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Assessing The COBIT Maturity Model in Manufacturing Company

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***Abstract*— PT Hema Indonesia is manufacturing company established in 2001 and has continued to grow. Nowadays the company has supported business processes in various companies, such as the use of information systems. The purpose of this research is to get an overview of the performance of information systems in order to determine the extent of maturity level which is currently running, with a few aspects to consider such as effectiveness and, efficiency. Implementing IT Governance, is a challenge to organizations. To ensure IT alignment with business goals use COBIT standard. The analytical tool used is the standard procedure COBIT issued by ISACA. In this paper the method to be used is COBIT 4.1. Coverage of Audit IT Domain are Plan Organize (PO), such as PO4, PO5, PO7 and PO8. The conclusion that can be drawn from the research that has been done is IT Governance at the company has been done, although still run optimally within each IT process contained in the sub domain average on level repeatable but intuitive and defined proses. Result audit of IT Governance based on COBIT in domain PO, average was at 2.4 until 2.9.**

***Index Terms*—Maturity level, PT Hema Indonesia, COBIT 4.1, Delivery Support.**

I. INTRODUCTION

The maturity model that provided by COBIT Management Guidelines has become an important tool to assess the current situation of a firm as well as identification of reasonable important measures readiness of firms to apply good IT governance [1], [2]. Scholars addresses the use of COBIT enables to manage the timeless issue of balancing risk and control in a cost-effective manner [3], [4]. The effective use of IT governance is believed enables to improve the profits, firm competitiveness, market agility, and enlarge market shares. For this reason, all organizations should develop sustainable IT and business strategy [5], [6], [7].

Increasing manufacturing flexibility is a key strategy to improve market responsiveness and dealing with future uncertainty [8]. The article takes a manufacturing firm, PT. Hema Indonesia (PTHI). The firm has applied ISO 27002 Information System Security and combined with COBIT framework. COBIT is abbreviation for Control Objectives for Information and Related Technology, is a standard in IT governance to assist a company in controlling business needs within the enterprise, where business needs include IT activities and emphasize activities to be achieved and controlled effectively [6], [8]. Problems with PTHI are difficulties in production i.e.: ensuring the availability of materials for production, capacity and schedule, estimating the availability of merchandise in accordance with customer demand to perform a quick audit of inventory based on batch number. In IT Department i.e.: Lack of investment and the quality of human resources is still relatively low. Company is using IT for the advancement of their companies. With the application of IT in a company, of course the application of IT is not free from mistakes. Problems that occur on the IT course can be audited by audit information system [9].

Benefits that can be taken from the implementation of technology security system audit is to know the level of readiness and quality of information system security of PTHI [10]. The review of the discussion will only be focused on the Plan and Organize (PO) domain COBIT framework that deals with security, problems and system maintenance i.e.: PO4 is Define the IT Processes, Organization and Relationships, PO5 is Manage IT Investment, PO7 is Manage IT Human Resources and PO8 is Manage Quality [11]. Money and people have long been considered to be assets, but nowadays, many organizations rely on their data to make more informed and effective decisions which help the organizations to achieve their goals. Hence, data needs to be managed seriously [12], [13]. Most of problem management or organizations included IT

process maximises system availability, improves service levels agreements, minimizes costs, and improves customer satisfaction [14]. It is expected that with this audit PTHI gets an idea of how the performance of the application system is already running, given recommendations and input for this company to be better [15]. And to make sure quality in IS/IT requires not only monitoring and management, but also adherence to strict standards by COBIT [16].

II. THEORIES

A. *Overview Manufacture Company*

Previous study by J.F. Andry and B. Sanjaya in manufacturing company [17], results are companies have not evaluated quality satisfaction, documentation has not been carried out in several fields of information technology, procedures and policies have not been taken seriously [18].

The development of the manufacturing and service industries is growing tighter today has led to open competition on a national scale as well international. Every company will always try to do as much as possible improving the quality and quantity of production to continue to gain confidence of its customers [19]. To observe that a company's manufacturing function could do more than simply produce and ship the products. Manufacturing strategy generally refers to exploiting certain properties of the manufacturing function as a competitive weapon. In the literature, manufacturing strategy is seen as that part of the operations management area that focuses on the strategic consequences of investments at the operational level [20]. Corporate governance is an issue that never goes out to continue to be studied businessmen, academics, policy makers, and others. An understanding of corporate governance practices continue to evolve over time. Corporate governance is one interesting phenomenon to be studied in connection with the vigorous publicity about fraud as well as a business slump that occurred as a result of errors made by the executive management [9].

B. *COBIT*

COBIT has had the following major releases: in 1996, the first edition of COBIT was released. In year 1998, the second edition added "Management Guidelines". In early 2000, the third edition was published. In 2003, an on-line version became available. In December 2005, the fourth edition was initially released and in May 2007, the 4.1 revision was released. COBIT framework concentrated on helping to achieve the institutions or managements requirements to present the information, it help to manage and take control the resources of IT/IS by a structured set of processes to supply information technology services that deliver the required information for the institutions [7]. Framework of COBIT 4, presents the 4 (four) domains along with the 34 (thirty four) high-level processes with each process subdividing into many varying activities and the relationship between the processes is brought about through documents and relations [7].

C. *Maturity Level*

Maturity model approach is that it is relatively easy for organizations to place itself on the level and appreciate what is involved if improved achievement is needed. The level includes 0 because it is quite possible that no process exists at all. The 0-5 level is based on a simple maturity level showing how a process evolves from a non-existent performance to an optimized performance [6].

Table 1. COBIT 4.1 Maturity Level Assessment [7], [11]

Level Index	Description
0 – 0,50 Non existents	Company knew nothing about the issue to be solved. Each process or problem is not clearly defined.
0,51 – 1,50 Initial	Company already has proof in identifying existing problems but needs to be directed. There i no standard process and the approach taken is ad-hoc.
1,51 – 2,50 Repeatable but Intuitive	Company has a developed process. There is a procedure to run a defined process; there is no formal training and standard communication procedures.
2,51 – 3,50 Defined	Company already has a standardized and documented procedure. The procedure has been well communicated through formal training.
3,51 – 4,50 Managed	Company monitors and measures the procedures and policies that have been effectively implemented. In the event of errors and irregularities, a series of procedures for corrective actions to be undertaken are already exist.
4,51 – 5,00 Optimized	The conducted process has had improvement efforts at the level of continuous best practices that produces the best process and best results. The use of integrated information technology is already available there by automation can be done within the company.

Currently the company wants to know the extent of maturity level of IT in the company, whether it can achieve the expectations of the Management is at the level of managed level (average 3.51 - 4.50) or not, for that required a comprehensive audit of the functions that there are some aspects of attention such as: effectiveness, efficiency (efficiency), functional unit of information technology in an organization, data integrity, safeguarding assets, reliability, confidentiality, availability, and security [21]. Table 1 provide COBIT Maturity Level Assessment

III. RESEARCH METHODS

The article research uses literature study by conducting early survey by analyzing vision and mission, goals and objectives as well as the company's strategic plan as well as the strategies, policies related to the management of IT investments and field observations.

Explanations of the Figure 1, provide Step by Step of Research Methods, are number of 1 overall about process of company, authors studied the business process of a company engaged in the manufacture of preservatives for export imports in containers, so that items carried in a container are not damaged if they are kept in the container for too long. Products offered include HD1000, HD 750 power gel and others. How to learn about information systems in the company, such as Security System, monitoring internal user, monitoring of implementation, control of access to IT/IS facilities, access rights, detection of damage, regular backups of data, Repair procedures in case of damage, routine of maintenance and protection of physical technology. Number of 2 Conduct studies related to research, such as COBIT, information systems. There are several questions that must be answered in between are how to solve the problem when there is an IT problem in PTHI? What is the level of physical security applied by PTHI? How to manage user and database at PTHI? And how to maintain hardware on PTHI? Number of 3 determination of the domain based on the needs that have been described in the process at the company.

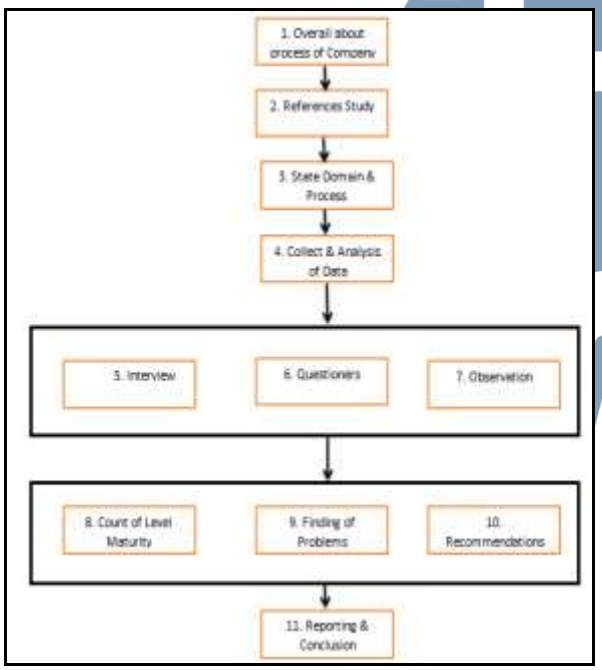

Figure 1. Step by Step of Research Methods [16]

The scope of this study is limited to attendance information system audit on PTHI. This stage, establish the information technology process in accordance with COBIT standards that have been processed in accordance with the case study. The IT coverage of domains that are audited in the attendance information system is shown in Table 2. The focus on this research is on PO4, PO5, PO7 and PO8 domains only. Collect and analysis of data from IT department of PTHI. Number of 5, 6 and 7 are interview, questioners and observation can be done parallel. After that count of level maturity for number of 8, then number 9 are finding of problems and number 10 are recommendation to PTHI, finally number 11 are make reporting and conclusion.

Table 2. Scope of Audit IT Domain

Sub Domain	Descriptions
PO4	Define the IT Processes, Organization and Relationships
PO5	Manage the IT Investment
PO7	Manage IT Human Resources
PO8	Manage Quality

The analytical tool used in this study is the standard procedure COBIT issued by ISACA (Information systems Audit and Control Association) [6], [7], where the data can be obtained by: questionnaire, by distributing questionnaires to every department in PTHI. The respondents consist of 5 respondents from the top management and 35 respondents as representatives of every department in the PTHI, so the overall total respondents obtained are 40.

Audit Selection of domains are Plan Organize (PO), such as PO4, PO5, PO7 and PO8 because: a) Input of control is all data entered into or input into the system must be authorized by management. Methods for authorization or approval have many forms, among others user access control, workstation identification, approved transactions and batches, and source documents. b) Input of validation is the input validation process is used to ensure that the type and value of the information is appropriate and rational. Type of input validation including type checking, range checking and input value, completeness, consistency, length or variable length, digit check, word checking, unwanted characters, and data control batches. c) Handling of error is the program should also be programmed and configured to take action specific if the previously mentioned input validation fails. Many possible responses, depending on the inputted data and input method i.e.: batch rejection, transaction rejection, and request re-input. d) Process of control is all newly generated data must be checked for results rationality calculations, to make sure that the calculations are already working with proper and bad information e) Output of control is applications receive input data, perform calculations, and generate data output. The result of the final calculation and its transformation must be checked for viewing rationality and validity. Some types of output controls are available, depending on the type of activity and data.

Reporting and conclusions, after count of level maturity, finding of problems and recommendations were distributed, the collected data were processed to be calculated based on the maturity level calculation. The result of the audit contains the findings of the present (current maturity level) and hope in the future (expected maturity level). The next steps were to calculate the gap analysis in order to analyze the interpretation of the current and expected maturity

level and to provide recommendation lists of the corrective actions to overcome gap to achieve the improvements in IT governance

IV. Result and Analysis

Further analyze more to the environment that occur within the IT department PTHI, from employees, equipment, physical security, regulations, etc., focused to domain on PO4, PO5, PO7 and PO8.

A. *PO4 Define the IT Processes, Organization and Relationships*

Process Description are An IT organization is defined by considering requirements for staff, skills, functions, accountability, authority, roles and responsibilities, and supervision. PO4 Define the IT Processes, Organization and Relationships.

Table 3. PO4 Define the IT Processes, Organization and Relationships

Sub Domain	Descriptions	Maturity
PO4.1	IT Process Framework	2
PO4.2	IT Strategy Committee	3
PO4.3	IT Steering Committee	2
PO4.4	Organisational Placement of the IT Function	2
PO4.5	IT Organisational Structure	3
PO4.6	Establishment of Roles and Responsibilities	3
PO4.7	Responsibility for IT Quality Assurance	3
PO4.8	Responsibility for Risk, Security and Compliance	3
PO4.9	Data and System Ownership	3
PO4.10	Supervision	3
PO4.11	Segregation of Duties	2
PO4.12	IT Staffing	4
PO4.13	Key IT Personnel	3
PO4.14	Contracted Staff Policies and Procedures	4
PO4.15	Relationships	3
	Average of sub domain PO4	2.9

This organization is embedded into an IT process framework that ensures transparency and control as well as the involvement of senior executives and business management. A strategy committee ensures board oversight of IT, and one or more steering committees in which business and IT participate determine the prioritization of IT resources in line with business needs. Processes, administrative policies and procedures are in place for all functions, with specific attention to control, quality assurance, risk management, information security, data and systems ownership, and segregation of duties. To ensure timely support of business requirements, IT is to be involved in relevant decision processes.

The IT department within the company should determine the staff's skills, functionality, accountability, authorization, regulation, and responsibilities and supervision based on their needs. The IT department should be part of the IT process framework that ensures openness and control which also involves senior executives and business management. Administrative processes, policies and procedures are required for all functions with particular attention to controls, quality assurance, risk management, information security, data and ownership systems, and the division of tasks. To ensure timeliness of business support, IT needs to be involved in decision-making related processes

Finding of Problems are at PTHI the rules and responsibilities of IT departments within the company as well as third parties have been defined. The IT department within the company has been developed in accordance with the existing IT strategy. This can be seen from the fatal IT part in the company. And all employees are given facilities tailored to their needs and effectiveness. The relationship between IT departments within a company with users and third parties is formally defined. From the above explanation, the Company concluded that for the PO4 process, the average is at 2.9, Defined. In more detail are sub domains PO4 Define the IT processes, organization and relationships, See Table 3.

Recommendations are adding human resources to help and improve the performance of the company Creating policies or procedures governing the issue of backup staff or secondary persons for important IT processes and always updating those policies or procedures Creating an ever-updated list to manage who is responsible and secondary person, It is necessary to create policy documents and procedures that govern the work processes of contract employees or suppliers in performing their respective duties and socialize to other fields for consultation or seek approval from the company about network problems. Calculate average sub-domain PO4 Define the IT Processes, Organization and Relationships included are PO4.1 + PO4.2 + PO4.3 + PO4.4 + PO4.5 + PO4.6 + PO4.7 + PO4.8 + PO4.9 + PO4.10 + PO4.11 + PO4.12 + PO4.13 + PO.4.14 + PO4.15 divided total sub domain = (2 + 3 + 2 + 2 + 3 + 3 + 3 + 3 + 3 + 3 + 2 + 4 + 3 + 4) / 15 = 43 / 15 = 2.9, same calculation is done for domain PO5, PO7 and PO8.

B. *PO5 Manage IT Investment*

Process Description are a framework is established and maintained to manage IT-enabled investment programmed and that encompasses cost, benefits, prioritization within budget, a formal budgeting process and management against the budget. Stakeholders are consulted to identify and control the total costs and benefits within the context of the IT strategic and tactical plans, and initiate corrective action where needed. The process fosters partnership between IT and business stakeholders; enables the effective and efficient use of IT resources; and provides transparency and accountability into the total cost of ownership (TCO), the realization of business benefits and the ROI of IT-enabled investments.

Table 4. PO5 Manage the IT Investment

Sub Domain	Descriptions	Maturity
PO5.1	Financial Management	2

Sub Domain	Descriptions	Maturity
	Framework	
PO5.2	Prioritisation Within IT Budget	3
PO5.3	IT Budgeting	2
PO5.4	Cost Management	2
PO5.5	Benefit Management	3
	Average of sub domain PO5	2.4

Policy and maintenance of the framework to manage the selection of IT investments covering cost, profit, budget priority, official budgeting process and budget reset. Work with stakeholders to identify and control total costs and benefits in the context of IT strategy, tactical planning and initiatives to take action needed to improve a condition. The process fosters the relationship between IT and business stakeholders, enabling increased effectiveness and efficiency of the use of IT resources by providing openness and accountability within the existing total cost of ownership, realization of business profits and return on investment from applied IT investments.

Finding of problems are Selection of investments made in PTHI is quite good. Because everything that is invested for the IT department is used can be as much as possible almost nothing useless, ranging from computers, laptops, LCD TV, hub, network cable, wireless router, internet connection, and so forth. Everything that will be invested is always communicated to all IT departments so that the investments made always follow the existing IT strategy. From the above explanation, the Company concluded that for the process of PO5, the average is at 2.4, Repeatable but Intuitive. Average of sub domain PO5 maturity level at 2.4. In more detail are sub domains PO5 Manage IT Investment, see Table 4.

Recommendations are implement a decision-making process to priorities the allocation of IT resources for operations, projects and maintenance to maximize IT contribution to optimizing the return on the enterprise's portfolio of IT-enabled investment programmed and other IT services and assets. The practices should allow for ongoing review, refinement and approval of the overall budget and the budgets for individual programmed. Implement a process to monitor the benefits from providing and maintaining appropriate IT capabilities. IT contribution to the business, either as a component of IT-enabled investment programmed or as part of regular operational support, should be identified and documented in a business case, agreed to, monitored and reported.

C. PO7 Manage IT Human Resources

Process Description is a competent workforce is acquired and maintained for the creation and delivery of IT services to the business. This is achieved by following defined and agreed-upon practices supporting recruiting, training, evaluating performance, promoting and terminating. This process is critical, as people are important assets, and governance and the internal control environment are heavily dependent on the motivation and competence of personnel.

Table 5. PO7 Manage IT Human Resources

Sub Domain	Descriptions	Maturity
PO7.1	Personnel Recruitment and Retention	2
PO7.2	Personnel Competencies	3
PO7.3	Staffing of Roles	2
PO7.4	Personnel Training	2
PO7.5	Dependence Upon Individuals	3
PO7.6	Personnel Clearance Procedures	3
PO7.7	Employee Job Performance Evaluation	3
PO7.8	Job Change and Termination	3
	Average of sub domain PO7	2.6

Maintenance and provision of competent workshops to create and deliver IT services to businesses. This can be achieved by following predetermined and approved support practices, such as recruitment, training, performance evaluation, promotion and job breakers. These processes are critical if humans are considered to be the most important asset, the management and internal control environment will depend on the motivation and competence of the personnel. From the above explanation, the Company concluded that for the PO7 process, the average is at 2.6, Defined. In more detail are sub domains PO7 Manage Operations, see Table 5.

In the IT governance of human resources, company does so tactically and strategically approaches in hiring and managing IT personnel. The company has its own way of choosing and seeing people who will be recruited to become IT personnel. Once IT personnel are recruited, they will be in through training informally or informally with the help of senior IT personnel within the PTHI. And everything done in this case should refer to IT strategy. Management does not have policies and procedures concerning the process of handling IT human resources [30].

Finding of Problems are Management recognizes the need for IT human resources management. There is a tactical approach to hiring and managing IT personnel, driven by project-specific needs, rather than by an understood balance of internal and external availability of skilled staff. A rotational programmed, designed to expand technical and business management skills, is established.

Recommendations are the level of supervision should be in line with the sensitivity of the position and extent of responsibilities assigned. Provide IT employees with appropriate orientation when hired and ongoing training to maintain their knowledge, skills, abilities, internal controls and security awareness at the level required achieving organizational goals. Take expedient actions regarding job changes, especially job terminations. Knowledge transfer should be arranged, responsibilities reassigned

and access rights removed such that risks are minimized and continuity of the function is guaranteed. Should receive coaching on performance and conduct whenever appropriate. Maintain IT personnel recruitment processes in line with the overall organization's personnel policies and procedures.

D. PO8 Manage Quality

Process Description is a QMS is developed and maintained that includes proven development and acquisition processes and standards. This is enabled by planning, implementing and maintaining the QMS by providing clear quality requirements, procedures and policies. Quality requirements are stated and communicated in quantifiable and achievable indicators. Continuous improvement is achieved by ongoing monitoring, analysis and acting upon deviations, and communicating results to stakeholders. Quality management is essential to ensure that IT is delivering value to the business, continuous improvement and transparency for stakeholders.

QMS (Quality Management Services) should be developed and maintained, including standards and development processes and guaranteed acquisitions. This can help planning, implementing and maintaining QMS by providing clear policies, procedures and quality requirements. Quality needs should be reported and communicated quantitatively and with an achievable indicator. Continuous improvements can be achieved by monitoring on a regular basis. Focusing on the definition of a QMS, ongoing performance monitoring against predefined objectives and implementation of a programmed for continuous improvement of IT services.

Table 6. PO8 Manage Quality

Sub Domain	Descriptions	Maturity
PO8.1	Quality Management System	2
PO8.2	IT Standards and Quality Practices	3
PO8.3	Development and Acquisition Standards	2
PO8.4	Customer Focus	2
PO8.5	Continuous Improvement	3
PO8.6	Quality Measurement, Monitoring and Review	3
	Average of sub domain PO8	2.5

The company continuously analyzes and performs an action against deviations that occur and communicates the results obtained to stakeholders. Quality management is fundamental to ensuring that IT delivers value to the business, conducts continuous improvement and transparency actions to stakeholders. In terms of quality, PTHI always prioritizes customers. So quality specifies based on customer demand. For quality standards applied based on senior experience in IT departments. The company has had regular planning of activity improvement since the company has not felt too important about it yet, but now the company is doing as planned. From the above explanation, the Company concluded that for the PO8 process, the average is at 2.5, Defined Process. In more detail are sub domains PO8 Manage Quality, see Table 6.

Finding of Problems are a programmed is being established to define and monitor QMS activities within IT. QMS activities that do occur are focused on IT project- and process-oriented initiatives, not on organization wide processes. QMS process is communicated throughout the enterprise by management and involves IT and end-user management. An education and training programmed is emerging to teach all levels of the organization about quality. Basic quality expectations are defined and are shared amongst projects and within the IT organization. Common tools and practices for quality management are emerging. Quality satisfaction surveys are planned and occasionally conducted.

Recommendations are The QMS should define the organizational structure for quality management, covering the roles, tasks and responsibilities, because it hasn't run with maximum QMS in PTHI. All key areas should develop their quality plans in line with criteria and policies and record quality data. Monitor and measure the effectiveness and acceptance of the QMS, and improve it when needed, Use industry good practices for reference when improving and tailoring the organization's quality practices, because the quality of products that are highly desired by the customer. Focus quality management on customers by determining their requirements and aligning them to the IT standards and practices. Define roles and responsibilities concerning conflict resolution between the user/customer and the IT organizations.

V. CONCLUSIONS

With an audit on PTHI the production difficulties can be overcome because the IT processes and other organizations in the company have synergized well, based on PO4 and relations with IT Human relationships with other department its clear base on PO7. Company has implemented information technology security system proven by managing the IT Investment that has been done, even though it has not been maximally base on PO5, for the problem of the batch production number it has been resolved properly because quality management has been improved in each department specially IT department base on PO8. Level maturity at Repeatable but Intuitive level and Defined Process. The results of questionnaire processing found the average value of 2 for the range of values 0 to 5. This is evident from the absence of fixed procedures on how to solve problems and the absence of documentation problems and solutions to problems encountered. This will make it difficult to detect, has it been done the right action in solving the problem? Then the absence of procedures can also increase the likelihood of IT staff doing the wrong action in solving the problem. Sub Domain PO4, PO5, PO7 and PO8 the results are quite

satisfactory. PTHI is aware of the importance of optimal IT operations, and conducts disaster prevention measures. But in practice in the field there are still many who only rely on intuitive. In some cases there are already done well, but the documentation in real terms. In addition there are also things that still require a fixed procedure in doing activities, in order to be more controlled.

Suggest for company are whether management demonstrates active support for security measures within the organization. This can be done via clear direction, demonstrated commitment, explicit assignment and acknowledgement. Whether regulations for acceptable use of information and assets associated with an information processing facility were identified, documented and implemented. Whether employee security roles and responsibilities, contractors and third party users were defined and documented in accordance with the organization's information security policy. Were the roles and responsibilities defined and clearly communicated to job candidates during the pre-employment process. Whether data protection and privacy is ensured as per relevant legislation, regulations and if applicable as per the contractual clauses.

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