AUDIT IT DIVISION IN MAINTENANCE PROCESS INTERNAL SYSTEM PT JAMKRIDA BALI MANDARA WITH FRAMEWORK SOFTWARE MAINTENANCE MATURITY MODEL (SMMM)

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Abstract - PT Jamkrida Bali Mandara is a credit guarantee institution owned by Bali Province which operates PT Jamkrida Bali Mandara operational company utilizing Management Information System and in developing and maintenace this system company is assisted by some IT staff and vendor. The process of maintenance of existing systems required an assessment of the performance of IT division. This assessment is done through audit method using Maintenance Maturity Model (SMmm) software framework. Based on the results of the audi obtained the highest level of capability is 3.7 in the domain domain maintenance training and the lowest level capability value is 2.03 in domain domain maintenance process / service definition and maintenace process performance

Keywords: Software Maintenance Maturity Model, Maintenace System and Capability Level

I. INTRODUCTION

PT Jamkrida Bali Mandara is a credit guarantee institution owned by Bali Province. In the operational implementation of PT Jamkrida Bali Mandara company utilizes Management Information System and in developing and maintenace this system company is assisted by some IT staff and vendor.

The services and products available from vendors are expected to be of the highest quality and cost as small as possible and with support services to face competition. To meet this need, PT Jamkrida Bali Mnadara's IT Staff faces two challenges: having the ability to develop and maintain software to meet the needs of all staff and must have access to software to support the company's business processes. Both software perspectives (external and internal) must be reliable and well maintained. Maintenance software in an organization is not an easy task and requires a management system for software maintenance. Adequate systems for software maintenance must meet a number of needs (enterprise service criteria and domain technical criteria), as well as maximize strategic impact and optimize the cost of software maintenance activities. This requires that PT Jamkrida Bali Mandara is committed to continuously improve the software maintenance process.

Based on this problem it is necessary to audit the division of IT in the process of maintaining the company's internal system by using the Software Maintenance Maturity Model framework. Through the audit process can be known the quality of the maintenance process undertaken and based on the lack of audit results it will be able to be improved through the recommendations of the audit results provided.

II. THEORETICAL BASIS

The framework used in the process of auditing the internal information system of PT Jamkrida is Software Maintenance Mturity Model (SMmm). Some explanations of this framework are as follows.

2.1 Software Maintenance Maturity Model (SMMM)

SMMM is handling and repairing software maintenance functions by proposing improvements to software maintenance standards and introducing the proposed maturity model for software maintenance activities per day. The software maintenance function includes a management model to facilitate ongoing evaluation, management and improvement. SMMM handles maintenance activities. This model is designed to be used as a complement and addition to the previous model. SMmm is based on practitioners' experiences, international standards, and software maintenance literature so as to present the objectives, scope, foundation, and architecture models, followed by initial validation.

The SMMM framework consists of 4 Domain Processes, 18 KPA (Key Process Access), 74 Roadmaps. Some KPA (Key Process Access) are unique and some are derived from CMMi models that have been modified to be mapped.

Roadmap is a series of related processes that focus on the area of organization or needs, or certain

elements in the software maintenance process. Each roadmap demonstrates significant capabilities for the software maintenance organization. In the given roadmap, process levels are based on their respective maturity levels.

2.2 Capability Level SMMM

SMMM uses continuous representation, as it may work: a) in accordance with SPICE recommendations; b) get a more detailed ranking for each roadmap and domain; and c) identifying specific practices at the maturity level and identifying their path from Level 0 (none) to a higher maturity level. SMmm is also based on the roadmap concept. Roadmap is a series of related processes that focus on the area of organization or needs, or certain elements in the software maintenance process. Each roadmap demonstrates significant capabilities for the software maintenance organization. In the given roadmap, process levels are based on their respective maturity levels. The most basic processes are at a lower level, while the most advanced are at a higher level. The organization will mature through the roadmap level. Low-level processes should be implemented and maintained at high-level processes to achieve maximum effectiveness. Each of the six levels of maturity can be characterized, in SMmm, as follows.

Table 1 Capability Level

Level	Level Name	Risks
0	Incomplete	Highest
1	Performed	Very High
2	Managed	High
3	Established	Medium
4	Predictable	Low
5	Optimizing	Very Low

III. RESEARCH METHODOLOGY

The stages performed in the audit process of PT Jamkrida Bali Mandara are as follows

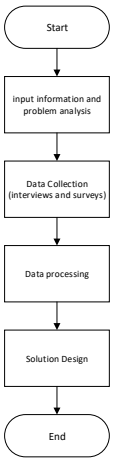

Figure 1 Flowchart Audit Process Maintenance System

1. Information Summary and Problem Analysis
   In this research will be focused on the IT division audit process in the process of maintenace system so that it can be evaluated on the performance of IT division of PT Jamkrida Bali Mandara in performing the internal company maintenance process.
2. Determination of Domain Software Maintenance Maturity Model
   Some domains used in the audit process in this study are as follows

Tabel 2 Domain Software Maintenance Maturity Model

Process Domain	Key Process Area	Roadmap
SM1 Software Maintenance Process Management	SM1001 Maintenace Process Focus	SM10011 Responsibility and Communications
		SM10013 Action plan
	SM1002 Maintenance Process / Service Definition	SM10021 Documentation and standarization of process / services
		SM10023 Repository processes / service
		SM10025 Requirements, plans and resources
	SM1003 Maintenace Training	SM10031 Personal training

		SM10034 User training
		SM10032 Initial training of newcomers
	SM1004 Maintenace Process Performance	SM10041 Definition of maintenance measures
		SM10043 Quantitative Management
		SM10044 Prediction Models
SM2 Software Maintenance Request (MR) Management	SM2002 Monitoring and control of service request and events	SM20021 Follow up on planned and approved activities
		SM20022 Review and analyze progress
		SM20023 Urgent changes and corrective measures
SM3 Software Evolution Enginering	SM3001 Software Transition	SM30011 Developer and owner invoivement and comunication
		SM30012 Transition process surveillance and management
		SM30013 Training and knowlege transfer surveillance
	SM3003 Software Evolution and Correction	SM30031 Detail Deasain
		SM30034 Documentation
		SM30033 Testing (unit, integration, regression)

3. Data Collection

Information gathering was done in three ways, namely questionnaire method, interview and observation method. Interviews were conducted with three people, one head of HR, General and IT and two PT Jamkrida Bali Mandara IT staff. While the questionnaire method is given to ten different people, which includes

a. Head of credit guarantee division
b. Head of the non-credit guarantee division
c. Head of finance
d. Staff of credit guarantee
e. Staff of the non-credit guarantee division
f. Supervisor
g. Subrogation staff
h. Staff claims
i. Accounting Staff
j. Financial staff

Observation method is done by checking all document completeness related to system maintenance process. Some examples of interview questions are as follows.

a. The extent to which the maintenance process has been done by the vendor
b. Is there an urgent maintenance process that needs to be done by the vendor and how the vendor responds
c. How to communicate between PT JBM with vendor in system maintenance process
d. Does the IT division have documentation about system development and how far has been done by the vendor
e. Does IT division have follow up to vendor about system maintenance process PT JBM

f. The extent to which the responsibility of IT in providing maintenance to the internal system of PT JBM
g. How to plan the maintenance process to be done on JBM internal system
h. Does the IT division ever expose the requirements, plans and resources to be implemented
i. Has there been any qualitative assessment of the IT division of management
j. Has the IT division ever explained the system design model to be built

Some examples of questionnaire questions are as follows.

a. Has the IT Division ever communicated the system development process to the user
b. Has the IT division ever explained about the business process of PT JBM internal system
c. Has IT division ever transfer knowledge to PT JBM staff
d. Is the internal system of PT JBM is in accordance with the standardization of OJK
e. Has IT ever provided training in the use of PT JBM's internal systems
f. Has the IT division ever provided training in the use of PT JBM's internal systems to new employees
g. Has IT ever done personal training in IT
h. Does the IT division supervise the use of PT JBM's internal systems
i. Has the IT division ever done internal testing of PT Jamkrida Bali Mandara
j. How to manage data recovery system PT Jamkrida Bali Mandara

4. Data processing
   Data processing is done by recapitulating the results of questionnaires and interviews. The result of the recapitulation is then determined the value of maturity level.

5. Recommended Solutions
   Based on the results of data processing it can be determined recommendations that can be given so that it can be a solution for the improvement of IT division in the process of internal system maintenance company

IV. RESULTS AND DISCUSSION

4.1 Results of Audit Process Maintenance Division PT Jamkrida Bali Mandara IT

Based on the results of interviews, questionnaires and observations made related to the process of maintenace division of IT in the management of PT Jamkrida Bali Mandara internal system, it gives the results of the following capability value

Table 3 Results Capability Level Domain Maintenance Process Focus

No	SM1001	0	1	2	3	4	5	Capability Level
1	Responsibility and Communications				3	7		2.7
2	Action Plan				2	1		2.3
Rata - Rata								**2.5**

In table 3 there are two road maps that are tested, namely responsibility and comunication and acction plan. The responssibilty and comunication roadmap has a capability level of 2.7, which is obtained through a questionnaire of 10 responses. Roadmap action plan has value 2.3 where this value is obtained from the interviews of 3 respondents. Based on the capability level of the two roadmaps, the average of 2.5 means that the maintenance focus process has been managed and determined precisely and controlled.

Table 4 Results Capability Level Domain Maintenance Process / Service Definition

No	SM1002	0	1	2	3	4	5	Capability Level
1	Documentation and standarization of process / services		1	9				1.9
2	Repository processes / service			1	2			2.6
3	Requirements, plans and resources		1	2				1.6
Rata - Rata								**2.03**

In table 4 there are three road maps tested: documentation and standarization of process / services, repository processes / services and requirements, plans and resources. The documentation and standarization of process / service roadmap has a capability level of 1.9 which is obtained through a questionnaire of 10 responses. Roadmap repository processes / services have a value of 2.6 which is where this value obtained from interviews of 3 respondents. Roadmap requirements, plans and resources have a value of 1.6 which is where the value is obtained from interviews of 3 respondents. Based on the capability level of three roadmaps, the average of 2.03 means that the maintenance process / service definition has been managed and determined precisely and controlled.

Table 5 Results Capability Level Domain Maintenace Training

No	SM1003	0	1	2	3	4	5	Capability Level
1	Personal training				2	8		3.8
2	User training				4	6		3.6
3	Initial training of newcomers				3	7		3.7
Rata - Rata								**3.7**

In table 5 there are three road maps tested: personal training, user training and initial training of newcomers. On the personal training roadmap has a capability level of 3.8 which is obtained through questionnaires of 10 respondents. Roadmap user training has a value of 3.6 which where this value is obtained from the results of questionnaires to 10 respondents. The initial training roadmap of newcomers has a value of 3.7 which is obtained from the questionnaire of 10 respondents. Based on the capability level of three roadmaps, it is obtained an average of 3.7 which means that maintenance training has been implemented using a defined process and has been able to achieve results in each process

Table 6 Results Capability Level Domain Maintenace Process Performance

No	SM1004	0	1	2	3	4	5	Capability Level
1	Definition of maintenance measures		2	1				1.3
2	Quantitative Management			2	1			2.3
3	Prediction Models			5	5			2.5
Rata - Rata								**2.03**

In table 6 there are three road maps tested that are definition of maintenance measures, quantitative management and prediction models. The roadmap definition of maintenance measures has a capability

level of 1.3 which is obtained through interviews of 3 respondents. The quantitative roadmap has a value of 2.3 in which this value is obtained from interviews against 3 respondents. Roadmap prediction models has a value of 2.5 which is obtained from the questionnaire results of 10 respondents. Based on the capability level of three roadmaps, it is obtained an average of 2.03 which means that the maintenance of the performance process has been managed and determined precisely and controlled.

Table 7 Results Capability Level Domain Monitoring and Control of Service Request and Events

No	SM2002	0	1	2	3	4	5	Capability Level
1	Follow up on planned and approved activities		2	1				1.3
2	Review and analyze progress				3			3
3	Urgent changes and corrective measures			3				2
Rata - Rata								**2.1**

In table 7 there are three road maps tested: follow up on planned and approved activities, review and analyze progress and urgent changes and corrective measures. On the roadmap follow up on planned and approved activities has a capability level of 1.3 which is obtained through interviews of 3 respondents. The roadmap review and analyze progress has a value of 3 in which this value is derived from the results interviews on 3 respondents. Roadmap urgent changes and corrective measures have a value of 2 where this value is obtained from interviews from 3 respondents. Based on the capability level of three roadmaps, the average of 2.1 means that monitoring and control of service requests and events has been properly managed and controlled.

Table 8 Results Capability Level Domain Software Transition

No	SM3001	0	1	2	3	4	5	Capability Level
1	Developer and owner invoivement and comunication			3	7			2.7
2	Transition process surveillance and management			5	5			2.5
3	Training and knowledge transfer surveillance				4	6		3.6
Rata - Rata								**2.9**

In table 8 there are three road maps tested: developer and owner invoivement and comunication, transition process surveillance and management and training and knowledge transfer surveillance. In the roadmap the developer and owner invoivement and comunication has a capability level of 2.7 which is obtained through questionnaires from 10 respondents. Roadmap transition process surveillance and management has a value of 2.7 which is where the value is obtained from the questionnaire to 10 respondents. Roadmap training and knowledge has a value of 3.6 where this value is obtained from the questionnaire of 10 respondents. Based on the capability level of three roadmaps, an average of 2.9 indicates that monitoring and control of service requests and events have been properly managed and controlled.

Table 9 Results Capability Level Domain Software Evolution and Correction

No	SM3003	0	1	2	3	4	5	Capability Level
1	Detail Desain			2	1			2.3
2	Document				3			3
3	Testing (unit, integration, regression)			3	7			2.7
Rata - Rata								**2.6**

In table 9 there are three road maps tested, namely design, document and testing (unit, integration regression). In detail roadmap design has a capability level value of 2.3 which where this value is obtained through interviews of 3 respondents. Roadmap document has a value of 3 which where this value is obtained from the questionnaire to 3 respondents. Roadmap testing (unit, integration, regression) has a value of 2.7 in which this value is obtained from the questionnaire of 10 respondents. Based on the capability level of three roadmaps, the average of 2.6 means that the evolution and correction software has been properly managed and controlled.

Table 10 Recapitulation of Maturity Index

No	Key Process Area	Capability Level	Expected	Gaps
1	SM1001 Maintenace Process Focus	2.5	4	1.5
2	SM1002 Maintenance Process / Service Definition	2.03	4	1.97
3	SM1003 Maintenace Training	3.7	4	0.3
4	SM1004 Maintenace Process Performance	2.03	4	1.97
5	SM2002 Monitoring and control of service request and events	2.1	4	1.9
6	SM3001 Software Transition	2.9	4	1.1
7	SMSoftware Evolution and Correction	2.6	4	1.4

Table 10 is a recapitulation of maturity index where the index value of expected maturity is 4. Based on the results of analysis from several domains obtained that the lowest gap value is in the maintenance training, this is because IT division of PT Jamkrida Bali Mandara routinely perform maintenance training to the user. The highest gap value is in maintenance process / service definition and maintenance service performance, this is because IT division never explained about running business system process.

4.2 Recommendations Improvement

1. SM1001 Maintenance Process Focus is still at level 2-Managed, so the recommendations that can be given are as follows.
   a. The IT division should always communicate any system that will be developed to the related divisions that will use the internal JBM system
2. SM1002 Maintenance Process / Service Definitio is still at level 1-Performed, so some recommendations that can be given are as follows
   a. The IT division should have documentation on the development - the system development that has been and will be implemented
   b. PT JBM internal system must be adjusted to the standardization of OJK
3. SM1003 Maintenance Training is at level 3-Established, so the recommendations that can be given are as follows
   a. The training process for PT JBM staff should always be scheduled every year, especially when new staff are added and new features are developed in the system
   b. Preparation of the manual book should be routinely implemented when the addition of new features
4. SM1004 Maintenace Process Performance is at level 1-Performed, so the recommendations that can be given are as follows
   a. IT Division should perform data collection on features that are still experiencing problems and not in accordance with OJK standardization, especially in report management
5. SM2002 Monitoring and control of service requests and events are at level 2-Managed, so recommendations can be given as follows
   a. The IT division should always follow up vendors regarding the maintenace process that is being done by the vendor
   b. The IT division should document all maintenance processes that have been done and have not been done by the vendor

6. SM3001 Software Transition is at level 2-Managed, so some recommendations that can be given are as follows
    a. IT Division must arrange communication schedule with vendor related to maintenance process which is being done by vendor
    b. Transfer of knowledge to other staff is required so that the maintenance process is only centered on the head of IT division
7. SM1004 Software Evolution and Correction is at level 2-Managed, so recommendations can be given as follows.
    a. IT Division needs to make detailed design of business process flow system of PT Jamkrida Bali Mandara system so it will facilitate system development

V. CONCLUSION

Based on the above explanation then some conclusions obtained are as follows.

1. The highest level of capability obtained is 3.7 in the domain of maintenance training, this is because the IT Division has been routinely doing training to the user in peggunaan internal system of PT Jamkrida Bali Mandara
2. The lowest capability value obtained is 2.03 that is in the domain of maintenance process / service definition and maintenace process performance, this is because IT division has never describe about system design to employees of PT Jamkrida Bali Mandara

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