DEVELOPMENT OF PRODUCTION INFORMATION MANAGEMENT SYSTEM IN INDUSTRI HILIR TEH PT. PERKEBUNAN NUSANTARA VIII BANDUNG

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ABSTRACT

PT. Perkebunan Nusantara VIII Bandung has a tea packing factory known as Industri Hilir Teh (IHT). Industri Hilir Teh (IHT) is a company that produces Walini branded tea with ten varieties of flavors such as Black Tea Celup Walini, Ginger Celup Walini Tea, Lemon Celup Walini Tea, and so forth to meet the domestic market. IHT has a production activity that is processing raw materials into Walini tea. The problems that often occur in Industri Hilir Teh PT. Perkebunan Nusantara VIII Bandung is the difficulty in determining the number of production and irregular production scheduling. Based on the problems that exist at the moment in Industri Hilir Teh PT. Perkebunan Nusantara VIII Bandung, the need of a management information system development that can manage production planning and production scheduling by using PDCA approach (Plan, Do, Check, Act). The purpose of this information system development is to facilitate the representative of production managers in determining the amount of production of each tea flavor variant and facilitate in planning production activities or production scheduling.

Implementation of management in production activities because in production management there is planning and control of production. This management information system is built using the PDCA approach (Plan, Do, Check, Act) because it is suitable for use in the scale of continuous improvement activities to shorten the work cycle, eliminating waste in the workplace and productivity. In determining the amount of production using the method of Single Moving Average forecasting.

Based on the results of functionality testing, UAT (User Acceptance Test) and end user testing can be concluded that this information system has assisted the production manager representative in determining the amount of production of each tea flavor variant and facilitate in scheduling production activities.

Keywords : Information systems, management, PDCA, single moving average.

1. INTRODUCTION

PT. Perkebunan Nusantara VIII Bandung has a tea packaging factory known as Industri Hilir Teh (IHT). Industri Hilir Teh (IHT) is a company that produces Walini tea with ten varieties such as Black Tea Celup Walini, Ginger Celup Walini Tea, Lemon Celup Walini Tea, and so forth to meet the domestic market. IHT has a production activity that is processing raw materials into Walini tea. The production process starts from the planning stage and then the implementation of the processing of raw materials into finished products. IHT uses the make-to-stock strategy of creating an end product that aims to be stored in other words of the production process prior to ordering. IHT has 41 employees in the production department, using 13 machines which are 1 blending machine, 10 single chamber tea dye machines, 2 wrapping machines with maximum daily production capacity of 960 master cartons.

Based on the results of the interview with Mr. Doni Juniansah as the Production Manager Representative determining the current production amount based on available raw materials and relatively the same every month, in the implementation of the determination of the amount of production tend not to be considered and not become a reference in the production process. Data from July to December of 2016 showed that the average remaining stock at the end of the month was 314 carton masters of each tea flavor variant. This indicates that the company is still difficult or less precise in determining the amount of production as seen from the average remaining stock of the end of the month is excessive. The remaining stock of most occurred in November 2016 on Tea Wangi products, the company produces Tea Wangi as much as 2972 carton master while only 1049 master cardboard sales so that the remaining stock of 1923 master carton on that month. The impact of excess stock remaining is the accumulation of products in the warehouse. Since

this is a consumption product that has an expiration period and will certainly be affected by the temperature and weather changes that occur, then the accumulation of products in the warehouse becomes a loss for the company as it will increase the risk of product damage.

Based on the interview with Mr. Doni Juniansah as the Production Manager Representative, also stated that production scheduling is still difficult due to the absence of planned production amount of each variant, which occurs currently in the scheduling company conducted on employees and machines used by not including the production amount of each - a variant of tea flavor and scheduling is done per week. As a result the production process does not refer to the target and is unstable sometimes runs slow when there is no booking and runs fast when many reservations up hold additional shifts. This is certainly a disadvantage for the company because additional shifts cost more for the production process.

This is where the importance of applying management in production activities because in production management there is planning and control of production. Production planning is an activity undertaken to determine what products will be produced in the required quantities, when to produce and when the product must be finished production. Decisions on the type and quantity of products to be produced based on market needs data from the sales department. In production planning there are several methods that can be used, one of them using forecasting method. In management there are also several methods or concepts that can be used, and one of which the author will apply in this case the PDCA method (Plan, Do, Check, Action) because it is a common method used for quality control, improvement / improvement of business processes , Or troubleshooting. This method was popularized by W. Edwards Deming. PDCA is suitable for use in the scale of continous improvement activities to shorten the work cycle, eliminating waste in the workplace and productivity.

Based on the problems that exist today in Industri Hilir Teh PT. Perkebunanan Nusantara VIII Bandung and PDCA concept for improvement / improvement of process, hence needed a development of management information system that can arrange planning management, scheduling in order to increase productivity in production activity.

Based on the problems that occur, the purpose of this research is to build Management Information Systems Production Division In Industri Hilir Teh PT. Perkebunan Nusantara VIII Bandung.

The purpose of development Management Information Systems Production Division In Industri Hilir Teh PT. Perkebunan Nusantara VIII Bandung is as follows:

1. Facilitate the Production Manager Representative in determining the amount to be produced from each tea variant.
2. Facilitate the Production Manager Representative in planning production activities.

2. RESEARCH CONTENTS

2.1 Theoretical Basis

Theoretical basis is a collection of definitions and concepts from various sources. The foundation of this theory becomes a strong foundation in a study, then some of the theoretical basis described is the theoretical foundation that support for the development of Management Information Systems Production Section in Industri Hilir Teh PT. Perkebunan Nusantara VIII.

2.1.1 System

In general, the system can be defined as a set of things or activities or elements or subsystems that work together or associated with certain ways to form a unity to perform a function to achieve a goal. [2]

2.1.2 Information

Information is the result of data processing so that it becomes an important form for the recipient and has a usefulness as a basis in making decisions that can be felt directly as a result immediately or indirectly in the future. To obtain information, required data to be processed and processing units. Examples of information are employee list by department, employee list by class, recapitulation of purchase transactions at the end of the month, recapitulation of sale transactions at the end of the month, and others. [3]

2.1.3 Management

Management can be interpreted as a process utilizing the various resources available to achieve a goal. Management can also be intended as a system of power within an organization for people to run a job. Generally, the resources available in management include human, material, and capital. The concept of this management resource will be increased when the discussion is focused on the management information system. In management information systems, management resources include these three resources plus information resources. [3]

In an effort to utilize these management resources, managers will undertake three kinds of management processes, including:

1. Planning
2. Control (including: organizing, movement, and coordination)
3. Decision-making

The management process can be carried out in three levels of management activities. The level

of management activities can be divided into three, namely:
1. Operational planning and control
2. Tactical planning and management control
3. Strategic planning

In the science of management there are several methods or concepts that can be used, one of which there is a concept of problem solving that can be applied using the PDCA approach as a problem solving process. PDCA (Plan, Do, Check, Action) is a common method used for quality control, business process improvement, or problem solving. This method was popularized by W. Edwards Deming. PDCA is suitable for use in the scale of continous improvement activities to shorten the work cycle, eliminating waste in the workplace and productivity. Here is the cycle of PDCA.

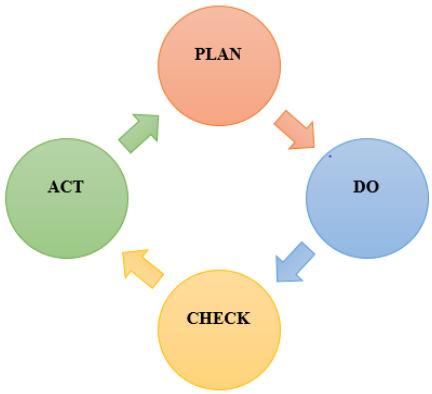


Figure 1 PDCA Cycle

Benefits of PDCA include:

1) To facilitate the mapping of authority and responsibility of an organizational unit.
2) As a pattern of work in the improvement of a process or system in an organization.
3) To solve and control a problem with a pattern and systematic pattern.
4) For continuous improvement activities in order to shorten the workflow.
5) Eliminating waste in the workplace and increasing productivity.

PDCA Process:

1) P (Plan = Planning)
This means planning the goals (goals) and what processes are needed to determine the results in accordance with the specification of the goals set.

2) D (Do = Implementation)
This means doing a pre-defined process planning. Measures of this process have also been established in the plan stage. In this Do's concept we have to completely avoid delays, the more time delays the work the more time is wasted and certainly the work will multiply.

3) C (Check = Check)
This means evaluating the objectives and processes and reporting on the results. Checking back what has been done, already in accordance with the planned or still lack.

4) A (Act = Action Taking)
This means doing a total evaluation of the objectives and processes and following up with the improvements. If it turns out that there are still undertaken less immediately make improvements to achieve what has been planned.

2.1.4 Definition of Management Information System

The term management information system actually consists of three keywords, namely system, information, and management. As mentioned above, a better way to provide a definition of a Management Information System is to begin by understanding the terms system, information, and management. Furthermore, based on the understanding obtained can be used to provide a definition of Management Information Systems, which combines these three keywords. [3]

2.1.5 Production Management

In production management, one of them is planning and controlling production. Basically the basic functions that must be met by planning activities and production control is [4]:
1. Forecasting product demand expressed in the number of products as a function of time.
2. Establish the amount and moment of ordering of raw materials and components in an economical and integrated manner.
3. Establish a balance between the level of production requirements, order fulfillment techniques, and monitor the inventory level of the finished product at any time, compare it with the inventory plan, and revise the production plan at the specified time.
4. Establish detailed production schedules, assignments, loadings and workforce in accordance with capacity availability and demand fluctuations over a period.

Initially the four objectives above are subdivided into different parts of the organization with diverse assignments. But the widespread use of data and computer systems has referred to the importance of integrating these responsibilities. The limited utilization of resources is the task and responsibility of the production planning and control division.

The problems facing the production planning and control section depend on the type of industry and the company. The types of data required, the characteristics of manufacturing processing / operation, the service demanded by the consumers, and the characteristics of the products vary greatly from one company to another. These

factors determine the position of production control within the company. In a continuous manufacturing system, the problem of production control lies in: (1) availability of raw materials at the right time; (2) avoid bottle-neck in cross-production; And (3) the transfer and distribution of finished products from cross-production to storage or sale points. On assembly lines controlled by the conveyor, the product moves at a predetermined rate. Cross-production produces at a steady pace as long as raw materials are available, there is no engine damage or labor absence, and there are no restrictions on loading of finished products at the end of the track [5].

2.1.6 Single Moving Average Forecasting Method

Single moving average method uses a number of actual data of new requests to generate predictive value for future demand. This method will be effectively applied if we can assume that the market demand for the product will remain stable over time. This method has two special properties that is to make forecasts require data.

Historically over a period of time, the longer moving averages will result in a smoother moving average, a systematic moving average can be calculated by equation 1.

$$S_{t+1} = \frac{x_t + x_t - 1 + \cdots + x_t - n + 1}{n} \quad (1)$$

Information:
St+1 = Forecast for period t+1.
Xt = Data in period t.
n = Duration Moving Averages

2.1.7 Measuring Forecasting Errors

Mean Square Error (MSE) is the mean of forecasting error squared and can be seen in equation 2.

$$MSE = \frac{\sum(x_t - F_t)}{n} \quad (2)$$

Information:
Xt = Actual data in period t
Ft = Data forecasting of the model used in period t
n = The number of data forecasting results

2.1.8 Monitoring

Supervision is used for the process of inspection and control of raw materials used products and the results of product realization based on the results of planning production activities [5].

"Supervision is to determine what has been done, that is to evaluate work performance and, if necessary, to apply corrective actions so that the results of work in accordance with the established plan" [7].

"Supervision is the control performed by conducting inspection, ability assessment, improving and perfecting, both management and operational area" [8].

Based on the opinion of the above two opinions the authors conclude the monitoring (Monitoring) is the process of observation, inspection, control and pengorksian from the results of the evaluation work so that in accordance with the previously established plan continuously and regularly. Monitoring helps alert when something goes wrong and helps keep the job on track.

2.2 Problem Analysis

Problem analysis is an assumption of the problem that will be described in the data processing procedures in the program Development of Information Systems Management Production at PT. Perkebunan Nusantara VIII Bandung. Problem analysis of the current system is:

1. The Production Manager Representative is difficult or insufficient in determining the amount to be produced from each tea flavor variant. The accuracy in determining the amount to be produced is very important in order to meet market demand and the product does not accumulate in the supply warehouse. This problem arises because the determination of the amount of production in the company at present based on available raw materials and the determination of the amount that is not a reference in the production process. Therefore, proper planning is needed to determine the amount of production.
2. Production Manager Representative difficulties in planning or scheduling production activities. This is due to the absence of a plan amount to be produced from each tea flavor variant thus causing the production process to run slow when there is no order, and vice versa the production process runs fast when many reservations to hold additional shifts.

2.3 Analysis of Production Part Management

Production activities in the company currently have 2 activities of planning production activities and monitoring or evaluation of production performance. In management science, there is a problem solving concept that can be applied that is using P-D-C-A approach (Plan, Do, Check, Act) as problem solving process. Analysis of production management information systems part of the production is a follow-up of the analysis of systems that are running. In this section will be analyzed how a production procedure will be implemented on the information system to be built. Here is the cycle of PDCA.

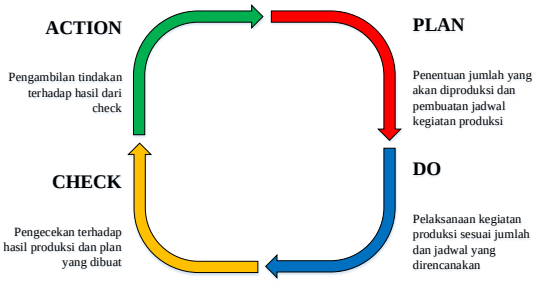


Figure 2 PDCA Production Management Cycle

1. Plan that is planning / determining the amount to be in production and planning / production schedule production activities.
2. Do the implementation of production activities in accordance with the number and schedule planned.
3. Check that is checking the implementation of production in stage do with production plan in phase plan.
4. Action is action taking of results from the check stage.

2.3.1 Plan Stage

Plan Stage is the stage to set the target or target to be achieved in improving the process or problem to be solved, then determine the method that will be used to achieve the target or target set. Here are the processes in the plan stage:

1. Determining Amount To Be Produced

The determination of the quantity to be produced is done by the production manager's representative, this is done to meet the market demand and not to accumulate the product in the warehouse so that from each product variant is determined will produce how much in the master carton unit. Determination of amount to be produced based on sales data using forecasting method. Forecasting the amount of production based on the actual data of previous sales. The results of forecasting obtained are used to determine the amount to be produced. The field responsible for this stage is the production field of the production manager's representative.

2. Schedule Production Activities

Scheduling production activities is done so that the production process can meet the amount that has been determined in the stage of determining the amount of production.

2.3.2 Phase Do

Phase Do is the stage of implementation or implementation of all that has been planned in the Plan stage, including running the process, producing and collecting data which will then be used for the Check stage.

2.3.3 Check Stage

Check is the stage of checking, checking and review and studying the results of the application in step Do. Do a comparison between the actual results in the Do stage with planning in the Plan stage.

2.3.4 Phase Act

The Act Stage is the stage to take the necessary action against the results of the Check stage.

2.4 Database Analysis

Database analysis on production management information system in Industri Hilir Teh PT. Perkebunan Nusantara VIII Bandung to be built using Entity Relationship Diagram (ERD). ERD is a data model that uses several notations to describe data in the entity context and the relationships described by the data. The diagram is illustrated in the following figure.

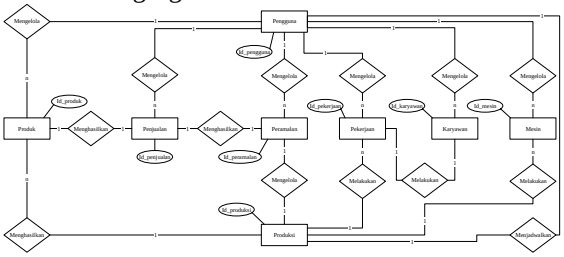


Figure 3 ERD Management Information System Production Section PT. Perkebunan Nusantara VIII Bandung

2.5 Context Diagram

Context diagram is a model to explain global how data is used and transformed to process or describe the flow of data into and out of the system. Context diagram on the system can be seen in the following figure.

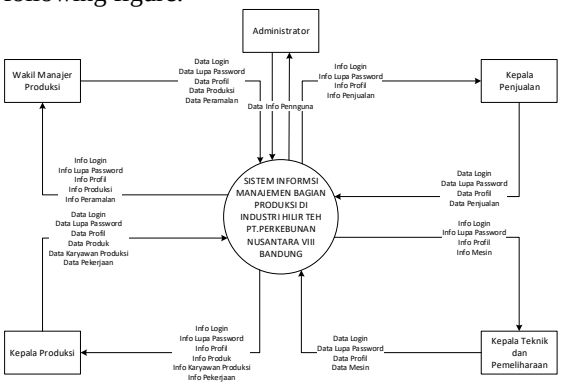


Figure 4 Context Diagram Management Information Systems Production Division in Industri Hilir Teh PT. Perkebunan Nusantara VIII Bandung

2.6 *Data Flow Diagram* (DFD)

Data flow diagram shows how the data flow describes the processes that occur in the system until the process more detail. In the context diagram like Figure 5 can be decomposed into several DFD.

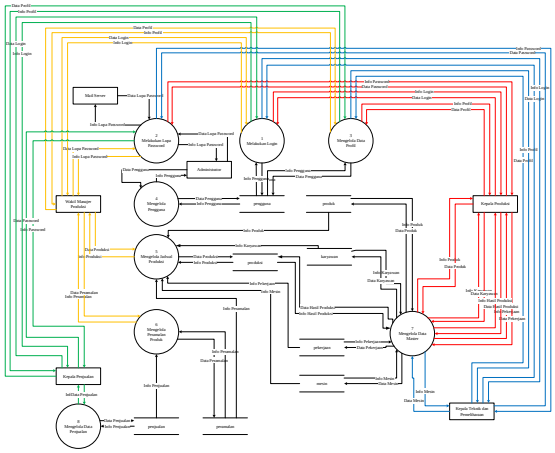


Figure 5 DFD Level 1 Management Information System Production Division In Downstream Industry PT. Perkebunan Nusantara VIII Bandung

2.7 Table Relationships

Table relation describes the relationship between data, meaning data and limitations. The process of relation between attributes is a combination of attributes that have the same primary key, so that these attributes into a unity that is connected by the key field. Here is a table of relationships that exist on the system.

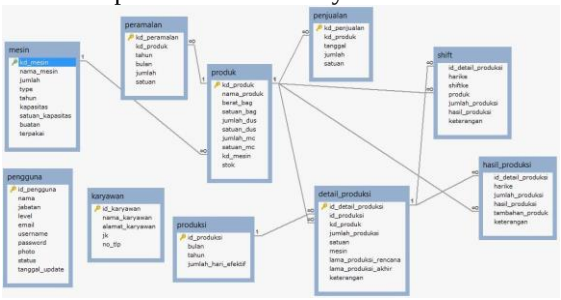


Figure 6 Table Relationship Management Information System Production Division In Downstream Industry PT. Perkebunan Nusantara VIII Bandung

2.8 Designing Menu Structure Production Manager Representative

The design of the Production Manager Representative menu structure is a menu structure designed according to user level Deputy Production Manager. Here is the menu structure of Production Manager Representative.

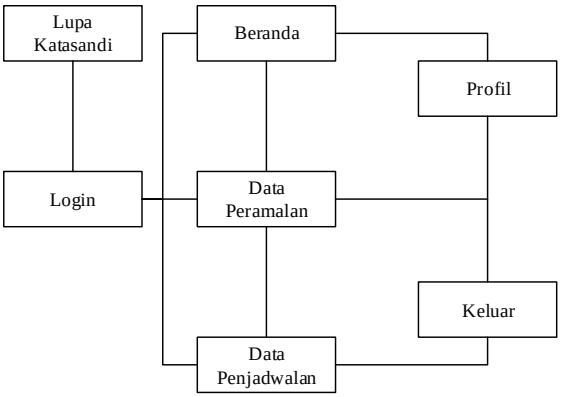


Figure 7 Menu Structure Production Manager Representative

2.9 Interface Design

Interface design is made to describe the appearance of the program that will be used by the user to interact with the system to be built. The design is made based on the interface of both input and output that will be generated when the application is implemented. Here is the interface design in production management information system in Industri Hilir Teh PT. Perkebunan Nusantara VIII Bandung.

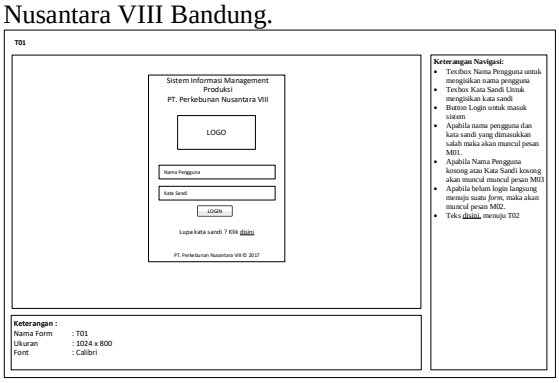


Figure 8 T01 Login Interface Design

2.10 Semantic Network Design

The design of semantic networks is a representation of interface design that shows where each interface is connected. Semantic network design in production management information system in Industri Hilir Teh PT. Perkebunan Nusantara VIII Bandung can be seen in the following figure.

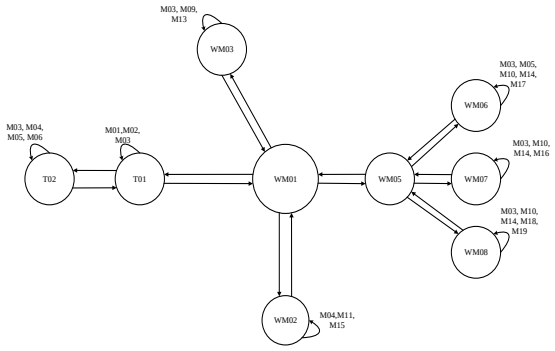


Figure 9 Semantic Network Production Manager Representative

2.11 Procedural Design

Procedural design transforms the structural elements of the program architecture into a procedural description of the software components. The procedural design for the application to be built is as follows.

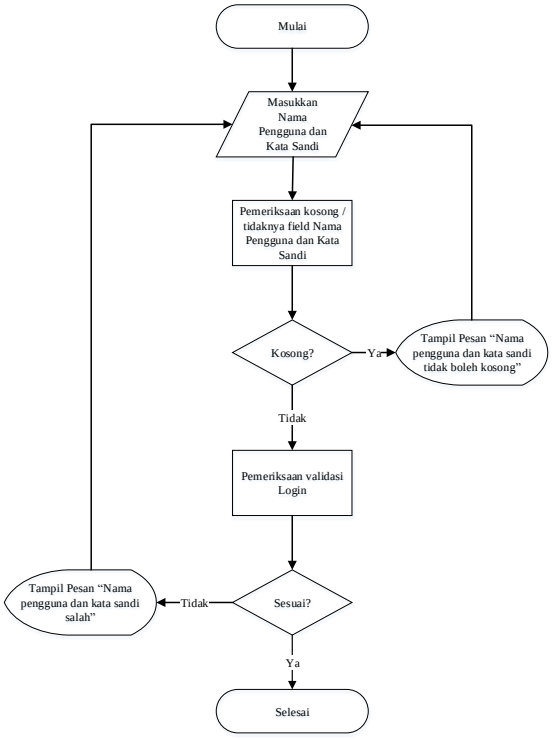


Figure 10 Flowchart Login Process

2.12 System Testing

Testing the system is the most important thing that aims to find errors or deficiencies in the system being tested. Testing intends to know the system created has met the performance in accordance with the design objectives.

The first test used to test the new system is the black box testing method, the two tests focused on user acceptance by using UAT (User Acceptance Testing), the three tests focused on user acceptance (end users).

1. Black Box Testing

Black box testing is focused on the functional requirements of built software.

Testing is done by testing each process for possible errors that occur.

Based on the test results with the test sample case that has been done to give the conclusion that the process is correct. Filtering process errors in the form of landing page view messages is quite maximal. Functionally the system is able to produce the expected output.

2. Testing User Acceptance Test (UAT)

Testing that focuses on user acceptance by using UAT (User Acceptance Test) which aims to find new defects not found by the developer and in the process of testing the software involves the potential users who are in the company selected by the developer And accompanied when testing.

3. End User Testing

Testing that focuses on user acceptance (end-user) is the end user acceptance test after the system is applied in the corporate environment by using interviews to end users using the software.

Interviews are conducted for users of systems consisting of administrators, vice production managers, production heads, sales heads, engineering and maintenance heads. This research was conducted at Industri Hilir Teh PT. Perkebunan Nusantara VIII Bandung in order to know the extent to which the system built can be a solution and solution of the problems that have been described previously.

Based on end-user testing, it can be concluded that:

1. The system assists administrators, vice production managers, production heads, sales heads, chiefs of engineering and maintenance in performing their respective jobs.
2. The use of language in the system is quite easy to understand.
3. The built system is easy enough to use.
4. The system has a pretty good interface.

3. CLOSING

In this section, explains the conclusions that contain the results obtained after the analysis, design, and implementation of the design of built and developed software and suggestions that will provide important records and possible improvements that need to be made for software development previous.

3.1 Conclusions

Based on the results obtained in the writing of this thesis, it can be concluded as follows:

1. This built information system can facilitate the representative of production manager in

determining the amount of production of each tea flavor variant.
2. This information system can facilitate the production manager's representative in planning or scheduling production activities.

3.2 Suggestions

Based on the results of testing the system, obtained some suggestions that can be taken into consideration. Suggestions that can be considered include at the time of interview with Production Manager Representative and Head of Production.

Suggestions for the development of this system there are several suggestions that can be done, another background:

1. Information systems need the development of such a display to make it more interesting.
2. Information systems need development so it is easier to use.

BIBLIOGRAPHY

[1] http://www.pn8.co.id/

[2] Fathansyah. (2007). Basis Data. Bandung: Informatika.

[3] Sutanta, Edhy. (2010). Sistem Informasi Manajemen. Yogyakarta: Graha Ilmu.

[4] Kusuma, Hendra. (2004). Manajemen Produksi, Perencaan dan Pengendalian Produksi. Yogyakarta: Andi.

[5] Nasution, H, A., & Prasetyawan, Yudha. (2008). Perencanaan dan Pengendalian Produksi. Yogyakarta: Graha Ilmu

[6] Makridakis, S., Wheelwright, S. C., & McGee, V. E. (1999). *Metode dan Aplikasi Peramalan Jilid 1*. Jakarta: Binarupa Aksara.

[7] Terry, G. R. (2006). Prinsip-prinsip Manajemen. Jakarta: Bumi Aksara.

[8] Rusyani, T. (1997). Manajemen Pendidikan. Bandung: Media Pustaka.

[9] Yuhefizar. (2008). *10 Jam Menguasai Internet Teknologi dan Aplikasinya*. Jakarta: PT. Elex Media Komputindo.

[10] Ardhana, Y. K. (2012). Dengan PHP: Membuat Website 30 Juta Rupiah. Jakarta: Jasakom.

[11] Simarmata, J. (2010). Rekayasa Perangkat Lunak. Yogyakarta: Andi.