

Implementation of Modified Maturity Level Measurement Model for AI1 COBIT Framework

(Case Study : IT Management Audit of PT.POS Indonesia)

Falahah
Faculty of Engineering
Widyatama University
Bandung, Indonesia
falahah@widyatama.ac.id

Abstract— *CobiT4* provide a framework to evaluate the performance of IT management by using some control objective, method and standard maturity measurement [1]. Assessing maturity level is usually a first step to start audit process in an organization. Maturity Level adjustment can be a significant input to improve the process. *CobiT4* has provide some maturity level characteristic for assess the existing condition in an organization, but in facts, there were some constraints to map existing condition into one exact score of maturity level measurement. Pederiva[2] proposed some approach to modify the maturity level measurement method which is more realistic approach for mapping the existing condition to some maturity level characteristics. The modified method for maturity level assessment then implemented on audit process at PT.Pos Indonesia using *CobiT4* Framework. During the audit process, site visit, interview and questionnaire were using to collect data directly from all stakeholders. The scope of audit was limited into one control objective from *CobiT4* framework, AI1, Identify Automated Solution. The audit results provide more realistic score for maturity level adjustment which are derived from fact finding and can express some real existing condition. Analysis from fact finding also can give some recommendation for improve IT resource management, especially on AI1 Control Objective scope.

Keywords—Battery; Electric Machine; Power

I. INTRODUCTION

PT.Pos Indonesia as the company which provides postal services within national wide networking. The IT support has been implemented since 1994 and since 1995 PT.Pos Indonesia had became national internet provider.

The IT management function at PT.Pos Indonesia has developed some system and technology solution to support their business process. Since 2004, PT.POS INDONESIA has established official IT Strategic Plan as main reference for all IT activity.

Recently, management PT.POS INDONESIA realized the importance of IT resource. The management needs significant input to improve the IT services. It needs audit activities to assess current condition of IT resource management and to give some recommendation for future improvement.

II. AUDIT METHODOLOGY

A. *CobiT4* Framework, AI1: Identify Automatic Solution

CobiT4 is one of well accepted and standardized method for audit IT related subject. The *CobiT4* framework consists of some control objective which addresses specific issue in IT. One of control objective which select as focus on this research is Item AI1, identification automatic solution.

Control Objective AI1 consists of some prerequisite process which need to be done for acquire new application or function. The process include requirement definition, evaluate alternative resource, study economic and technology feasibility, risk and cost-benefit analysis, and make or buy decision. The main objective of AI1 control is to monitor the process of identify automated solution and business control to be an automated solution design with focused on identify technical feasibility and cost effective solution. This objective can be reach by :

- Identify business and technical requirement
- Do feasibility study as development standard method
- Approve or reject the result and recommendation from feasibility study

Control Objective AI1 then can breakdown into detail objective, which are :

- AI1.1 Definition and Maintenance of Business Functional and Technical Requirements
- AI1.2 Risk Analysis Report
- AI1.3 Feasibility Study and Formulation of Alternative Courses of Action
- AI1.4 Requirements and Feasibility Decision and Approval

AI1 needs input from the others control objectives such as: PO1,PO3, PO8,PO10, DS1 and DS3. PO has strong relation with planning and organization, and DS include delivery and services. The result of this process is business requirement feasibility study report.

Implementation of this method can be done by collecting data from stakeholders, using interview or

questionnaire. To identify the data resource, we can use RACI matrix to determine the process and stakeholder of each process.

Activities	Functions											
	CEO	CFO	Business Executive	COO	Business Process Owner	Head Operations	Chief Architect	Head Development	Head IT Administration	PMO	Compliance, Audit, Risk, and Security	
Define business functional and technical requirements.			C	C	R	C	R	R			A/R	I
Establish processes for integrity/currency of requirements.				C		C		C			A/R	C
Identify, document and analyse business process risk.			A/R	R	R	R	C	R			R	C
Conduct a feasibility study/impact assessment in respect of implementing proposed business requirements.			A/R	R	R	C	C	C			R	C
Assess IT operational benefits of proposed solutions.		I	R	A/R	R	I	I	I			R	
Assess business benefits of proposed solutions.			A/R	R	R	C	C	C	I		R	
Develop a requirements approval process.			C	A		C	C	C			R	C
Approve and sign off on solutions proposed.		C	A/R	R	R	C	C	C	I		R	C

Figure I. RACI Matrix for AII.Identify Automatic Solution[1]

Result of assessment then can be mapped into some indicator to measure the process performance. CobiT4 has established some tools to measure the IT management which divide into activity objective, process objective, key goal indicator, and key performance indicator. Also, the characteristic of each process can be map into numeric scale Maturity Model to show how far the current process fit with some phase on improvement process.

B. Maturity Model

Maturity model usually can be used as measurement tools to assess the goal achievement or level of quality achievement of some activities. Usually, maturity model consists of some level, which is each level can be determine by some characteristic. The higher level the better achievement we already done.

In CobiT4, the maturity model is used to measure the quality of a process based on its control objective. The result that has been mapping into specific maturity level can give us significant information about recent condition, and also expected condition. The difference between recent maturity level achievement and expected maturity level, known as gap analysis, can be use as significant base for improvement strategy.

The Maturity Level Model in CobiT4 consists of 6 stages, which is:

- 0: Non-Existent
- 1: Initial /Ad Hoc
- 2: Repeatable but Intuitive
- 3: Defined Process
- 4: Managed and Measureable
- 5: Optimized

Each level contains some key characteristics which can be map into our assessment result. The characteristic of each level is defined based on the control objective.

C. Modified Maturity Model Measurement

After collecting information using interview or questionnaire, we need to adjust the position of maturity level into certain level. This level is a representation of current performance achievement. To do this, we need to

define the questionnarie set based on characteristic of maturity level.

In some audit process, practically, it is hard to adjust maturity level of audit result into fixed and integer number, because, usually we could not find the condition when all the characteristics of certain level has fit with audit result. For example, sometimes we just could not justify the level of maturity score at 2, because some of audit result show the process is fit for level 3 characteristic, but also, we could not decide the score is 3, because not all the level 3 characteristic has been found in audit result. So, the maturity would vary between some scales. To resolve this problem, Pederiva[2] modified the method for calculate maturity level score so we can justify the maturity of our process into more realistic result. Pederiva has proposed the method to implement modified maturity level measurement as follow:

1. Divide the scale of answer with 4 scale : 1-2-3-4 with weight starting from 0 to 1 (0, 0.33, 0.66, 1), weight show the agreement level to one statement.

TABLE 1. COMPLIANCE VALUE FOR AGREEMENT

Score scale	Agreement with statement	Compliance Value
1	Not at all (N)	0
2	A little (L)	0.33
3	Quite a lot (Q)	0.66
4	Completely (C)	1

2. For each answer that has been chosen by responden, calculated the weight (score).
3. Calculate total score for each answer and find the average (divide by total number the question),as in this example

TABLE 2. CALCULATE AVERAGE SCORE

Maturity Level	Count of statements	Total score compliance values	Average (maturity level compliance value)
0	4	0.99	0.25

4. The average score then compare to all score average for 6 level maturity model, to show the normalized data distribution, then it multiply by maturity model as in this example.

TABLE 3. COMPUTATION OF THE SUMMARY MATURITY LEVEL

Maturity Level (B)	Average (maturity level compliance value) (A)	Normalized Compliance Value (A / sum[A])	Contribution(n omalized x B)
0	0.25	0.08	0
1	0.35	0.13	0.13
...
Total	2.8	1	3.25

The final computation result can expect to show the real representative level of maturity measurement.

III. AUDIT OF CONTROL OBJECTIVE A11 AT PT. POS INDONESIA

The proposed method for calculate maturity level then implemented into audit result of PT.Pos Indonesia. This audit process was limited into specific control objective, A11. These audit activity was held as part of student assignment on Master Degree Program at Informatics Department, Institute Technology Bandung, 2006. Target of audit was limited into assessment of process acquisition and implementation of new solution, systems or technology, that bought or made based on user request and alligned with IT Strategic Plan.

A. Existing Condition of IT Management at PT.Pos Indonesia.

Management of PT.POS INDONESIA implement the concept CPTD to manage their IT Services, CTPD stands for: *collecting, processing, transporting and delivering*. IT function organized and managed by center of Technology Development, consist of 4 units [4]:

- System Technology Development (*Bangsisstek*) : has responsible to develop system technology both made or buy / outsource.
- Virtual Network (*Jarvit*) : has responsible to provide virtual network to access the services.
- System technology control (*Dalsistek*) : has responsible to implement the system and system feasibility testing.
- Data and computation (*Datakom*) : has responsible to manage data and backup.

Some facts finding on IT management process regarding to A11 Control Objective, as the result of this audit process, can summarized as follow:

• IT Strategic Policy

Since 2004, PT.POS INDONESIA has established the IT Strategic Plan (ITSP) to provide the reference for development and management of IT and IS. The formal document is *RSTI/ATI*. This document has clear statement for all the system that would be develop, still develop or already implemented, need to evaluate and map it into IT Strategic Plan by the Technology Manager or Manager *Bangsisstek* or other responsible management. The *RSTI/ATI* document doesn't mentioned explicitly the opportunity or alternative for outsourcing solution. Outsourcing can be done by any stakeholder as long as it had been evaluated by *Bangsisstek*. The evaluation process include the requirement, allignment with standard that had defined on IT Strategic Plan, database, front end, interface and load. Recently, each function in Center of Technology development has their own standardization. IT Strategic Plan has built based on business process and has include some CSF (critical success factor). ITSP also provide a road-map to achieve the ideal position to support the business. ITSP consist of risk management, risk of technology and tranformation. CSF on ITSP also state the management commitment about IT implementation, standardization, future development plan, IT support for business and standardization for interconnectivity[3].

Bangsisstek can support only at about 50% IT requirement. The rest of requirement has not supported

yet for many reason, such as priority, and no standardization from business unit which required the IT services. Usually, the system has develop based on tendency type, seasonal, cyclical, long term and random. To support the solution, PT.POS INDONESIA also purchase some development component such as database, tools for development, and other supported tools, such as Microsoft SQL Server, FireBird, Delphi, and some of operating system.

• Outsourcing Problem

During the audit process, there were two systems that have been developed by vendor and use by PT.Pos Indonesia. These systems has been develop before ITSP founded at 1994 and still develop until year 2004. ITSP does not have the methodology to evaluate the outsource. On ITSP, outsource opportunity has mentioned implicit and only possible in cruisial condition, it caused by assumption that outsourcing is the last alternative.

In some outsourcing cases, PT.Pos Indonesia use standard and procedure that established by government such as 2 times auction, and invited 5 vendor for each auction. When outsourcing systems started at 1997 there were global organization restrukturalization that involved independent management consultant outside from PT.Pos Indonesia. During that time, the process for defining requirement did not involved *Bangsisstek* on vendor proposal evaluation. *Bangsisstek* only has responsible to test the feasibility of system implementation. In some cases, the involvement of *Bangsisstek* to evaluate IT aspect of solution was limited because there was no company policy which state the role of *Bangsisstek* on these process.

After some failure implementation case, finally management had learned some important and valuable lesson such as need to follow some standard development phase (testing of system load before implementation), and evaluate the proposal carefully. As the result, the management then put the statement of manage and evaluate outsource case in ITSP, but still in implicit statement.

B. Audit Process

The process of audit process then started from distribute some questions regarding A11 Maturity Level assessment. For each level, the set of questions had tried to extract some condition based on detail maturity characteristics as describe in tables 4, 5, 6, 7, 8 and 9. Each level consist some questions derived from maturity characteristics reference. The answer for each question then plotted on score range 1 to 4 as follow:

1. Not at all (N)
2. A little (L)
3. Quite a lot (Q)
4. Completely (C)

The score for each maturity level then put into one table (Table 10).

C. Audit Results

As shown on the Table 10, the final score of Maturity Level is 2.57. The adjustment of this score had been

made after analyze the characteristic of level 2 and level 3. If we refer to the level 2 characteristic :

- Some intuitive approach was used to identify existing IT solution and vary in all business sectors.
- Solution was identified informally based on internal experienced and IT function knowledge.
- The success of project depends on some dominant individual experience.
- Document quality and decision making process was vary.
- The unstructured approach has been used to define the business solution requirement and identification.

TABLE 4. MATURITY LEVEL 0 : NON - EXISTENT

No	Statement	1	2	3	4	Score
1	Functional and operational requirement identification does not inquired by organization to develop, implement or modify the solution.	✓				0
2	The organization does not have awareness of the available potential technology solution for the business	✓				0
					
					

TABLE 5. MATURITY LEVEL 1 : INITIAL / AD-HOC

No	Statement	1	2	3	4	Score
1	The organization has the awareness for the needs of requirement definition and identification technology solution			✓		0.66
2	The groups discuss the requirement routinely and informally, sometimes the requirement was documented			✓		0.66
3	The solution has identified individually based on the best market consideration or as a respond to vendor proposal.	✓				0
4	Research and analysis on available technology has done frequently		✓			0.33

TABLE 6. MATURITY LEVEL 2 : REPEATABLE BUT INTUITIVE

No	Statement	1	2	3	4	Score
1	Some intuitive approach was used to identify existing IT solutions and vary in all business sector.		✓			0.33
2	Solution was identified informally and based on internal experienced and IT function knowledge.	✓				0
					
					

TABLE 7. MATURITY LEVEL 3 : DEFINED PROCESS

No	Statement	1	2	3	4	Score
1	There is structured and clear approach to define IT solution.			✓		0.66
2	Approach to define IT solution was considered alternative evaluation to business or user needs, technology opportunity, economical feasibility, risk, risk assessment and others factor.		✓			0.33
					
					

TABLE 8. MATURITY LEVEL 4 : MANAGED AND MEASURABLE

No	Statement	1	2	3	4	Score
1	Methodology for identify and assessment of IT solution already established and implemented in almost IT Project		✓			0.33
2	Good quality project documentation is available and there was suitable approval process for each stage		✓			0.33
3	Requirements are state clearly and in structured format.		✓			0.33
					
					

TABLE 9. MATURITY LEVEL 5 : OPTIMIZED

No	Statement	1	2	3	4	Score
1	Method for identify and assess of IT solution are directed into continuous improvement	✓				0
2	Method for acquisition and implementation are flexible for some project scale, start for small scale into big project scale.	✓				0
					
					
6	Management could detected and take some action if IT solution is approved without considering alternative technology or business function requirements	✓				0

TABLE 10. SUMMARIZED MATURITY LEVEL ASSESSMENT

Maturity Level	Average	Normalization	Contribution
0 Non-Existent	0.00	0.00	0.00
1 Initial / Ad-Hoc	0.41	0.28	0.28
2 Repeatable but Intuitive	0.13	0.09	0.18
3 Defined Process	0.58	0.40	1.20
4 Managed and Measurable	0.33	0.23	0.91
5 Optimized	0.00	0.00	0.00
Total	1.45	1.00	2.57

Based on the list of level 2 characteristic, it can be recognized that some characteristics did not satisfy enough. The score 2.57 show that the maturity level tend to reach 3. It can be recognized by some efforts such as standardization and refer to *RSTI/ATI* on solution development. Some facts which are fit with the level 2 such as:

1. Requirement identification usually defined by *Bangsistek*, and also refer to *RSTI*. After prototype of solution was developed, the new solution then tested and evaluated with user, which means that not all user can understand their requirements and the initiative of requirement not always come from user. Solution identification was highly dependent into intuitive and internal experienced, and knowledge of IT function on user's business process.
2. Final decision is taken by Head of *Pusbangtek*, refer to *RSTI* and some input from some stakeholders, but there was no structured documentation for all solution identification stage and decision making process.

3. *RSTI/ATI* is not provide structured approach to define the requirement, but only suitable solution outline that should available, scale of priority and commitment of management. Development methodology was done by common process and highly dependent on IT function experience.
4. There are some facts which are alignment with level 3 of Maturity Model, such as there is alternative recommendation and evaluation for business solution and user's need, which can include economic considering, scale of priority, risk analysis, and other factors involved the decision making process.

Based on analysis of existing situation and Maturity level assesment, the audit result finally can summarized some significant facts which are important for future improvement, such as:

1. Strategic Planning Guide

PT.Pos Indonesia had formal document as reference to define solution. The document guide just implemented for 2 years and maybe not all content has been implemented well. The guide maybe not well understanding by other management outside of IT function, so it needs more socialization.

2. Requirement Identification Methodology

IT function of PT.Pos Indonesia does not have standard methodology to define the requirements. Requirements usually identified by intuition of IT function or analysis of user's business need.

3. Standard Methodology for Solution Acquisition

There is no guide document which provided standard methodology for solution acquisition, both solution developed internally by IT function or by outsourcing. *RSTI* document is not state separated policy for the two sides of development resources (internal and external).

4. Cost and Benefit Analysis for Each Solution

The cost and benefit analysis for each decided solution never made carefully. The reason for decision making mostly based on management intuition and IT function consideration. The decision was not included analysis to assess the benefit of system for user's business function in measurable characteristic. The solutions also usually not include cost consideration because the cost was handled by user. In business process expansion case (PT Pos Indonesia had develop partnership with some stakeholder to improve services spectrum, such as banks, universities and so on), the cost of system solution was handled by third parties. If the user is internal department of PT.Pos Indonesia, the cost could be accumulated as company cost of IT solution.

5. Documentation Quality and Procedure Standard

Although there is a standard documents requirement guide on IT solution development but in a practice it is not always completely done. The documents are provided for IT solution mainly consists of user interface or user manual. The specification of system might be not well documented because of the main initiative is started from IT function. The IT function

also provided some standard procedures for IT solution development such as load testing and risk analysis. In some cases (though in small portion), sometimes the procedure not well implemented for some reason, for example short development time, high priority solution, and limited budget.

6. Feasibility Study

The feasibility studies are never done before. There were also no intensive analysis about alternative solution regarding efficiency and effectiveness of management, risk analysis, cost and benefit, and technology alignment analysis with business requirement.

7. Outsource Opportunity

There is no document which state clear explanation about possibility to use outsource as solution provider. It might be caused by management and IT function vision which state that the solution should can be provided internally and also it has relation with their bad experience on failed outsourcing project. The depth interview uncover that the cause of failed past outsourcing project was lead by no suitable guide for outsourcing and no standard procedure for outsourcing process. The fail were common and could predicted from the beginning process if the management had clear understanding about risk and benefit of outsourcing.

D. Recommendations

Audit result then proposed some recommendations for management, especially for Automatic Solution Identification process (control objective A11), such as:

1. Review and improve *RSTI/ATI*, adjust it with system requirement improvement both external and internal (refer to recent business opportunity)
2. Establish the standard methodology of solution identification process so it can understandable and executable by IT functions and users.
3. Externalization and socialization the methodology and provide user to self identified the needs so this process can validated from beginning and it can improve the user awareness regarding system contribution to user's business process.
4. Provide detail guide, which can separated from *RSTI* document, which provided some standard procedure such as :
 - a. The standard formatted documentations that should available on IT project solution.
 - b. The procedures that should executed with risk and consequences.
 - c. Evaluation mechanism and approval requirement for each stage on solution decision making process.
5. For each solution which is will choose, it needs feasibility studies included technology feasibility, economic, cost and benefit analysis, and potential risk. Feasibility study should

include some alternative course of actions for management.

IV. CONCLUSION

Maturity model measurement for assessment IT Management using COBIT4 Framework could implemented with some modified measurement tools. The modify process was done regarding the facts that it was hard to find an organization or company fulfilled exact score for each maturity level, according to characteristics alignment for each level. The model which was proposed by Pederiva[2], provided the more suitable measurement method to assist maturity level based on normalization and weighted score approach. This model then was used to assess maturity level for AII control objective from COBIT4 Framework, and implemented on Audit process at PT.POS Indonesia. Some results can conclude from this are:

1. The assessment of maturity level for AII control objective using modified model could express more real result based on facts finding on daily business process.
2. The final score derived from audit process show that the organization was on level 2.57, which was in the middle of level 2 : Repeatable but intuitive, and level 3 : Defined Process. It was supported by facts finding that there were some initiatives had been established such as availability of guide for IS/IT Strategic Planning and standard procedure. But it was not implemented consistently in some case and needs to improve.
3. The audit process also produced some recommendation for management to enhance the IT management process and control, especially in control objective AII, Automatic Solution Identification, which were derived from fact finding. The recommendation expected could give significant improvement for quality of IT resource management in PT.POS Indonesia.

To get more representative result, it needs more intensive research which included some enhancement on method or questioner tools so it can express more realistic result.

II. REFERENCE

- [1] ITGI, "*CobiT 4 : Control Objective, Management Guidelines, Maturity Model*", December 2005, www.isaca.org/cobit
- [2] Pederiva, Andrae, "*The COBIT Maturity Model in a Vendor Evaluation Case*", Information System Control Journal, Volume 3, 2003, www.isaca.org/Journal/Past-Issues
- [3] PT.Pos Indonesia, "*RSTI/ATI*", Internal Official Document, 2004.
- [4] PT.Pos Indonesia, "*Organization Function and Role*", Internal Official Document, 2005.