

Improving Public Service Employment Systems Through Web Based Office Automation

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Abstract— Efficiency in the government operations has been a demand of institutional performance assessment. Administration activities in the document preparation at public service employment office provide opportunity to optimize the use of paper. To encourage the use of information technology in Ministry of Manpower and Transmigration hence information systems and work processes are arranged with modern management with networked organizations to shorten decision-making lines and expand the control range, then were arranged strategy in the information system development at Ministry of Manpower and Transmigration as integral part to carry out e-government and provide public service employment systems which reliable, trustworthy and can be accessed easily and cheaply.

This research aims to decide the most appropriate information system model which was used to automate administrative work process, as well as improve the quality and efficiency in public services. Web based system was proposed to automate office activities. The system was developed as a web based system in order to its interoperability and simple distribution. Knowledge base was built using MySQL database and modelled using UML (Unified Modeling Language). The system divided into several subsystems which each subsystem is modeled with use case diagrams, activity diagrams, and state chart diagrams. The study produced an automation model which was a web-based. Automation models illustrated three main activities of training process, certification, and placement. Testing of models conducted with functional testing to present function and appearance of the system to get feedback how users understand the system and triangulation for data validation.

Our finding highlight the importance office automation in public service employment will increase productivity and improve working quality with natural changes in information process organization. Capability automation applications in making decisions, managing and recalling information as how humans manage information will improve reports quality and productivity. Implementation of automation will increase from 2.81 sigma level becomes 4.525, which means the control and use of technology has increased. Finally, stakeholders recommended to implement a real-scale applications to automate training process in public service employment.

Key words - public service, employment system, web based, office automation.

I. INTRODUCTION

Future employment challenges increase heavily and more complex. Availability of employment opportunities in accordance with the level of workforce education increased in line with the opening of the free market. So, it was mandatory to improve quality in order to compete in the

international market and domestic market [1]. Improving quality of labor is done by holding a job training that aims to improve and develop competence, productivity, discipline, attitude, and work ethic at a certain level of skill and expertise and qualifications in accordance with the level of office or employment. The Association of Southeast Asian Nations (ASEAN) concentrates its emphasis on regional cooperation on security, sociocultural and economic integration with ASEAN Economic Community (AEC) by 2015. Establishing the AEC creates additional values in regional scope such as a common market economically connected through the basis of consistent production, free trade investment, capital transfer, labour market based on common and same for all ASEAN member countries. By 2015, ASEAN will have become a community. In place of ten heterogeneous labour markets there will be a large labour market in which nations recognize one another's qualifications [2][3]. Technical and vocational Education and training (TVET) institution is increasingly seen as the key for solving future problems. Thus, the systems need to provide answers to questions like the possibilities of the future work life and new working structures and also questions like the implementation of a sustainable development. But already today the vocational education system is faced with serious challenges. Highly skilled workers are needed in several working fields and also the complex working systems and the newly developed market systems demand for new solutions and concepts for their vocational training [4].

Presidential Instruction No. 3 of 2003 on the national policies and strategies for the development of e-Government was the rule of development of e-Government strategy in the Indonesian government. This instruction be a legal framework for implementation of e-Government in every government agency in Indonesia to further streamline the process of providing public services to the community. Directorate of Personnel Training and Instructor has had several information systems that support the implementation of e-Government at the ministry of labour. However, information systems are still not integrated and performed manually. So the existence of the computer has not been used as much as possible. Implementation of information systems manually takes a long time and frequent errors happened in the administration in the form of printing large documents provide ample opportunities occurrence of disability due to an error that occurs when the printing process documents.

From the above formulation, problems can be stated as follows.

- a. Employees had difficulty in preparing documents manually.
- b. Differences in employee understanding of the administrative rules cause errors in document creation.
- c. The cost of printing large documents

There are two main factors that motivate business organizations to automate part or all of the work routine. The first is a critical need to improve the productivity of office workers both administrative and managerial. The second reason was increasing of complexity of organizational decision-making and information needs [5]. In the future, information technology is the right choice to handle the processing of information in complex organization and rapidly changing environment of the organization.

This study adds a web-based application model in the office automation activities, which improve efficiency in the execution of administrative activities and document creation. Based on the background of the problem and the method has been selected, the research hypothesis is formulated as follows:

1. Automation of office administration will save money, time, reduces errors in the presentation of the report credit score.
2. Web-based applications in the activities office provides convenience of employees completing the work.
3. The application model can represent a function in view of work activities that provide convenience and comfort for employees.

Research on the automation system has also been done by some researchers which have discussed planning for some information systems functional positions in a different organization using a methods being customized to the characteristics of the organization. From some research above, give an idea to do research on development web based automation at public service employment system. Along of searches performed, similar to the study of functional positions instructor has never been done in the Directorate of Instructor and Personnel Training of Ministry of Manpower and Transmigration.

II. METHODOLOGY

Web application model needs to be described in more detail in order to become a tangible web applications that can serve to automate administrative processes in the training hall. Software engineering can be carried out by the method of steps that flow like a waterfall model [7] as shown in Figure 1 below.

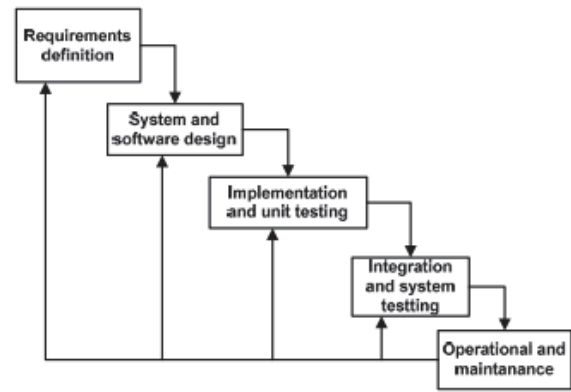


Figure 1. Waterfall model

In Waterfall, the entire software development process was divided some phases separate process. The phases of the waterfall model were: Requirements definition, system and software design, Implementation and unit testing, Integration and System Testing, and Operational and maintenance. All these phase flows for each other so that second phase was started and when defined set of goals are achieved for first phase and it was so perfect just step next phase and to be perfect as well, continue to the next phase again, until the last phase. Each phase can be controlled back to the beginning of the previous phase so that all phases of the system perfectly all, methods and processes carried out in the waterfall model becomes a system can look perfect all over. The stages on waterfall model can be categorized in model acquisition, model representation, prototype development and testing and evaluation. Requirement definition was built from relevant official regulations. Then performed a review of the business processes with an analysis of the benefit and deficiencies during current process. Model representations of administration business process in vocational education and training institution were used to form conceptual models and design of web follow the stages of making a web based model. Prototype testing performed with a functionality test to present function and appearance of the system to get feedback how users understand the system. Test done to government employee to create a document using web based model to evaluated system function, availability, reliability, performance and system supporting.

General stage processes can be shown in Fig. 2 below.

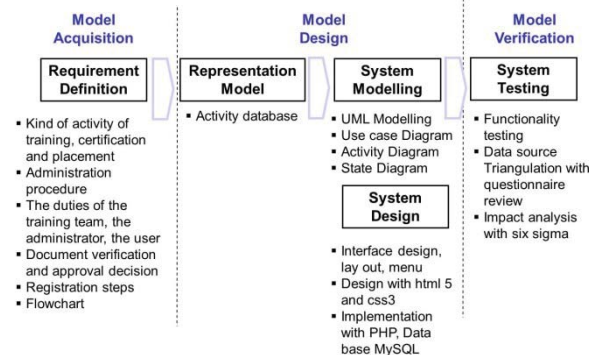


Figure 2. General stage processes

A. Requirement Definition

All possible requirements of the developed system is captured in this phase. Requirements set functions and constraints that the end user (who will be using the system) expects from the system. Requirements collected from end-users through consultation, these requirements are analyzed for validity and the possibility of incorporating the requirements of the system to be development is also studied. Finally, requirements specification document is created which serves the purpose of guideline for the next phase of the model. Requirement analysis phase aims to identify the types of data, information, processes and interfaces required by the user with the ultimate aim is to increase the system. User needs are translated into functional requirements (functional requirements) for example are: input, output, process and data stored and nonfunctional requirements (non-functional requirements) for example is a system performance (throughput and response time), user friendly and security controls.

In this research, observation and interviews step towards the users of the system: administrators, personnel certification and placement officer thus reflected the desire of the user to the system requirements. This model system will work by identifying the activities performed by the users that will create registration document. Then the system will display selected performed activities in the form of systematic selection steps that done by users when prepare registration document or certification and placement document. Entry of information and data done according logic based collected in a database table.

B. System and software design

Before starting for actual coding, it is important to understand what we are going to make and what it should look. Specification requirements of the first stage is studied in this phase and system design is ready. Design system helps in determining the hardware and system requirements and also helps in determining the overall system architecture. System design specifications serve as input to the next stage of the model. Application design process was an advanced stage after getting model system requirements. Application design stage use the Unified Modeling Language (UML). The system divided into several subsystems which each subsystem is modeled with use case diagrams, activity diagrams, and state chart diagrams.

Use case diagram was a system functions process modeling in business processes, actors who use them, and how the system / software that responds to the conditions. Use case diagram of the system was made to show the behavior of the system when viewed from the side of the user. This diagram shows the general overview of what the system is done and what the actors could do on the system. In this application there were three users : the administrator, the trainee and staff. In general, users could do some things on the system, such as enter a profile, entry registration form, check / preview, attach evidence / photo, and print document

C. Implementation and unit testing

Receiving system design documents, this work is divided in modules / units and actual coding begins. This system was first developed in small programs called units, which are integrated in the next phase. Each unit is developed and tested for functionality, this is referred to as Unit Testing. Unit testing mainly verifies if the modules / units meet their specifications.

The purpose of verification phase was to determine the knowledge of the truth, completeness and consistency of the system. Knowledge verification did evaluation for system, which aims to summarize learning with recommendations for improvement and correction of errors. Evaluation performed by testing a prototype that has been created in which the purpose of the testing to evaluate the function of the system, availability, reliability, performance and support. Tests were performed using functional testing (black box testing functionality). Functional testing was testing a system that is based on a scenario that has been made. This test ensured function of each scenario the system has been running as expected and appropriated with the particular functional needs[15]. The test is performed to ensure prototype had been made appropriate with management activities that have been designed previously. Additionally, to ensure activities were valid and well defined, performed validation using triangulation. This method is performed to ensure the validity of data by utilizing something else outside the data itself, for checking or as a comparison to the data[16]. In this test performed triangulation of data sources with the parties related to the preparation of the credit point with data obtained through questionnaires.

D. Integration and System Testing

As mentioned above, the system is first divided into units that are developed and tested for their function. The unit is integrated into a complete system during Integration phase and tested to check if all modules / units coordinate between each other and the system as a whole behaves as per specifications. After successfully testing the software, it is delivered to the customer.

E. Operational and Maintenance

Phase of the waterfall model is almost endless (very long). Generally, the problem with the system developed (which are not found during the development life cycle) appears after its practical use starts, so the issues related to the system are solved after deployment of the system. Not all the problems come in picture directly but they arise time to time and need to be resolved, then the process is referred to as maintenance

Designer software collects a wide range of views and suggestions from testers were selected and reanalyzed for design and modify the code if necessary. Having succeeded in testing products, means software programs succeed in acceptance testing, the product can be uploaded to the customer.

Evaluation is done by testing a prototype that has been created in which the purpose of this test is to evaluate the function of the system, availability, reliability, performance and support. Tests were performed using functional testing

(black box testing functionality). Functional testing is testing a system that is based on the scenario that has been made.

In addition, to ensure that the rules are defined is valid, the validation is done by using triangulation. Triangulation is a qualitative cross-validation to assess the adequacy of the data with a variety of data sources or multiple data collection procedures. Used to check data from various sources in various ways, and various time[8]. This method is performed to ensure the validity of data by utilizing something other than the data itself, for the purpose of checking or as a comparison against the data[9]. In this test done triangulation of data sources with the parties related to the process of preparing the credit score with the data obtained through questionnaires author. As a complement to the evaluation of measurement error in the preparation of statements of credit points with six sigma analysis. Six Sigma is a management philosophy that focuses on removing defects by emphasizing understanding, measurement, and process improvement. Defects (defects) is a measurable characteristic of a process or its output is not within the boundaries of acceptable customer, which is not in accordance with specifications. This method is used to eliminate defects and produce products and services that meet customer specifications to calculate the sigma level of a process related to the number of defects in a ratio to the number of opportunities for defects [10]. It is fundamental to Six Sigma is to determine clearly what is desired by the customer as an explicit requirement. This need is often called the Critical To Quality (CTQ). The organization then count the number of defects that occur so that the results would be obtained without the defect percentage of the items and use a table to determine the sigma level. Sigma level is often called errors per million opportunities (Defects Per Million Opportunities / DPMO). DPMO indicates how many errors which would arise if an activity is repeated up to a million times. DPMO is also a simple way to describe the qualities and capabilities of a process as shown in Table 1.

TABLE I
CONVERSION SIGMA LEVEL AND DPMO

Hasil Proses (Persentase Item Tanpa Defect)	Defects per Million Opportunities (DPMO)	Level Sigma (Kemampuan Proses)
30,90 %	690.000,0	1
69,20 %	308.000,0	2
93,30 %	66.800,0	3
99,40 %	6.210,0	4
99,98 %	320,0	5
99,99 %	3,4	6

III. RESULT AND DISCUSSION

The process of application design is an advanced stage after acquired knowledge representation system of credit scoring expert instructors that will be developed. At the stage of application design, modeling language used Unified Modeling Language (UML). The system is divided into

several subsystems which each subsystem modeled using use case diagrams, activity diagrams, and state chart diagrams.

A. Web-based Modelling

Use case diagram is a process of modeling the system functions in the business process, the offender is using it, and how the system / software that responds to these conditions. This diagram shows the general overview of what the system is doing and what the actors can do on the system. In this application, there are three main components, namely training, certification, and placement.

Training Staff in charge of analyzing the training needs of the job seeker, if the quality of the job seeker / not in accordance with the desired company. Analysis carried out by looking at the condition of the labor market and technological development at the time, the type and level of training are suggested. The officer in charge of analyzing the certification type and level of competence required of job seekers. Analysis and level of competence should be based on standards that have been issued by the National Board of Professional Standards (BNSP) and can be in the know the community at large. Placement officer in charge of carrying out all the functions covered by the activities of the labor market. Functions of the Placement officers based on the Special Employment Exchange Establishment Guide - BKK given by local authorities

B. Web Interface

Application design process was an advanced stage after defining model requirements. Application design stage use the Unified Modeling Language (UML). The system was divided into several subsystems which each subsystem was being modeled with case diagrams, activity diagrams, and state chart diagrams.

Web interface was designed with simplicity and clarity of design for easy use by the user. First time to go to the web model must LOG IN firstly. Interface of LOGIN as show at figure 3 below. If the user enter the wrong username or password when logging in, the web will be reminded that the username or password is entered incorrectly.



Figure 3. Log in page

After entering firstly, the web registration form will appear and the user must fill first in order to be listed on web database. Web design registration can be seen as figure 4. Once users register, means have been recorded in the web server, to enter into the website user must log in back by writing the ID and password that has been loaded.



Figure 4. Training Registration page

After a successful login, certification registration and placement pages would appear. The design interface is shown in figure 5 and figure 6 as follows.

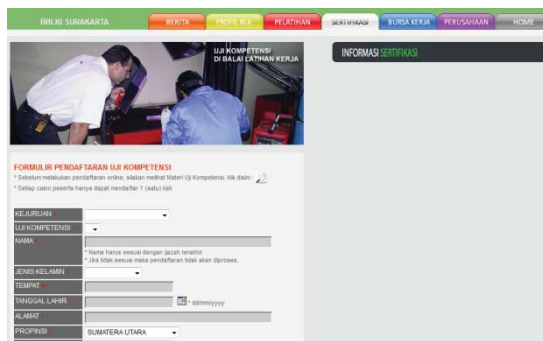


Figure 5. Certification registration page



Figure 6. Placement registration page

C. Database Design

In the development of the necessary system design database consisting of multiple tables so that the storage will be well ordered. These classes are the basis of data on which to base the drafting of the application to the relationship between classes.

D. Testing and Validation

Testing were performed using functional testing (black box testing functionality). Functional testing was a testing system that based on a scenario that has been made. This test ensured function of each scenario the system has been running as expected and in accordance with the specific functional needs. The test was performed to ensure that the prototype had been made appropriate with management activities that have been designed previously.

Functional testing web based model preceded by uploading to the internet. Tests performed according to the activity carried out in the filing of the training activity, certification and job placement. In training activity there were 7 major activities into functional testing criteria, whereas in certification activity were 5 major activities became the main criteria of functional testing. Activities that became the main criterion of the test as follows.

1. Training activity :
 - a. there were menus for log in as administrator and trainee,
 - b. user management to add, modify and delete,
 - c. trainees that logged in has each profile can be changed by the user,
 - d. trainee can change the profile,
 - e. trainees can create a registration form,
 - f. trainees can view and print the final document,
 - g. users can log out of system.
2. Certification activity :
 - a. trainees can view certification scheme,
 - b. trainee can select certification,
 - c. trainees can fill and edit certification registration,
 - d. trainees submit certification plan,
 - e. trainees can print certification registration,
3. Placement activity :
 - a. trainees can view job opportunity,
 - b. trainee can select job placement,
 - c. trainees can fill and edit placement registration,
 - d. trainees submit placement,
 - e. trainees can print placement registration,

Tests on the prototype can be concluded output system appropriate with the activities carried out. In this test also conduct triangulated data by the parties related system, in this case was the Head of Training, Head of Certification and Head of Placement. Triangulation is done by reviewing the results of the questionnaire.

E. Capability Measurement

With automation applications in the administrative activities of the Vocational Training Centre affect the efficient use of paper to document the number of credits equal to 75% of paper consumption. It also reduces the time needed to create the document. The following calculation can be collected which can give you an idea of efficiency that occurs by reducing the amount of paper used.

If the salaries of employees (Staff) Rp.2.000.000 means the equivalent of Rp. 3.02 / Seconds (23 working days /

month, 8 hours / day). When the price of ink refill Rp. 150,000 for 2500 sheets, the cost of ink per USD. 60. When the paper price of Rp. 70 / sheet and document printing time 5 seconds per sheet, the cost of printing per sheet of paper + = price (salary employees per second * old print) + price of ink per sheet. So the cost of printing per sheet = $70 + (3.02 \times 5) + 70 =$ Rp. 155. The use of paper for administrative documents equivalent to two reams (1000 sheets) of paper per month. With an efficiency of 75% the impact it will save as much as 750 sheets of paper usage. Or equivalent to Rp. 116 250 / month.

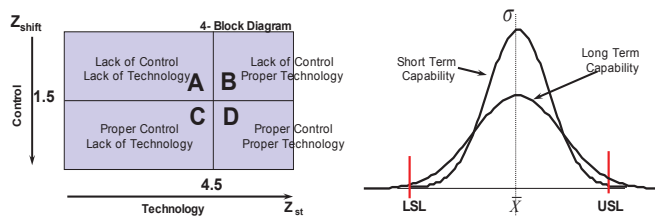
Process capability was shown by the sigma value will determine the direction of analysis and improvement will be made. Data realization of the large number of defects in the printing of paper documents for a month to be simulated to determine the value of Defect per Unit (DPU), Defect per Opportunity (DPO), Defect per Million Opportunities (DPMO), Yield (YRT) and Sigma Level. When the activities performed during the 10 months beginning the process capability obtained with 2.81.

TABLE 2
CURRENT PROCESS CAPABILITY

Nama	Rumus	Hasil
Defect	Def	750
Unit	U	7500
DPU	Def/U	0,1
DPO	(Def/U)*Opportunity	0,01
DPMO	DPO*1.000.00	10.000
Yrt	$2,718^{(-DPU)}$	0,90483 7
Zlt	Zinverse(Yrt)	1,30962
Zshift	1,5	1,5
Sigma Level (Zst)	Zst=Zlt + Zshift	2,80962

After getting the Sigma Level in Table 2 then in use in 4-Block diagram showing the control level (Zshift) and the influence of technology (Zst) consists of:

- Area A, showing an area with bad controls and bad technology (Bad Control & Bad Technology)
- Area B, showing an area with good control and influence enough technology (Good & Proper Control Technology)
- Area C, showing an area with good control but the use of technology ugly (Good Control & Bad Techology)
- Area D, shows an area with good control and good technology (Good Control & Good Technology)



Gambar 10. 4-Block diagram capability process

Figure 10 shows the distribution of the area within a 4-block diagram. In the short term there kapabilitas 6 sigma level (standard deviation), which is between the X and the SL (specification limit). When the process capability has reached six sigma then $Z_{st} = 6$ and $Z_{lt} = 4.5$, so that the estimated reduction in the capability of short term and long term capability of 1.5 sigma. Figure 11 below shows the location of the initial poses capabilities are in the areas A (crappy controls and the use of technology less), so it should be encouraged by the positive improvement in order to the area D.



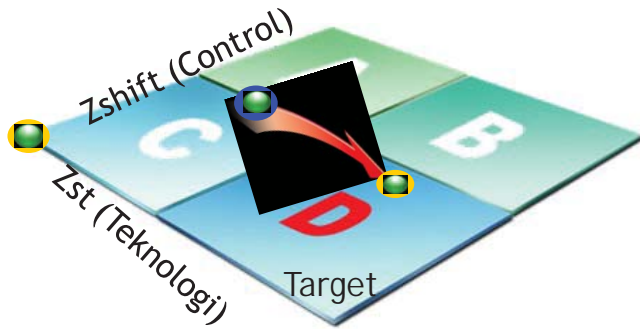
Gambar11.4-Block diagram BEFORE

The use of web automation training, certification and placement of a solution to the lack of use of technology. When the hardcopy output can be saved only with 22 sheets and other documents already stored in digital form. In printing documents only 17 pieces were damaged or misprinted copies of the document and the need for the process capability after the repair is done to reduce the documents shown in Table 3 below

TABLE 3
CAPABILITY PROCESS : AFTER

Nama	Rumus	Hasil
Defect	Def	17
Unit	U	220
DPU	Def/U	0,08
DPO	(Def/U)*Opportunity	0,008
DPMO	DPO*1.000.00	8000
Yrt	$2,718^{(-DPU)}$	0,9987
Zlt	Zinverse(Yrt)	3,0245
Zshift	1,5	1,5
Sigma Level (Zst)	Zst=Zlt + Zshift	4,5245

Figure 12 shows the location capability poses after perbaikan is in the area D (good control and good use of technology).



Gambar12.4-Block diagram capability AFTER

After the repair process capability obtained at the level of 4.525, which means the function and application of process control technology is good.

IV. CONCLUSION AND FUTURE WORK

This paper presented the development of a model for the automation of activities in a web-based training centers. The case study illustrates the use of web automation to provide solutions to the problems faced by staff and trainees in completing the training documents. Having tested a prototype on-line application is running in accordance with the expected activity scenarios stakeholders both in terms of functionality and appearance recommends encouraging stakeholders to develop the full-scale automation applications. Increasing the efficiency of the process capability characterized by increased printing of documents in a vocational training center. Initial capability based on an analysis of six sigma in 2.809 sigma level is in the area A in 4-Block diagram. This means that the function of control and the use of technology is still ugly. Once the repair is done using a web automation preparation of credit points gained at the level of process capability is 4.525, which means the function and application of process control technology is good.

For further research it is recommended to make a real system which has a direct link with others vocational education and training institutions.

ACKNOWLEDGMENT

The authors would like to acknowledge Directorate of Instructor and Personnel Training at Ministry of Manpower and Transmigration of Republic Indonesia for its support to this work. We would like to thank to reviewers for their valuable comments and suggestions.

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