Original Research Paper

Office Supplies Requisition-Disbursement System Processing on Cloud: Algorithms and Database Design Techniques

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Abstract: Digital business organization is an organization that has applied information technology to its operations and benefits from saving costs, saving resources, and making it quick to act and operate the business. However, many organizations lack systems to complement effectively internal management such as in-house office supplies requisition-disbursement system. Past research papers have shown that a wide range of office supplies requisition-disbursement systems have been developed, but almost all of them are developed for one specific agency. Therefore, it brings to the development of this research, which aims 1. To develop a cloud-processed office supplies requisition-disbursement system, 2. To design algorithmic systems and office supplies requisition-disbursement system databases that comply with cloud computing and 3. To evaluate the efficiency of cloud-processed office supplies requisition-disbursement system. As a methodology framework, the authors adopted the System Development Life Cycle (SDLC) development model, which involves problem identification, feasibility research, analysis, design, implementation, and maintenance. As a focus group for this study, the financial and managerial staff provided the required information to the author. The system was created using the PHP programming language and MySQL was utilized to store the database. The results of this research have led to an Office Supplies Requisition-Disbursement processing system on cloud (OSRD) which provide free services for organizations who want to use the online office supplies requisition-disbursement system through cloud computing system and registration via Gmail account with Google API service. Moreover, the researchers have designed algorithmic systems and databases to store data for future applications. In addition, it has tested the performance of the system on real users. Overall, the average of the evaluations was at its highest level in the operation accuracy test with an average of 5.000 and the lowest average was the functional requirement test and usability test with an average of 4.833. However, the OSRD is very beneficial and helps an organization that lacks IT staff to develop its system. This is to increase the potential of the organization sustainably.

Keywords: Office Supplies Requisition-Disbursement System, Stock Management, Database Design Techniques, Cloud Computing

Introduction

In both public and private sectors, it is necessary to have enough office supplies in operation. The staff responsible for office supplies must supervise the office supplies disbursement per the office policy. Paper base office supplies requisition has a problem due to the multiple requisitions per day which mean multiple transactions that have to be recorded in a registration book. This resulted in difficulty in collecting and summarizing the information on office supplies and a lack of planning for purchasing office supplies to accommodate the demand for office supplies at a time. The same goes for research from Yomasarn and Jasuwan (2018) that has looked at the problems and guidelines for optimizing the requisition system of Suan Sunandha Rajabhat University.
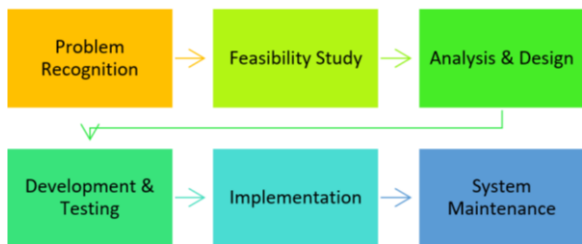
Fig. 1: Show information system development cycle SDLC (But-Aon and Pimpimool, 2016; Turban *et al*., 2018)
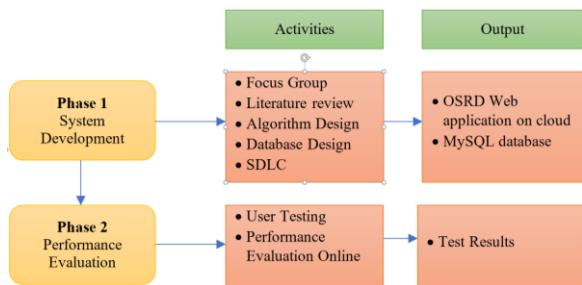
Fig. 2: Research process design (Source: The authors)

They discovered that the problems ranging from the complicated procurement procedures process of acquiring office supplies, the process of controlling and counting remaining office supplies cannot be immediately verified, the remaining office supplies being low but is not purchased in time, resulting in not enough office supplies according to the amount of demand. This research suggests solutions by tightening procurement processes and implementing barcode systems to help with the office supplies stock counting accompanied by the office supplies requisition system to speed up the whole system.

Therefore, to solve these problems. The researchers developed office supplies disbursement system, which uses information technology to help in the process of reducing workflows and speed up command to improve the efficiency of the process instead of manually journalizing the transactions. This office supplies disbursement system program can make it easier to find relevant information such as summaries of office supplies disbursement reports and present the report to management conveniently and quickly. In addition to developing office supplies disbursement system programs, the researchers designed the system for other organizations to use through cloud computing to operate on computer systems through the Internet. This makes it easy to get information about storing and monitoring storage and picking and dispensing office supplies to facilitate teachers and staff pick up office supplies. Other agencies who want to share the system and to facilitate, fast and timely and to reduce the redundancy of stored data, can find and display details of the remaining materials in preparation for purchase by searching using the office supplies' name or by code/name of office supplies, and

can also report the remaining information to the internal audit office of the affiliated agency (Thapthim, 2019). This is why developing the system is necessary to help in the operation of an organization. It is also important to design algorithms and databases on cloud computing services to support the use of the system in various organizations.

There are many methods of developing the system, one that is most used is the Systems Development Life Cycle (SDLC) many scholars have set different stages of development, but there are similar steps, including systems investigation, system analysis, systems design, systems implementation, and systems maintenance and review. Therefore, the researchers want to bring information technology into the organization to the maximum benefit of their work. The Office Supplies Disbursement System is another program that can be used to store information on the disbursement of office supplies each day as evidence of the search, check stock and be a database for purchasing office supplies next time for all agencies with budget constraints on system management or lack of human resources in administration. This research is critical to developing the same free and efficient online system. Consequently, the following research questions were framed in this study: 1. How do we develop this system, 2. How do we design this algorithm and database 3? How do we evaluate the performance of the system?

Research Objective

1. To develop a cloud-processed office supplies requisition-disbursement system
2. To design algorithmic systems and office supplies requisition-disbursement system databases to support cloud computing
3. To assess the effectiveness of cloud-processed office supplies requisition-disbursement system

The expected results from the development of cloud-processed office supplies requisition-disbursement system:

− The free office supplies requisition-disbursement system is available for the public and private sectors
− Organizations that have already subscribed can freely add, edit, or delete office supplies
− The organization saves the cost of hiring the developer itself and does not have to pay for the maintenance of the system
− Organizations can quickly use stock report data to make decisions
− Mahasarakham Business School (MBS), Mahasarakham University has a proactive academic service system and a modern service system that is in line with the corporate vision and jointly drives the organization towards becoming a social enterprise innovation institute

Literature Review

The concept of a System Development Life Cycle (SDLC) is a breakdown of the process of developing a working system or information technology system (Fig. 1.) to help solve business problems or meet the needs of the organization. System development is divided into 7 stages as follows (But-Aon and Pimpimool, 2016; Turban *et al.*, 2018)

1. Organization Problem Recognition is the first important activity to set clear goals for improvement by using the system to help to classify, group, and prioritize problems. Then select the most suitable projects to develop. The project to be developed must be able to solve the problems that exist in the organization and provide the most benefit to the organization
2. A feasibility Study is to study whether it is appropriate to modify the system at least cost and time with a satisfactory result. And find out the needs of stakeholders in three areas: Techniques, tools or equipment used, personnel and readiness, and value for money, to present to management for further approval
3. The analysis is to collect information on the problems that are needed to be used to design the system. This procedure is studied by the user by analyzing the operation of the old system (As Is) and the demands that are available from the new system (To Be), then take the results of the study and analyze and write them as a system flowchart and data flow diagram
4. Design is to take the analysis results and design into the concept (Logical Design) to solve problems. This section does not yet indicate many details and device features, only focus on the layout design on paper and sends it to the system designer to design it (System Design). This procedure starts to identify technical system behavior, detailed device features used, the technology used, appropriate network design database type, characteristics of data import, the nature of the resulting report format, and the result
5. Development and Testing is a programming coding to develop the system from paper to system according to the defined features. Then test for errors (Testing) to verify the accuracy and ensure that it is accurate and meets the requirements. If an error is found to be caused by the operation of the system, it must be adjusted and ready to use before it is installed
6. Implementation is the process of installing a fully developed system (Installation) that can use in reality. In this section, in addition to installing the system, the system is installed. It also requires the provision of support procedures to promote its use to be fully functional by providing user training courses, documentation, and support for the system to be used continuously
7. System Maintenance is a continuous system

maintenance procedure after the commencement of operations. System users may experience problems that occur later, such as problems due to unfamiliarity with the new system, so they should set a continuous plan for the problem. Follow-up evaluation, collection of system update requests, analyze the data, request to update the system, and then the design of the functions that need to be updated and installed, which require system training for the user to know the user's satisfaction

The organization's implementation of the system development cycle approach will allow it to operate effectively. There are clear guidelines and procedures for operation. Time and budget can be easily controlled by choosing to follow all or part of the guidelines, which may vary depending on the methodology or procedures that will be implemented, which can be adjusted to suit the availability of each organization and should be repeated in the monitoring process and find ways to continuously improve for better development.

Wisochsongkham (2009) studied the effectiveness assessment of information systems for accounting and office supplies management at Rajabhat University. The objective is to study opinions on performance and satisfaction, problems and obstacles from the use of information systems for accounting and office supplies management, and compare opinions on efficiency and satisfaction from the use of information systems for accounting and office supplies management of the five Rajabhat Universities. A total of 464 practitioners and service users at Rajabhat University are involved in the use of information systems for accounting and office supplies management. The results showed that respondents had moderate opinions about the effectiveness and satisfaction of using information systems for accounting and office supplies management. Comparison of opinions on efficiency and satisfaction from the use of the information technology system for the management of accounting and office supplies, practitioners, and service users, the five Rajabhat Universities differ in statistical significance at 01, problems and obstacles from the use of information systems for the management of accounting and office supplies of each Rajabhat University. It found that some universities experienced problems with system models and ready-made programs. Some experience cognitive problems with system users. Most of the problems with using the system are hardware or computer problems. Information system operators for accounting and office supplies management experienced a problem: The system was unable to reduce document consumption, resources require documents in parallel, the database link cannot link the required database, and retrieving reports from the system does not respond to the needs of the operator as much as it should, the operating procedures are complex, the information in the system is out of date

and the office supplies database cannot be updated.

As in Vongprasongchai *et al.* (2013), problems and guidelines for the development of office supplies management of office supply operators at Naresuan University. The aim is to study the office supplies management problems of the office supplies operators of Naresuan University in three areas: Procurement, control, and supplies used counting. And to study the development of office supplies management at Naresuan University according to the opinions of the office supplies operators in 3 areas, conducting studies with the entire demographic, namely office supplies operators at Naresuan University 102 people, 4 groups: Educational, support group, social sciences group, science and technology group and health sciences group. The tools used to collect data are queries, data analysis using frequency, percentage, average standard deviation, and content analysis in conclusive form.

The results showed that 1. The overall problem of office supplies management is moderate. Considering it individually, there appear to be moderate problems on all sides as well. (1) Procurement includes excessive procurement procedures and processes and too many computer programming systems used for procurement causing confusion and delay. (2) Office supplies control includes moving the package without notifying the responsible person or the operator of the office supplies that caused the loss of office supplies. (3) The disposal of office supplies includes there are not having enough places to store deteriorating office supplies waiting to be sold. 2. The office supplies operator provides suggestions for the development of management as (1) In terms of procurement, procurement procedures should be reduced. To reduce the process of document operations, the agency should have a clear procurement plan and reduce the program system, and should provide training to new office supplies officers. (2) In terms of office supplies control, there should be guidelines and a document book that indicates the date and time of pick-up/borrowing-return of the package and there are protocols for the office supplies user to inform. The office supplies officer is in writing when the package is moved. Office supplies officers should not be replaced frequently and the system should be made into a barcode system. (3) The disposal of parcels should seriously be explored and disposed of office supplies should be sold more than once a year and collect defective packages waiting to be sold in the same place.

Different from Tarltip *et al.*, (2014). The research was to study the personnel satisfaction with the office supplies job at Phatthalung Hospital using descriptive research methodology. The objective is to study the level of satisfaction of personnel towards office supplies work at Phatthalung Hospital and study how to improve the disbursement of office supplies services at Phatthalung Hospital. The samples include personnel at Phatthalung Hospital, a total of 128 people used the method of selecting a sample at their convenience. The research instruments are questionnaires through expert instrument content integrity and sentiment determination. (Reliability) and (Cronbach's Alpha Coefficient) The whole sentiment is equal to .74. Analyze data using standard percentages, averages, and deviations. The results showed that 1. Personal data showed that the majority of the samples were female, had bachelor's degrees, working age of 16 years or more, working as a nurse/academic/medical scientist/ Radiologist/physiotherapist/psychologist, and were in current position as a practitioner. 2. Personnel satisfaction with office supplies work at Phatthalung Hospital, was high (Mean = 2.46, SD = 0.51). Classified as office supplies management, low level (Mean = 2.38, SD = 0.51) and the depot management is high (Mean = 2.54, SD = 0.58) 3. Guidelines for the development of office supplies services at Phatthalung Hospital found that details of the office supplies should be offered to the service providers. The procurement system does not have to go through multiple stages and uses online methods instead of the old system, as well as speeding up ordering/hiring and delivery.

In addition, But-Aon and Pimpimool (2016) have developed an office supplies system for planning and budgeting for the administration of schools under the Office of secondary school districts. This aims to develop and find the efficiency of the information system, planning, and administrative budgets of the schools under the Secondary School District office and their satisfaction with the developed system. The target audience used in the research is divided into two groups: System development and experts. 5 people choose specifically from people with computer and network experience. The research follows the guidelines of the system development cycle, dividing the operating range into five stages: (1) Study system problems and system feasibility (2) System analysis and design (3) System development (4) Improvement, and (5) Implementation and maintenance. The results showed that (1) Get an office supplies information system, plans, and budgets for school administration under the Secondary School District (2) The performance of the system is good and the user satisfaction is at a good level as well.

Moreover, Wattanacheewanopakorn (2020) developed the office supplies system database by surveying problems and users' needs at the college of social communication innovation, Srinakharinwirot University.

Table 1: Summary of relevant studies

Studies	Research method/ collecting data	Research-based software output	Performance evaluation
Current study	SDLC/focus group and online survey	Office Supplies Requisition-Disbursement Processing System on Cloud (OSRD)	Yes
Chanthinok and Sangboon (2021)	Waterfall development model /focus group	Digital Accounting system on a Cloud-computing service (DAC)	No
Chanthinok and Jantarajaturapath (2020)	Use case analysis/online survey	Item Analysis Examination system (IAE)	Yes
Wattanacheewanopakorn (2020)	SDLC/questionnaire survey	Database system for the supply of college of social communication innovation	Yes
Abu-Dalbouh *et al.* (2019)	Quantitative approach/ questionnaire survey	Electronic Health Records (EHR) are electronic versions of patients' healthcare records	Yes
But-Aon and Pimpimool (2016)	SDLC/questionnaire survey	Development of school procurement, planning, and budgeting system	Yes

Table 2: Displays variables and how they are measured and applied from But-Aon and Pimpimool (2016)

Performance Evaluation	Items
Functional requirement test	
	FR1: Work correctly to meet the needs
	FR2: Display the information fast and accurate
	FR3: The reports can be displayed quickly and accurately
	FR4: The operation of the system can be well-linked to other systems
	FR5: The operation process of the system is not complicated
Operation accuracy test	
	OAT1: Accuracy of visualization of results when clicking menus
	OAT2: Accuracy of displaying results when processing is complete
	OAT3: Accuracy in managing various aspects of data processing
	OAT4: Access accuracy
	OAT5: Accuracy of system usage based on permissions granted
Usability test	UT1: Speed of processing and the result display of the system
	UT2: Appropriation of the placement of elements within the page
	UT3: Proper deployment of report formats
	UT4: Menu layout and order are easy to use
Security test	ST1: The right to access the system is appropriately assigned
	ST2: User group assignments are appropriate
	ST3: System input is validated
	ST4: Secured at the database level
	ST5: Secure access to user data

Table 3: Shows the result of the efficiency of OSRD in each group

Group item	$\bar{X}$	S.D.
Functional requirement test	4.833	0.150
Operation accuracy test	5.000	0.000
Usability test	4.833	0.150
Security test	4.866	0.242

The basic information was collected for developing the database system and the office supplies system at the college of social communication innovation, Srinakharinwirot University. Then ask about the management's satisfaction using descriptive statistics. The results showed that the system had the following functions: 1. Receiving office supplies from a supplier which is divided into 3 parts 1.1 Receipt log section 1.2 Inbound receipt office supplies update and 1.3 Search/cancel a section of getting the office supplies information in. 2. Office equipment requisition/lending section 3. Return of the equipment 4. Notification of repair of the equipment and 5. Supplier data Management. This research presents a detailed database structure used to develop the system. Additionally, Table 1 includes findings from studies that examine the research methodology/data collection, research-based software output, and performance evaluation that are closely related to the current work.

However, according to the review, although there is research that studied the office supplies system through cloud computing studied at Pho That Prachasan School,

Sisaket Province (Pitprasert, 2019), it also provides only the service of disbursing office supplies in one unit. In recent research, it has been found that it is not open to other agencies that want to use the office supplies system, which is necessary to implement in all government agencies. Therefore, this research has developed an office supplies requisition-disbursement system so that other agencies that do not already have an online disbursement system can implement the system conveniently and quickly without having to develop the system itself.

Research Methods

This research has been segmented the research into two phases, as shown in Fig. 2. The first step is to Develop (OSRD) by surveying the model agency, Mahasarakham Business School (MBS). This is to get a complete system for office supplies requisition-disbursement online. To explore the need to focus group conversations with users related to the office supplies system. Then analyze and design the system and develop it into a system OSRD. In phase two, after the user has tested it for some time, the researchers conducted a questionnaire to evaluate the effectiveness of the system online.

Part 1: The Development of the OSRD System

Data Collection

The researchers interviewed the sample using a focus group of financial staff and management who are responsible for office supplies to understand the original operating problem. Consider the disbursement pattern from the manual record of disbursement documents. There are 3-4 interviews, 20-30 min at a time, in a friendly atmosphere, so that users can thoroughly share the problems caused by the operation in detail so that the development of the new work system meets the objectives and solves as many problems as possible.

The System Development using SDLC

The development of the office supplies disbursement system on cloud computing system: SDLC (Chanthinok and Sangboon, 2021; Turban *et al.*, 2018) will collect data by interviewing focus groups which are the ones who will use the system. The development of the system on cloud computing system has the following steps: recognize the problem in the current system, study the possibility of developing the system, analyze and design the system, develop and test the system, and system maintenance.

Details of the programs used in system development and analysis of related system designs are as follows:

- Analyzing current problem conditions using Fishbone Diagram (Wujie *et al.*, 2022)
- Developing a cloud-processed office supplies disbursement system using PHP language.
- Cloud-processed databases with MySQL programs by design database using the relationship of database adjusted with normalization (Coronel and Morris, 2015)

Part 2: An Assessment of the Performance of the System

The researchers applied questions to assess the effectiveness of the system based on the research by But-Aon and Pimpimool (2016). There are four variable groups: 5 Questions from a functional requirement test, 5 questions from an operation accuracy test, 4 questions from a usability test, and 5 questions from a security test. Each question has a score of 1-5, with 1 meaning the least agreeable and 5 agreeing the most. The question item is displayed in Table 2. Additionally, content analysis was the first method taken into consideration for objectively evaluating the caliber of the study instrument. Each item question and component of the scale that represented the instrument's constructs were proofread by three experts.

Results

Result in Part 1

According to the interviews with a focus group, the main problem with the traditional disbursement operation is that the requester does not know the total remaining amount. Moreover, there is delayed stock counting. There are also errors in writing the requisition by hand and the lack of efficiency in remaining inventors. The detail of the Fishbone Diagram is elaborated in Fig. 3.

Database Relationship with Normalization

Based on the design of the database structure, the researchers used database relationships and use database system norms. There are 10 related tables, the main table is tbl_2020_stock_org which contains the field org_id as the primary key linked with a foreign key in another table. The important information in this table is (1) information about the unit that applies to use the service (2) Contact name (3) Contact number (4) email address (5) the name of the staff who is responsible for the office supplies. Other tables contain org_id as a foreign key. Therefore, the design of the table structure in this way will make the system compatible with a wide range of organizations using code org_id to separate the information. Using Query to retrieve the data or Update or Insert data is referred to as org_id. The table relationship details are shown in Fig. 4.

Using Google Sign-in

The sign-in flow for obtaining an access token for your server-side application is illustrated in Fig. 5. There are 3 components including google API, server, and client. Moreover, the relation of them is 7 steps for google sign-in. In the first step, the user clicks the sign-in button. The authorization request is sent to Google's OAuth servers.

Secord step, the OAuth dialog is triggered for the user. In the third step, there are returned some variable such as access_toker, id_token, and a one-time code.

In the fourth step, the Client sends code to the server. Fifth step, Server exchanges one-time for access_token and id_token. In the sixth step, Google returns access_token and id_token. Finally, the Server will confirm "fully logged in" to the client.
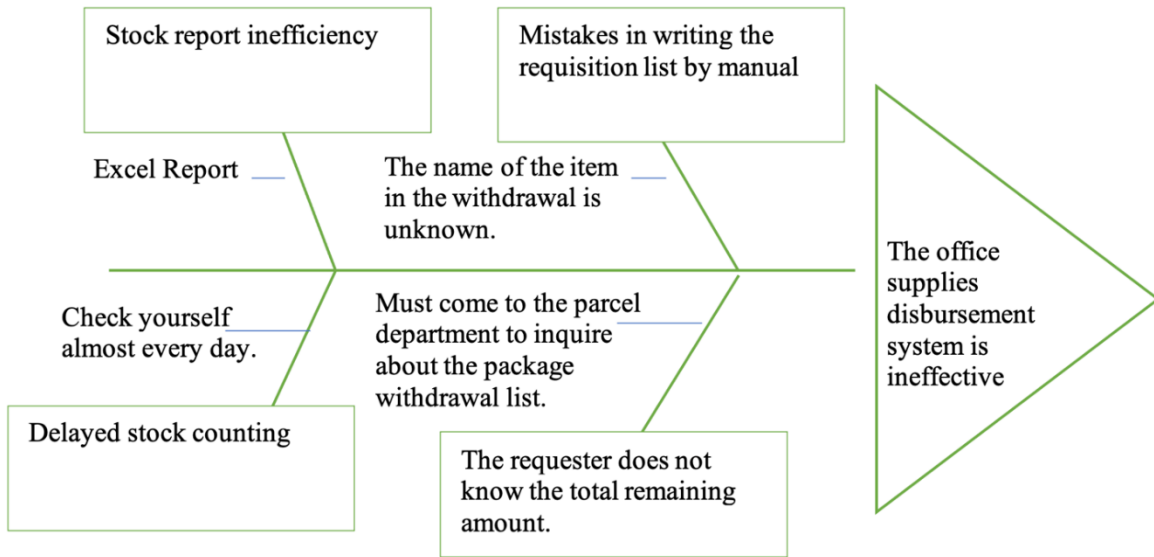
Fig. 3: Shows a fishbone diagram of an inefficient traditional office supplies disbursement system
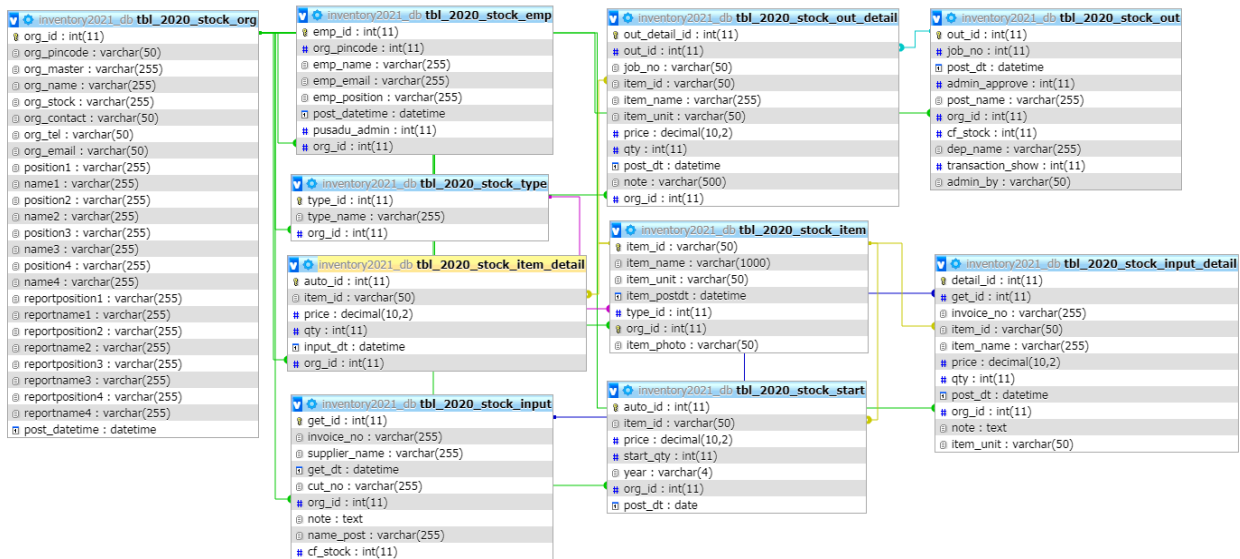
Fig. 4: Shows the relationship of the online office supplies disbursement system database through the cloud computing system
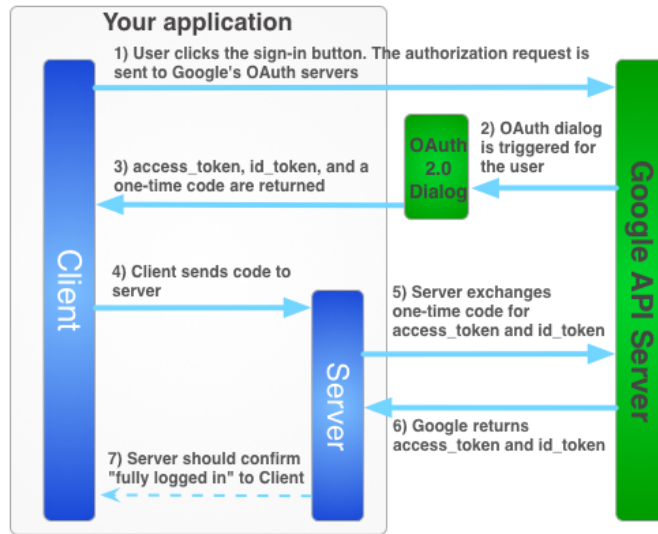(Source: The authors)

Fig. 5: The sign-in flow from the server-side application (Source: developers.google.com)
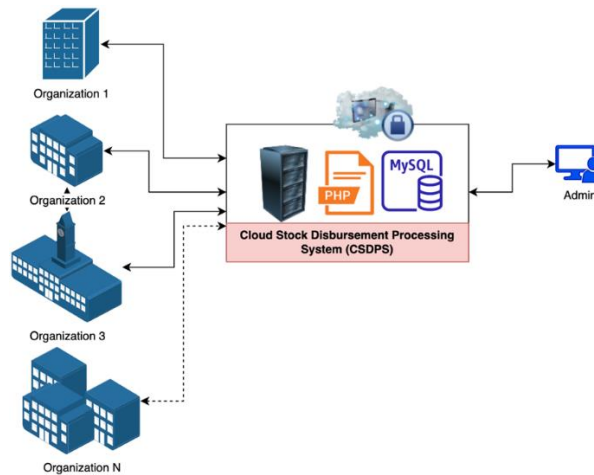

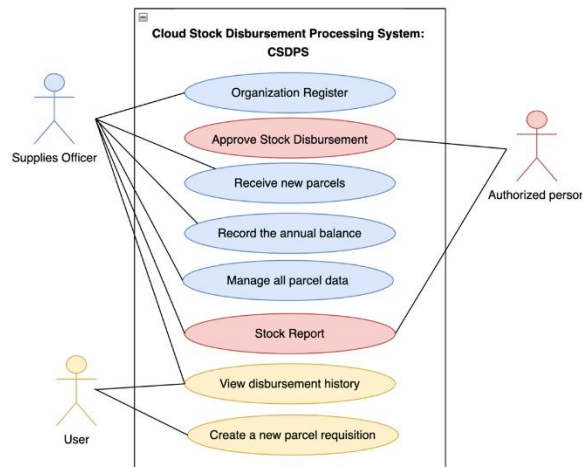**Fig. 6:** OSRD system overview (Adapt from Chanthinok and Sangboon, 2021)

Fig. 7: Use case diagram
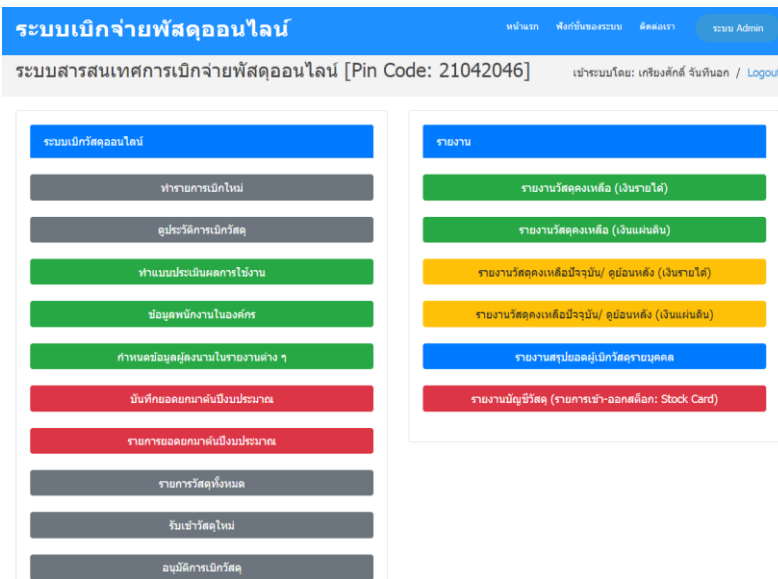
Fig. 8: Registration screen

Fig. 9: Office supplies disbursement system menus for administrator
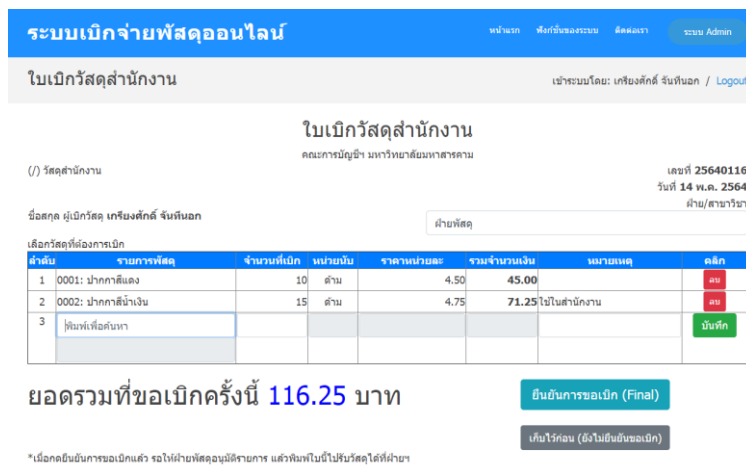

Fig. 10: The office supplies requisition screen
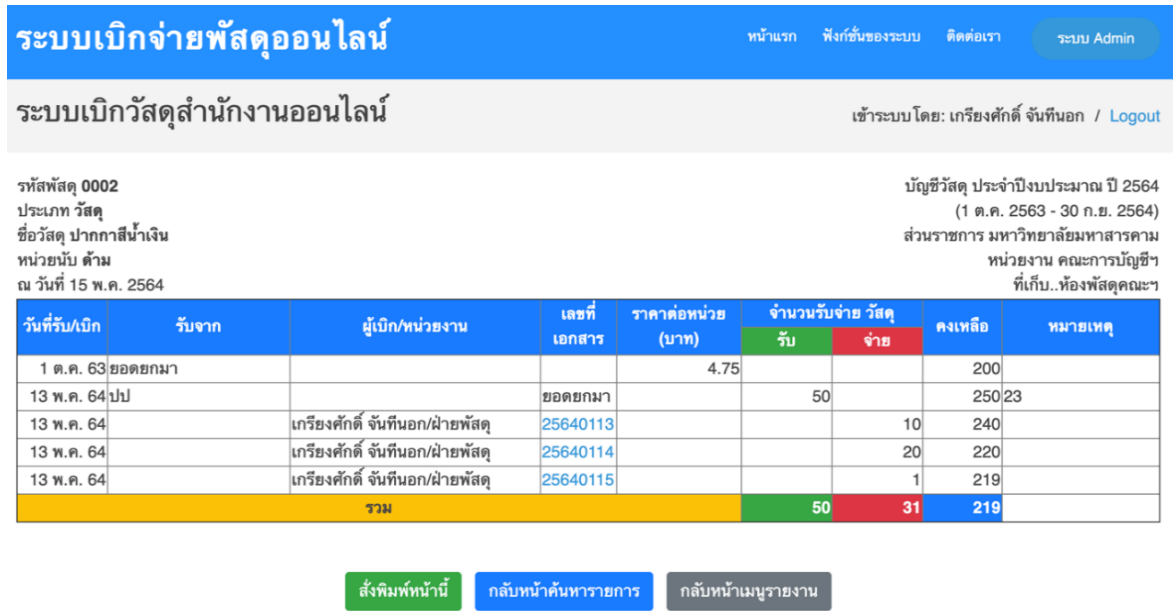
987

Fig. 11: The screen of office supplies in and out (Stock Card)
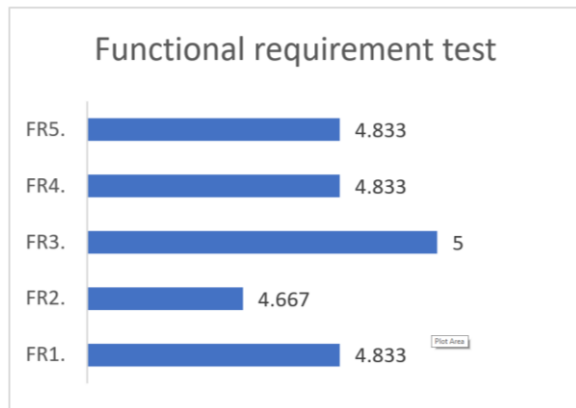

Fig. 12: Mean values for functional requirement test
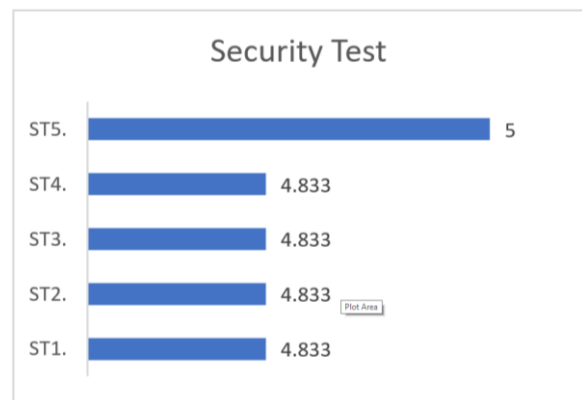

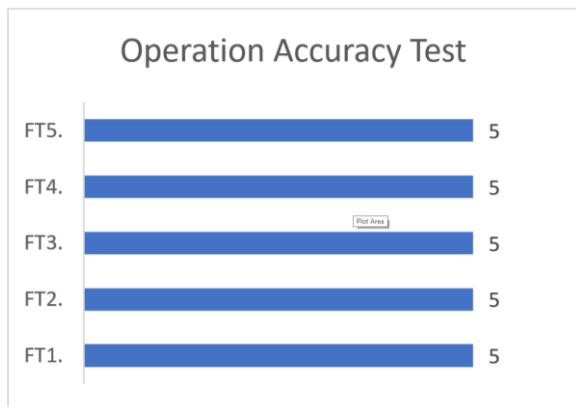**Fig. 14:** Mean values for usability test

Fig. 13: Mean score for operation accuracy test
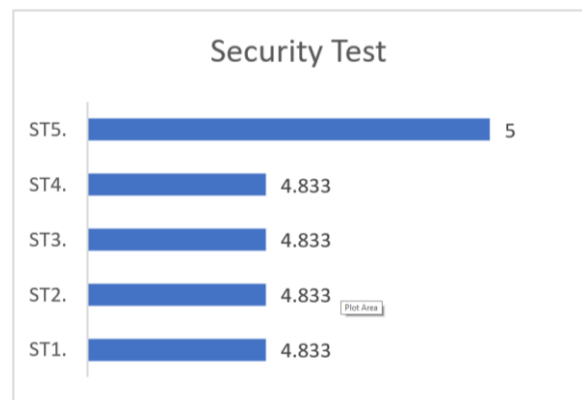

Fig. 15: Mean score for security test

Algorithm of office supplies disbursement system

Disbursement and write-off of office supplies system

Input Item, Qty
Stock = CheckRemainStock(Item,Org_id)
If Qty <= Stock Then
    Insert into tbl_2020_stock_out, tbl_2020_stock_out_detail
    Set Confirm order stock by user
    Cut off stock for each qty item by an auto system
Else
    Alert ("Display message stock is not enough")
End if

Algorithm of the approval and disapproval of requisitions system

The approval and disapproval system, and returns the inventory in case of disapproval system
Read tbl_2020_stock_out, tbl_2020_stock_out_detail for wait approve status
If Post_datetime <= 7 Then
    If Admin set approve=1 Then
        Set confirm transaction = 1
        Update tbl_2020_stock_out_detail set transaction_show = 1 where out_id = {$_GET[out_id]} and org_id = {$_SESSION[session_org_id]}
    Else if Admin set approve=2 Then
        Set confirm transaction = 0
        Update tbl_2020_stock_out_detail set transaction_show = 0 where out_id = {$_GET[out_id]} and org_id = {$_SESSION[session_org_id]}
        Update tbl_2020_stock_item_detail set qty = qty+{$_GET[return_qty]} where item_id = {$_GET[item_id]} and org_id={$_SESSION[session_org_id] }
Else
    Set approval is not allow
End if

Figure 6. is an OSRD system model, which serves either public or private agencies. The users can sign up for the service for free by using a google email account. It is available for use now, the first person in the organization who signs up for use of the system will automatically be assigned as the administration in the organization. The administrator can add other staff to the system or the others can choose to sign up for the system themselves. The steps are to Click on the menu "Adding new users to the system (register users in the organization)" to specify an e-mail address for the next time you log in. Then identify the reference number of the agency received from the officer responsible for office supplies. The disbursement usage data and the remaining amount of office supplies are stored securely in the database system. The stored table structure is the same in all units, with researchers designed to have organizational IDs (org_id) in all tables to separate data between organizations.

Due to problems working in the legacy system, the researchers have developed a system OSRD to provide other agencies that want to sign up for the service for free. The system comes with 3 user levels (1). Administrator or office supplies officer (2). Users are responsible for approving the disbursements and (3). The users at the user level request office supplies.

For Administrator

- Registering access through Google sign in
- Online office supplies requisition
- History of disbursement transactions
- Management of users' information in the organization
- Define the signatory information for approval, disbursement
- Record opening balance at the beginning of the year
- Manage all the office supplies and information
- New office supplies in stock
- Approval of the office supplies' requisition
- Reports

  o Current remaining office supplies report
  o Monthly office supplies Report
  o Individual drawdown report
  o In and out of office supplies report (Stock Card)

For manager:

- Make a transaction of approval of the disbursement of office supplies
- Accessible all the reports in the system

For users:
- Online office supplies requisition
- View historical disbursement history

Summarization as Use Case Diagram illustrated in Fig. 7. Also, Fig. 8-11 shows the screen of using OSRD.

Research Result Part 2 Evaluation of System Efficiency

The transactions using OSRD in the model organization include 436 transactions and 6 people that relate to the system. The evaluation from all the users in 4 areas are 1) Function requirement test-details shown in Fig.12. 2) Operation Accuracy Test details show in Fig.13. 3) Usability Test-details shown in Fig. 14 and 4) Security Test-details shown in Fig. 15.

Figure 12 shows the mean score of the evaluation of the functional requirement test. The highest score is 5.000 in FR3: They can be displayed the report quickly and accurately. The lowest score is 4.667 in FR2 displayed information fast and accurately. This may result from the users having to learn the new system and being unfamiliar at the beginning of the testing period. Which intern produces inaccurate data from the inaccurate input.

Figure 13 shows the mean score of the evaluation of the operation accuracy test. All the questions have a full score (5 points) which means that the system has worked appropriately well. There is an observation that with the correct and complete data input, the processed output is also correct and complete. This is as Warwick *et al.* (2022) explained in the concept of Garbage in garbage out: GIGO.

Figure 14 shows the mean score of the evaluation of the usability test. The score of 5 is in UT2. Appropriateness of the placement of elements within the page and the proper layout of the report format. The lowest score is 4.667 in UT1. speed of processing and display of the system and UT4. menus layout and workflow are easy to use. However, the score is still at a very good level.

Figure 15 shows the mean score of the evaluation of the security test. The highest score is 5.000 in ST5. Secured access to user data. The other questions have the same score of 4.833 which is a very good level. In comparison with the result of 3.79 found in the study titled an evaluation of the Information system for cooperative education, a case study in the Mahasarakham Business School (MBS), Mahasarakham University (Muangkote *et al.*, 2019), The OSRD has a higher score. However, the two systems have different working functions and also focus on different groups of users which may result in a score difference between the two systems.

Table 3 shows the result of the efficiency of OSRD in each of the 4 groups. This also showed in Fig. 12-15.

Table 3 Show the evaluation of the efficiency of the system. The mean score from the highest to the lowest are: Operation accuracy test (Mean = 5.000, S.D. = 0.000), security test (Mean = 4.866, S.D. = 0.242), functional requirement test (Mean = 4.833, S.D. = 0.150) and usability (Mean = 4.833, S.D. = 0.150, respectively. The results of the evaluation of the performance of the system reflect that the accuracy of processing is carried out. Accurate display of results, including access levels, accurate according to the access level which contains the requester level, office supplies officer, and management approval of the system work properly according to the needs of the agency.

Discussion

Based on research in the past, was found to be the development of an office supplies system for self-agencies only, such as Thapthim (2019) study titled "The Development of Office Inventory System by Using Office Registration Material Program for the office of the Science and Technology, Nakhon Pathom" developed web application using a web browser with PHP language. Thapthim (2019) conducted a satisfaction assessment before and after using the system, finding that all the satisfaction scores after using the new system had an average higher than the score before the development of the disbursement system. Phobutta *et al.* (2015) also studied the development of the disbursement system of office supplies at Dong Bang Community School Nadoon District, Mahasarakham Province, and developed a window base application using VB.NET language and MS-SQL Server 2008 database. The focus group is teachers at the school. The evaluation of the system by the users is at a very good level. As also found in Anupab (2020) developed a standalone program for the lens production control department of Sony Technology Company (Thailand) that has the evaluation of the program at the greatest level.

From the literature review in the Thai context, it was found that the system development has both the Web application and Window base application. The similarity to this study is an evaluation of the satisfaction and performance of the system. However, the difference from past research, most notably, is that the development of the office supplies disbursement system is not limited to one agency. It has been developed to accommodate users from a wide range of agencies by placing systems in the cloud which facilitates unseen jobs, a shortage of IT personnel, and no budget for hiring the system developer. This gives agencies that do not have office supplies disbursement systems the option to consider in case it is suitable for their agencies. We anticipate that this research will boost organizational productivity and increase the number of registrations. The system is still being improved and maintained by the researchers continually.

Conclusion and Recommendation

This research has been carried out in its entirety. The first is to develop a cloud-processed office supplies disbursement system. The researchers developed a system based on the SDLC framework. Beginning with recognizing the user's needs, then gathering data from a group of prototype users from Mahasarakham Business School (MBS), analyzing the data, and designing the program for the MBS as the model organization. This was to make sure that the system can be used and appropriate for the organization. The researchers also allow other organizations to utilize the program via the internet by registering to use the system on the cloud computing system.

Secondly, design algorithmic systems and requisition-disbursement system databases to support cloud computing. In this regard, the investigators designed the process of registering a new agency,

eliminating the stock of office supplies that have been disbursed, the process of adding new office supplies to the stock, and the approval process of executives in the unit. In case of the management does not approve, the amount of stock that has been eliminated will be repatriated into the stock system again. In addition, the researchers designed a database system to support multiple agencies, by adding organization IDs (org_id) in all tables to link information to query information with databases. Even with more subscription agencies or a wide range of office supplies information, the database system designed by the researchers will support all operations without having to revamp the system by individual units (Upscale compatible). And the final research objective is to assess the effectiveness of cloud-processed office supplies requisition-disbursement systems. The researchers designed a questionnaire to assess the effectiveness of the system. The results of the assessment were found to be very good. The researchers would like to recommend this newly developed office supplies a requisition-disbursement system to organization with office supplies requisition-disbursement problems such as counting stocks, issuing office supplies daily report, monthly and fiscal year results, or have experienced overall problems with the on-premises office supplies disbursement system. Our recommendation is to sign up for a free service at URL: www.mse-exam.net/inventory2022. This is an important piece of this research team's work. The researchers also add the share function of the system to Facebook Wall in case the users want to share to their social network, which makes it convenient to get access to the system.

However, this research has a limitation in that the system only allows a user with a Gmail account only since it is a development with a google API server. Therefore, it requires the user to apply for Gmail. In the future, the researchers will continue to develop a system that complies with other API like Facebook login API which is open for the developers and most of the users have a Facebook account.

Author's Contributions

Kriangsak Chanthinok: Developed the idea, designed both the Office Supplies Requisition-Disbursement Processing System on Cloud (OSRD) and the research plan, wrote the manuscript, designed the data dictionary, created the fishbone diagram, database design, and coded the program.

Ekkachai Naenudorn: Contributed to the literature review with the related fields, designed the study, developed the methodology, collected the data, performed the data analysis, and reviewed the final manuscript.

Ethics

This research study is an original version and has not been previously submitted or published before. The researchers have read and agreed to the submission requirements for this original paper and have abided by the research ethics code.

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