QUALITY METRIC DESIGN USING INTERNAL CONTROL FOR CONTROLLING THE QUALITY OF E-LEARNING PROJECT AT UNIVERSITY X

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Abstract - University X is a private university that is developing an e-learning based system. This project is divided into 4 major programs: digital content development, development of production studios, development of information technology infrastructure and upgrading of lecturer competencies. Project success indicators can be seen from the components of the project constraint, one of which is quality. This project is at risk of experiencing a project quality failure, because this project didn't have a quality plan document in the planning phase. Therefore, it takes a tool in the form of a master plan project to ensure the quality of the project. Designing quality metrics is done using the internal control method. The existence of quality metrics in the planning phase can be used as a tool to manage quality on a project, with an internal control method that contains details about how to avoid common mistakes and as an effective training tool for workers. The internal control method helps the project manager (owner and vendor) to determine possible errors, critical success criteria and resources for each critical activity in the project Then the implementation of the critical success criteria will be carried out at the quality metrics and making treatment of critical activities in the project. Obtained 42 results from 66 equivalent 64% success criterion statement has been applied. While the critical success criteria of 15 out of 24 equivalent 62% have been implemented, this is one of the causes of the project quality failure.

Keywords - E-learning, Proyek, Quality Metric, Internal Control, Control Quality.

I. INTRODUCTION

Change is the most appropriate word to describe human life today. Indicators of change can be seen from human behavior or technological progress in each era, indicators of the direction of change in the world today can be categorized as generic to personal, analog to digital, thethered to mobile, isolated to connected, consuming to creating, and close to open [1]. The direction of change like that, allows all the components involved in this world to change or at least adapt to the circumstances, one of them is the mindset of students today. the most suitable learning media for learners in the present era is the use of virtual learning environment (VLE) or what is often known as electronic learning (e-learning) [2]. The components that make up e-learning are e-learning infrastructure, e-learning systems and e-learning content. E-learning is one form of learning model that is facilitated and supported by the use of information and communication technology [3].

University X is one of the private universities in the State of Indonesia. University X has a vision to become a world-class university that plays an active role in the development of information technology-based science and art. To realize this vision, University X plans to raise the level of learning towards information technology by creating an ICT-based learning system (Information and Communication Technologies), e-learning. This project allows lectures without face-to-face meetings between lecturers and students, this is in line with the Minister of Education and Culture Regulation No.24 of 2012 concerning the Implementation of Higher Education Distance Education. The problem faced in this project is the absence of reference documents for planning and implementing projects. Where without the planning document at the beginning, it will increase the probability of project failure [4]. This is in accordance with the survey conducted by Gartner and Standish Group in 2016 regarding the reasons for the failure of an IT project.



Figure 1: Survey of causes of IT project failure

The biggest contributing factor to IT projects failed 13.10% due to lack of supporting requirements for the project. One way to document the requirements of a project is to make a master plan project which includes all supporting documents so that the project is successful.Based on project management office data, this project does not have a quality standard specification guide that can be used when the project is underway to assist the quality control process. Without a quality standard specification guide on this project the risk of project failure is due to not fulfilling the specifications of a deliverable (rework). This phenomenon is very counterproductive to the

indicators of project success, because the success of a project is measured by quality, timeliness, budget fulfillment, and the degree of customer satisfaction with products and projects [4].
Based on the problems faced by the company in this project, it is necessary to have a master plan project for the company in order to be able to manage the project well and avoid the risk of quality project failure. Quality implies specifications or meeting requirements [5], because based on interviews with Project Managers, this project does not have quality guidelines for project planning and implementation. Then metric quality was made as a reference for quality control in the process of making University X's e-learning project. Quality metric in the planning phase can be used as a tool to manage quality on a project, with an internal control method that contains details about how to avoid common mistakes and as a training tool effective for workers [6].

II. LITERATURE REVIEW

E-learning is a system or concept of education that utilizes information technology in the teaching and learning process. The process of distance learning by combining principles in the learning process with technology [8].
Control Quality is the process of monitoring and recording the results of the implementation of quality management activities to assess performance and ensure project output is complete, correct, and meets customer expectations [4]. One tool for control quality is quality metric using internal control.

Internal control processes can increase effectiveness, efficiency, and adaptability to business processes, also make measurements (metrics) .Making quality metrics internal control method must go through several steps that must be done are [7]:

1) Creating business process for each activity in the project
2) Identify business processes that may be potentially errorthat called as possible errors
3) Provide warning signs of possible errors
4) Identification of prevention of all potential problems. Ensure that quantitative precautions are included in the criteria for business process success (critical success criteria)
5) Documentation quality metrics using systematic internal control tables.

Quality metrics consist of supporting quality management components such as possible errors, critical success and resources. The existence of a possible error makes it easy for workers to know the mistakes that might occur during the implementation of each project activity, critical success criteria can also make it easier to find out the key performance criteria of each project activity.

III. METHODOLOGY

The research methodology is shown in Figure 2. First, the authors collect research support data such as the Work Breakdown Structure, WBS Dictionary, and Project Schedule (Critical path), Activity List by interviewing the Project Manager of the project.

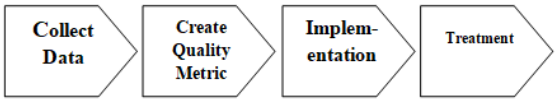


Figure 2: Research Methodology

Then the next step is making quality metrics using the internal control method. After quality metric has been made,the next process is the implementation of quality metrics that have been made for the activities that are in the project. The implementation process consists of two stages. The first stage is done by giving YES or NO answers in the form of the critical success criteria statement. The next implementation is carried out by checking the quality metric of the deliverables with the specifications / requirements on this project. In the process of implementing this stage, it is carried out on several deliverables (samples) in critical activities. The final process in this research is in the form of an analysis that can be used in this project to minimize the project quality failure.

A. Work Breakdown Structure (WBS)

This project is divided into four phases, where each phase has the same activity but is different in the number of subjects for each phase. WBS is shown in Figure 3. In this project there are three fairly complex work processes, namely, project management, training and the creation of both video and non-video content.

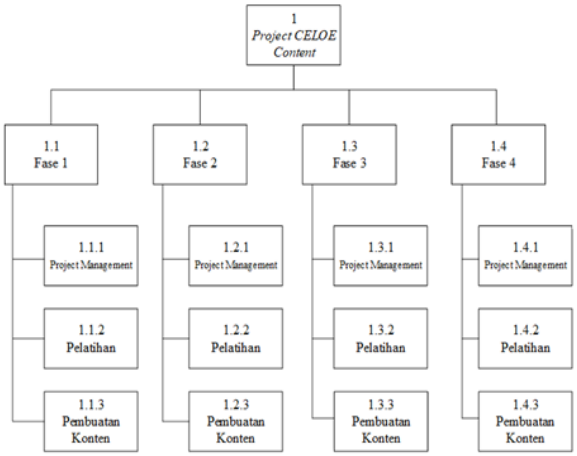


Figure 3: Work Breakdown Structure (WBS)

B. WBS Dictionary

The WBS dictionary delivers detailed information, activities, and scheduling about each component at the WBS [4]. Besides that, in making the WBS Dictionary it also lists the level of work / activity along with the owner of the activity.

WBS Number	Task Title	Description	Task Owner
1.1	Project Management	Organize matters relating to administrative processes and policies in the project.	PMO *officer*, P*roject Manager*
1.2	Training	Public speaking training, slide visualization workshops, studio technical training to raise the competence of lecturers.	PMO *officer,* lecture, Interviewes
1.3	Content Creation	Consists of processes related to the process of creating content such as video content, non-video content and making proposals.	Lecture, Studio Crew, Reviewer

Table 1WBS Dictionary

C. Activity List and Critical Path

Activity List is a documentation of all activities related to the ongoing project. Document creation is required to be very detailed and comprehensive and provide some fundamental information on the project, so that specific information can be easily seen by the components involved in the project [4].

The critical path shows the sequence of activities that represent the longest path to complete the project, which determines the duration of the project as short as possible. Determination of critical activities in this project using Microsoft Office Project 2016 software, the following is the result of critical path identification in University X's E-learning project activities.

WBS Number	Task Name	Duration	Total Float
1.1	Project Management	**131 days**	**0 days**
1.1.1	Organizing Project	123 days	0 days
1.1.2	Controlling Project	100 days	0 days
1.1.3	Organizing BAP	100 days	0 days
1.1.4	Organizing PKS	100 days	0 days
1.1.5	Organizing Shooting Schedule	100 days	0 days
1.1.6	Organizing Financial Project	100 days	0 days
1.2	Training	**17 days**	**0 days**
1.2.1	Slide Visualization Workshop	2 days	28 days
1.2.2	Learning Management System Workshop	2 days	18 days
1.2.3	Public Speaking Workshop	2 days	13 days
1,3	Content Creation	**110 days**	**0 days**
1.3.1	Proposal Creation	15 days	0 days
1.3.2	Proposal Review	24 days	0 days
1.3.3	Non video content Creation	34 days	0 days
1.3.4	Non video content Review	38 days	0 days
1.3.5	Video Content Creation	61 days	0 days
1.3.6	Video Content Review	67 days	189 days

Tabel 2 Activity List and Critical Path

Activities are called critical activities if the delay in time in this activity will affect the overall completion time of the project. It can be said that the Activity is declared critical if the activity does not have float time or the total float is "0". Based on table 2, the critical activities in this project are all activities except slide visualization workshop, learning management system workshop, public speaking workshop and non-video content review.

D. Quality Metric

Quality metrics are used during the Quality Assurance process and Quality Control Examples: reliability, failure rate, availability, etc. The making of quality metrics is carried out using an internal control method where there is a process of identifying possible errors in each project activity, possible errors are the possibility of failures predicted so that workers can avoid them.

WBS Number	Task Title	Possible Error	Critical Sucsess
1.3.3	Non video content creation	Course Description does not contain 11 elements (<= 11 elements)	Lecture description contains 11 elements
		Non video content not contain learning guides	Has a minimum of 1 learning guide in each weekly subject matter
		Non video contentdoes not include lecture notes or format	. Have a minimum of 1 lecture notes in each weekly subject matter. Pdf, txt, pptx format.
		Do not load feedback for each answer	There is a feedback evaluation for each answer
		The assessment rubric is not in accordance with the assignment	Has a minimum of 1 external link in each weekly subject matter, Reference external links in the form (Lecturer Blog, Masteran Material, video tutorial)
1.3.5	Video content creation	Excessive video script content material, not according to the format given	100% video script content in accordance with training material
		Shooting inventory cannot be used (Trouble)	100% shooting support inventory can be used
		Environment problem (human noise / lightning, lighting, etc.)	Environment factor (Temperature, Noise, light) according to normal conditions (studio condition)
		Final videos do not match requirements (Audio and visual aspect)	Resolution of 1280 x 720 pixels, MP4 format, 5-7 minutes video duration, high quality 720 HD preset,

Tabel 3 Quality Metric (Example)

Table 4 shows the example of quality metric. At implementation phase, all indicators in quality metrics are implemented and analyzed if there is a gap between quality metrics and ongoing projects.

IV. RESULT AND DISCUSSION

Figure 5 shows the business process of organizing schedule of shoting activities, which then developed into a quality metric that will be implemented in this project. The results of the implementation of all indicators on quality metrics will be analyzed with gap analysisis.

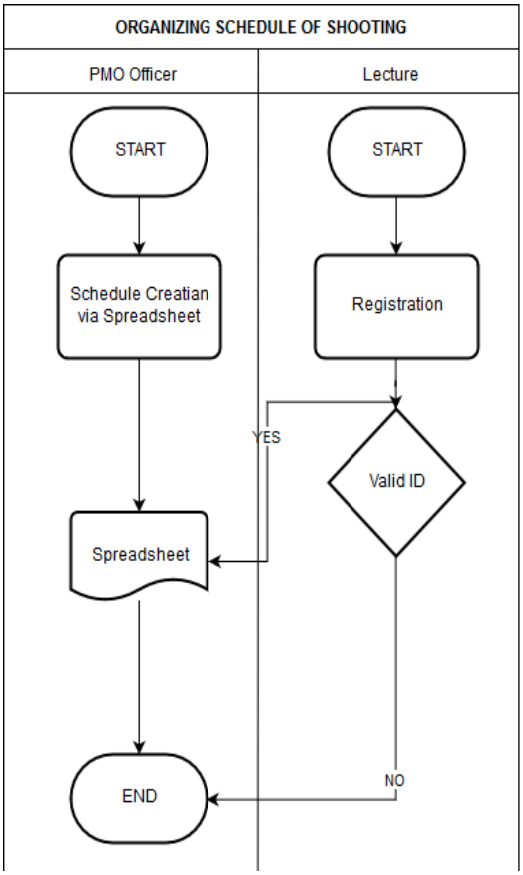


Figure 3: Flowchart of Organizing schedule

WBS Number	Task Title	Possible Error	Critical Sucsess
1.1.4	Organizing Schedule of Shooting	Schedule slots are still empty (not filled by lecturers)	100% of slots are filled
		Lecturer has not made 100% videoscript for all the subjects, so the lecturer cannot carry out shooting activities	100% of lecturers have made videoscript according to the number of subjects.
		Number of schedule slots ≠ subject matter	The slot quantity of lecturers must be in accordance with the subject matter of the PKS
		Clash schedule slots	Minimum percentage of slots filled every week> 85%

Tabel 3 Quality Metric

The results of the implementation of quality metrics in the Organizing Schedule of Shooting activities as many as 50% of critical criteria have not been fully implemented and some have been realized on the project.. Figure 4 shows the results of the first phase of implementation.

Information	Question	Percentage
NO	24	36 %
YES	42	64 %
Total	**66**	**100 %**

Tabel 4 Recapitulation of Quality Metric

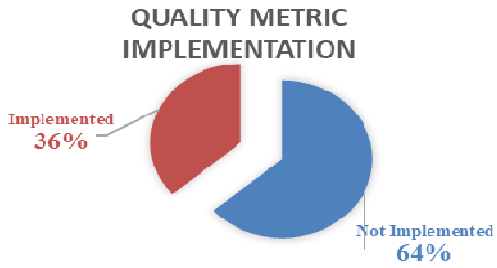


Figure 4: Quality Metric Implementation

Based on Table 4 and Figure 4, there are 42 critical succesess criteria statements with YES answers. While 24 critical statements success criteria with NO answers. By looking at the whole, with a total number of critical success criteria statements as many as 66. Then it can be said that 42 of 66 critical criteria criteria statements or 64% of statements have been implemented in University X's E-learning project. The remaining 24 critical success criteria statements from 66 statements or 36% have not been implemented in this project.

The second stage of implementation is carried out by inspecting the conformity of deliverables with specifications loaded on quality metrics. In Figure 5 and Figure 6 can be seen the results of the implementation of non video content and implementation on videoscript:

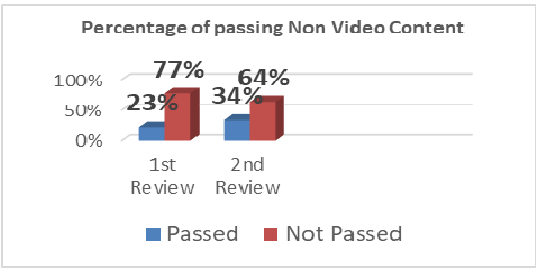


Figure 5 Percentage of passing Non Video Content

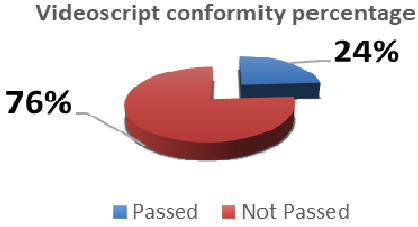


Figure 6: Videoscript Conformity Percentage

Based on Figure 5 the results obtained in the first review process of non-video content were 23% or 40

MK who passed the review process (final score> 75) and as many as 77% or 134 courses that did not pass the review process. In the second review process there was a not too significant increase, there were 34% or 60 MK who passed the review process (final score> 75) and as many as 64% or 114 MK who did not pass the review process. In addition, based on Figure 6 the number of videoscript is appropriate and can be used for shooting as much as 24% of documents that have been submitted previously by lecturers at googleform. Based on the data obtained, it is very risky for project failure due to the low level of success of videoscripts and non-video content.

Based on the results of the analysis, it is only natural that in the project there will be a delay due to the many occurrences of the rework process in several activities such as the creation of non-video content and video content. Therefore, according to the research carried out, proposals can be given to help implement the quality control process in each project activity, which is carried out by applying the quality metric design results to achieve results that are in line with the project objectives in the planning phase. To maximize the design of quality metrics and minimize the occurrence of the rework process, companies can develop quality items into an action / treatment such as:

1) Tutorial
2) Making a guide / tutorial on how to carry out activities on the project, such as the guidelines for making lecture notes and videoscript.This tutorial aims as a reference by lecturers in making lecture notes and videoscript in the project. In this guide there are procedures for making documents that meet the requirements agreed upon previously. The existence of this document reduces the occurrence of rework, thus minimizing the occurrence of project quality failure
3) Dashboard (Data centralization System)
4) Making a tool to control the project (Data Centralizational system). This tool uses the Google sites platform and Google Data Studio as a media for creating project information dashboards. The dashboard can be seen in figure 7.

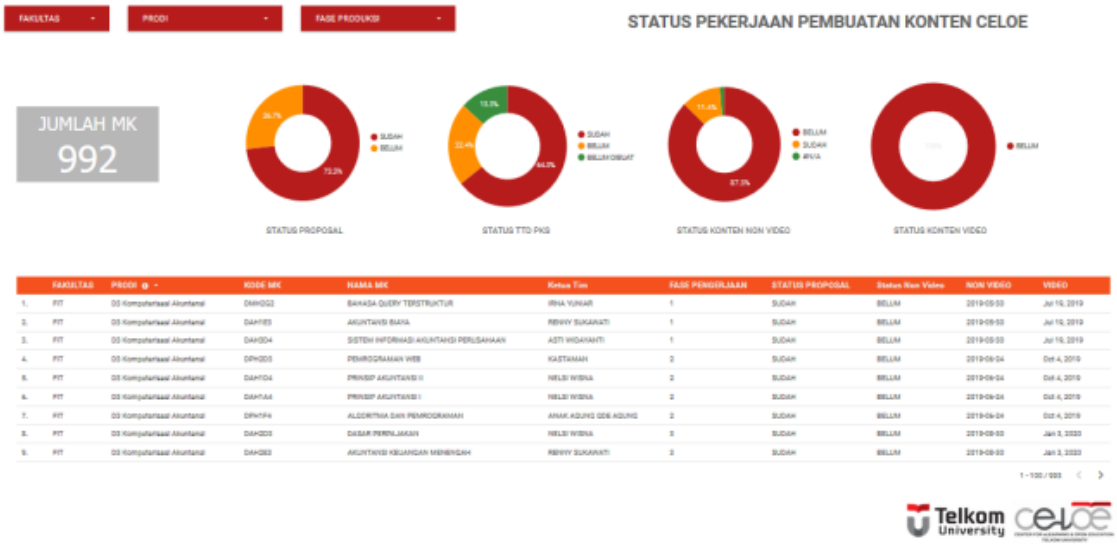


Figure 7 Dashboard

Dashboard (Data Centralized system) was created because based on the results of the implementation of quality metrics, it was found that some activities such as controlling the project schedule had not been implemented properly on this project. Then the dashboard was made to facilitate controlling and monitoring of the activities that took place on the project.

The two treatments came from quality items that were re-developed into a more specific component to minimize the rework process. Both treatments can be used in the next phase of the project, which is useful as a tool for mitigating errors that may arise in this project.

V. CONCLUSION

Designing quality metrics produces a specification guide / guide on project quality that can be used by project executors as a reference for carrying out activities in the project. Quality metrics consist of supporting quality management components such as possible error, critical success and resources (material, tools / doc, man, method, specification / function). The existence of a possible error makes it easy for workers to know the mistakes that might occur during the implementation of each project activity, critical success criteria can also make it easier to find out the key performance criteria of each project activity.

Quality item development is a real treatment such as making guides / tutorials, making the project's data data centralization system. The application of some of these treatments can reduce the rework process by minimizing errors in some activities such as controlling the project schedule, arranging studio schedules (dashboard data centralization system) and making video and non-video content (guidelines for lecturer notes and (videoscript tutorials).

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