DEVELOPMENT OF ASSET MANAGEMENT CONTROL APPLICATION FOR DIREKTORAT JENDERAL SUMBER DAYA DAN PERANGKAT POS DAN INFORMATIKA

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Abstract - The goal of this research was to identify problems, analyze needs, and develop management information system especially the process internal control of asset management on Direktorat Jenderal Sumber Daya dan Perangkat Pos dan Informatika (SDPPI - Government Communication and Informatics Organization). This system development used the System Development Life Cycle (SDLC) method which refers to 4 phases. Those were initiation and business feasibility, requirements definitions, functional design, and verification. The analysis used to support the research methods was Enterprise Architecture (EA) and SWOT. The analysis was conducted on business process that was running at the moment. The results show that the management information system in the form of web-based applications can help the process based on activity logging assets, assets allocation, complaints, and user guide in accordance with the needs of the Direktorat Jendral SDPPI. The design of this application can also help the existing asset management process to become more efficient and effective.

Keywords: management information system, asset management, System Development Life Cycle, Enterprise Architecture, SWOT

I. INTRODUCTION

Information System (IS) is one of the important factors to support an organization to improve its business process regarding effectiveness and efficiencies. IS is used to analyze high variety of data and fact inside a company, and the report can be used by middle-high manager of a company to make important or day-to-day decisions. IS can touch every single part of a company and help the management of a company to make the process like the asset management better.

The asset is an important resource in the company. Thus, assets always exist in a company, non-profit organization, and government directorate. Assets can also be a core component in an organization depending on the type of business that the organization is doing. Some company struggles to manage its asset due to the lack of knowledge of management process needed to manage the asset. Then, the asset is not organized well which raises the unwanted cost to a company. By managing the assets well, the company can increase the efficiencies in term of operational and fixed cost. In terms of this issue, IS can help the company with a system that can manage and summarize company's assets.

According to Wang, Tan, and Li (2015), there are a variety of forms of assets. It may include the production material, equipment, vehicles, desks, computers, cables, and people. However, some precious assets that are essential for enterprises have the characteristics of high value, strong liquidity, difficult security management, and so on. Related to the importance of the assets, the process in managing those is not a less important issue.

The asset management process can be a challenging task in the company or even in government institution. ISO 55000:2014 (International Organization for Standardization, 2014) defines Asset Management (AM) as the coordinated activity of an organization to realize value from assets. It will normally involve the balancing of costs, risks, opportunities and performance benefits.

Dixon (2017) said asset managers should change every asset-related aspect of the business they worked in. However, they should apply the AM approach to develop holistic views with the help of the network of colleagues. Thus, it became a respected source of compelling expert advice. Moreover, AM community should think about the headline strategic projects and apply it to the main business to improve business-scale enterprises.

Direktorat Jenderal Sumber Daya dan Perangkat Pos dan Informatika (SDPPI - Government Communication and Informatics Organization) is a government institution that focuses on managing, processing, and controlling internal use of mail, information, and resources. In this institute, the assets always grow in line with the increasing use of SDPPI resources. Then, the institution is expected to manage its assets well from asset replacement, asset reparation, asset documentation, asset problem report, and the utilization of the assets. Currently, Ditjen SDPPI has two web-based applications, Inventory and Help Desk. Those handle asset management and problem report. However, since the system works in separate platform, the institution cannot integrate all the data in the real time and correctly. Then, the information generated from this system cannot meet the expected information required by top level management. With this condition, this research tends to solve the situation by developing a new web-based application that integrates function of Inventory and Help Desk with some improvement to the current process.

This research is to give a solution to the asset management process about the problem of managing assets in company. The object of the research is the government institution, Ditjen SDPPI.

II. METHODS

The research method applied in this research is divided into several parts. For data collection method, the researcher collects data by observing and interviewing Ditjen SDPPI as the key user involved in asset management directly. Then, analysis and design method used in this research is System Development Life Cycle (SDLC) method with waterfall method. It is shown in Figure 1.
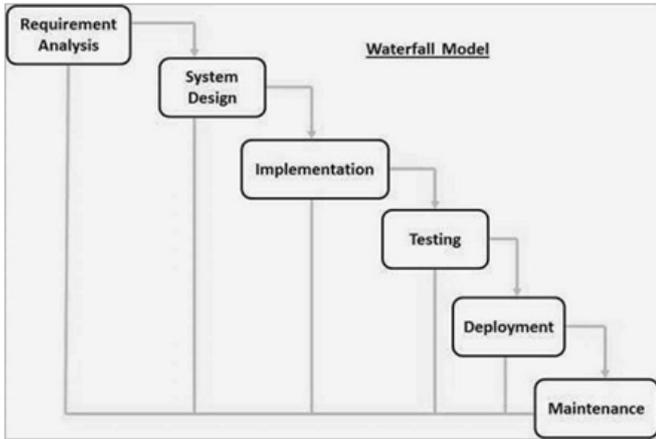

Figure 1 Waterfall Model
(Source: Balaji, 2012)

Waterfall model is the sequential development model, so each work-product or activity is completed before moving on to next phase and the phase of development proceeds in order without any overlapping. Moreover, each phase schedule for the tasks is completed within a specified period. Then, the requirement should be clear before going to next phase of design. Further changes in requirement will not be considered (Balaji, 2012). Testing is carried out once the code has been fully developed. The documentation and testing happen at the end of each phase, which helps to maintain the quality of the project. In the waterfall model, each step is frozen before the next step. The requirements are frozen before the design starts. Once the design is frozen, the coding starts. However, the testing consumes high cost and time. Tester role will be involved in testing phase only.

Next, fishbone is also used as explained by Pyzdek (2003). Fishbone analysis is a systematic tool analyzing problem and the factors that can be considered as the causes.
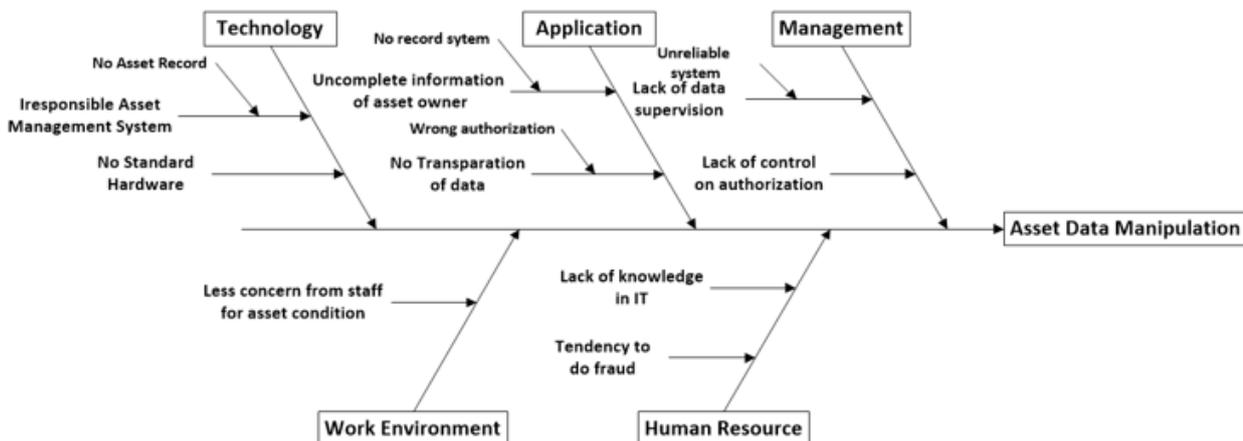
Fishbone analysis also shows the condition with the causes and the contribution to the impact. This tools will be used to find out how Asset Management work in this institution. The first important issue is how asset data manipulation occurred and what the factor that trigger the asset data manipulation. The second issue is how the asset/resource optimization work in this institution. Those two issue are important to be analyzed in this institution in order to develop a good asset management control system that support asset management control process in Ditjen SDPPI.

This research also uses network connectivity diagram to show the physical connection within data, voice, and video in a company. It includes Wide Area Network (WAN) and Local Area Network (LAN) (Bernard, 2012).

Moreover, design process in Asset Management Control Application consists of two parts. First, it is asset documentation. It includes asset inbound/outbound, repair, status change, stock report. Second, it is a problem report handling. It consists of report about damaged hardware, software, and network. The tools used in this design process are UML Diagram (Use Case, Domain Class Diagram, Design Class Diagram, and User Interface Design) and Network Connectivity Diagram.

III. RESULTS AND DISCUSSIONS

Figure 2 is an analysis that shows the problem of asset data manipulation related to asset management control in Ditjen SDPPI. The fishbone diagram describes that there are five factors of problems occurred in asset data manipulation. It consists of management, application, technology, workplace, and human resource. Those factors make the institution face a problem in asset data manipulation.

In the first factor (management factor), it is lack of data supervision. It is because the system is unreliable in terms of data supervision. This has led the asset to no supervision status so management does not know anything about the detail of every asset. In addition, there is no control of authorization for every user in accessing and manipulating the company's data. Thus, the data can be manipulated easily by unauthorized user.

Related to application factor, there is incomplete information of asset owner which is derived from the unavailability in record system in software or database. Meanwhile, regarding authorization, it also drives the transparency of data become the other problem. This

Figure 2 Fishbone Diagram – Asset Data Manipulation

happens because the management does not know how to set the authorization level, so the data is available for everyone without proper authorization.

Next, in terms of technology, there is no standard asset management system and hardware in the institution. It can lead the institution to asset data manipulation problem. This issue is also related to application factor that Ditjen SDPPI currently does not have the proper asset management control system that is responsible to control the asset.

The other factor is work environment factor. It shows that the staff has little concern about asset condition. Even Ditjen SDPPI has a system that supports the asset management control process, but the work environment has to be changed subsequently. It is because staff also has important role to identify the physical condition of the asset and record it to the system.

The last factor is human resource factor that is caused by the staff who has little concern about asset condition, lack of knowledge in IT, and tendency to do fraud. This also becomes unimportant factor because the tendency to do fraud is unacceptable habit and should be banned in institution's employee culture.

Figure 3 shows the cause of asset/resource optimization issue related to asset management control activity in Ditjen SDPPI. Like the fishbone analysis in Figure 2, there are also five factors that affect the asset/ resource optimization. There are management factor, application factor, technology factor, work environment factor, and human resource factor.

In management factor, wrong asset management happens because there is unreliable information system in asset management. Therefore, the management does not have thee media or tools in controlling the asset usage. The other cause in management factor is the inaccurate decision in asset acquisition process. This problem occurrs because management does not have the information of asset needed and detail specification of the asset needed. This will trigger the incorrect of acquisition and affect the asset usage in sequence.

Related to application factor, the first issue is the inaccurate asset status from the lack of information on asset. This will make management confused about the real asset condition. The other factor is unreliable information system because of the lack of asset record and obsolete hardware or software. This issue is also related to technology factor that obsolete hardware or software and no asset information or record become the factors of asset/resource optimization.

In work environment factor, it is about little concern of the staff about asset condition and the lack of documentation in using the application. This issue occurs because most of the staff does not know how to check the detail condition of the assets and cannot use the system as the media or tools in reporting the asset condition or status.

The last is human resource factor. The lack of knowledge in IT and lack of awareness of the staff in Ditjen SDPPI become an important issue. The lack of knowledge in basic IT causes the staff to be hesitate to use the application. This absolutely will drive the the inaccurate data of the asset. Moreover, lack of awareness of staff also will lead to that condition.

From two fishbone diagram analysis, it can extract the main problem or cause in asset management control issue. Those are the lack of information system in Asset Management Control (AMC), lack of staff awareness for asset condition, lack of knowledge in IT and application, lack of information to management about asset detail and status.

The human resources issues should be solved first. Employee performance has a direct impact on the organization in terms of efficiencies and effectiveness. With many asset turnovers in Ditjen SDPPI, the quality of service such as time must be maintained well to meet users' expectation. IS is used to handle this process with two separate software, but it does not have maximum result for the institution. Almost 50% of employees in Ditjen SDPPI cannot use the system well due to the lack of experience, documentation, and knowledge of the system. This issue becomes a big problem for Ditjen SDPPI and affects the quality of service the institution provided.

AMC application is designed to solve the problem identified before. This application has user interface that easier to understand by user, integrates all asset managements and helps desk process in Ditjen SDPPI. This application is tested and brought to user before the main development to meet the expectation of users. Thus, the employee of Ditjen SDPPI can use this application well. Besides the new and user-friendly UI design, all potential users are trained to use the AMC application to understand the flow and functional use of this application.

Next, the researcher focuses on the process of defining application architecture and software design. It starts from the use case diagram, domain model class diagram, updated design class diagram, user interface design, and network connectivity diagram.
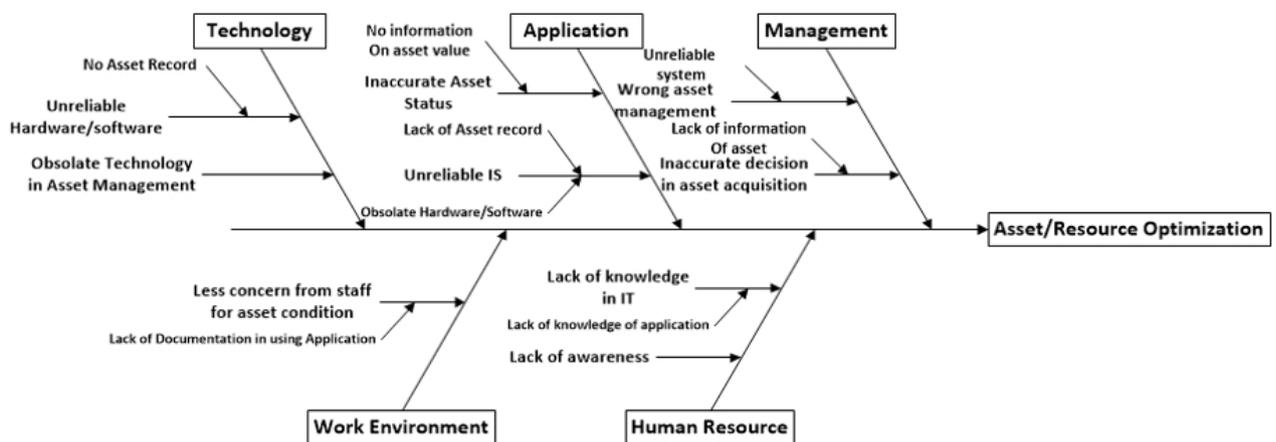

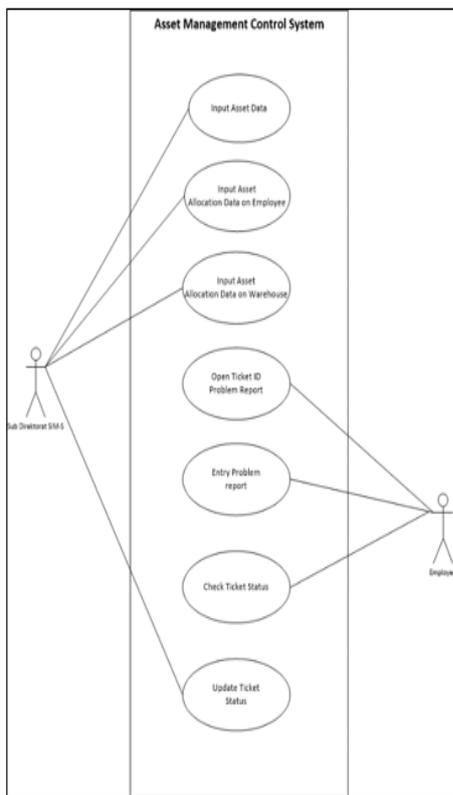Figure 3 Fishbone Diagram – Asset/Resource Optimization

Figure 4 Use Case Diagram

Figure 4 shows the use of the system for users. In this Asset Management Control Application, the main users are Sub Direktorat SIM-S staffs and employees. The main functions for Sub Direktorat SIM-S staff are to create master asset, allocate asset ownership to employee and warehouse, receive and open ticket for problem report, update ticket status, and show ticket report log. Meanwhile, for employee, it is to open ticket for problem report, entry problem report, and show ticket status. This simple set of function is designed to provide all needs of users in controlling and managing the asset in Ditjen SDPPI.

After defining use case diagram, domain model class diagram is created to define the object relation of the system. It is shown in Figure 5 (see appendix). It defines the list of objects and its relations to the others. The object will be enriched in sequence diagram to determine the necessary functions in every object. After the function is determined, the updated design class diagram is generated as the references to the development or coding process of the application.

Figure 6 (see appendix) shows the design class diagram which shows and directs the application developer to create a program based on the relational object and function. The design is in design class diagram. In this phase of development, the developer can enrich another object or function from design class diagram in coding purpose.

After the design class diagram is created, next figure will show the user interface design in order to give a picture of the software interface to the developer or programmer in building the software. Meanwhile, the user interface design consists of every module page in future system. Figure 7 is the user interface login page design of Asset Management Control Application.

Figure 7 User Interface Design – Login

In login page, the user can log into the application by filling the field of username, password, and role. The roles are employee, admin, and super admin. These login roles will determine the personal menu for every role that is signed in the application.

Figure 8 User Interface Design – Homepage

Moreover, the navigation menu in home page can be varied according to the role and authentication of the users. If the user's role is super admin, the user management menu is open and can be accessed. The example is in Figure 8. Table 1 shows the detail of navigation menu for every role.

Table 1 Menu and Role Description

Navigation Menu	Role
User Management	Manage User - Super Admin
	User Info - Admin, Employee
Asset Data Management	Admin, Super Admin
Asset Allocation	Admin, Super Admin
Problem Report (Ticket)	Admin, Employee
Ticket History	Admin, Employee
Help Center	Admin, Employee, Super Admin
Log Out	Admin, Employee, Super Admin

From the role in Table 1, admin and employee have identic authorization in this application. However, the content of module is different from one to another. For example in problem report menu, if the user role is admin, the problem report menu is as shown in Figure 9.
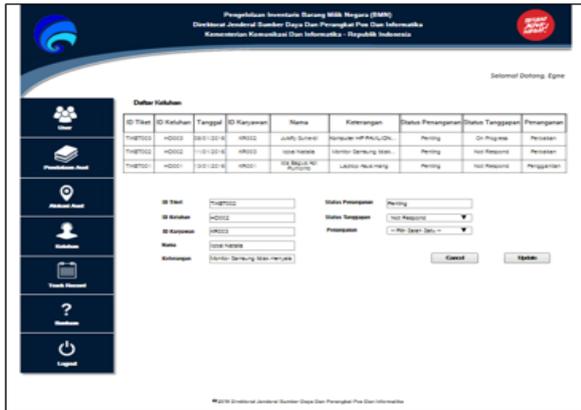
Figure 9 User Interface Design – Problem Report (Admin)

Next, in problem report menu, admin can update and change the status of problem report created by user. The menu for user to create the problem report is shown in Figure 10.

Figure 10 shows the module in application that allows user to input the problem report and notify admin to solve the problem in real time. There is some field that has to be filled by user to report the problem. There is also some standard validation in authentication of the input by users.

The other features existing in this application are help center. This module allows user especially employee to find some help regarding the use of application. The help center module also shows user the Frequently Asked Question(s)

(FAQs) which make the employee easy to find the solution for their problem. It is shown in Figure 11.

Figure 10 User Interface Design – Problem Report (Employee)

Figure 11 User Interface Design – Help Center
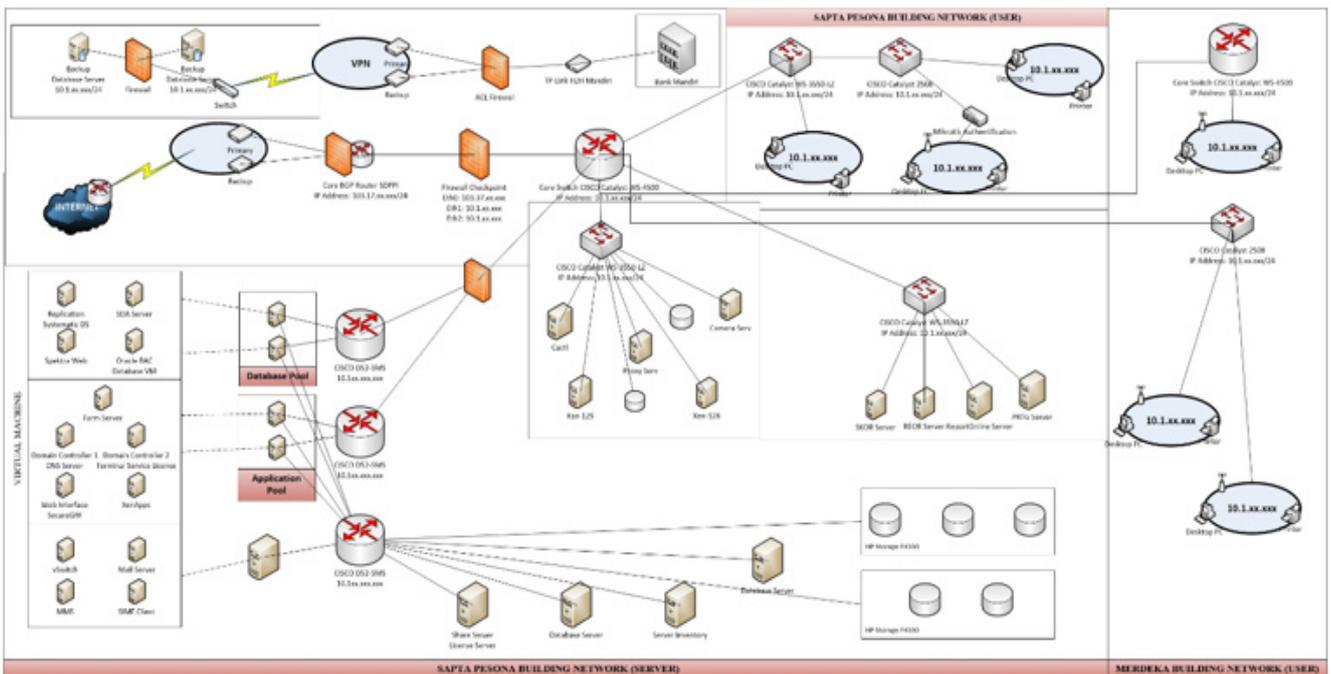
Figure 12 Network Connectivity Diagram

Other than the user interface design, there is another tool used in this research to develop Asset Management Control Application. It is the network connectivity diagram. It is used to draw the network architecture of Asset Management Control Application.

Network connectivity diagram in Figure 12 shows the network condition of Ditjen SDPPI. In Figure 12, it can be seen there are three main sections of network topology in Ditjen SDPPI. Those are Sapta Pesona Building (SERVER), Sapta Pesona Building (USER), and Merdeka Building (USER). Sapta Pesona Building (SERVER) hosts the function of Sapta Pesona Building (USER) and Merdeka Building (USER).

From the network connectivity diagram, it can imply that the actual infrastructure of Ditjen SDPPI is already established to support the development of Asset Management Control (AMC) System. Thus, the development may not meet the obstacles related to infrastructure issue.

Table 2, Table 3, and Table 4 show the detail specification of server, router, and switch in this system infrastructure. The specification of hardware is the current specification in Ditjen SDPPI building.

Table 2 Hardware Specification (Server)

No	Description	Unit
1	Server Dell Power Edge 2850	2
2	Server Dell Power Edge 1850	2
3	Server Dell Power Edge 6850	1
4	HP Server DL 580G5	3
5	HP Server DL 380G5	2
6	IBM Server X3550 M3	6
7	IBM Server X3250 M4	2
8	Server HP DL580G7	7
9	Server HP DL380p G8	1
10	Microsystem SunFire X4150	1
11	DELL Poweredge M 1000e	1
12	DELL Poweredge M 620 Blade Server	12

Table 3 Router Specification

No	Description	Unit
1	Mikrotik 1100	1
2	Mikrotik RB1100X2AH	1
3	Mikrotik routerboard CCR1016-12G	1
4	Allied Telesis switch AR415S	2
5	D-Link Access Point	1
6	Cisco Linksys Access Point	1
7	Cisco 3900 Series	1
8	TP-LINK Mandiri	1

Table 4 Switch Specification

No	Description	Unit
1	H3C S5500	2
2	H3C RPS 800A	2
3	Cisco Catalyst 4900M-10G-RJ45	3
4	Cisco Catalyst 4503	1
5	Cisco Catalyst 3550	2
6	Cisco Catalyst 2950	4
7	Cisco Catalyst 3560G	1
8	Cisco Catalyst Express 500	1
9	3com 3C16593B	3
10	Allied Telesis AT-GS900/16	2
11	HP/ProCurve Networking	5
12	HP/ProCurve Networking	1
13	D-LINK/8-PORT 10/DES-1008D	1
14	Access Point - 3COM Office Connect ADSL Wireless	2
15	TP-Link TL-SL5428E	1
16	FO Fibre Driver Raisecom	2
17	Cisco Catalyst 4507+R	1
18	Cisco Catalyst 2960G	1
19	Cisco Small Business SG300-52	1
20	Cisco Catalyst 2800 Series	1
21	Cisco Catalyst 6500 Series	2

IV. CONCLUSIONS

From result and analysis, it can be seen that the development of Asset Management Control Application to solve the institution's problem in asset management is divided into several parts. First, it is asset data management. It is easier for controlling unit (admin) to add asset data to the system because this module supports all data related to the asset. Moreover, it has the authorization to make sure that the assets can be only created by the controlling unit. Then, the user interface is more user-friendly than the old application (Inventory).

Second, there is asset allocation. Regarding management of assets, this application can manage all running functions in Ditjen SDPPI right now. It includes warehouse, employee, and allocation. This asset allocation module also makes asset controlling process much easier because the controlling unit can track the asset by its owner and warehouse.

Third, it is related to problem report process. This application can facilitate the employees to insert their problem report and at the same time notify admin to handle and respond the report. Last, in data input process, this application requires authorization and authentication process. Thus, the data are already validated first before being processed inside the system.

Beside of the problems described, human resource issue becomes the other important factor in running asset management control. The system also needs support from human resource which is related to the awareness of asset maintenance and responsibility. The institution needs to use the system to classify the authorization and authentication of important asset.

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Appendix

Warehouse
-Warehouse_ID
-Warehouse_name
-Address
-Capacity
-Date_Established

1..1   1..*

Warehouse_Allocation_Form
-Warehouse_Allocation_Form_ID
-Warehouse_ID
-Asset_ID
-Allocation_Date

1..*

1..1

Asset
-Asset_ID
-Asset_Name
-Asset_Type
-Asset_Category

1..*

1..1   1..1

1..1

1..*

Asset_Record_Form
-Asset_Record_Form_ID
-Asset_ID
-Employee_ID
-Asset_Category
-Asset_Type
-Quantity
-Record_Date

Asset_Allocation_Form
-Asset_Allocation_Form_ID
-Asset_ID
-Employee_ID
-Asset_Category
-Asset_Type
-Quantity
-Record_Date

Employee
-Employee_ID
-Sub_Directory_ID
-Employee_Number
-Employee_Name
-Category
-Address
-Phone_Number

1..*   1..1

1..1

1..1   1..*

1..1

1..*

Problem_Report_Form
-Problem_Report_Form_ID
-Employee_ID
-Report_Date
-Report_Detail
-Report_Status

1..*

Asset_Reparation_Form
-Asset_Reparation_Form_ID
-Ticket_ID
-Reparation_Number
-Reparation_Date
-Reparation_Detail

1..*

1..1

1..1

1..1

Ticket_Data
-Ticket_ID
-Report_Form_ID
-Ticket_Progress_Status
-Date_Monitoring

1..1   1..1

Ticket_Handling_Form
-Ticket_ID
-Employee_ID
-Handling_Action
-Handling_Date

1..1

1..1

0..1

0..1

1..1

Asset_Replacement_Form
-Asset_Replacement_Form_ID
-Ticket_ID
-Replacement_Number
-Replacement_Date
-Replacement_Detail

1..*

Figure 5 Domain Class Diagram

Warehouse
-Warehouse_ID
-Warehouse_name
-Address
-Capacity
-Date_Established

1..1 1..*

Warehouse_Allocation_Form
-Warehouse_Allocation_Form_ID
-Warehouse_ID
-Asset_ID
-Allocation_Date
+Create_New_Warehouse_Allocation_Form()
+Input_Warehouse_Allocation()

1..*

1..1

Asset
-Asset_ID
-Asset_Name
-Asset_Type
-Asset_Category

1..*

1..1   1..1

1..1

1..1

Asset_Record_Form
-Asset_Record_Form_ID
-Asset_ID
-Employee_ID
-Asset_Category
-Asset_Type
-Quantity
-Record_Date
+Create_Asset_Record_Form()
+Input_Asset_record()

1..*

Asset_Allocation_Form
-Asset_Allocation_Form_ID
-Asset_ID
-Employee_ID
-Asset_Category
-Asset_Type
-Quantity
-Record_Date
+Create_Asset_Allocation_Form()
+Input_Asset_Allocation()

Employee
-Employee_ID
-Sub_Directory_ID
-Employee_Number
-Employee_Name
-Category
-Address
-Phone_Number

1..1

1..1

1..1   1..*

1..1

1..1

Problem_Report_Form
-Problem_Report_Form_ID
-Employee_ID
-Report_Date
-Report_Detail
-Report_Status
+Create_Problem_Report_Form()
+Input_Problem_Report()

1..*

Asset_Reparation_Form
-Asset_Reparation_Form_ID
-Ticket_ID
-Reparation_Number
-Reparation_Date
-Reparation_Detail
+Create_Asset_Reparation_Form()
+Input_Asset_reparation()

1..*

1..1

1..1

0..1

Ticket_Data
-Ticket_ID
-Report_Form_ID
-Ticket_Progress_Status
-Date_Monitoring

1..1   1..1

Ticket_Handling_Form
-Ticket_ID
-Employee_ID
-Handling_Action
-Handling_Date
+Create_Ticket_Handling_Form()
+Input_Ticket_Handling()

1..1

1..1   0..1

Asset_Replacement_Form
-Asset_Replacement_Form_ID
-Ticket_ID
-Replacement_Number
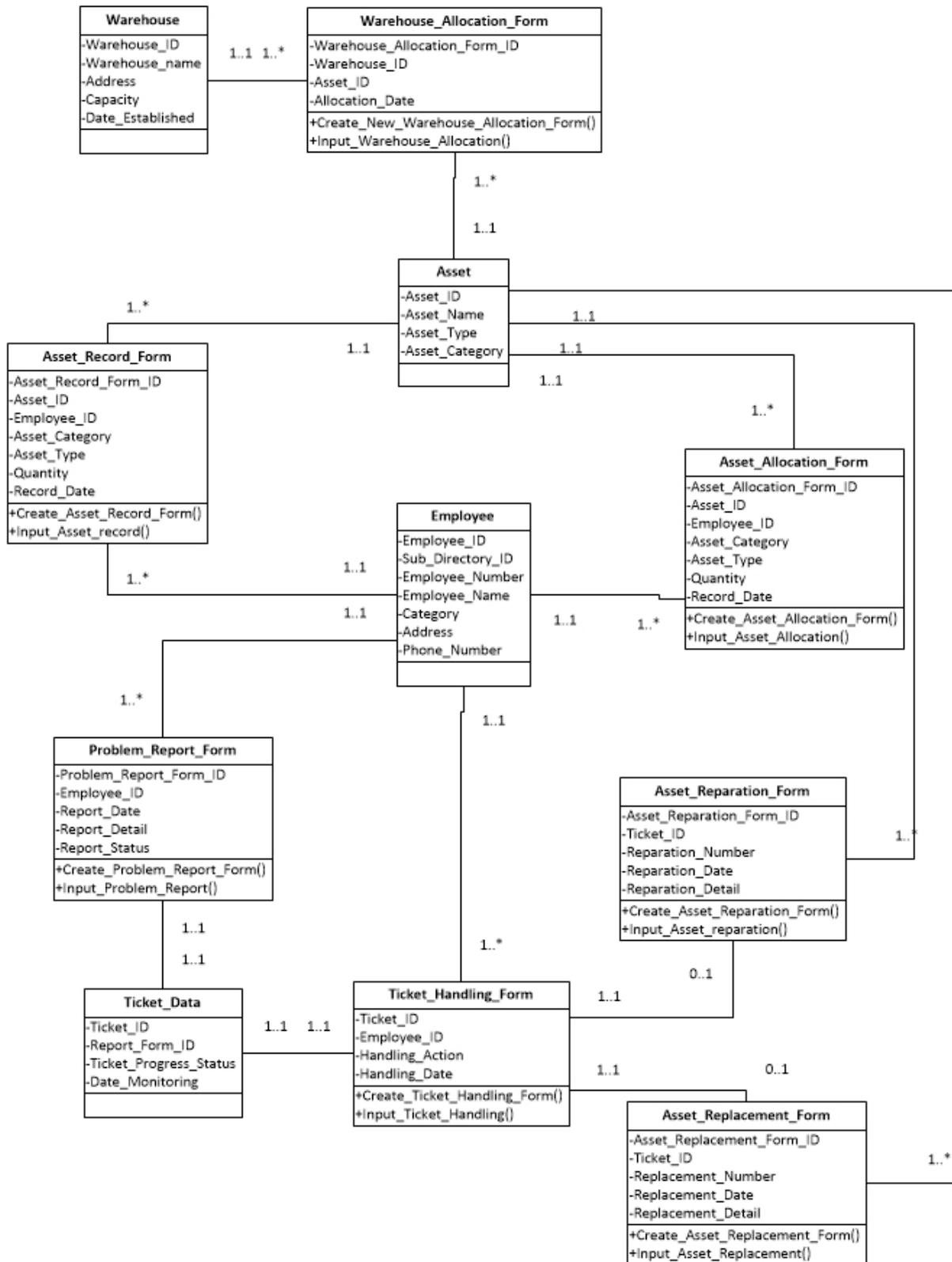-Replacement_Date
-Replacement_Detail
+Create_Asset_Replacement_Form()
+Input_Asset_Replacement()

1..*

Figure 6 Design Class Diagram