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The Development of Smart Document Management System With Mobile Application Technology In Agricul-Tural Sector (Malaysia Sustainability Palm Oil)

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Abstract

The development of mobile applications built as a platform that offers many additional features to organization to carry-out business operation especially in the life cycle management of document-based information. The lack of resources was one of the significant factors that contributed to the need of this system due to lean organization set up. Thus, the need to shift onto the effectiveness performance and importance of document management system (DMS) and electronic document management system (EDMS) will provide cost effective document management as to fulfill technical MSPO 2530:2015 requirements, dependencies and enhance data analysis efficiency. Organization requires to investigate fast result of responses in document and record traceability, especially the data analysis for quality investigation will provide the solution in developing in solving customer needs. Therefore, this project will provide the solution in developing the document management system (DMS) with mobile application that capable in taking responsibilities in updating record, capturing, storing, securing and document's approval become faster and efficient. The software makes it easy for process operation in keep updating data information by directly transferring data into digital files instead of keeping a copy of scanned physical files. The software can support all document formats such as Microsoft, Spreadsheet and Adobe Portable Document.

Keywords - SMART Document Management System (SDMS); Mobile Application; Agriculture sector

1. Introduction

Palm oil is one of the main contributors to Malaysian economy and quality assurance is the main issue for Malaysian to sustain in the palm oil business. Thus, Malaysian government has made Malaysia Sustainable Palm Oil (MSPO 2530:2015) certification mandatory for palm oil plantation (Kannan et al., 2021). The M.S.P.O standards cover seven areas: management commitment and responsibility; transparency; compliance to legal requirements; social responsibility, safety and employment conditions; environment, natural resources,

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biodiversity and ecosystem services; best practices; and development of new plantings (Malaysian Sustainable Palm Oil, 2019). However, until now, to the best of our knowledge, there is no platform that makes the process of certification easy. Electronic document management systems are used in various fields. Hajjar et al. (2021) opine that wireless technologies are affecting our day-to-day lives as technology advances. In particular, electronic document management systems play a key role in the structuring of paperwork processes in government agencies, bringing them into a single order, as well as optimizing the work of civil servants by providing effective and seamless access to documents with the function of automating routine operations to track and search for necessary information and the formation of reports on the document flow (Abdulkadhim et al., 2015; Ahmed et al., 2023).

The palm oil industries are one of the primary contributors toward economic development in the country. The Malaysian Sustainability Palm Oil (MSPO 2530:2015) standard requirement has become mandatory since last December 2019. One of the plantation challenges is to comply to the standard and legal requirement with updated evidence data. As described by Majid et al. (2021), current conventional manual documentation and record traceability has some flaws due limitation in real-time data monitoring and resources competency skill matrix. Therefore, this paper is aimed to improve documentation efficiency within a short time approval through flexible application mobile system, and to provide real time data to fulfil MSPO Legal requirements for license renewal, policies enforcement without penalty. This will create organization continual improvement plan for international recognition and certification to Roundtable Sustainability Palm Oil (RSPO) standard in future.

2. Literature Review

An electronic document management system (EDMS) is a computerised system that enables the creation, capture, categorization, storage, retrieval, manipulation, and controlled circulation of electronic documents. This means that a typical EDMS system will include at least a storage facility for electronic documents, a way (or several methods) of adding documents to the storage area, and a method of recognising and retrieving documents from the storage area (Lemdaoui et al., 2023; Yatin et al., 2015).

However, public authorities handle a high volume of documents with a set processing time each year, and the quality and efficiency of document interactions primarily define the efficiency and effectiveness of public authorities. The number of requests processed every day may approach several thousand as e-government grows. Moreover, because government operations and documents are stereotyped, the use of intelligent algorithms will be more effective than in a structure with a complex and unique organisational structure. Sambetbayeva et al. (2022) view that machine learning can help speed up document processing, prepare all of the data needed for human decision-making, and eliminate human mistakes.

Document management is a critical system for a business since every action, whether it is management, finance, or production, is mirrored in papers. Digital technology, software, and mobile have advanced significantly in recent years and now play a significant part in modern life (Nuanmeesri, 2020; Villarreal et al., 2023). In many cases, document management automation alone can considerably improve an organization's business processes. Due to the pandemic's tremendous increase in the volume of electronic document flow, the mechanical single-type labour of employees, managers, and document services personnel of businesses, who register and reply to a thousand or more documents per day, has increased. As a result, labour and time costs have skyrocketed. The relevance of this problem in modern times is to improve traditional systems of electronic document management by using data analysis and machine learning methods to optimise the work of

organisation employees and quality passage of the entire electronic document life cycle with minimal human intervention (Sambetbayeva et al., 2022).

3. Research Methodology

Sambetbayeva et al. (2022) in their discussion also mention that SMART Document Management Systems automate the technological processes of document preparation, registration, centralised structure, storage, archiving, search and processing, control of execution, authorization of access to them, issuing and distribution, extracting information from documents and its analysis, obtaining knowledge from accumulated information, and decision-making support. System dynamics is a decision-experimentation strategy that establishes a learning environment for policymakers to better understand how the system will respond to their decisions and the unintended repercussions of those actions (Ghani et al., 2021). Therefore, this study method will be divided into four approaches that are software design, software implementation, software testing and expected deliverables. All of these approaches will be exposed in the next chapter.

4. Approaches to Building Smart Document Management System Model

This subchapter discusses the models that the researchers proposed as the new system; major new systems and subsystems that are undergoing design and implementation. The process of design and implementation involves continual trade-offs between cost and performance. The performance implications are prioritized in this system.

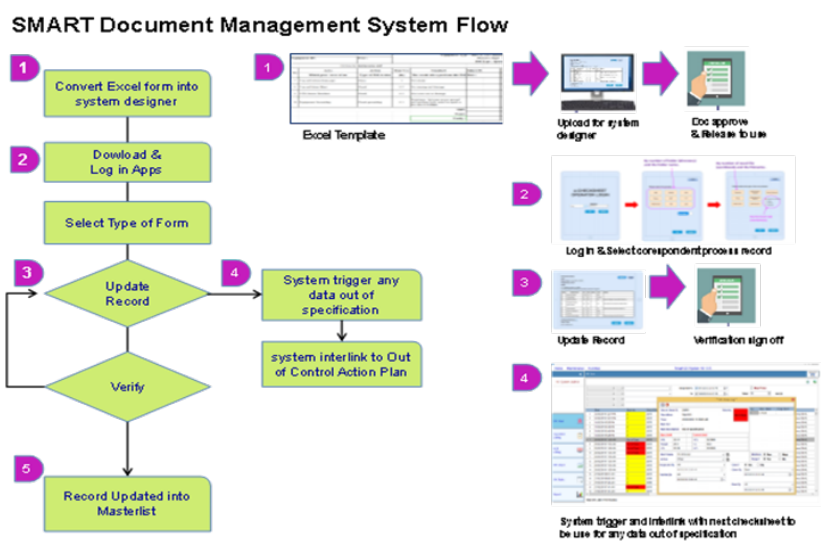


Fig. 1. The illustration of SDMS SMART Document Management System Flow

4.1. Software design

The new system will be using a new data design that describes structures that reside within the software. The process of designing usually consists of the elements of system with uses information characteristics and execute them into the program structure.

This system design is needed to provide sufficient detailed data and information about the system elements to ensure the implementation is defined in models and views of the system. This is to ensure the designs are fulfilling system requirement and as a guideline for the designer for create or modify the current design of system.

a. Case diagram

The case diagram is an alternative that sums up all the details that are needed in the system actors and their interactions with the system. It is the way of simplest representation of a user interaction with the system that can easily interlink between the users and different use cases in which user is also involved. It has also been used to summarize the whole scenario since there are different types of users of a system and different use cases are running in organization and will often be accompanied by other types of diagrams as well.

Putting this into perspective, Figure 2 illustrates the process from creating new documents to validating digital signature that will involve the users along those processes of the proposed module. They are different types of users in the same case diagram. However, these users enable them to communicate within themselves by interfacing through the system with main case of enter document and approval plan proposal module.

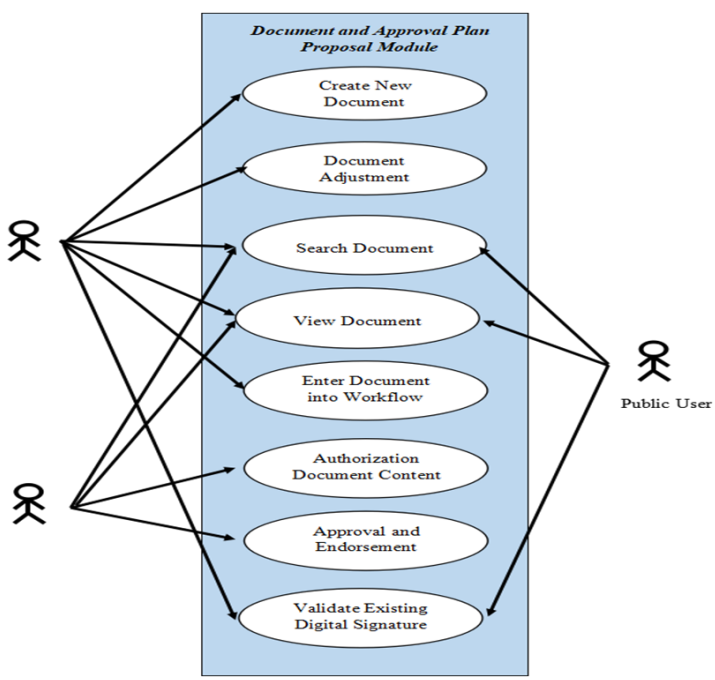


Fig. 2. document and approval plan proposal module

b. Sequence diagram

The sequence diagram is used to indicate the interaction in the system in a sequential order. It is also used to clarify every single use case involving several objects. In particular, it shows the objects participating in the interaction and the sequence of messages exchanged. It also helps in describes all the possible scenario that occurred in a system. As this can be portrayed through the Fig. 3., Fig. 4., Fig. 5., and Fig. 6. as below. See the figures as follow:

c. Login

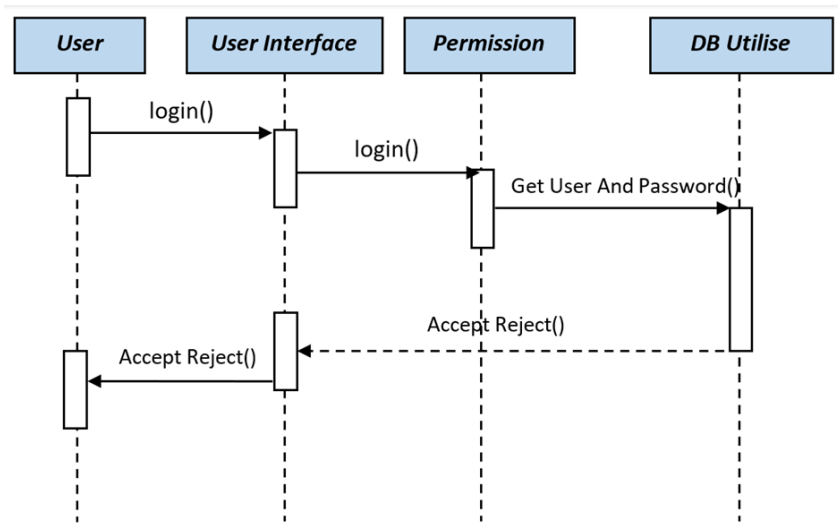


Fig. 3. sequence diagram for log in

d. Select language

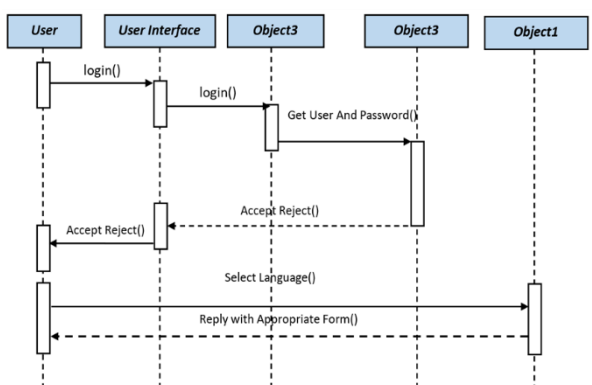


Fig. 4. sequence diagram for select language

e. View/Modify

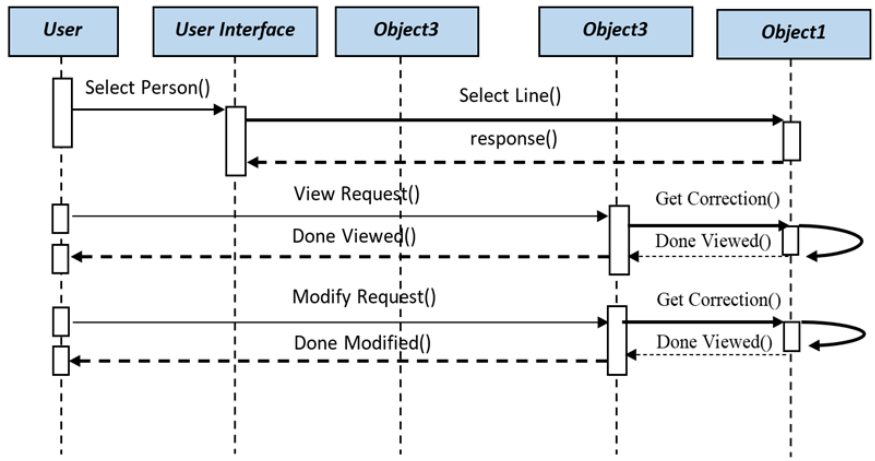


Fig. 5. sequence diagram for view/modify

f. View/Approve/Reject request

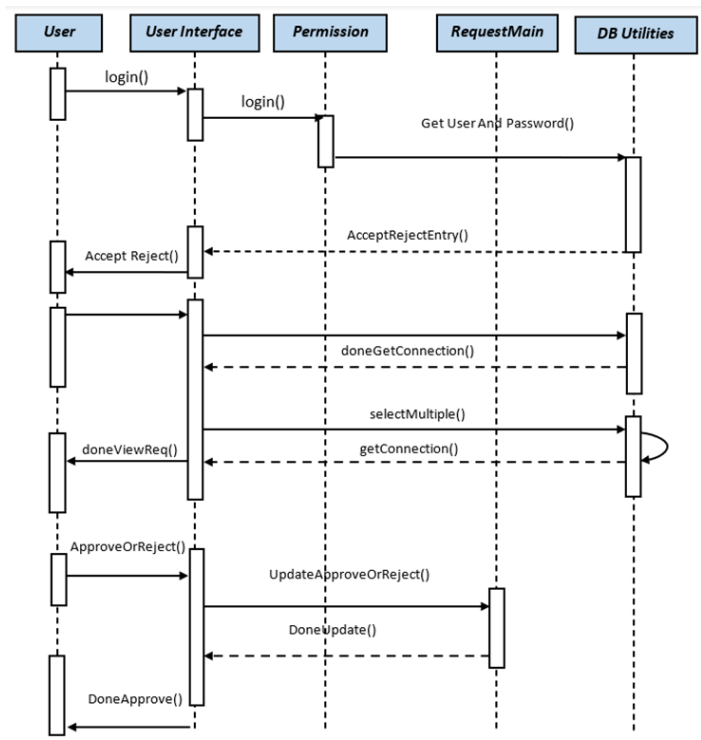


Fig. 6. sequence diagram for view/approve/reject request.

4.2. Software implementation

The software implementation is an approach with a systematic methodology to effectively integrate a software-based service or component into the workflow of an organizational structure.

a. Build and test database

The purpose of this testing is to provide functionality in building and test a new database for use by the new system. The test can be counted by entering some sample data from the production database table for database testing. Since the data was successfully entered the system but still unloaded into the database structure, it became an unpopulated database. Modified the database structure schema and re-entered the data once again. Record and store the test data details produced from the test for future references.

b. Install and test new software

The purpose of this testing is to ensure the proper installation of all necessary components and validate whether the components are in compliance with the requirement of the software product. A necessity to have testing is to ensure a perfect coordination of all components inherent in the software. The user can prepare on the basis of the requirements to test the software to ensure it covers all cases and workflow. In order to validate whether insufficient space occurred, a test can be performed. Users need to check on the disk space before and after installation.

4.3. Software testing

The software testing involves a test plan that needs to be conducted after the software implementation. It helps in identifying software limitations by outlining the strategy that will be used, the test environment in which testing will be performed, the limitations of the testing and the schedule of testing activities.

a. Security testing

It is a type of software testing that intends to trespass confidential data information of the system and the results will determine how secure the data was protected from possible intruders. It also contributes to detect any possible security risks and helps the developer to take action immediately through coding.

b. Utility

The utility is an extent which helps in manage, maintain and control computer resources. The user may consider on how easy to handle Document Management System, whether the system fully optimize its functionality in met user's need, and whether the system is cost-effective compared to other system. Thus, in the first place, when considering the system, the utility of the system should be tested, and if any irregularities observed, testing should be terminated immediately.

c. Reliability

Another aspect that needs to be considered in software testing is the reliability which for any probabilities of system failing within specified of period or environment, which may occur due to some consequences faults are counted. The user should keep on track on how frequently the system fails, and the effect from the failing issues rises. So, the importance in collecting fault and failure data is to ensure the software is approaching failure free software. The mean time of software to fail and its recovery process time should be noticed, if the system is inoperative which froze all the database and communication and took a less time to recover, thus, the reliability is low. It also depends on how long the mean time to failures.

d. Robustness

The robustness is to determine how the system can be cooperative to cope with unexpected errors or termination during the execution. The system should have triggered an alert when impermissible data entered, instead of becoming unresponsive. To test the robustness, the user should enter data that does not stratify the input specifications and keep on observing how the system reacts.

4.4. Expected deliverables

a. Designation of user-friendly and interactive interfaces in mobile application system

This sub-topic will concern visual layout and workflow of SDMS mobile application as shown in Figure 1 with interface designs description to achieve goals, objectives and scope. The flow of systematic on how the system does should work from the current excel template system designer, log in until the record is completely updated by user.

b. Administration

This sub-topic will concern analyzing and handling a new system by applying detailed conversion databases to ensure a smooth transition from the old server system into a new Document Management System.

c. Conversion of standardized templates

The existing old templates in Excel file format need to be transferred into application designation to create a new application form. The workers will have standardized application forms available through online and directly fill-up the data. There is a one-week delay with the template set up in the new system. Unexpected delay to complexity of each element rules requires to be identify and factor in, which as to ensure prompt of out of specification control be able to rectify by user. It’s also impact sub-sequence one-week delay on the next phase project.

d. Online approval

This design specifications of Smart Document Management System provides an effective solution for documents online approval and speed up the process. The system will provide an interface that display the contents of documents or information that has been key-in for approval and can interlink approval process with each other.

e. Document release

Documents that passed stages of completeness, accuracy and reviewed shall retain an electronic copy of the document in the system database with its unique part number and revision for easy traceability.

f. Users application

This sub-topic will concern the sequence of processes in the implemented system for information or data exchanges.

g. Login page

Interface for login page of SMDS apps is simple and innovative design. An employee needs to login apps of SMDS by key-in their employee ID and password. If the employee inputs the wrong ID or password, an error message will be display and re-login is necessary after 5 seconds as shown in Figure 8.

Fig. 7. example of interface design in tablet version for log in.

h. Main menu page

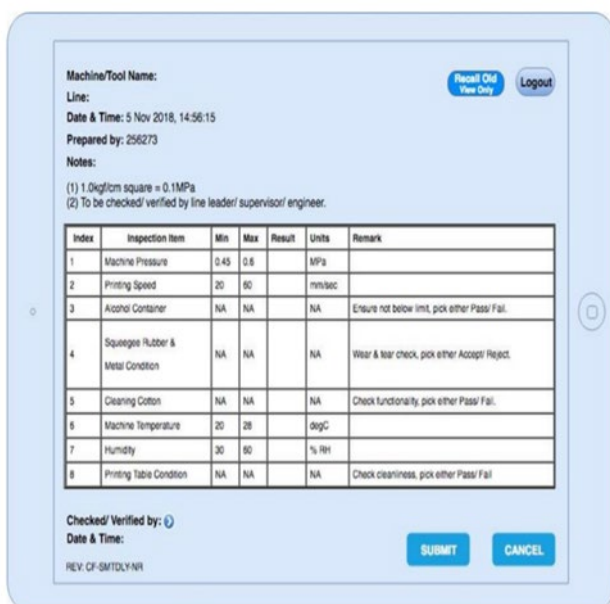
This screen displays the main menu with numbers of folder buttons in SMDS apps. The employee needs to click on their desired process buttons as shown in Figure 8. Then, the screen will move to clickable buttons of standardized template forms as shown in Figure 9.

Fig. 8. example of interface design in tablet version for main menu options.

i. Selection of form

The selection of form corresponds to the current need of employee in particular processes by clicking the buttons of desired file as shown in Figure 10 and file will be display for view directly from screen as shown in Figure 10.

Fig. 9. example of interface design in tablet version for list of forms options.



Index	Inspection Item	Min	Max	Result	Units	Remark
1	Machine Pressure	0.45	0.6		MPa	
2	Printing Speed	20	60		mm/sec	
3	Alcohol Container	NA	NA		NA	Ensure not below limit, pick either Pass/ Fail.
4	Squeegee Rubber & Metal Condition	NA	NA		NA	Wear & tear check, pick either Accept/ Reject.
5	Cleaning Cotton	NA	NA		NA	Check functionality, pick either Pass/ Fail.
6	Machine Temperature	20	28		degC	
7	Humidity	30	60		% RH	
8	Printing Table Condition	NA	NA		NA	Check cleanliness, pick either Pass/ Fail

Fig. 10. example of interface design in tablet version for view and update record.

j. Record update

The employee can directly modify the existing documents by filling out all information of such as shown in Figure 12. The KPI provides a performance tool used to analyze, track and report on the data in real time with the help of interactive data visualizations. These real-time dashboards can be simply access, update, monitoring and analysis process by the employee with all critical data can be interpreted in real-time dashboards.

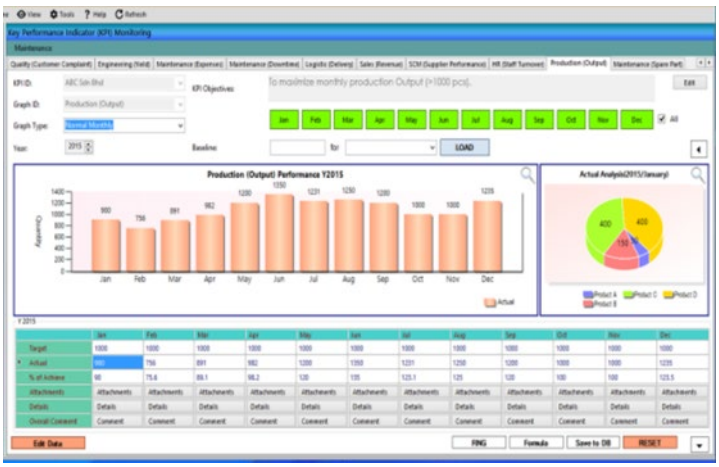


Fig. 11. example of interface design of dashboard real-time report in pc version.

k. Verification

The assurance of filled data information integrity in application form must seek a verification before proceeding into next process. The interface design will appear on screen displaying information for employee evaluation.

l. Specification out of limit

Specification out of limits defines the measurement results that fall outside the specifications or acceptance criteria which has been officially specified or the finished product specification dossiers. The frequent occurrence in results for every finished product that falls out of specified limits indicates the abnormal in analytical procedures. For every out of specification alert triggered, the system will interlink documents and corrective actions spontaneously. The employee can directly investigate the main factor on result occurrences.

m. Compliance of the record update

In order for Client to control records from the creation to disposition, records management are compulsory. Record management is the retention and maintenance of business records. It may exist in SDMS for easier to manage business records when the documents are in electronic format. Compliance will ensure the record management policies being followed and in line with requirement.

n. Task status

The system will display current status to inform employees of the state of completion of tasks. Each status is predefined with “Pending” and “Completed”. The employee can return to the incomplete task, accomplish all inquiries and re-submit the form. Refer to Figure 13 on the status of record update which is minimum supervision required to monitor the fulfilment on routine task identify to the personnel.

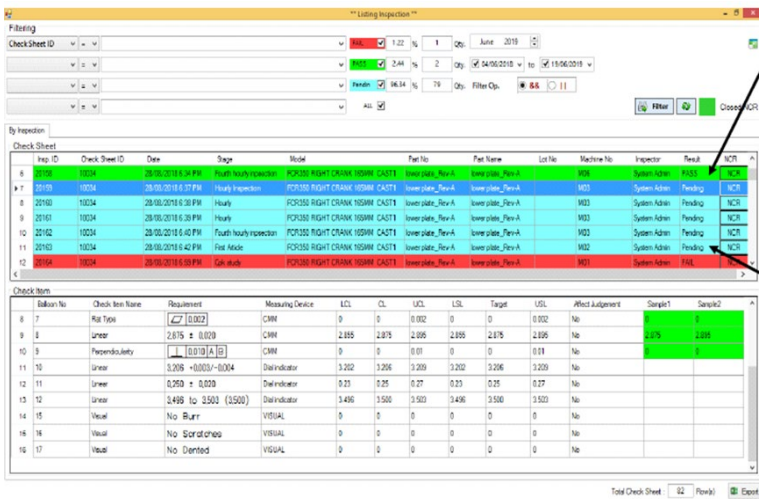


Fig. 12. example of task status overview.

o. Action taken on non-conforming

The system will also trigger an alert with red highlight for every nonconforming occurrence and will request corrective action to eliminate the alert fatigue as shown in Figure 14. It provides a systematic system which consists of improvements to the company processes and verification taken to eliminate causes of non-conformities. The employee can also easily view the data and root cause of non-conformities.

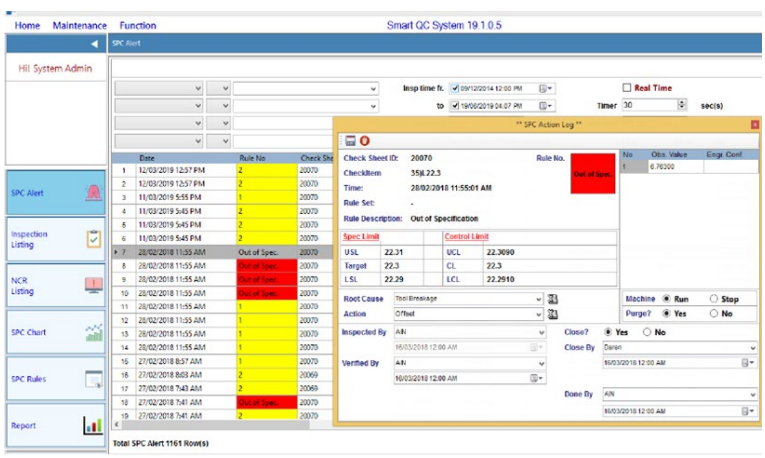


Fig. 13. example of interface design of ocap status log for verification out of specification in pc version.

p. Reporting

The system also provides a conventional route of displaying data with trend charts as shown in Figure 15. The employee needs to fill in blank inquiries based on their desired data result outcomes. The system will automatically display corresponding data. The interrelation between variables can be represented in simplest and most straightforward way. Thus, by clicking on the charts and graphs button, it will help employees to customize the variables and achieve data visualization and make educated decisions based on data.

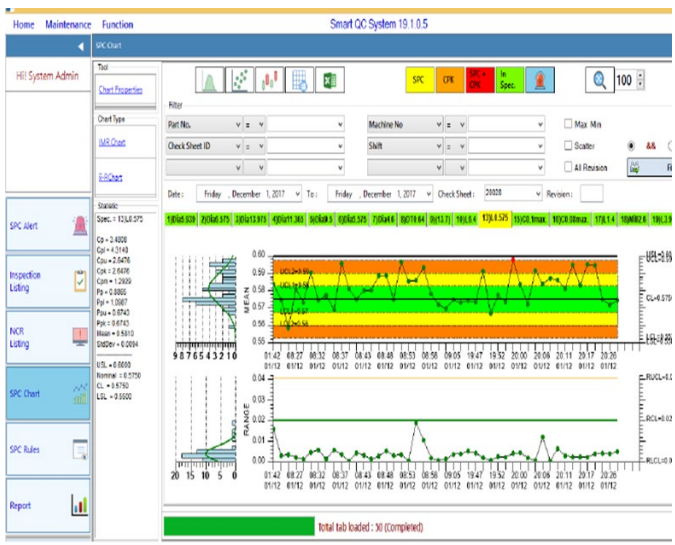


Fig.14. example of interface design of conversion of report into chart analysis in pc version.

q. Testing the developed mobile application

Despite the user's requirement to be adopted in SDMS mobile application, another limited resources should be taken into account compared to the desktop version. The factor of functionality components, either the menu buttons or the performance for the mobile application. In response to the issues, functionality testing by employees needs to be conducted to ensure that every function on the mobile application can function properly for user interactions and transactions. A variety of factors are relevant in the functional testing type of application based on the business functions and distribution channels used to deploy the applications such as Google Play.

5. Conclusion and Recommendation

SDMS may enhance its efficiency with a systematic workflow of online approval as a convenience for document release. The mobile application implementation can be reduced number of days' approval responses time recorded after the implementation. Thus, data are ever ready in SDMS for any legal audit from MPOCC. Furthermore, as the business grows, it is importance in having an electronic document system to have a good deal of investment by answering customer inquiries or complaints instantly. With all documents organized and

structured, a search and retrieve engine in mobile applications helps in document's traceability and instant access of employees with low level of education. Therefore, there is no chance in having a non-certified client for renewal of MPOB license.

The benefit of mobile applications is in helping documents traceability and quick decision making as well as to support the identification of reportable events and reports follow the requirement (European Centre for Disease Prevention and Control, 2020). This comparison concluded the successive of complaint coordinator in handling the submission of regulatory compliance assessment based on timelines using the system. Thus, documents can be accessed anytime, anywhere by using electronic devices. Where the old traditional DMS are always needed to access and manage documents does not always come conveniently during office hour or always at the desk. The convenience of SDMS can be installed in any device, allowing us to access and work in documents directly outside the organization. Having unprecedented access to relevant information through SDMS available throughout our business processes, even if we're offline.

SDMS powerfully assists with document control, change management, audit planning, risk management and training with an interface design approach. It is standardizing our documentation employing templates for revising documents, process procedure, customer agreement and improvement activities documentation streamlining our processes. There are many micro processes within a team where an individual manages an important procedure in a home-grown manner often on a spreadsheet with date, check boxes, and reminders. Finding these and deploying their methods in M-Files can ease the task and share responsibility among the team.

SDMS helps to automate document management workflows. Document management is beneficial to automate and much more possible to let employees work with something profitable. Document management system allows us to stop working for information and design the inputs information to work for us so friendly. It can set up automatic workflows to support the business processes and let the system take care of the whole document management life cycle. SDMS collaboration and sharing information with partners, customers and other external parties of legal compliance e.g. MPOCC make all information being transferred so easy and efficient. As such, it can share a link to the file in SDMS without sending an actual copy of the document, which guarantees everyone has access towards designated report or data. These links can even be shared with external parties on respective share information or report. Integrated collaboration tools, such as annotations, make co-authoring easy and efficient. Collaboration can be done by using any device, mobile and tab.

In conclusion, this project is focus on management's requirement in developed and implement a mobile application to reduce clerical task and manpower headcount, speed up the approval process and fast response in customer complaint by using waterfall methodology as a model of software tools in development life cycle. The waterfall method is split into a several sequence steps. This method depends on the successive of each phase deliverables of the previous one and corresponds to a specialization of tasks. The previous consideration has drawn a conclusion that no systematic and flexibility of document file traceability in the traditional document management system has led to the main problem in management. The SDMS mobile application has come out with features that allow the flexibility of time and places for workers to access, view and manage documents by using a magical touch through technologies. All the features introduced in the mobile application provide a simple and understandable program with integration of attractive interface design.

The approval process flow and step challenges have come across with a solution through monitoring and online approvals directly from the mobile application. A biometric and digital signature provides convenience of signing documents anywhere regardless of time and place. Thus, it's avoided delays and better efficiency in

overall approval required that proven first objective is achieved.

Hence, this study recommends that network contention across multiple workers in one real time while waiting for each request to be processed are causing lag and reduced responsiveness throughout the system. While the system froze until its reach no response time out, the system should temporarily hold the entered data information and presents them back for preview. Thus, a symmetrical in uploading and downloading data should be enhanced, automatically save the data while attached to network connectivity. Next, a compulsory to attach with network connection defines weakness in the system. Workers could only freely access the file offline once downloaded into device. In order to have the latest file updated, the system has to connect to a network connection and files update automatically whenever the app is open. A route change to mobile data to have a continuous network connectivity will just raise data consumption and increase expenses. Furthermore, with changing markets and business model, the system needs to maintain and improve its competitive edge by rapid implementation in feature and design enhancement to improve productivity and reduce cost. Next step will be on the elimination of Microsoft Office software and replacement with free and long-life editing and reader software. This new feature still can display data either as text and numerals or in graphical form. Thus, the company can cut on extra cost from continuous buying Microsoft Office license.

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