*RESEARCH ARTICLE*

# ONLINE ACTIVITY DURATION MANAGEMENT SYSTEM FOR MANUFACTURING COMPANY

Soh Hui Gian[1], Shahreen Kasim[1]*, Rohayanti Hassan[2], Zalmiyah Zakaria[2], Hairulnizam Mahdin[1], Azizul Azhar Ramli[1], Mohd Farhan Md Fudzee[1], Mohamad Aizi Salamat[1]

[1]Faculty of Computer Science and Information Technology, Universiti Tun Hussein Onn Malaysia, Johor, Malaysia
[2]Faculty of Engineering, Universiti Teknologi Malaysia, Skudai, Johor
*Corresponding Author Email: shahreen@uthm.edu.my

## ARTICLE DETAILS

## ABSTRACT

The researcher of Asian Composites Manufacturing Sdn. Bhd. (ACM) are currently doing a research on how to reduce waste within all processes in an activity duration of the production, in order to increase profit for the company. Currently, the duration of the activity processes was recorded by manual procedure in paper-based form which are prone to many problems. At the same time, it lacks in real-time feedback between the researcher and the staff of ACM. To overcome these problems, the Online Activity Duration Management System (OADMS) is proposed. This system will computerize the manual procedure. It is provided in a web-based environment. The OADMS system is developed by using the waterfall system development methodology, while the programming languages are using Hypertext Markup Language (HTML), Hypertext Preprocessor (PHP), Structured Query Language (SQL) and JavaScript. The OADMS provided a systematic activity duration management for staff of ACM and eased the works of researcher in analyzing the processes and providing feedbacks for improvements of the activity duration. By, providing a computerized solution, it is concluded that the activity duration management is more systematic and precise.

### KEYWORDS

## 1. INTRODUCTION

Nowadays, Information and Communication Technology (ICT) provides various approaches to automate manual systems with the aim to improve non-computerized procedures. State-of-the-art technologies such as internet, database, object-oriented and mobile platforms are significant platforms for developing various information systems. Therefore, it is imperative that these technologies are utilized to develop an information system that could automate manual procedures. With that intention, the Online Activity Duration Management System (OADMS) for a manufacturing company is thereby proposed. Duration management system is essential application in a workspace environment since it is used to record and track the shift movements of the staffs. As an example, University Tun Hussein Onn Malaysia (UTHM) is an organization that implements such system. Duration management system eases the workload of management department, particularly in calculating the staff"s wages. This is achieved by accessing and manipulating the working hours data in the duration management system"s database. In manufacturing companies, they are using more than one type of duration management system, such as production planning system, production scheduling system and activity duration management system. However, this project will only address on the activity duration management system.

This project proposes to develop an online system that allows staffs of the manufacturing company to record the duration of all processes involved in an activity of manufacturing a product, beginning from the raw materials to the finish goods. Most of the manufacturing companies were now using manual procedures to record the duration of every single

process of the activities occurred in manufacturing a product. The duration is recorded in the form of duration summary. This summary will be analysed by researcher of the respective company in order to improve the efficiency of the manufacturing processes, decrease the costs incurred and improve profits for the company.

OADMS is to develop an online-based activity duration management system (OADMS) to replace the current paper-based form procedures. The objectives are to develop OADMS in order to improve the duration management by automating the existing system, to provide a web-based platform for performing summary analysis in order to enhance the efficiency of doing research on the improvement of manufacturing activities in the company and get swift feedback from researcher to the staff of the manufacturing company.

Regarding the project scopes, the proposed system serves as a web-based platform (online) that will be specifically used by certain users only, which are staffs and researcher (Mr. Ahmad Nur Aizat) at the ACM, Bukit Kayu Hitam, Kedah, Malaysia. With respect to the data used in this project, the duration of the processes in the manufacturing activities will be used as the data for the proposed system. In this proposed system, only the respective staffs and researcher will be authorized as users. Warning message is to be given to any invalid users, and access will 5 subsequently be prohibited. Authorized staff will then be able to enter the duration data after they were successfully logged into the system. Data that were entered will then be used to generate the analysis for future use. All of the data will be stored inside the database. Next, the summary will be auto-generated by these data. At the same time, system will send a SMS for the researcher to notice that a summary was inserted. As a result, researcher that has

successfully logged into the system will be able to review the summary of the activity processes online through any computer devices with Internet connection, even if they are not physically inside the company building. Eventually, the researcher will be able to provide response, comment or feedback based on the summary that has been carried out and finally give suggestions in taking the most suitable action to improve the efficiency of the production. The suggestions is presented in the form of advise on using certain specific improvement tools to reduce waste during the activity processes. The feedback will then be directed to the staffs and sent through the system.

This project propose the development of an online-based activity duration management system for the manufacturing company due to the lack of relevant solution that are available widely for tracking tasks. All the procedure that records the duration of activity processes were in paper-based, thus it is prone to many problems such as the inefficiency of managing time and space, lack of real-time feedback, probability of missing records of duration or damage to the paper-based documents. Therefore, this project was proposed to automate and computerized the manual procedure to solve the above-mentioned problems.

Duration management is useful in managing the duration of an activity or an operation, scheduling and others. The duration management system is a software application which helps in recording operational data and uses to measure the actual variation in activity performance duration (Jason Whittaker, 2008). Most duration management system allows user to input duration of activities or operations. The data will be stored inside the database once it is saved by user. Next, the stored data will be processed into information that will be used by user to improve the efficiency of related operation. This feature helps in reducing the problem of time and space inefficiencies that usually occurs in the duration of an activity or an operation.

Activity duration management system is available in market nowadays, which is exists in form of software that use for commercial. However, in Malaysia is not exist activity duration management system yet in fields of manufacturing company. Therefore, online activity duration management system which is proposed here is a computerized system that helps in record the duration of the processes in an activity during the operation in the manufacturing by using online.

Based on this project, survey and investigation had been made towards existing Online Activity Duration Management System in terms of programming languages is use to develop the system, technology and other related characteristics.

The systems that have almost similar properties and serve similar purpose are reviewed. The reviewed systems are scheduling system and production management system for manufacturing company. For example, Punch Card Scheduling System.



**Figure 1:** Punch card (time card)

Figure 1 shows the manual method is the conventional way of scheduling for a company, in which all scheduling is funneled record through punch card and electronic time recorder. In this system, the workers have to punch their card whenever they leave company, including lunch time and tea time. For large manufacturing company with very busy schedules, this system can swiftly become untenable.

**Figure 2:** Electronic time recorder

Figure 2 show the electronic time recorder used to record the time into the punch card.
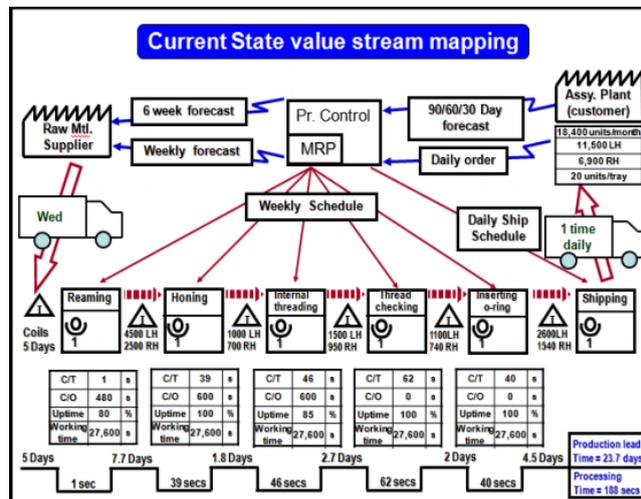


**Figure 3:** Paper-based and draw manually summary that carried out by manufacturing company's staff

Figure 3 shows the manual Procedure of Activity Duration Management. The manual procedure of activity duration management that is currently being applied at ACM requires staffs of the manufacturing company in each department to record duration of their activities/operations using pen and paper method. Every single process in an activity from raw material until 14 finish good will be recorded. Eventually, the summary of the collected data is generated by either manually drawing the duration in each process or using a template (template named value stream mapping) provided by Edraw Max. The respective staff will fill-in the duration of each process in the blank fields that is provided in the template.
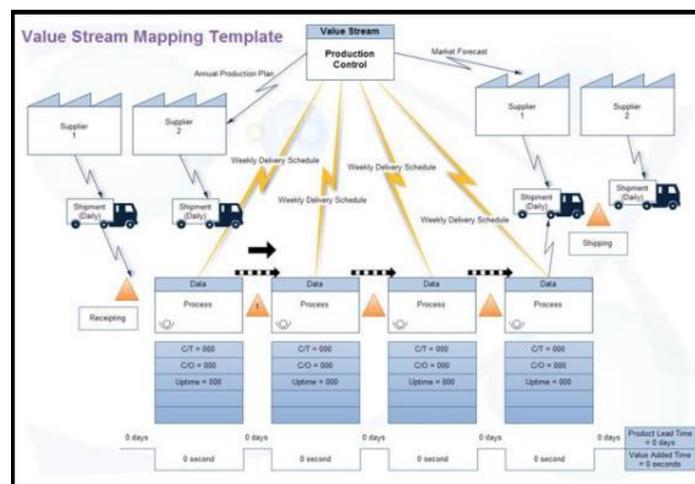


**Figure 4:** Value stream template by using Edraw Max software

Figure 4 shows the value stream template by using Edraw Max Software. There are a number of approaches available. This reflects the fact that choosing the right methodology for developing a system is a subjective matter. Thus, it is decided that the methodology that will be used in developing the OADMS for manufacturing company is Waterfall methodology. Consistencies in the development process by following the continuous phases defined in the methodology became the reason why waterfall methodology is being chosen. The requirement of going through each detailed and iterative phases is suitable in developing this proposed system.

The Waterfall method (also known as "traditional") is a rigid step-by-step approach to project management (Byrom, 2009). The Waterfall method originally introduced in the manufacturing software development area (Sacha, 2012). This model represents the software life cycle using processes and 18 products. Each process transforms a product into a new product as an output for that respective process. Then the new product becomes the input for the next process. In addition, this model allows revisitation to any previous process (refer Figure 3.1). According to a VersionOne survey on 2007, nearly 70% of software development organizations are still using the Waterfall Method/Methodology. In other words, it is not only the oldest and most well applied methodology, but it is also the most suitable methodology in developing a software for a company (Sigal, 2007).

## 2. IMPLEMENTATION AND TESTING

System analysis helps in enhancement of understanding the clients needs and expectation of the system. The system requirement is gained through analysing the interview session that was conducted with the researcher of the manufacturing company.
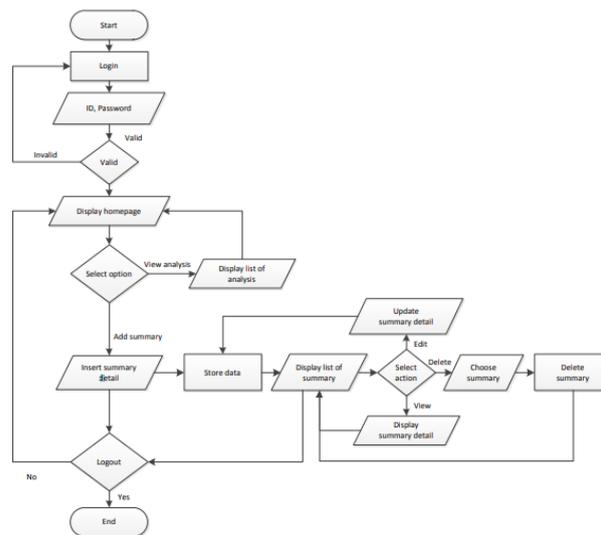


**Figure 5:** The flow of the proposed OADMS for staff of the ACM

Figure 5 shows the process of staff for manufacturing company in using the proposed system. Staff has to logon first prior to using the system. After the logon process, staff can manage the summary of activity duration, add new summary, update summary, delete summary and view the summary.
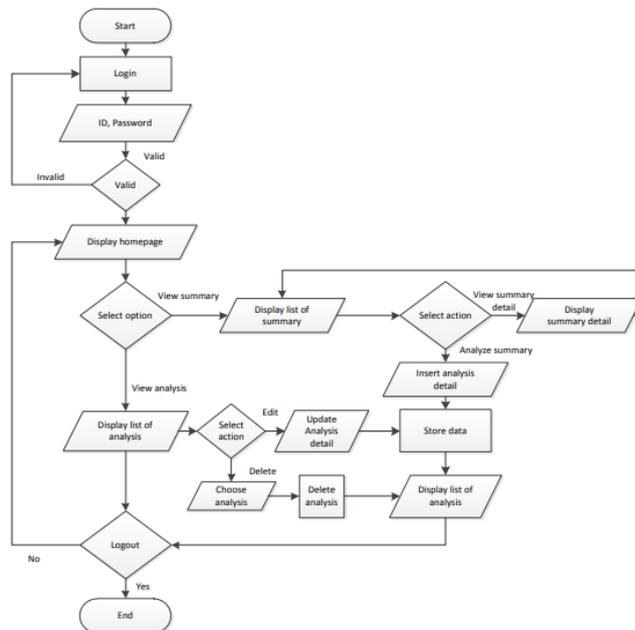


**Figure 6:** The flow of the proposed OADMS for researcher of the ACM

Figure 6, the process of how the researcher uses the proposed system is shown. Authorised researcher will get a web page that lists all activity duration summaries after logon. The functions which are provided to the researcher are to view the summary and to provide feedback on improvement of the activity duration. DFD was introduced and made popular for structured approach in system analysis and design. It is a diagram that is use to describe the transformation and flow of the information in the system. The visualisation of the data being processed helps in identifying and improving certain aspects. A context diagram is a DFD with only one massive central process that represent the proposed system. It includes all data flow between the proposed system and its external entities within the scopes of the proposed system.
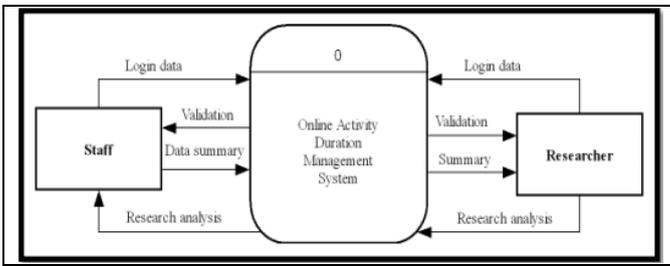
**Figure 7:** Context diagram of OADMS

Figure 7 show the context diagram for the OADMS for manufacturing company. DFD Level 0 describes the overall process that occurs between the proposed OADMS system and its external entities which are staff and researcher of the manufacturing company.
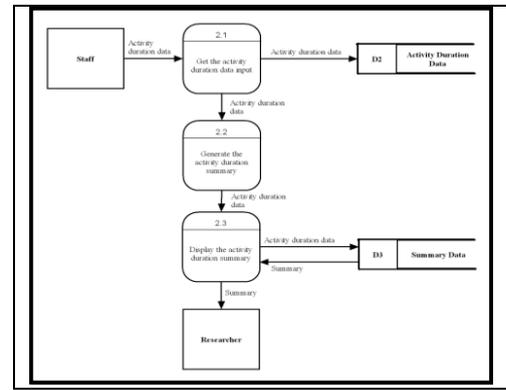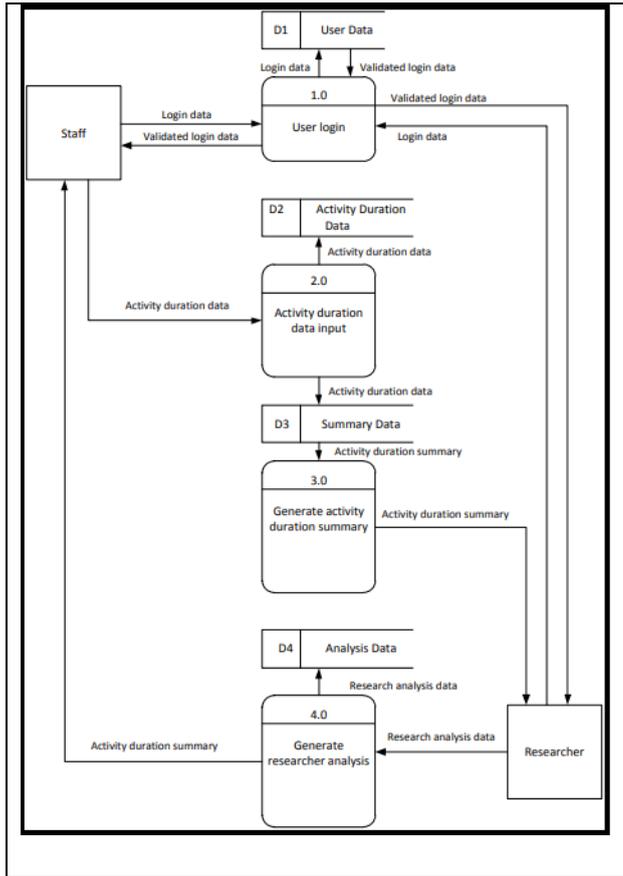


**Figure 8:** DFD level 0 of the OADMS

Figure 8 shows DFD level 0 of the OADMS. There are four main processes, namely User Login, Activity duration data input, generate activity duration summary and generate research analysis. Aside from that, there are also four types of data involved, which are Users data, Activity duration data, summary data and analysis data.
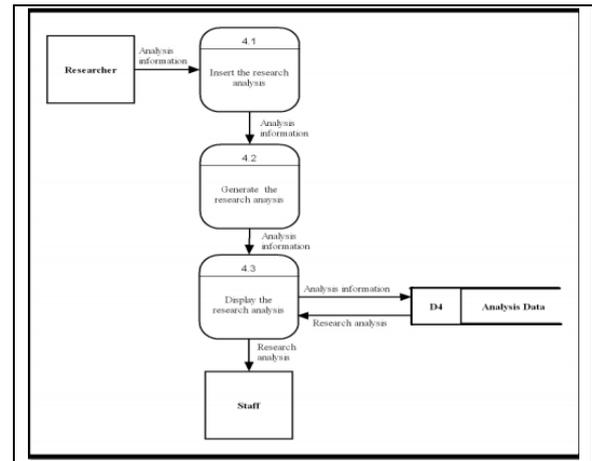


**Figure 9:** DFD level 1 of the OADMS for the process 1.0

Figure 9 shows the DFD level 1 of the OADMS for the process 1.0.



**Figure 10:** DFD level 1 of the OADMS for the process 2.0

Figure 10 shows the DFD level 1 of the OADMS for the process 2.0



**Figure 11:** DFD level 1 of the OADMS for the process 4.0

Figure 11 shows DFD level 1 of the OADMS for the process 4.0. An ERD illustrated the relationship between all existing entities in a database. The tables for the proposed OADMS system are namely user, summary, process and analysis.
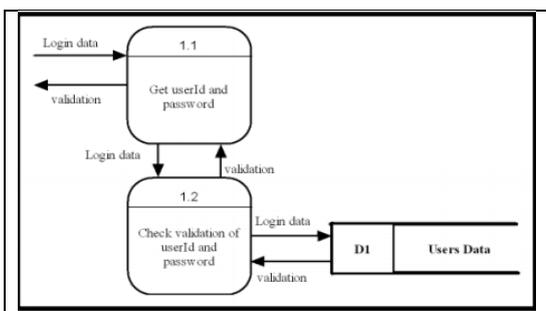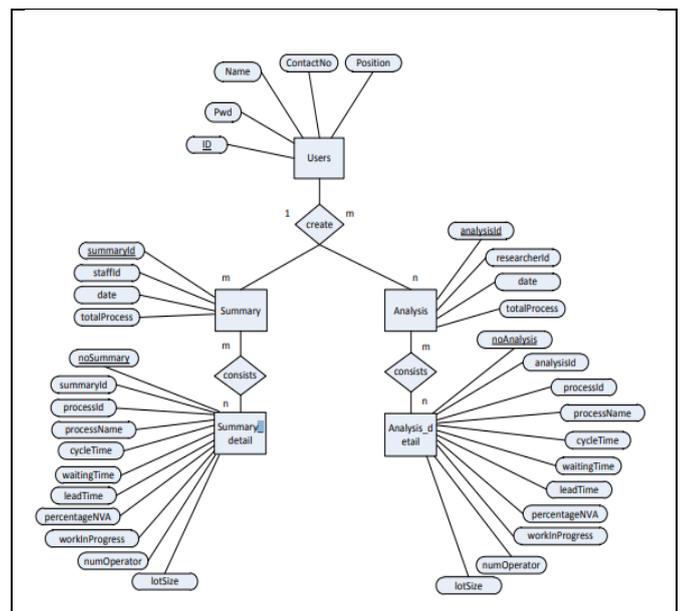


**Figure 12:** ERD of the OADMS

Figure 12 is the ERD of the OADMS. Users communicate to the system by using Graphical User Interface (GUI) on the screen of the computer. Therefore, the design of interfaces must be easy to understand and user-friendly. Other than that, the design of the interface should not confuse the user. Instead, it should provide a clear indication in using the proposed

system and it is able to guide user while they are using the proposed system.



**Figure 13:** Main interface of the OADMS

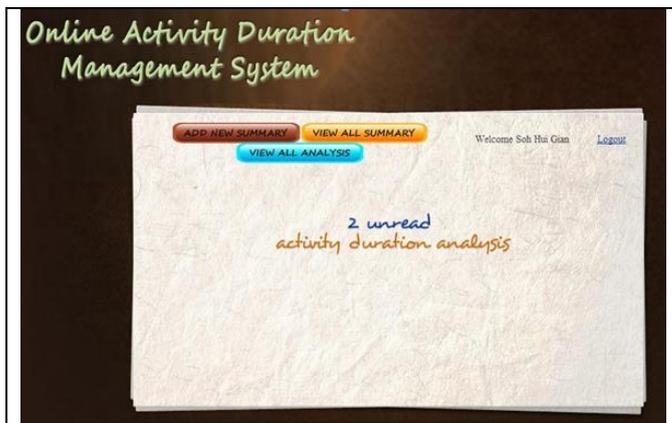Figure 13 shows the main interface of the OADMS.



**Figure 14:** Interface of the homepage after staff logged on OADMS

Figure 14 shows the Interface of the homepage after staff logged on OADMS.
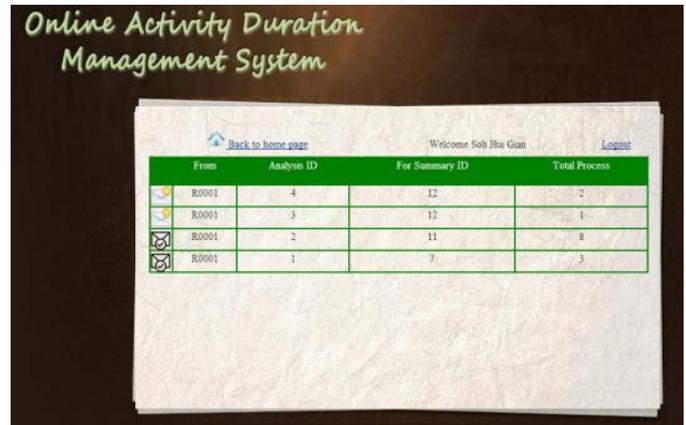


**Figure 15:** Interface of list of analysis that received from the researcher

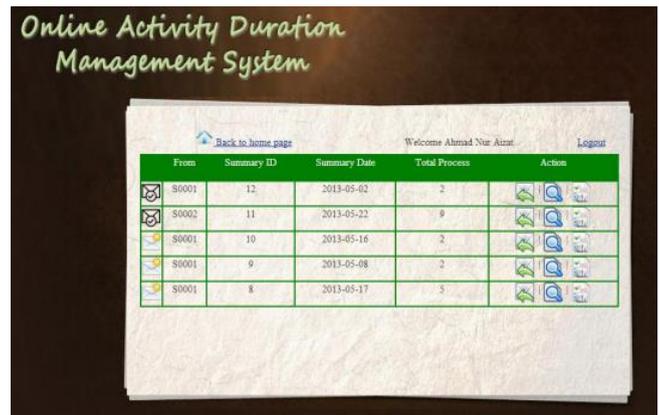Figure 15 shows the interface of list of analysis that received from the researcher.



**Figure 16:** Interface of researcher in review the summary list that sent by staff

Figure 16 shows the interface of researcher in review the summary list that sent by staff. Functional testing is testing of all the features and functions of a system which called as black box testing. It is based on the test plan and test cases specification of each system component to ensure that the functions perform well. The following sections was describing the functional testing for OADMS.

**Table 1:** Test plan for the OADMS

| Test Cases | Expected Output | Actual Output |
|---|---|---|
| **User Login** | Redirect to the respective page based on user position | Redirect to the respective page based on user position |
| **Create new summary** | Summary successfully created and added into database without any empty field in add new summary form | Summary successfully created and added into database without any empty field in add new summary form |
| - No data inserted | Show alert message | Show alert message |
| - Empty field(s) found in the form | Show alert message | Show alert message |
| - Form is not filled properly | Show alert message | Show alert message |
| **View summary** | Data retrieved from database and display in GUI | Data retrieved from database and display in GUI |
| **Edit summary detail** | Summary successfully updated and stored inside the database without any empty filed in add new summary | Summary successfully updated and stored inside the database without any empty filed in add new summary |

| - Empty field(s) found in the form | Show alert message | Show alert message |
|---|---|---|
| - Form is not filled properly | Show alert message | Show alert message |
| View analysis | Data retrieved from database without any empty filed in replying summary form | Data retrieved from database without any empty filed in replying summary |
| **Create new analysis** | Analysis successfully created and added into database without any empty field in add new summary form | Analysis successfully created and added into database without any empty field in add new summary form |
| - No data inserted | Show alert message | Show alert message |
| - Empty field(s) found in the form | Show alert message | Show alert message |
| - Form is not filled properly | Show alert message | Show alert message |
| **Edit analysis details** | Analysis successfully updated and added into database without any empty field in add new summary form | Analysis successfully updated and added into database without any empty field in add new summary form |
| - Empty field(s) found in the form | Show alert message | Show alert message |
| - Form is not filled properly | Show alert message | Show alert message |
| **Restriction of users access** | User access the system based on their position | User access the system based on their position |
| **Generated summary report** | Generated and display in GUI | Generated and display in GUI |
| **SMS functionality** | A SMS will be send automatically by system once staff created a new summary | A SMS will be send automatically by system once staff created a new summary |

Table 1 shows the test plan for the OADMS. Based on the test have been made, all the objectives are achieved and can be used.

## 3. RESULT AND DISCUSSION

OADMS was satisfactory fulfil the overall objectives based on the accepting testing in the previous stage. The objective of this proposed system is to develop an activity duration management system that automated the manual procedure that exists in the ACM currently. The system is able to keep data of summary and analysis in the database. Users are allowed to add, update, delete and view the data of summary or analysis by using the system.

## 4. CONCLUSION

Online activity duration management system was successfully developed to fulfil the objectives that to manage the activity duration summary and analysis in a systematic way. The system is able to manage the activity duration and generate summary in web-based platform. The objectives have been satisfied after the development and received a good response from the stakeholders through the user acceptance testing. Although the main objectives were achieved, but there are several improvements that can be applied for produce a more functional and useful system, yet easy to use and compatible. Improvement can be done to be enhancing the OADMS with suggestion and requirements from users in the future.

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