaucratic mode of control would not be enough. There is a need for a controller to have a certain degree of knowledge of the discipline to be able to assess the achievement adequately[7].

The above data indicates that the project selection process is to ensure that the project goals were related to the Annual Operational Plan. Although the use of goals to select the project was difficult and may be far from accurate particularly for a basic research project, 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 in selecting the project as a complementary element to the practice that emphasised the bureaucratic and financial aspects to keep it within the limit.

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[1] An interview with the head of the bureau
[2] An interview with the head of the bureau
[3] An interview with the head of the bureau
[4] An interview with the head of the bureau
[5] An interview with the head of the bureau
[6] An interview with the head of the bureau
[7] An interview with the head of the bureau

The Agency for Research and Development in Industry

The Agency for Research and Development in Industry (BPPI) 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[8]. The priority rank criterion refers to the task and function of the ministry in developing the country. Therefore it relates to the priority of projects which pursue the objectives of the Ministry of Industry such as "…a new technology process or a new product that directly or indirectly will increase exports from the industrial sector…".[9]: Through an observation, 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.

Every month each project will prepare a progress report and send a copy to the agency. The progress report will be used by the agency to assess project progress. 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. For example, how far the testing has progressed, to what extent the results have been implemented, and how far the effort in training the small industries has progressed. In addition, the progress report will also consist of the use of funds from each source. The financial information may be used to calculate the percentage of funds being used, and can be compared to the percentage of completion of activities. It may be calculated from the activities that had been done divided by total activities of the project, or from days that have been used divided by total days budgeted for the project. The comparison process will provide a warning signal to indicate a project that is in a critical situation, and that will lead the agency to assess in more depth the condition of a particular project. From this assessment the decision may be made to provide more funds, to discontinue or to postpone the project until the next fiscal year.

The above data indicates that the role of the Agency for R&D in Industry is to coordinate all the research and development under the Ministry of Industry. In coordinating these activities, the agency should evaluate and select the project proposal in relation to the role of the ministry in the national development program. The control system applied by the agency along the project evaluation and selection process is focused on the directional dimension. The use of the directional dimension in this context is related to the goals of the ministry.

During the project duration, the control system applied by the agency 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 accurately reflect the project achievement; rather it is limited to providing a critical signal regarding the project's financial position.

A similar condition was also found when assessing the output of the R&D function. 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 as a base for a decision 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. It can be suggested that since the function of R&D activities

[8] Interview with Head of the agency
[9] Interview with Head of the agency

is to produce knowledge, it seems to be appropriate to involve the scientific dimension to monitor the progress and to assess the value produced by R&D project.

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 General of Budget. A budget meeting dealing with a R&D project from the Agency for National Atomic Energy was observed by this study.

The project was a new project that consisted of several programs that were related to managing radioactivity/radiation in the environment. The project's location was in Yogyakarta. Five staff from the Atomic Agency, one from the Directorate General of Budget, and one from the Planning Agency attended the meeting.

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.

The next question raised by the Planning Agency was on the format of the List of Proposed Projects (DUP) form presented by the project. The staff from the Planning Agency required the project's personnel to change the format of the form and the way the budget items were calculated. Seeming differences in the format presented by the project created some difficulties for the staff from the Planning Agency to assess the proposal. Furthermore, the staff from the Directorate of Budget raised questions about several budget items, and required re-calculation for several items and suggested to switch some of the items to other research activities under the same project, so it would not affect the total amount of the project's budget.

An interview was conducted with the personnel from the project, to determine their view of the meeting, during the time break. They said that they felt unsatisfied with the meeting. They felt a lot of pressure from the Directorate of Budget and the Planning Agency. They felt that the Directorate of Budget and the Planning Agency could dictate to the project what they wanted because they had power to do that. The most unsatisfactory situation was the rejection of the topic. It was mentioned that the Ministry of State for Research and Technology had approved the topic, so how could the Planning Agency reject it without any reason. If the funds were not enough, it is acceptable to postpone or even reject the topic, however in this case the budget was still higher than the proposed funds. Further, one of the project personnel explained that they had known the predetermined fund allocated to the project before they set up the proposal. Therefore, the reason behind the rejection was obscure. At the end, one of the personnel from the project made comment that[10]:

> …all researchers in the government sector should consider that this kind of situation occurs. No wonder the quantity of the project output will be set by the researchers regarding the amount of budget available, rather than quality.

It should be noted that during the observation there was no discussion of the project's goals and the appropriateness of a particular research topic in terms of the

[10] Interview with a staff from Atomic Agency, 2 February, 1993

scientific dimension. The conversation mostly referred to the working paper that consisted of financial calculations of 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, he said that[11],

> …the output of a R&D project is intangible. It is a report that is very difficult to connect to the budget. What I do is to look at the Terms of Reference. I try to interpret the project background and its goals as much as I can. Then I look at the budget items and raise questions about any item that does not convince me.

The data from observation indicated that three dimensions of control tools were used. The directional dimension was used by the Planning Agency to evaluate and select the proposal in relation to the contribution of the project to the national development plan. The selection by the Directorate of Budget was limited to only the financial dimension. The financial dimension was used by the Directorate of Budget to define the project's financial boundaries without reference to the value of expected benefits. The project personnel in contrast focus on the scientific dimension as applied by Ministry for Research and Technology. The different dimensions used by each party seem to be misunderstood by the other party and finally create conflict. 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.

Cross-cultural incompatibility among those personnel may lead to misunderstanding of the role of each party. The person from the Planning Agency used bureaucratic culture to define the project's rank of priority regarding the achievement of the national development plan. However, less understanding of the scientific culture experienced by the person from the Planning Agency would be one of the possibilities that cause difficulties in explaining the decision made to the project's personnel. At the other end, the project personnel who had less understanding of the bureaucratic culture exercised by the personnel from the Planning Agency would cause the project's personnel to misapprehend the decision being made by the personnel from the Planning Agency.

CONCLUSION

Two types of government institutions in Indonesia were discussed: Departmental Government units and Non-departmental Government units. The two distinct types follow a different procedure in proposing a R&D project. Two types of budget were found to be practiced by the government sector in Indonesia: the Development budget and the Routine budget. Any government project will be funded by the development budget, while a routine budget is only used to finance routine expenditure. In addition, to obtain a budget, the project must proceed through three phases: the preliminary phase, the project proposal selection phase, and the project 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 R&D project is selected internally by Departmental Government units while for Non-departmental Government units the proposed project must be selected by Ministry of State for Research and Technology. 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

[11] Interview by telephone with a staff member at Budget C4, DJA, 29 October 2004

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 General of Budget (DJA) is an institution which acts on behalf of the Ministry of Finance. The control function applied by this unit in selecting an R&D project is based on the bureaucratic and financial dimensions. This was found during the observation and interview. However, it was also indicated from interviews that the personnel of the Directorate General 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.

REFERENCES

Abernethy, M. A., and J. U. Stoelwinder (1991): "Budget Use, Task Uncertainty, System Goal Orientation and Subunit Performance: A Test of the 'Fit' Hypothesis in Non-For-Profit Hospitals", *Accounting, Organizations and Society*, Vol. 16, No. 2, pp. 105-120.

Anthony, R. N., John Dearden, Norton M. Bedford (1989): *Management Control Systems*, sixth ed., Richard D. Irwin Inc., Illinois

Birnberg, J. G., and Coral Snodgrass (1988),"Culture and Control: A Field Study", *Accounting, Organizations and Society*, 13, 5, pp.447-464.

Bisbe, Josep and David Otley, (2004): “The effects of the interactive use of management control systems on product innovation”, *Accounting, Organization and Society*, 29, pp. 709-737.

Chua, Wai Fong, Tony Lowe, and Tony Puxty (1989): *Critical Perspectives in Management Control*, London, Macmillan Press ltd.

Cohen, M., March, J. and Olsen, J: (1972): "A Garbage Can Model of Organizational Choice", *Administrative Science Quarterly*, March, pp.1-25.

Cooper, D. J., David Hayes, and Frank Wolf (1981): "Accounting in Organized Anarchies: Understanding and Designing Accounting System in Ambiguous Situations", *Accounting, Organizations and Society*, Vol. 6, No. 3, pp. 175-191.

Flamholtz, Eric G. (1983): "Accounting, Budgeting and Control Systems in Their Organizational Context: Theoretical and Empirical Perspectives", *Accounting, Organizations and Society*, 8, 2/3, pp. 153-169.

Georgiou, Petro (1973): "The Goal Paradigm and Notes Toward a Counter Paradigm", *Administrative Science Quarterly*, pp. 291-310.

Gibson, J. E. (1981): *Managing Research and Development*, New York, John Wiley & Sons.

Giglioni, G. B., and A. G. Bedeian (1974): "A Conspectus of Management Control Theory: 1900-1972", *Academy of Management Journal*, Vol. 17, No.2, pp. 292-305.

Hopwood, Anthony G. (1974): *Accounting and Human Behaviour*, Haymarket, London.

Jain R. K., and H. C. Triandis (1990): *Management of Research and Development Organisations: Managing the Unmanageable*, John Wiley & Sons, New York.

Jaworsky, B. J. (1988): “Toward a Theory of Marketing Control: Environmental Context, Control Types, and Consequences”, *Journal of Marketing*, Vol 52, July, pp. 23-39.

Lebas, Michel, J. Weigenstein (1986): “Management Control: The Roles of Rules, Markets and Culture, *Journal of Management Studies*, 23, 3, May, pp. 259-272.

Lindblom, Charles E. (1959): "The Science of Muddling Through", *Public Administration Review*, 19, No. 2, pp. 78-88.

Merchant, K. A. (1985): "Organizational Controls and Discretionary Program Decision Making: A Field Study", *Accounting, Organizations and Society*, Vol.10, pp. 67-85.

Ouchi, W. G (1979): "A Conceptual Framework for the Design of Organizational Control Mechanisms", *Management Science*, pp. 833-848.

Place, Geoffrey (1977): "National Policies for Science & Technology-Needed-More Intuitive Applied Research", *Research Management*, November, pp. 19-23.

Root-Bernstein, R. S. (1989): "Strategies of Research", Research Technology Management, May-June, pp. 36-41.

Silaen, P. & Williams, R. B. (2007). Management control systems framework for R & D organisation: a new approach. *7th Global Conference on Business & Economics*, pp. 1-31, Lynchburg, VA: Association for Business and Economics Research. This paper can also be accessed by visiting http://ro.uow.edu.au/commpapers/404

Tatikonda, Mohan V and S. R. Rosenthal (2000): “Successful Execution of Product Development Projects: Balancing Firmness and Flexibility in the Innovation Process”, *Journal of Operation Management*, 18, pp. 401-425.

Twiss, Brian (1992): *Managing Technological Innovation*, 4th. Edition, Pitman.