APPLICATION OF PRODUCT QUALITY ASSURANCE IN MANUFACTURE, CASE STUDY IN MECHANICAL ENGINEERING DEPARTMENT, SRIWIJAYA UNIVERSITY

Nugrasyah A.[1], Mohruni A.S. [1*]

[1]Mechanical Engineering Department, *Sriwijaya University,* South Sumatera, Indonesia

ABSTRACT

Product Quality Assurance (PQA) is a standard procedure to ensure product quality in practical manufacturing engineering. In this study, the PQA-procedure will be applied for academic assurance in the Mechanical Engineering Department, Sriwijaya University. The objective of this study is to generate web-based Academic Quality Assurance (AQA) in the Department, which accomplices with the National Accreditation Agency for Higher Education (BAN-PT). The development of web-based AQA was carried out using an open-source PHP, MySQL, CSS, and REST API to ensure web integration with the existing website of Sriwijaya University. The results show that this application can overcome the current problems when the Academic Quality Assurance was conducted manually. The AQA web can work smoothly.

Keywords: PQA, Web-Based AQA, PHP, MySQL, CSS, Rest API, Accreditation, BAN-PT.

1   INTRODUCTION

The industrial revolution 4.0 era is a phase of change the manufacturing industry uses the internet for all activities in digital form. One of the challenges in industrial revolution 4.0 for manufacturing industries, is to monitor and evaluate the product quality. Product Quality Assurance (PQA) systems are used to ensure the production process from raw materials until becoming a product [1] [2].

In the education tertiary especially, it also can not escape from the 4.0 industrial revolution development. The Education Law mandates that a university not only conduct academic activities but also carry out Academic Quality Assurance (AQA) to maintain and improve the quality of higher education. In a planned and sustainable manner, which conducted through the establishment, implementation, evaluation, control, and improvement of the standards of Higher Education. Based on the similarity of the concepts of PQA and AQA, this study will design and apply web-based AQA in Mechanical Engineering Department Sriwijaya University following the standards of the National Accreditation Agency for Higher Education (BAN-PT) in 2019.

Design web-based student information management system, one centralized database via the internet technology, The principal data collection methods were questionnaires and follow up interviews, The quantitative data collected were analyzed and presented using Microsoft Excel Package, The system benefits students as it has cut the time spent during registration periods in every new semester [3].

Design of a Multifunctional Web Portal for College Departmental Activities, Keeping and maintaining online records have become vital, a Website has become an essential requirement, design, and build a Web portal for the college department. This Web portal will consist of various interlinked web pages comprising of several types of information and activities; Crucially, it serves to reduce the communication gap between the faculty and the students, to accomplish this using the latest scripting technologies like HTML, CSS, javascript, and PHP [4].

The QA system will work as providing users the required NCAAA (National Commission for

---

*Corresponding author's email: mohrunias@unsri.ac.id

Academic Accreditation and Assessment) reports' forms to be filled. Then, the proposed QA system will gather forms and generates completed reports, and at the same time, it provides them to the decision-makers. The proposed QA system will allow decision-makers to approve reports and view gathered information in many aspects in which will facilitate the making decision processes in continuous improvement of the educational processes and outcomes, Based on the functionality of the proposed QA system, the architecture that will be used is Client/Server architecture using the "Client/Server Model".

There are three layers that composed together, which are: client layer, server layer, and the data layer. The client layer contains the interface which will be implemented in the proposed QA system by HTML and java scripts languages and for the user to request a process from the server layer we will use an ASP.net language.

On the other hand, the server layer will handle the request by performing an SQL query and retrieve the data from data layer which contains the QA database such as equipment, staff and building data that will be stored in a relational database. Also, the QA database interacts with the relevant data files and responds to the requests. Moreover, Client/Server model selected because the proposed QA system is web-based system and this architecture excels in flexibility, easy to add new servers or upgrade existing servers and user independence, In conclusion, this project has achieved some features and functionalities that the QA system provides [5].
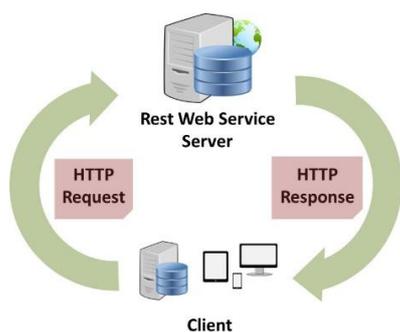
Figure 1 REST API architecture

2   METHODOLOGY

AQA Web designed using the Hypertext open source web programming language The Pre-processor (PHP) and open-source database My Structured Query Language (MySQL) with interface connections uses the concept of

Representational State Transfer (REST) architecture applied in the use of Application Programming Interfaces (API) and for web display settings using Cascading Style Sheets (CSS) as shown in Figure 1.

Based on the system analysis carried out, the system is determined according to the needs of Sriwijaya University. The stages of the website design that will be built are shown in the research flow diagram Figure 2.
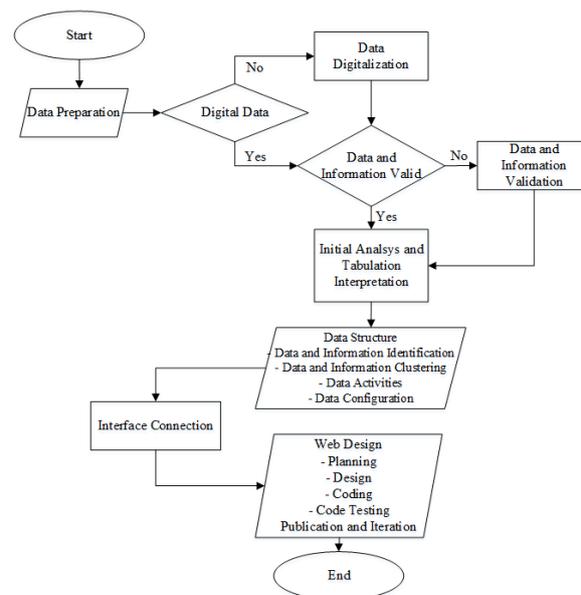
Figure 2 Research Flow Diagram

3   RESULTS AND DISCUSSIONS

The processed data in this AQA-web is retrieved from the internal data of the Mechanical Engineering Department, Sriwijaya University.

The data will be delivered in the form of master data, which has been grouped based on entities and attributes.

The entities and attributes or the data is written using alphanumeric or pdf. On the other hand, the external data are retrieved in the form of REST API, which is originally belong to the Information, Communication, and Technology Center of Sriwijaya University.

3.1   Result in MySQL-Database

The AQA web dashboard design has access rights which are arranged into 3 parts consisting of super admin, study program, and reviewer admin. The dashboard display of 3 menus level on the left, composed of 3 menus level where the screen has the same type as the applications that already exist at Sriwijaya University. AQA web is designed on

web hosting who located on Sriwijaya University's servers, and for server-side security, access is done using the Virtual Private Network (VPN) interface. The MySQL AQA Web database is designed using PhpMyAdmin with the Laravel framework for structuring codebase and folders by using the model view controller to organize files and folder structures.

3.2 Result in PHP-Coding

The most significant activity in the Laravel Framework is the controller and model coding. In the controller, the primary CRUD function will be programmed, such as create, read, edit, show, store, destroy, display, etc.

Whereas for PHP coding is done on the app, * .env, resources, and routes. The AQA's web dashboard display is designed by using CSS, accessing the server via File Transfer Protocol (FTP).

For the models, the public function, the public static query selects; a query where; the query group; will be designed according to CRUD function.

The results will be further used in controlling the whole processes of the web activities in accessing the database.

3.3 Result in Dashboard

Initially, the dashboard will be designed using CSS for displaying the desired results. The appropriate data will be retrieved using a suitable data filter.

3.3.1 Data Access

The Dashboard designing results can obtain and filter the academic data. Getting academic data can be done comprehensively, partially, and individually. The data accessed can be a combination of internal data, external or both as shown in Figure 3.
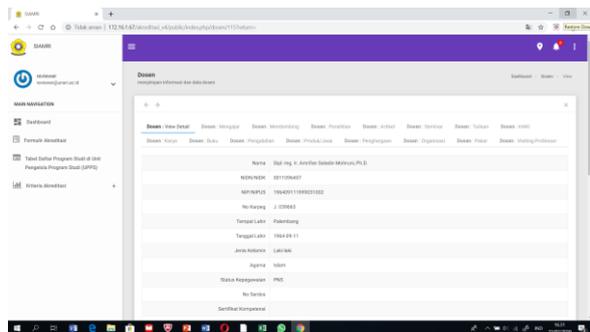
Figure 3 Academic data accessing display

3.3.2 Data Filtering

The academic data filtering can be done on the AQA Web includes lectures and student academic data. The data filtering is done by combining information requests in the form of a combination of data attributes using Boolean logic 'AND' and 'OR.'
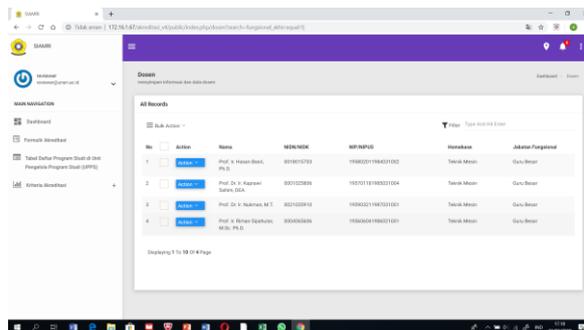
Figure 4 Academic data filtering display

3.3.3 Decision Supporting System

The data and information displayed by AQA Web that has been designed can be used as a support system for decision making for the department. This AQA Web design can also display data and information by the performance criteria of the study program table, according to BAN-PT, which consists of 9 accreditation criteria with 24 of standards.

4 CONCLUSIONS

1. In general, web-based AQA designed can run smoothly where this AQA can display data and information:
2. Can demonstrate and access data as desired, and perform filtering operations (cross-check) against a choice of predetermined data
3. Data access by the needs of the BAN-PT Accreditation Standards can be appropriately met through the appropriate data screening process
4. Data access to the database Sriwijaya University still has problems in terms of data transfer through the REST API because not all Unsri databases are available to be accessed through the REST API format
5. Availability of data and information that is accurate and following the needs of the development of Mechanical Engineering Study Program is very helpful for the Study Program in carrying out the task of monitoring, evaluating and determining the policies to be taken

REFERENCES

[1]   Illes B, Tamas P, Dobos P and Skapinyecz 2017 New Challenges for Quality Assurance of Manufacturing Processes *Solid State Phenom.* **261** 481–6

[2]   Daniel D E, Koerner R M and Carson D A 1995 *Quality Assurance and Quality Control for Waste Containment Facilities.* (Cincinnati, Ohio, USA)

[3]   Lubanga S, Chawinga W, Kapondera S and Holloway R 2018 Web Based Student Information Management System in Universities : Experiences from Mzuzu University *Standing Conference of Eastern, Central and Southern Africa Library and Information Associations (SCESCAL), May 2018A, Uganda* (Kampala) pp 655–69

[4]   Vaidya O S and Bakshi T 2017 Design of a Multifunctional Web Portal for College Departmental Activities *Int. Res. J. Eng. Technol.* **4** 2127–32

[5]   El_Rahman S A and Al-Twaim B A 2015 Development of Quality Assurance System for Academic Programs and Courses Reports *Int. J. Mod. Educ. Comput. Sci.* **7** 30–6