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Establish and Implement PAM and PRM ISO 20000-1:2011

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ABSTRACT

Most enterprises are now using information technology services as their assets to support business objectives. These kind of services are provided by internal service provider (inside enterprise) or external service provider (outside enterprise). To deliver quality information technology services, service provider (which from now on will be called "organization") either internal or external, must have standard for service management system. At present, the standard that is recognized as best practice for service management system for organization is international standard ISO/IEC 20000:2011. The most important part of this international standard is the first part or ISO/IEC 20000-1:2011-Service Management System Requirement, because it contains 22 for organization processes as requirement to be implemented in organizational environment in order to build, manage and deliver quality service to customer. Assessing organization management processes is the first step to implement ISO/IEC 20000:2011 into the organization management processes. This assessment needs Process Assessment Model (PAM) as assessment instrument. PAM comprises two parts: Process Reference Model (PRM) and Measurement Framework (MF). PRM is built by transforming the 22 process of ISO/IEC 20000-1:2011 and MF is based on ISO/IEC 33020. This assessment instrument was designed to assess the capability of service management process in Divisi Teknologi dan Sistem Informasi (Information Systems and Technology Division) as an internal organization of PT Pos Indonesia. The result of this assessment model can be proposed to improve the capability of service management system.

INTRODUCTION

Managing IT service intended to gain business and competitive advantage requires a management approach as a foundation for service delivery [1-2]. Top management has the authority to create policy as a basis for procedure and process of an IT service provider organization [3]. As top management is aware of the important of service management system, the process of integrating service management system standard to the organization's processes can be implemented [4].

Service management system is the only methodology used by various IT organizations to improve the ability of managing service delivery to customer [5-6], ISO 20000 is the only recognized international standard for service management system. ISO 20000 includes information security management system that can maintain service (information) integrity, confidentiality and availability.

Assessing the process is the first step of implementing ISO 20000 and to know the ability of organization's processes to achieve the intended outcomes. An assessment tool is required to conduct an assessment; this tool is designed specifically based on 22 process requirements in ISO 20000-1:2011 and measurement framework in ISO 33000. The result of an assessment can be used by the organization as a basis for decision making to improve the IT services provided by the organization.

LITERATURE REVIEW

Information Technology (IT)

Information Technology (IT) has undergone significant transformation throughout the last few decades [5]. The digital revolution of the 1990s, sparked by the development of the internet, cloud computing, and mobile devices, has changed the way organizations operate and interact with their stakeholders. In addition, artificial intelligence (AI), Internet of Things (IoT), and blockchain technology have taken center stage in recent literature, indicating the direction of continued evolution of information technology.

Information Technology offers a variety of benefits to organizations, including increased operational efficiency, product innovation, and providing added value to customers [6]. In research by Brynjolfsson & McAfee (2014), it was found that companies that adopt information technology well have better financial performance compared to their competitors. However, IT implementation also brings challenges, including data security issues, implementation costs,

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and changes in organizational culture and processes required to support digital transformation. Other articles and studies have highlighted the importance of change management, appropriate investments, and integration strategies to overcome barriers to information technology implementation.

In today's digital era, ethical and security issues in information technology have become a major focus in academic literature and industrial practice. Technological advances such as big data collection, predictive analytics, and real-time data processing, questions arise about privacy, fairness, and responsibility in the use of information. Additionally, security threats such as cyber attacks, identity theft, and malware are increasing, prompting organizations to increase investments and efforts in information security. In response, the literature underscores the importance of policies, regulations, and ethical frameworks in managing and using information technology responsibly.

Service Management System

Service Management System (SMS) refers to a structured approach to planning, providing, managing, and improving services within an organization [7]. According to ITIL (Information Technology Infrastructure Library), one of the most recognized frameworks in IT service management, SMS is the foundation for integrating the best principles in providing effective and efficient services to users. Over time, the literature on SMS has expanded from its initial focus on IT service management (ITSM) to cover a variety of other industries and service sectors, such as financial services management, healthcare, and transportation.

International standards, such as ISO 20000, have become the main reference in SMS development and implementation [8]. ISO 20000, first introduced in 2005, establishes requirements for the establishment, implementation, operation, maintenance and improvement of SMS. Literature related to the implementation of ISO 20000 often emphasizes the importance of process standardization, performance measurement, and a focus on customer satisfaction. Empirical studies also show that organizations that comply with these standards tend to have services that are more consistent, reliable, and responsive to the needs of their business and customers.

Although SMS offers many benefits, including increased operational efficiency, increased customer satisfaction, and enhanced business reputation, the literature also highlights a number of challenges in its implementation. Conboy et al. (2011) highlight several barriers that organizations may face when adopting SMS, such as cultural resistance, lack of resources, and technological complexity. However, with the right approach, training, and commitment from top management, many organizations have successfully overcome these obstacles and implemented effective SMS, creating significant added value for themselves and their customers.

METHOD

The methodology used in this research refers to design research methodology [9] as shown in figure 1. This methodology consists of four stages: (1) research clarification, (2) descriptive study I, (3) prescriptive study, (4) descriptive study II. The first stage describes initial and impact condition of research object based on literature study and assumptions, second stage describes full condition of research object based on empirical study, the third stage describes impact condition of research object and develops support to realize impact condition, the fourth stage is to evaluate the applicability and success of a support.

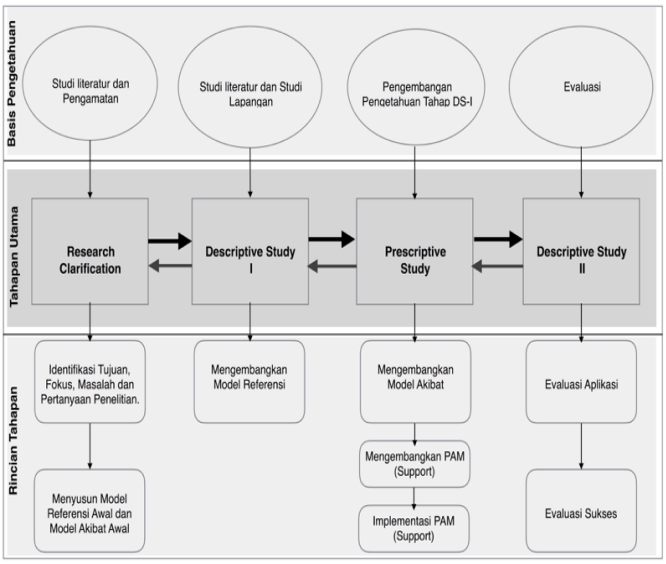

Figure 1. Research methodology [10]

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RESULT

IT Service Management

IT service means service benefits that make customer implement IT services efficiently and effectively to support and execute their business process. Quality of service can be achieved by establishing a service management system that serves to direct and control service management activity from the service provider [11].

IT service management system (ITSMS) itself means the special ability of a service provider to provide value to customer in form of service [12] and [13] integrated processes that make service provider able to provide service according to business demands and customer requirements. Benefits that can be gained from implementing ITSMS include; decision making in order to expand IT infrastructures, clear roles and responsibility of employees and improved coordination among employees.

Information Security

Business information play important role in an organization and therefore an effort to protect information should be a priority. Protecting information focuses on risk that affects the business from the technological perspective because IT has an important role in storing, processing and transmitting information asset [14].

Organization that is aware of the importance of securing information asset is organization that uses information in every process and every level of organizational management, from top level management to entire employee, thus misuse of information can threaten organization business processes.

The main objective of information security is to properly protect information from unauthorized access, use, disclosure, disruption, modification and destruction [15]. Integration between business process and information security is needed for continuous protection of information asset and for service provider to provide secure services to customer.

ISO 27001 is the international standard for information security framework under the control of organizational management. This standard determines the need to build, implement, operate, control, review, maintain and improve information security management system in context of business risk.

ISO/IEC 20000-1:2011 Requirements

ISO 20000 is the most widely used international standard to build service management system which in line with ITIL principle. ITIL was developed and intended to be used for individual own knowledge and certification while ISO 20000 was developed for organization certification. ISO 20000 does not explain specifically how to implement service management system, but it provides requirements to be fulfilled for certification.

ISO 20000 was built in a structure containing nine clauses, the first three clauses describe about scope, application and definitions, the fourth clause describes about the requirements for ITSMS, the fifth clause describes how to design and transition to new or changed service, clause six to nine describe about processes that should be executed and explanation about provision of services, control, problem solving and business relationship. Figure 2 shows 22 process requirements ISO 20000-1:2011.

Service management system ISO 20000 has the characteristic of continual improvement (PDCA) and generic, making it suitable for integration between other management system standards such as ISO 27001 and ISO 9000. Four stages of PDCA are Plan that identifies opportunities for improvement, Do for conducting test of the Plan stage, Check to review and analyze the testing phase and Act to take actions after the review.

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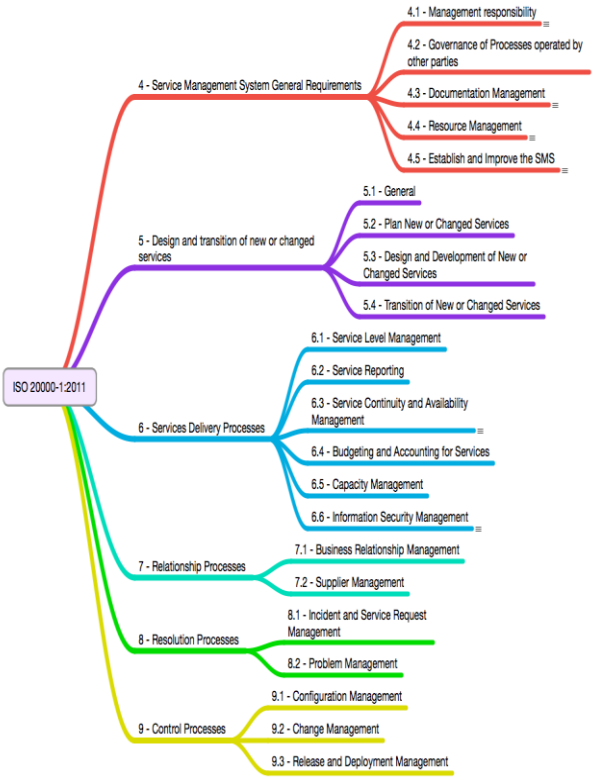

Figure 2. 22 Process requirements ISO 20000-1:2011

ISO/IEC 33000 series

Assessment of a process is important to determine the performance achievement of a process and when necessary improvement can be made. ISO 33000 is an international standard for process assessment, the previous version of ISO 33000 is ISO 15504 or SPICE. The core element model for process assessment is shown in Figure 3. Those elements are process reference model (PRM), process assessment model (PAM) and measurement framework (MF).

Measurement framework for process assessment is a scheme that can be used to provide quantitative assessment of the quality characteristic of a process. Measurement framework consists of capability level, process attribute in which process is being assessed and rating scale that is assigned to each process attribute.

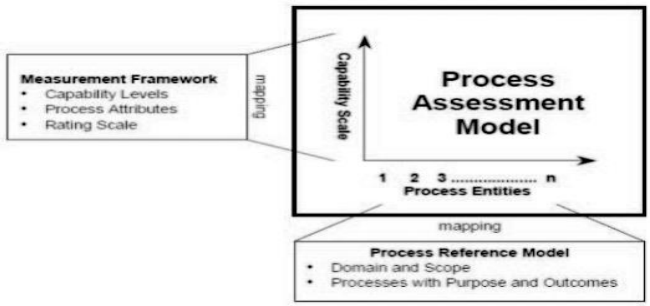

Figure 3. Process assessment model [16]

Process reference model is a model that consists of a set of process definition. Each process definition in PRM must include the purpose statement that describes at high level overall objectives of performing the process, together with the outcomes demonstrating the successful achievements of a process purpose [17].

Process assessment model is a model to assess quality characteristics of a process. PAM consists of measurement framework (capability level, process attribute, and rating scale) and process reference model. PAM assesses the capability of a process. In this research processes in ISO 20000-1:2011 are to be assessed using PAM.

In ISO 33000 capability level consists of 6 capabilities, they are level 0: incomplete process, level 1: performed

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process (2 process attributes), level 2: managed process (2 process attributes), level 3: established process (2 process attributes), level 4: predictable process (2 process attributes) and level 5: innovating process (2 process attributes). Process dimension consists of 22 processes in ISO 20000-1 that will be converted into PRM. Figure 4 shows the concept of PAM used in this research.

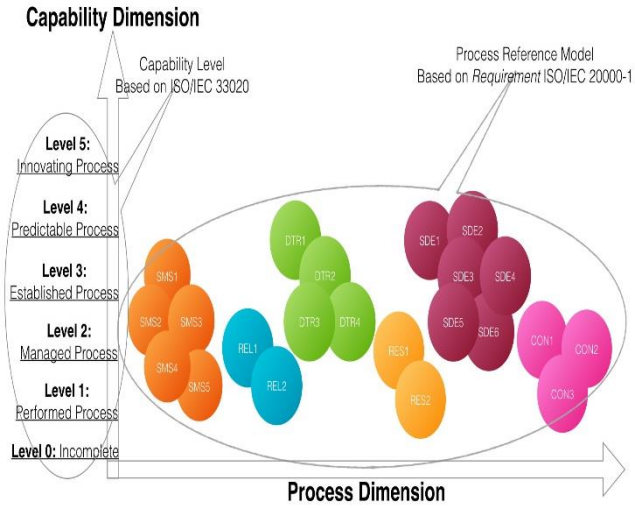

Figure 4. Process Assessment Model concept.

The scales used to assess each process attributes are [18]:

a. N (not achieved): 0-15%
   There is little or no evidence of achievement of the defined process attribute in the assessed process;
b. P- (partially achieved -): >15% - <= 32.5%
   There is some evidence of an approach to, and some achievement of the defined process attribute in the assessed process. Many aspects of achievement of the process attribute may be unpredictable;
c. P+ (partially achieved +): >32.5% - <=50%
   There is some evidence of an approach to, and some achievement of the defined process attribute in the assessed process. Some aspects of achievement of the process attribute may be unpredictable;
d. L-(largely achieved -): >50% - <=67.5%
   There is evidence of a systematic approach to, and significant achievement of the defined process attribute in the assessed process. Many weaknesses related to this process attribute may exist in the assessed process.
e. L+(largely achieved +): >67.5% - <=85%
   There is evidence of a systematic approach to, and significant achievement of the defined process attribute in the assessed process. Some weaknesses related to this process attribute may exist in the assessed process.

A process assessment model conformity with requirements ISO 33004 should include process name, process purpose, process outcomes, base practices and work product input and output. Base practice and work product input and output are used as assessment indicator. As a general rule, the achievement of a given level requires a large achievement of the corresponding process attribute and a full achievement of any lower lying process attribute [19].

DISCUSSION

The process assessment model for capability determination was designed to be implemented at Divisi Teknologi dan Sistem Informasi (Information Systems and Technology Division) as IT service provider for Pos Indonesia. Assessment questionnaire was designed according to process requirement of ISO 20000-1:2011 and delivered to a member of the division that is responsible for service delivery.

Figure 5 and Figure 6 show 22 processes reference that has been measured, only 5 processes achieve the capability level 1 (Largely achieved) namely; SMS 1 (Management responsibility), SMS 3 (Documentation management), SMS 4 (Resource management), DTR 3 (Design and development of new or changed services) and SDE 4 (Budgeting and accounting for services). The remaining processes do not meet the rating requirements to achieve capability level 1.

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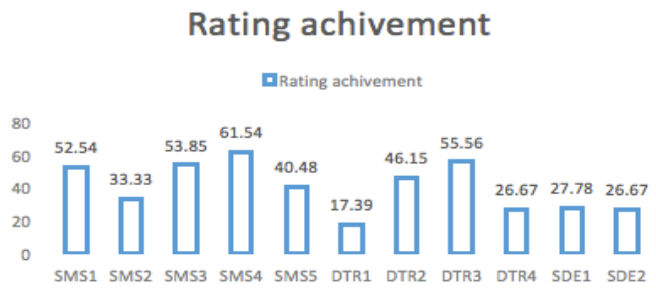

Figure 5. Rating of process capability of 1st 11th processes.

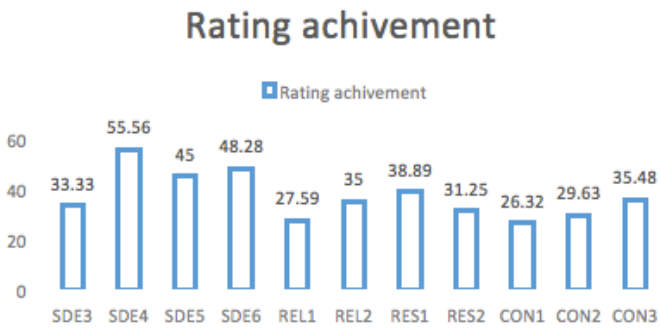

Figure 6. Rating of process capability of 2nd 11th processes.

The result of the assessment carried out shows that all 22 processes does not meet requirements to fully achievement, therefore a process improvement is proposed to increase the process capability level at level 1 as follows:

1. Base practices to be implemented in process SMS 1 are:
   a. Establishing and communicating the scope, policy and objectives for service management;
   b. Ensuring that the service management plan is created, implemented and maintained in order to adhere to the policy, achieve the objectives for service management and fulfil the service requirements;
   c. Communicating the importance of fulfilling service requirements;
   d. Assigning authorities and responsibilities for ensuring that service management processes are designed, implemented and improved in accordance with the policy and objectives for service management;
   e. Ensuring the provision of resources;
   f. Ensuring that risks to services are assessed and managed.
2. Base practices to be implemented in process SMS 2 are:
   a. Ensuring that the contracts or documented agreements with other parties are fulfilled;
   b. Identifying processes or parts of processes operated by other parties;
   c. Demonstrating the authority to enforce adherence to the agreed processes;
   d. Controlling the definition of the processes and interfaces between processes;
   e. Controlling the criteria and enforcing adherence of process performance and requirements;
   f. Controlling the planning of process improvements.
3. Base practices to be implemented in process SMS 3 are:
   a. Ensuring all documents are available as evidence of service management;
   b. Reviewing, updating and protecting the document to ensure visibility of changes in service management process;
   c. Developing and implementing the control of records procedure for effective operation of service management process.
4. Base practices to be implemented in process SMS 4 are:
   a. Identifying and assigning resources to implement, maintain and improve service management process;
   b. Creating procedure to approve the use of agreed resources;
   c. Assigning roles of human resources within the service according to competencies;
   d. Bridging the gap through formal training and education.
5. Base practices to be implemented in process SMS 5 are:
   a. Communicating the scope of services management system within the organization by top management;
   b. Establishing and reviewing the scope of the service management system by service provider and top management;

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c. Communicating the scope of assessment to determine which service will be assessed;
d. Controlling the definition of the processes and interface between process;
e. Communicating the service management plan in order to audit and improve service management system;
f. Planning the service management and determining the objective of the service;
g. Planning and controlling the service management to ensure the effectiveness of the process;
h. Determining the procedure needed to specify the roles and responsibility of service improvement.

6. Base practices to be implemented in process DTR 1 are:
   a. Negotiating the service with the customer to finalize its contents and with the service provider to ensure that the targets are achievable;
   b. Synchronizing activity between change management process and configuration management;
   c. Monitoring and reviewing throughout the design, development and deployment phases of new or changed service project;
   d. Identifying the requirements of new or changed service by the customer or interested parties to fulfil the business needs or affect the improvement.
7. Base practices to be implemented in process DTR 2 are:
   a. Establishing and communicating service level agreement with the customer to finalize its content and goals;
   b. Identifying and managing all the risks associated to the services;
   c. Identifying and documenting the change of services using a change management policy;
   d. Managing and identifying new or changed services;
   e. Communicating all services to the interested parties for reviewing and agreement;
   f. Planning and documenting services for removal.
8. Base practices to be implemented in process DTR 3 are:
   a. Designing new or changed service to meet business and customer requirements;
   b. Assigning roles, responsibilities and authorities involved in the service delivery in such a way that each knows which activities they need to execute;
   c. Preparing a service specification of the new or changed services;
   d. Defining the requirements for service delivery such as people, finance and technology;
   e. Specifying infrastructure and support components to support the design of services;
   f. Controlling and assuring the integrity of new or changed versions of documents;
   g. Developing new or changed service that satisfies the criteria in the service specification.
9. Base practices to be implemented in process DTR 4 are:
   a. Identifying service transition requirements;
   b. Testing and verifying new or changed services according to the service specification before deployment;
   c. Accepting and fulfilling the requirements of new or changed services;
   d. Communicating outcomes of transition of new or changed services to interested parties.
10. Base practices to be implemented in process SDE 1 are:
    a. Identifying service level objectives and utilization characteristics to meet service level targets;
    b. Identifying and documenting all IT services in one or more Service Level Agreement;
    c. Identifying and fulfilling Service Level Agreement with supportive service agreements, supplier contracts and procedure;
    d. Maintaining and reviewing Service Level Agreements regularly with interested parties;
    e. Monitoring service levels to meet the agreed objectives;
    f. Investigating and reporting All Service Level Agreements;
    g. Recording all improvement actions of service level targets.
11. Base practices to be implemented in process SDE 2 are:
    a. Defining and identifying the service report needs;
    b. Defining service report content in terms of service reporting needs and requirements;
    c. Producing service report according to the service report requirements;
    d. Communicating service reports with interested parties;
12. Base practices to be implemented in process SDE 3 are:
    a. Identifying and fulfilling the requirements of service availability and continuity;
    b. Reviewing, in time intervals, the availability and service continuity to ensure that requirements can be meet all the times;
    c. Updating regularly and continually the availability and service continuity plans to ensure they meet the agreed business changes;
    d. Testing and re-testing the availability and service continuity plans after every major change.
13. Base practices to be implemented in process SDE 4 are:

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a. Estimating cost of service provision;
b. Producing budgets using cost estimates to enable effective financial control;
c. Allocating cost according to service and cost centers;
d. Planning cost in appropriate detail including financial control and a basis for decision making;
e. Managing and monitoring budget for effective financial control;
f. Calculating changes of cost and communicate to interested parties.

14. Base practices to be implemented in process SDE 5 are:
    a. Creating and updating capacity plan according to business requirements;
    b. Identifying and applying method, procedure and technique in order to monitor the service capabilities;
    c. Identifying and examining changes in terms of their impact for existing capacity;
    d. Forecasting the influences of technological developments;
    e. Analyzing current service capacity as a basis for decision making for future needs.
15. Base practices to be implemented in process SDE 6 are:
    a. Authorizing an information security policy and communicating it to employee, customer and suppliers;
    b. Using and recording adequate security controls to enforce the requirements of the security policy;
    c. Identifying and establishing the documentation of the security controls to describe the inherent risks and nature of the operation and maintenance of controls;
    d. Defining all arrangement based on formal agreements to meet the security requirements;
    e. Identifying information security risks and assessing that at planned intervals;
    f. Analyzing and reporting the impact of changes on information security;
    g. Identifying the criteria and acceptable level for the assessment of information security risks;
16. Base practices to be implemented in process REL 1 are:
    a. Identifying customer and interested party of the services;
    b. Reviewing and assessing the services changes in terms of service scope, SLAs, contracts and current and projected business needs;
    c. Reviewing and communicating the performance, achievements and events of service and service performance;
    d. Informing and communicating to the customer all major changes of the services in order to respond business needs;
    e. Recording and managing service complaints through their life cycle to closure;
    f. Escalating service complaints which are not resolved through normal channels;
    g. Measuring, analyzing and communicating customer satisfaction and satisfaction analyze result to the customer and interested parties.
17. Base practices to be implemented in process REL 2 are:
    a. Identifying and recording the supplier management and the process of supplier management;
    b. Identifying and communicating scope of services to be delivered by each supplier;
    c. Monitoring supplier obligations to meet service requirements;
    d. Monitoring supplier performance to ensure meet the agreed criteria;
    e. Communicating and recording all roles and relationship between key supplier and contractors.
18. Base practices to be implemented in process RES 1 are:
    a. Recording and classifying incidents and service request with an appropriate priority;
    b. Establishing method for controlling the impacts of all incidents and service request;
    c. Communicating and informing regarding the status of reported incidents and service request to customer;
    d. Authorizing employees involved in the incidents management process and service request process to all relevant information such as known errors, solutions and the Configurations Management Database;
    e. Classifying and providing solutions of major incidents and service request.
19. Base practices to be implemented in process RES 2 are:
    a. Identifying, classifying and recording problems;
    b. Establishing procedure to identify, minimize and prevent the impact of incidents and problems;
    c. Establishing procedures for recording, classification, updating, escalation, resolution and closing of all problems;
    d. Identifying and establishing preventive measure to reduce potential problems such as tracking of trend analysis on incidents volumes;
    e. Communicating problem status and progress of the resolution of the problems to interested parties;
    f. Passing the changes of services to the change management process to be handled.
20. Base practices to be implemented in process CON 1 are:
    a. Identifying configuration item uniquely;
    b. Controlling the changes and release of configuration items in configuration management database;

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c. Recording configuration item status to ensure effective control;
d. Reviewing and auditing to verify the existence of configuration items, checking they are correctly recorded in the configuration management database.

21. Base practices to be implemented in process CON 2 are:
    a. Defining and documenting changes of level of service and infrastructure;
    b. Recording and classifying all request for change, all changes to the services, service components, service requirements, catalogue of services, service level agreements and other documented agreements are recorded and classified;
    c. Determining and establishing procedure for failure in changes so that a change can be reversed by rollback procedure;
    d. Testing and implementing accepted changes in a control manner and introduce in a production environment;
    e. Reviewing and measuring changes after implementation for improvement;
    f. Establishing and controlling authorization and implementation procedure for emergency changes;
    g. Establishing and communicating an implementation schedule of changes and releases, schedule of change containing details and their proposed deployment dates.
22. Base practices to be implemented in process CON 3 are:
    a. Communicating the development of Release Policy with the interested parties for the agreement;
    b. Establishing and communicating Release Plan of services or service components;
    c. Designing releases;
    d. Testing releases in a controlled acceptance test environment prior to deployment;
    e. Deploying all approved releases;

CONCLUSION

Assessment instrument created in this research has been used to assess process capability of Divisi Teknologi dan Sistem Informasi (Information Systems and Technology Division) Pos Indonesia based on process reference ISO 20000-1:2011. The result shows only 5 processes that achieve capability level 1 (largely achieved), the remaining 17 process are still at the level 0.

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