OLIVAREZ COLLEGE TAGAYTAY

OCT- INFOTECH

INFORMATION AND TECHNOLOGY
OFFICIAL STUDENT RESEARCH JOURNAL

VOL. 1 NO.1

The OCT - INFOTECH is the official student research journal of the BACHELOR OF SCIENCE IN INFORMATION TECHNOLOGY is published annually by the Olivarez College Tagaytay Center for Research, Publication, Planning, and Development.

ISSN:

Please send your inquiries to the Head of Olivarez College Tagaytay Center for Research, Publication, Planning, and Development.
E. Aguinaldo Highway, Barangay San Jose, Tagaytay City
Email: jeanrizza.delacruz@olivarezcollege.edu.ph
Telefax: (046) 860-2301

THE EDITORIAL BOARD

FOREWORD

As the Editorial Chief of the BSIT Research Journal, I am pleased to introduce this compilation of innovative research studies conducted by our talented pool of student and faculty researchers. This issue of the BSIT Research Journal Digest showcases cutting-edge projects that tackle real-world challenges faced by businesses and organizations in our local community. The researchers have developed practical solutions ranging from an integrated information system for the Olivarez College-Tagaytay SHS Office of Student Affairs to a comprehensive sales and inventory tracking system for a local motorcycle parts retailer.

These projects demonstrate the meaningful impact that our BSIT students and faculty are making through the application of technology. For example, the team has created a point-of-sale system tailored to the needs of small-scale cafés in Silang, Cavite, providing enhanced sales analytics and reporting capabilities. Additionally, they have designed a robust point-of-sale system specifically for a local Filipino restaurant, Sis Ems Bulaluhan, improving customer service and back-office management.

I am proud to showcase the dedication, creativity, and problem-solving skills of our BSIT researchers through this research digest. Their hard work and commitment have elevated the quality of research within our program, and I am confident that the solutions presented in this issue will inspire others to tackle similar challenges in our community. I hope you enjoy reading about these remarkable achievements and find them as inspiring as I do.

TABLE OF CONTENTS

Digitized School Inventory and Reservation Management System for Olivarez College Tagaytay Bookstore

Researchers:

Alab, Frix Gerald R.
Alcaraz, Mark KC C.
Alegado, Bren Julius
Andaya, JohnDominic
Barral, Noah Alexander
Bulawin, Dynna
Dalanon, Mike Kerby
Dela Vega, Jaypee
De Gala, Angel Lowyza
Canja, Julia Ortega
Conteñente, Jhona Joy
Fradejas, Maxine Grace

OCT – InfoTech

Research, Survey, and Publication of the
BACHELOR OF SCIENCE IN INFORMATION TECHNOLOGY
OLIVAREZ COLLEGE TAGAYTAY

Vol. 1 No. 1 ISSN – July 2024

Development of Olivarez College-Tagaytay SHS-Office of Student Affairs' Information System

Anacay, Vince Anthony C., Boado, Kyle Vincent M.,
De Ocampo, Ace Ephreim C. Gamboa, Arrysh Morris, Marasigan, Jane D.
Peña, Clarence Idabelle J

I. ABSTRACT

Olivarez College-Tagaytay requires a senior high school department system to handle student records specifically for the Office of Student Affairs. This capstone aims to create an Information System to help the Prefect of Discipline, OSA Head, Principal, and Teachers to organize the student records. It will be a big help for the administrators and faculty of Olivarez College-Tagaytay since it will fasten document searching and save physical space for data storage. The participants in this study were the four users in the Office of Student Affairs, 5 Teachers, and 6 IT Experts as they have experience in creating systems. Each respondent is given a survey questionnaire while the researchers demonstrate the technique. The Rapid Application Development approach for instructional technology analyzes the system user data through four phases: Requirements Planning, User Design, Rapid Construction, and Cutover. In addition, the users determine if the system's functions are working or need improvement. Data gathered from the 15 respondents is calculated and converted into information. This is used to check if the system satisfies the user and all the requirements are met. This study sought to develop an information system to organize records and files, which admin and Senior High School faculty members in Olivarez College-Tagaytay can use. It is marked as fully functional by most of the respondents. Load times are fast, and the system can adapt to different computers. One out of 15 respondents disagreed that the tables were neat and organized. In other words, there is room for improvement.

***Keyword**: Student Affairs' Information System, Olivarez College-Tagaytay*

II. INTRODUCTION

With the birth of information technology, the process of computerization allows the loading, administration, and searching of a company document in the fastest, easiest, and safest way, guaranteeing the up-keeping of documents and considerable reduction of operative costs such as the physical location for files, time spent in the searching of information, the issue of copies, paper use and effort exerted in accomplishing the given task.

Ruth & Warner (2016) reiterated that digital platforms and applications are critical to business success. Assuring the availability, performance, and usability of processes, information, and infrastructure is one of the significant concerns of top-level management across industries. Plaza (2018) states that the academy is one of the many institutions that need computerization. This is because the educational sector stores data from its operations, such as students' data, grades, enrollment, and many more.

The Information System is known for storing records and can be stored. The Student Information System is now a facility that each department in a university uses to manage the records of their students. Negash (2017) states, "It is aimed to improve the timing and quality of input in the decision-making process and to facilitate management work." The Information System is known for storing records and can be stored.

The Information System and Student Information System have many comparisons, mainly because both are used in managing and storing data. Student information systems (SISs) are “electronic information system(s) to assist in the organization and management of student data” (US Dept. of Education, 2008).

Currently, the Office of student affairs in Olivarez College-Tagaytay uses a manual recording of transactions and Google forms, which take most of their time searching and looking

for information whenever a query occurs. According to the principle of S.H.S. in Olivarez College-Tagaytay, "the current way of inputting records of the students is much of a hassle and not organized, especially when we are dealing with many transactions at a time." Aside from that, the volume of documents being produced and filed consumes a lot of time and space. According to Alzahrani (2017), the information system quality and success model has been studied on a digital library system, and it has been found that "behavioral intentions are greatly influenced by system quality, information quality, and service quality."

With this in mind, the researchers were motivated to develop a student information system that can store student records and all other student affairs transactions in the Olivarez College Tagaytay office. It will be a big help for the administrators and faculty of Olivarez College-Tagaytay since it will fasten document searching and save physical space for data storage. In addition, it is to provide excellent data storage and retrieval. The Information System for SHS OSA of Olivarez College Tagaytay will help to efficiently handle and provide student data information and minimize work time.

The study's main objective is to develop a system for managing student records in the Office of student affairs, senior high school department in Olivarez College-Tagaytay.

It specifically aims to answer the following:

1. What system design will be utilized in the Office of student affairs at Olivarez College-Tagaytay in managing student records?
2. What are the requirements for developing OSA’s system for the Office of student affairs in Olivarez College-Tagaytay?
3. What is the level of acceptance of users and IT Experts on the develop student records management systems, in terms of:

3.1 Functionality;

3.2 Reliability;

3.3 Usability;

3.4 Efficiency;

4. What is the level of effectiveness of the developed student records management system as evaluated by the IT Professionals:

4.1 Functionality;

4.2 Reliability;

4.3 Usability;

4.4 Efficiency;

4.5 Maintainability

This study was anchored on Rapid Application Development, officially introduced to the public in 1991 with the book *Rapid Application Development* by James Martin. It introduced systematic selection and training procedures, provided a way to study workplace efficiency, and encouraged systematic organizational design (EYRE, 2015).

The Rapid Application Development can be used in looking at the interplay of processes involved in the development of senior high school information systems in Olivarez College-Tagaytay.

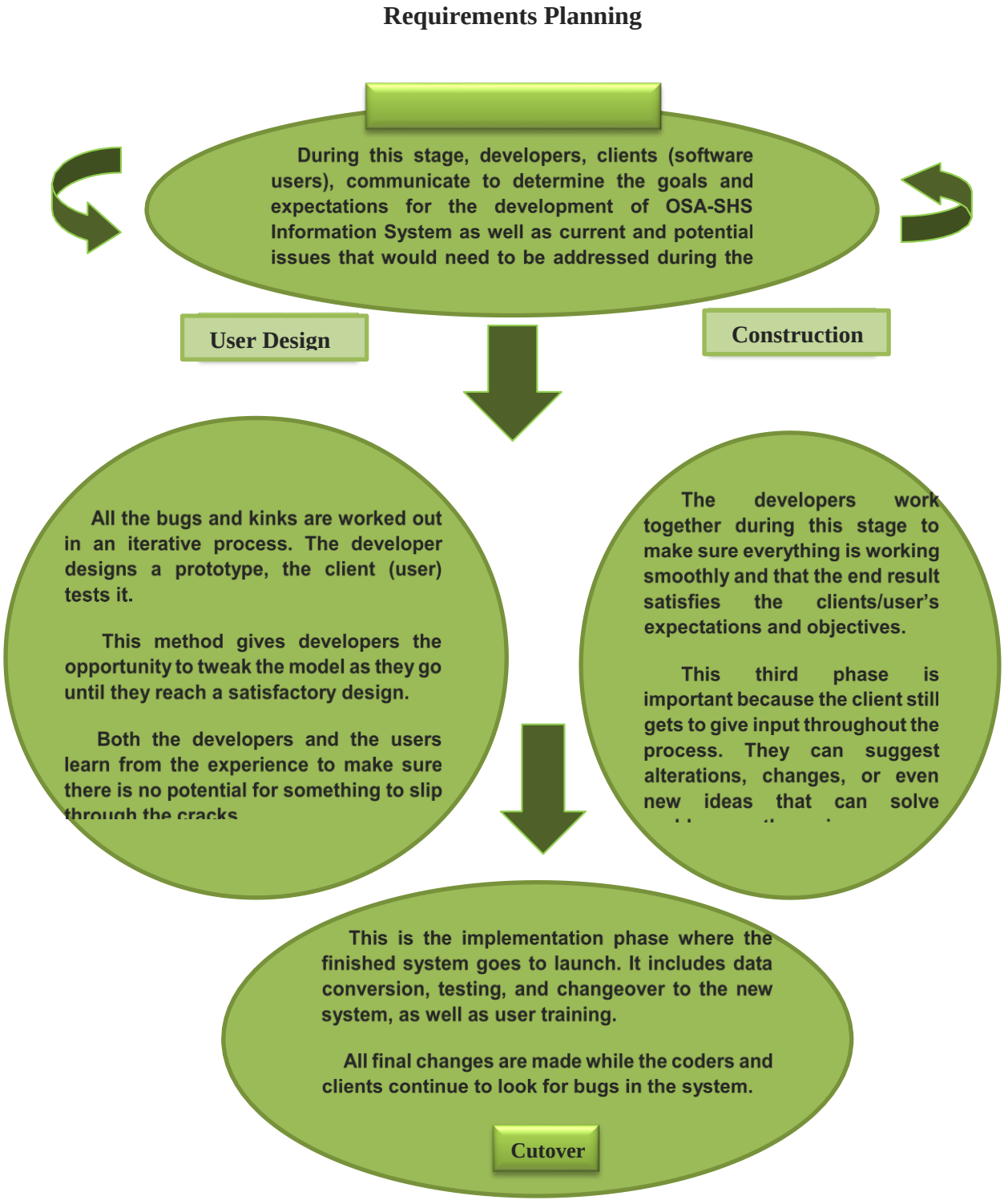


Figure 1. Rapid Application Development of SHS-OSA Information System

The development of senior high school information systems in Olivarez College Tagaytay started by identifying the input needed for the system development. It is divided into four major requirements, and they are as follows:

Table 1

INPUT	PROCESS	OUTPUT
Data Requirements - Office of Student Affairs People Requirements - OSA Head - Secretary - Prefect of Discipline - Principal - Strand Coordinator Software Requirements - PHP Editors (Visual Studio Code or Sublime Text) - MySQL - PHP Maker (RAD Tool) - Photoshop - Windows/Linux Hardware Requirements - Desktop/Laptop - Server - 1TB disk space, minimum of 4GB RAM	Rapid Application Development - Requirements planning - User Design - Rapid Construction - Cutover	Senior High School Information Systems for Olivarez College-Tagaytay

The study's primary goal is to create a system that stores and manages students' information in the SHS Office of Student Affairs in Olivarez College-Tagaytay.

Specifically, it aimed to:

a. To create a system that will significantly help the admins and faculty of Olivarez College-Tagaytay. Since it will speed up document searching and save physical space for data storage.

b. The SHS-OSA's Information System can be beneficial in creating a less time-consuming system, as manual data may cost a lot of time.

c. To create an Information system that stores data in a sophisticated manner, making the process of finding the data much more manageable.

The developed system will focus on SHS OSA Student records for Olivarez College-Tagaytay. Efficiency is the key factor of the developed system. This means that it can be developed to adjust to the needs of its users as they arise. By creating this system, it will be much easier for the faculty to browse and create student records when needed. The information system will provide the personal information and academic details of every S.H.S. student enrolled in Olivarez College-Tagaytay. It will also be much easier for those personnel in charge of accessing the system

III. METHODS

This chapter presents the research methodology for developing the student information system in the Office of student affairs at Olivarez College-Tagaytay.

One approach was applied in the study: a descriptive design used in the descriptive part of the study and software development methodology, which includes a detailed discussion of the procedures to be performed in the different phases of the chosen Rapid Application Development (RAD).

This study utilized the descriptive research method. According to Dela Cruz (2019), this research design allows the researcher to systematically, factually, accurately, and objectively describe a situation, problem, or phenomenon as it naturally occurs.

This method includes a survey in which a set of questions has already been prepared to be answered by the participants. An interview includes a discussion with the individuals involved in the current process; and observation, which is a method of viewing and recording information relevant to the study being conducted.

The RAD Model was used in developing the system. It consists of four phases: requirements planning, user design, construction, and cutover.

As shown in Figure 2, there is a continuous interaction between the user design and construction phases. This implies that users can examine a working model as early as possible to determine if the needs are met, and changes must be applied. The working model is then modified based on the inputs given by the user, and the interactive process continues until the system is completely developed and users are satisfied with it (Rosenblatt & Shely, 2012).

RAD (Fig. 2) may be a progressive development methodology that prioritizes quick prototyping and rapid feedback over a lengthy development and testing cycle. This method

enables developers to make several iterations and upgrades to the software without restarting a development cycle from scratch on every occasion. The overarching idea behind this technique is to approach software projects as if they were clay instead of steel. Due to the uncertain market conditions and competitive marketplace, RAD is increasingly required.

Flowchart

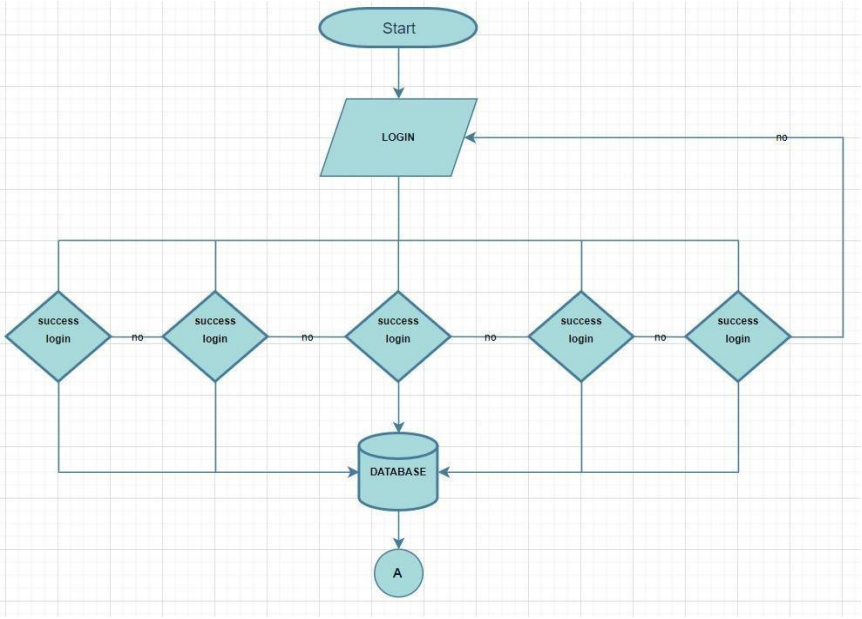
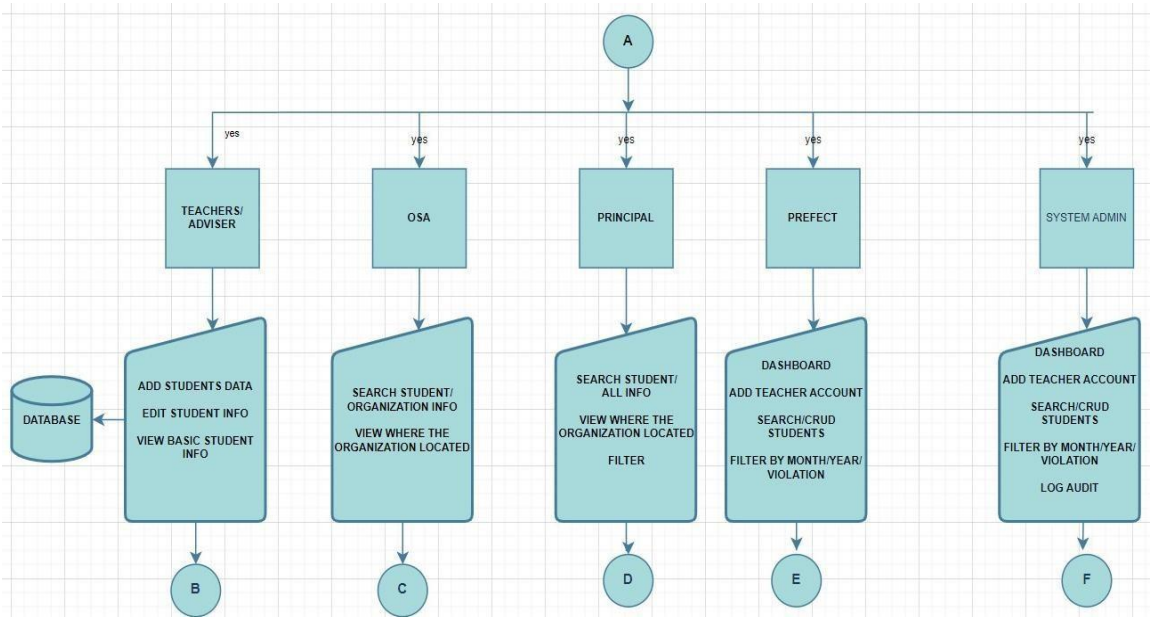


Figure 2 Flowchart of SHS-OSA Information System



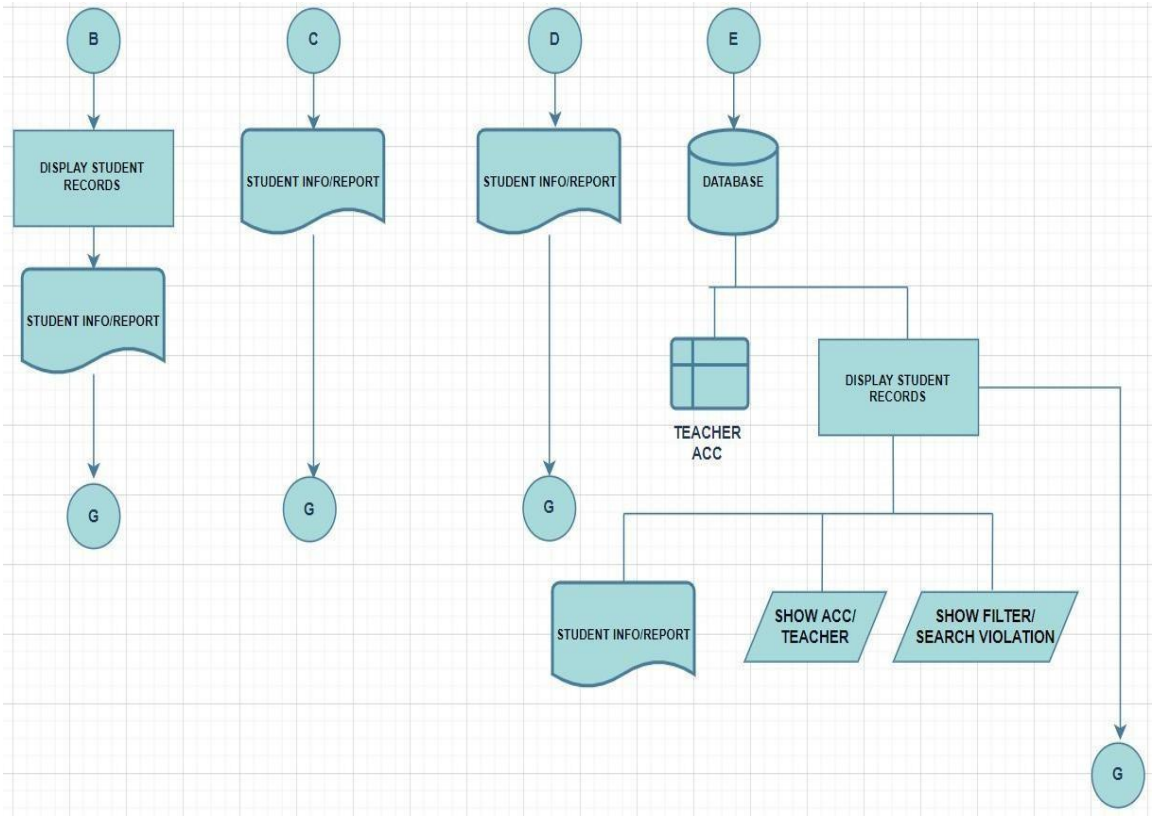


Figure 2.1 Continuation of Flowchart of SHS-OSA Information System

Figure 2.2 Continuation of Flowchart of SHS-OSA Information System

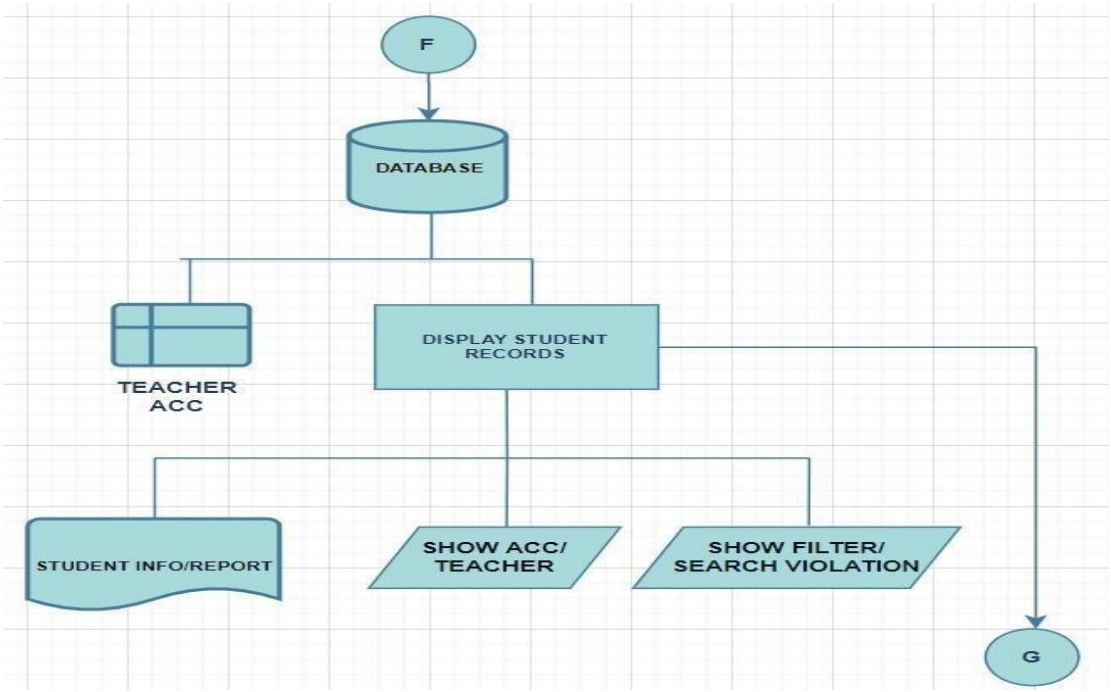


Figure 2.3 Continuation of Flowchart of SHS-OSA Information System

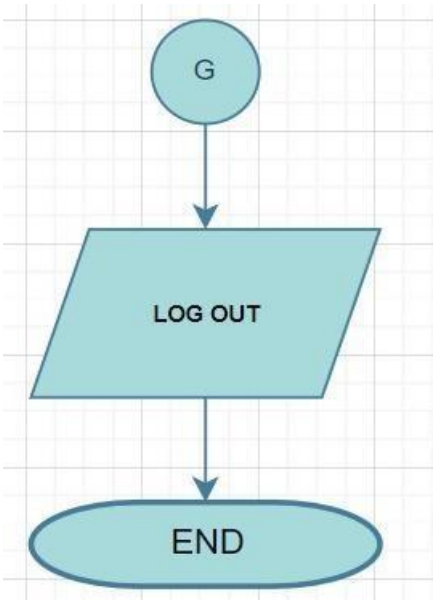


Figure 2.4 Continuation of Flowchart of SHS-OSA Information System

To input a record into the system, the Teacher/Adviser must log in using the account given by the Prefect of Discipline. The admin must give the account to the Teacher to ensure an individual account is in the system. Also, if the Teacher/Adviser forgot their account and password, they can ask for their account details from the System Admin and Prefect to reset their password.

The Teacher/Adviser can input the primary data of their student into the system. Also, they can edit and delete their record. The Teacher/Adviser can submit a student report in the system if a student makes a violation.

The Prefect will automatically receive the record and be able to view the violation record on his/her computer and update, edit, and delete the student violation record on his/her account. If the student wants a physical copy of the data, the Prefect can print the basic student information in Excel and pdf. The Prefect has a Dashboard to see and analyze the data for violation.

The OSA can view the student information system on his/her computer and can see the students' basic information with the record of each organization on which the student chooses and joins the organization. Also, if the student wants a physical copy of the data, the OSA can print the student record with basic information about the student’s organization details in Excel and pdf.

The Principal can view the student information system on his/her computer and can also see the students' basic information with a record of organization and violations of the student. The Principal can print the student record with the student's basic information with organization and violation details in Excel and pdf if the students want a physical copy of the data.

The System Admin can monitor the accounts of all the users together with their usernames and password. He/she can see the Audit Trail. The System Admin can restore the user password if forgotten. He also has a database of the system. Also, the System Admin can search the student records and can be able to view, update, delete, and edit the record. The System admin can also print the records as Excel and pdf.

Data Flow Diagram

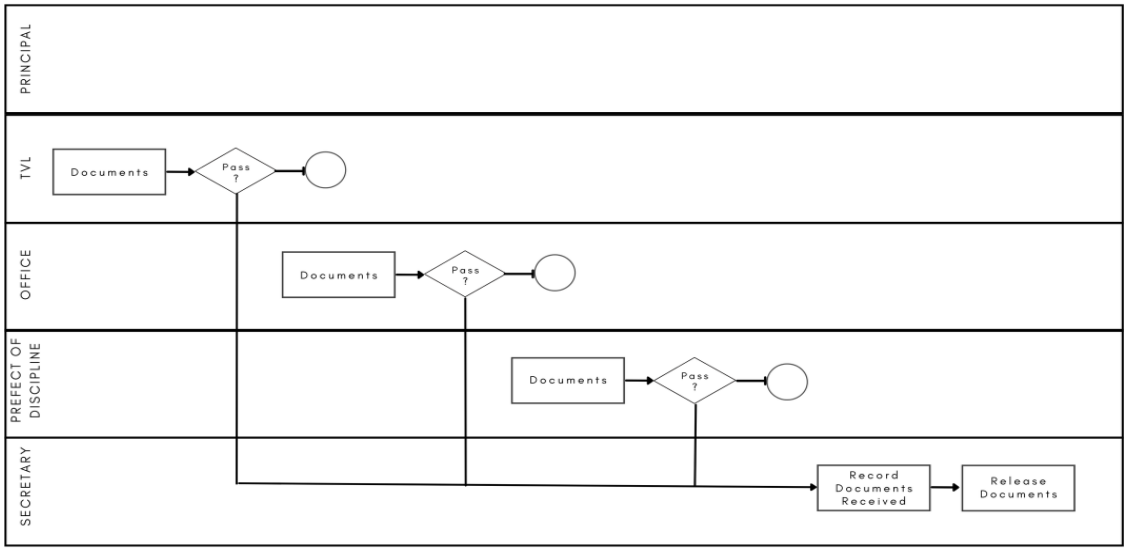


Figure 3. Data Flow Diagram of Current SHS-OSA

Illustrates the current SHS OSA's data flow diagram, demonstrating that the secretary will receive all the documents and segregate them for distribution to the appropriate personnel.

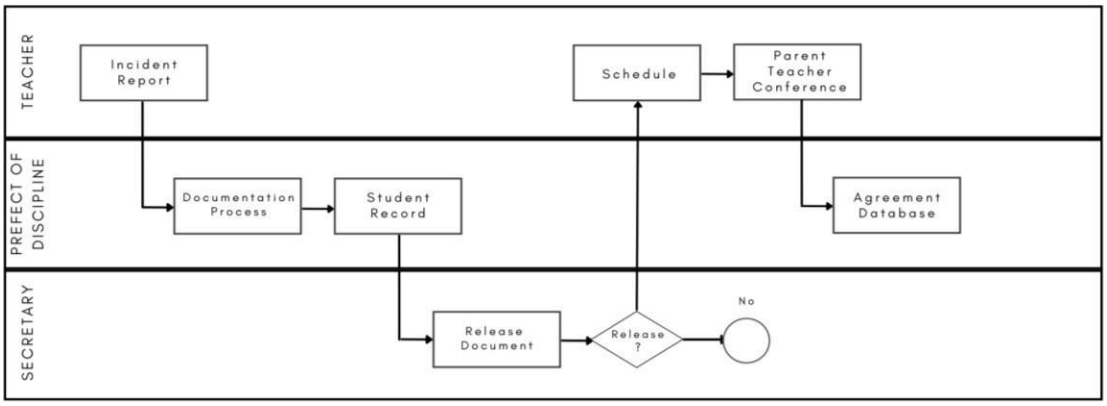


Figure 3.1. Data Flow Diagram for Prefect of Discipline

When a student violates, a teacher will make an incident report. After that, the teacher will pass it to the Prefect of Discipline, and he/she will start to make a documentation process and proceed to the student records to put the violation. After the process, the secretary will review the documentation. If it is valid, he/she will release the document directly to the teacher to schedule the parent and teacher conference.

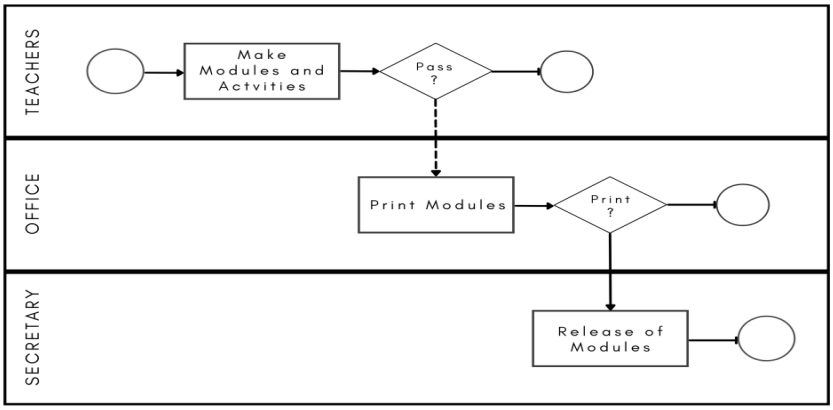


Figure 3.2. Data Flow Diagram for Office

It can be observed that the teachers create the assessments and modules that are delivered to the students and then print them to the secretary, who will distribute them to the students. The completed modules will be received by the secretary, who will subsequently deliver them to the office, where the teachers will check them.

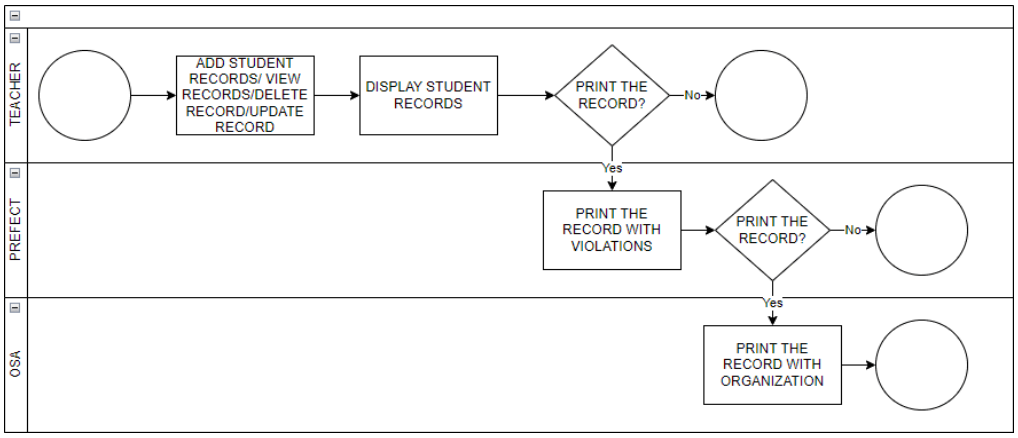


Figure 3.3. Data Flow Diagram for Teacher

Teachers can access the student records and edit and delete the record of the students. They can also display and print the data and let the student see their basic info. If the student wants to see their violation, they can direct it to the Prefect Office, and in the organization, they can direct it to the O.S.A. office. Each Office can print the specific data.

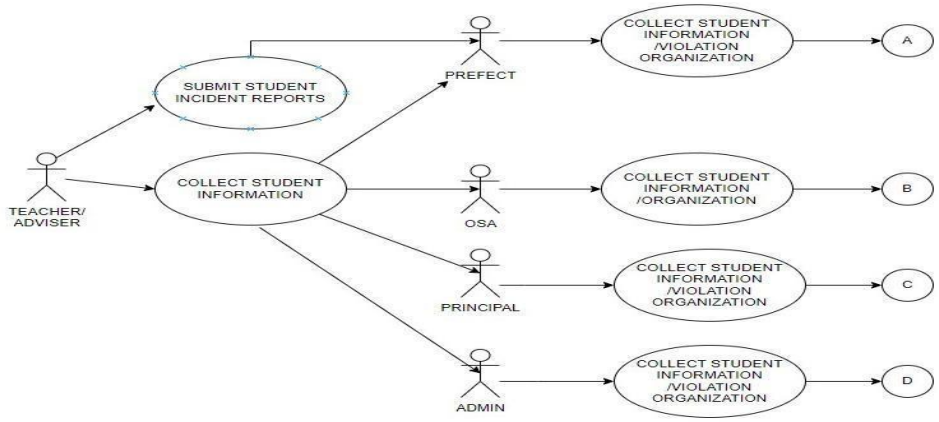


Figure 4. Case Study Diagram of Users

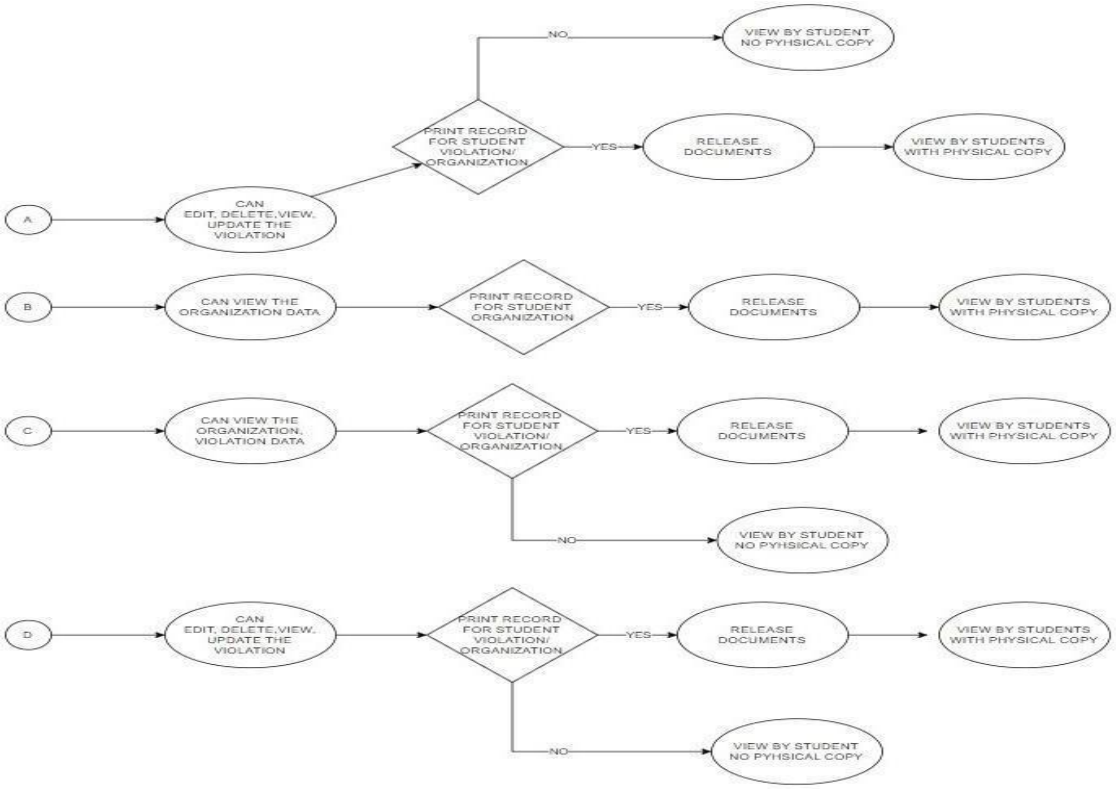


Figure 4.1. Continuation of Case Study Diagram of Users

This diagram shows the transaction and flow of receiving and collecting information and records of Senior High School students in the Office of Student Affairs.

Population of the Study

The study's target population includes the office of Student Affairs in the Senior High School department at Olivarez College-Tagaytay.

The study's respondents are the OSA Head, Principal, Secretary, Teachers, IT Experts, and IT Graduates.

Instrumentation

The study used the ISO 9126 in evaluating the developed system. This is about the study by AL-Badareen et al. (2017), wherein they stated that ISO 9126 is a piece of the ISO 9000 standard, the essential standard for quality affirmation. This model ordered the totality of programming item quality traits in various level tree structures of attributes and sub-qualities. The maximum level of this structure includes the quality attributes, and the minor level comprises the product quality criteria. The model determined six attributes: usefulness, Reliability, Usability, Efficiency, Maintainability, and Portability.

Evaluation and Scoring

Level of acceptance of the proposed system was measured in terms of a 4-point scale as follows:

Table 2

Evaluation and Scoring

Assigned Point	Numerical Range	Categorical Response	Verbal Interpretation
4	3.26 - 4.00	Strongly Agree	Highly Acceptable
3	2.26 - 3.25	Agree	Acceptable
2	1.76 - 2.25	Disagree	Moderately Acceptable
1	1.00 - 1.75	Strongly Disagree	Not Acceptable

Data Gathering Procedure

The questionnaire and interview are considered the most appropriate data-gathering instrument for this descriptive research study development of the student information system in the Office of student affairs in Olivarez College-Tagaytay.

Permission to conduct the study and administer the interview and questionnaire will be secured from the college dean of Olivarez College Tagaytay.

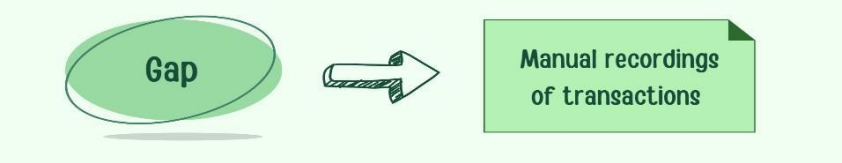


Figure 5 Gap of Transactions in SHS-OSA

Currently, the office of student affairs in Olivarez College Tagaytay uses a manual recording of transactions and google forms, which take most of their time searching and looking for information whenever a query occurs.

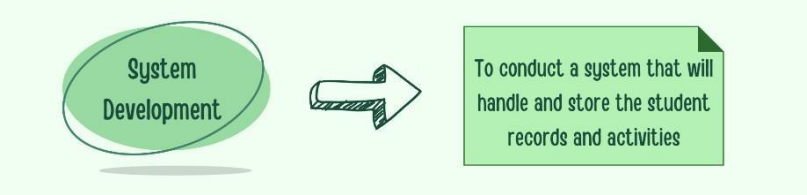


Figure 5.1 Development of Information System in SHS-OSA

The researchers were motivated to develop a student information system that can store data such as student records and all other transactions in the Office of student affairs at Olivarez College-Tagaytay.

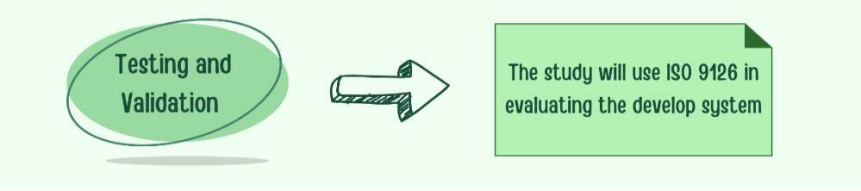


Figure 5.2 Testing of Information System in SHS-OSA

ISO 9126 is a piece of the ISO 9000 standard, an essential standard for quality affirmation. This model ordered the totality of programming item quality traits in various level tree structures of attributes and sub-qualities.

IV. RESULTS

This chapter discusses the research design and methodology of the study and will answer the procedural operations of the research problem.

In this study, Rapid Application Development for instructional technology was used and was combined in the development process (Ritchey et al., 2015). Throughout the study, the researchers followed the principles of Rapid Application Development. This study was divided into phases, requirements planning, user design, rapid construction, and cutover.

Phase 1 is the requirements planning. During this stage, developers and clients (system users) communicate to determine the goals and expectations for the development of the OSA-SHS Information System and current and potential issues that would need to be addressed during the build. Phase 2 was the user design; the idea of this system was to create a user-friendly system for the users. All the bugs and kinks are worked out in an iterative process. The developer designs a prototype, and the client (user) tests it. This method allows developers to tweak the model until they reach a good design. Phase 3, rapid construction; The developers work together during this stage to ensure everything works smoothly and that the result satisfies the client/user's expectations and objectives.

This third phase is essential because the client still gets to give input throughout the process. They can suggest alterations, changes, or even new ideas that can solve problems as they arise. Lastly, phase 4, cutover, is the implementation phase where the finished system goes to launch, change over to the new system, and user training. All final changes are made while the coders and clients continue looking for system bugs.

Project Design

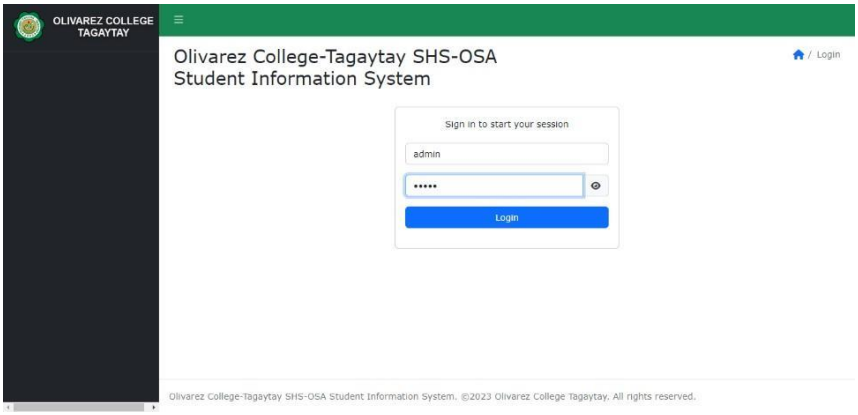


Figure 6. Login Page

The Login page is the opening page where the user is required to enter their username and password.

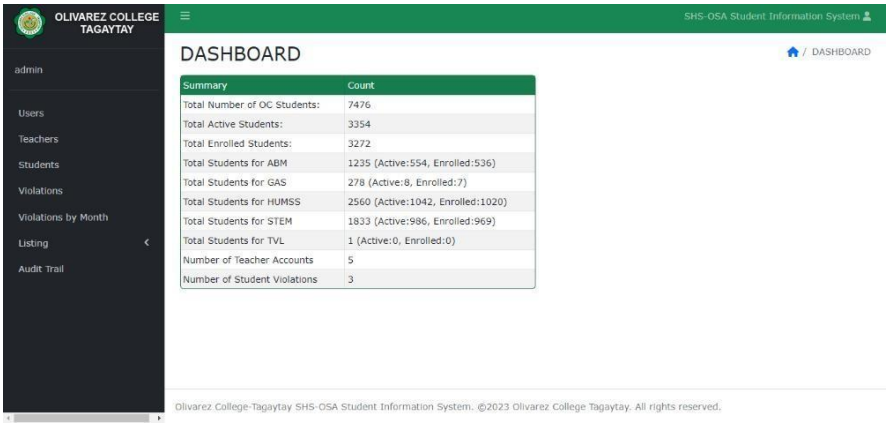
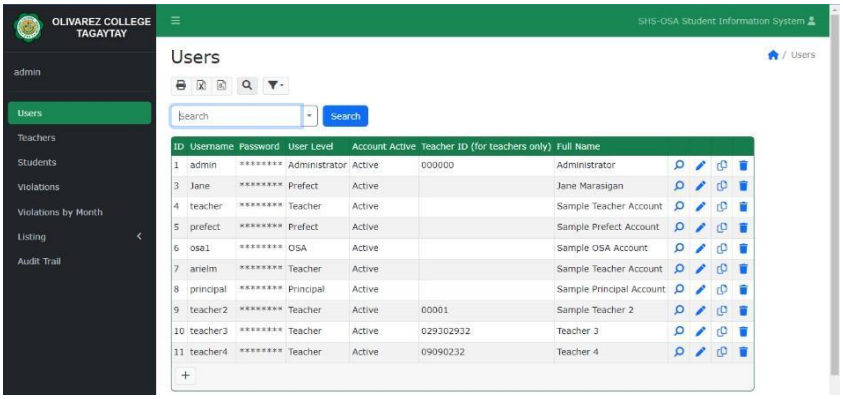


Figure 6.1. Dashboard

The Dashboard is the page where the admin can browse the total number of students, counts of violations, and the total student in each strand.

Figure 6.2. User Page



The User Page is where the admin can access the account usernames and password.

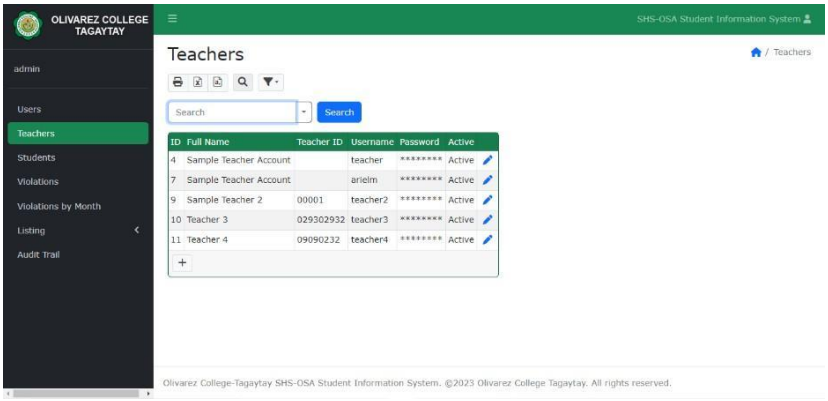


Figure 6.3. Teacher Page

This is the page where the teacher's information is located with their teacher ID and email address.

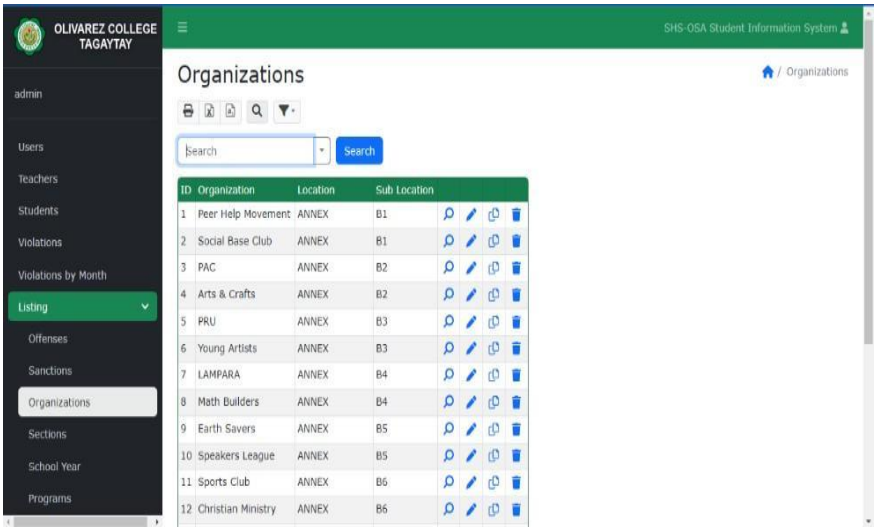


Figure 6.4. Organization Page

This is the page where the SHS Organizations are displayed. The user can add, edit and delete an organization.

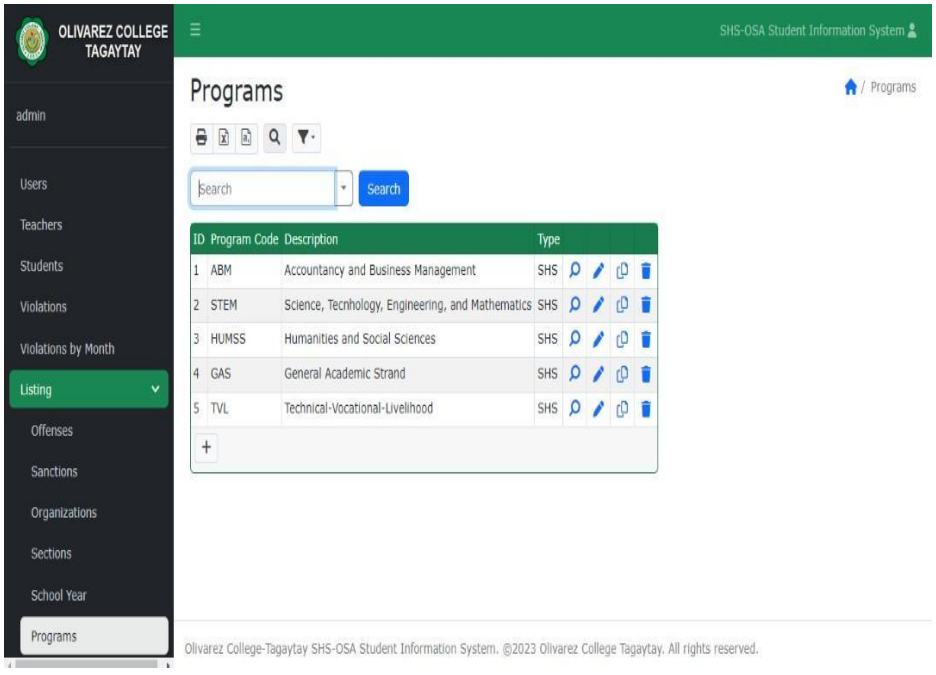


Figure 6.5. Program Page

The Program page is where the program/strand is displayed, and the user can search, add, edit, and delete.

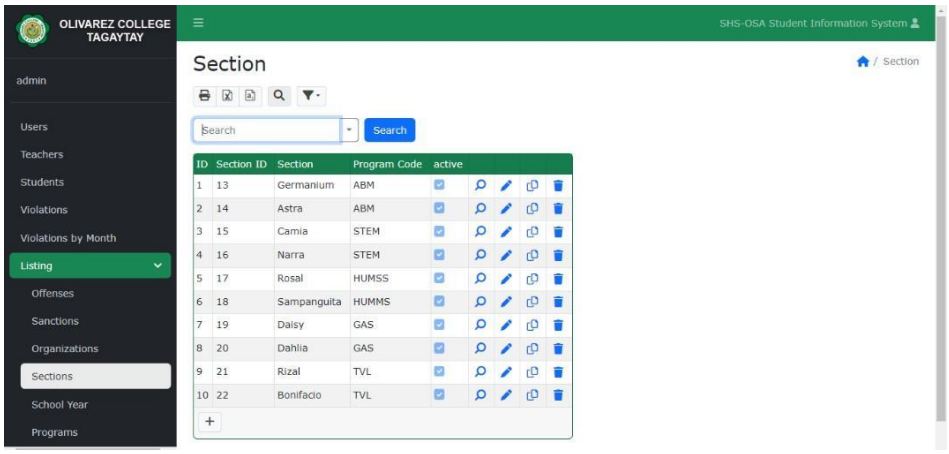


Figure 6.6. Section Page

The Section page is the page where the user can add a section and the user can search, add, edit, and delete.

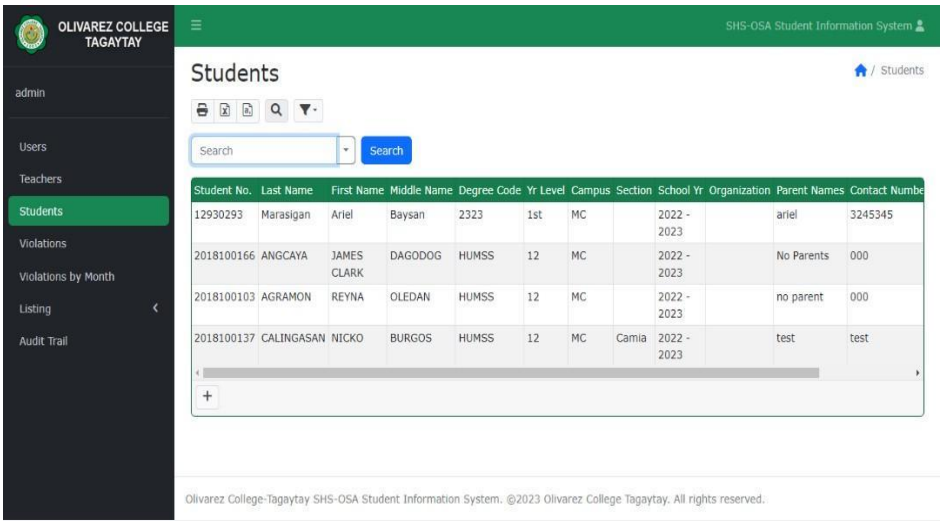


Figure 6.7. Student Page

The Student page is the page where the user can add the student information.

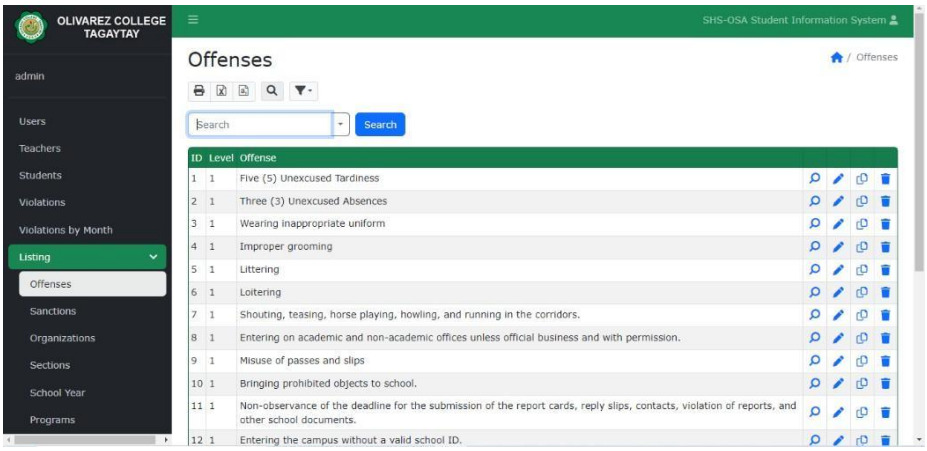


Figure 6.8 Offense Page

This is the page where the user can view the list of offenses and can the user also edit, view and delete.

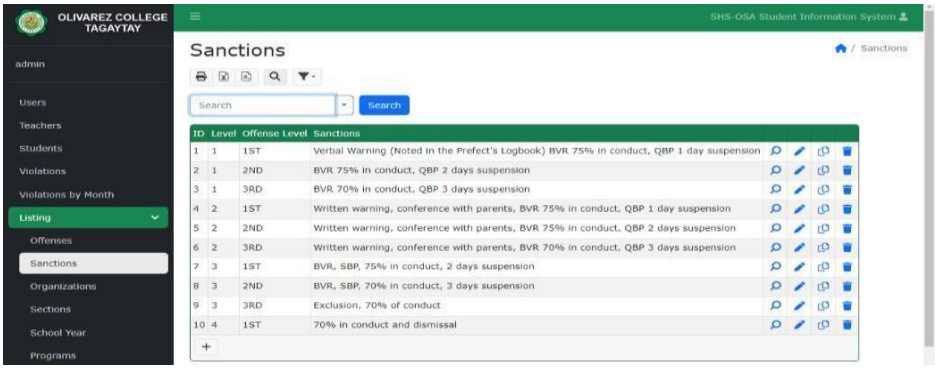


Figure 6.9 Sanction Page

This is the page where the user can add and access the list of sanctions together with their offense level.

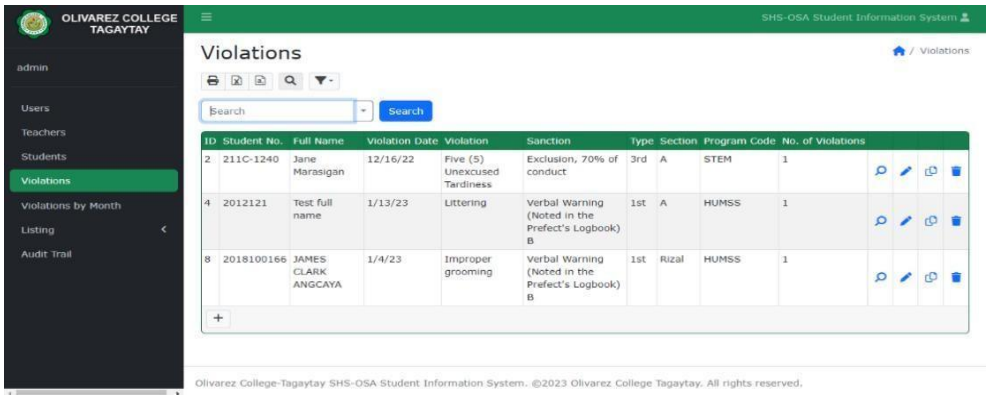


Figure 6.10 Violation Page

The Violation page is the page where the user can view and add a student's violation.

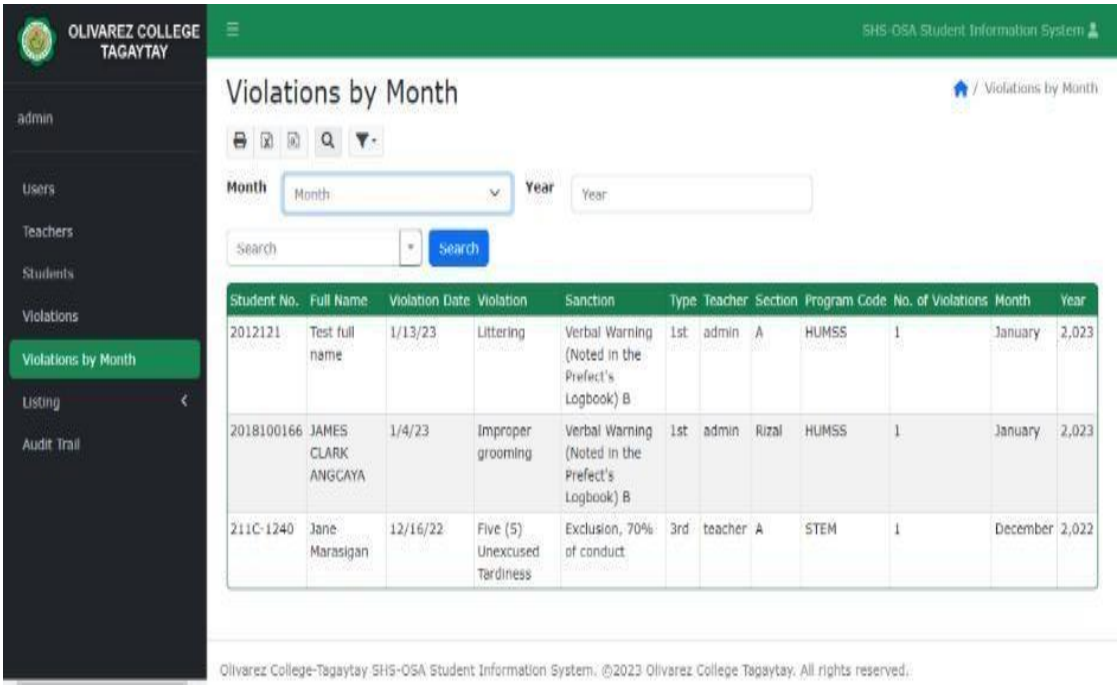


Figure 6.11 Violation Filter Page

This is the page where the user can filter the year and month of the violations added by the user.

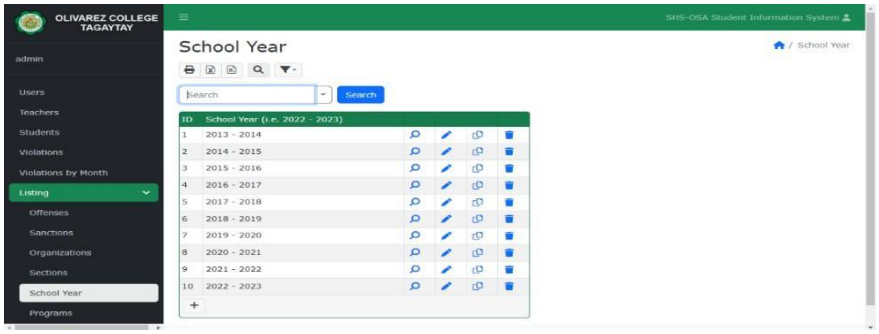


Figure 6.11. Violation Filter Page

This is the page where the school year can be changed to open/closed depending on the needs of the user.

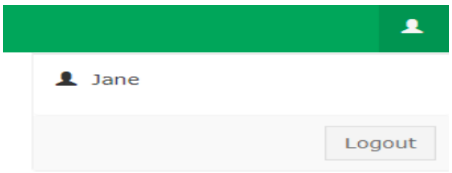


Figure 6.12 Log Out

This is the portion where the user can log out his/her account and it will be automatically directed to the login page.

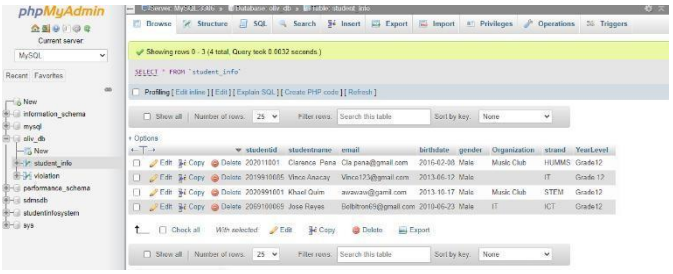


Figure 6.13. Database

The database is where the admin can view information, users and keep passwords private.

V. DISCUSSION

This presents the description of the developed system, respondents' profiles, and results from the survey. Data gathered in this study demonstrates the analysis and interpretation.

1. System assessment by the User

Online surveys are given to the respondents using Purposive Sampling as measurement. There are a total of 15 people who have responded. Three responses are from the users in the office of SHS-OSA, which represents the Prefect of Discipline, OSA Head, and Principal. Seven respondents are IT Professionals, and five are from Olivarez College- Tagaytay's SHS teachers. In terms of functionality, the users agreed that all of the system's buttons were functional. According to the study, the system's usability is user-friendly since users can readily access it. Ultimately, the users' efficiency determines how successfully they can complete tasks in the SHS-OSA Information System.

2. System assessment by the IT Professional

According to the survey, the researchers discussed the SHS-OSA Information System with IT Professionals. The system is functional, can input and output data, and does what it is supposed to do. It also met the system's requirements. The Usability result revealed that the user interface is simple to assess. In contrast, the survey revealed that the system could save time and offer data and information efficiently. Both users and administrators agreed that the system can multi-access and still work effectively in terms of maintainability. Finally, the technology allows data to be conveniently handled using the SHS-OSA Information System.

3. System assessment by the Teachers

According to the responses of the SHS teachers in Olivarez College-Tagaytay, the SHS-OSA Information System is efficient in handling the students' data and less time- consuming when doing transactions.

4. Results from the Respondents

The tables below measure verbal interpretations of functionality, user interface, design, and database based on the online survey. The mean score is measured from 4 (best) to 1 (needs improvement).

Table 4

Evaluation and Scoring

	SUCCESS CRITERION	Mean Score	V.I.
a. Functionality	1. Login page is implemented with no errors to show.	4.00	HA
	2. The Login page will not accept invalid values.	4.00	HA
	3. Once login button is clicked, the user will be automatically directed to the main page.	3.66	HA
	4. Logging out will be automatically directed to the login page.	3.93	HA
	Mean Score for Functionality	**3.90**	**HA**
b. Reliability	1. The Login page accessibility is easy.	3.93	HA
	2. Only primary information are needed for registration.	3.93	HA
	3. Buttons are organized and in proper placements.	3.86	HA
	4. Navigation bar is neat and organized.	3.86	HA
	5. The system takes less page load time.	3.86	HA
	6. The system can be used by many users at at the same time.	3.60	HA
	Mean Score for Reliability	**3.84**	**HA**
c. Usability	1. The system can be used without much effort.	3.60	HA

	2. The system can be easily comprehended.	3.73	HA
	3. The system has simple yet convincing design.	3.40	HA
	4. The system can be tested easily.	3.66	HA
	Mean Score for Usability	**3.66**	**HA**
d. Efficiency	1. All tables made are utilized.	3.66	HA
	2. Proper naming of tables and columns.	3.60	HA
	3. The tables and columns are organized.	3.80	HA
	4. Records are properly placed on its fields and tables.	3.66	HA
	Mean Score for Efficiency	**3.68**	**HA**
e. Maintainability	1. Faults are easily diagnosed.	3.66	HA
	2. System can be easily modified.	3.73	HA
	3. The system continues functioning even if changes are made.	3.73	HA
	Mean Score for Maintainability	**3.71**	**HA**
	Mean Level of Acceptance	**3.75**	**HA**

Legend:
3.26 - 4.00 = Highly Acceptable
2.51 - 3.25 = Acceptable
1.76 - 2.50 = Moderately Acceptable
1.00 - 1.75 = Not Acceptable

As shown in Table 4, the researchers got the general average score of 3.75, verbally interpreted as Highly Accepted. Below are the results of responses based on its:

Functionality

The highest score was 4 for implementing the login page and for not accepting null

values. This means that these features were fully implemented with no errors. The lowest score was 3.8, for the user will be automatically directed to the main page. This means the system functions correctly, wherein entering empty data in the login form is required for the user to continue.

Reliability

The highest score was 3.9 for easy access to the login page. It is fully functional without delay. The lowest score was 3.6, meaning multiple users could use the system simultaneously. It is still considered fully functional.

Usability

The highest score was 3.9, for the system can be tested quickly. It is designed well with no issues. The lowest score was 3.4 for design inspiration. This means the design matches Olivarez College Tagaytay with no problems.

Efficiency

The highest score was 3.8 for the tables and columns, which means the records are organized with no issues. The lowest score was 3.6 for the proper naming of all tables, which means the naming can be considered to improve.

Maintainability

All scores were 3.7 for the faults are easily diagnosed, the system can be easily modified, and the system continues even if changes are made, which means the system can be easily maintained for future purposes.

For functionality, logging in, logging out, and adding and deleting files on the page were implemented with no errors.

For the user interface, accessibility, information, and button placements have no issues. Load times are fast, and the system can adapt to different computers. One out of 15 respondents disagreed that the tables were neat and organized. In other words, there is room for improvement.

The system’s design is simplistic, and the colors match Olivarez College-Tagaytay. The database used all tables which were appropriately named and organized. This includes field records; the primary and foreign keys were used correctly.

Summary of Findings

This study sought to develop an information system to organize records and files, which admin and Senior High School faculty members in Olivarez College-Tagaytay can use.

1. The system's design is simplistic, and the colors match Olivarez College-Tagaytay. The database used all tables which were appropriately named and organized.
2. This study determined the requirements needed in the SHS-OSA Information System.
3. A strong internet connection and considerable peripheral storage space are necessary to function.
4. Most respondents agreed that the system's functionality could do the intended work.
5. Most of the respondents agreed that the system functions with less load time.
6. All respondents agreed that the design is easy to understand and user-friendly.
7. Most respondents agreed that the system is simple, easy to use, and can be used smoothly.
8. The IT Professional scored the system as adequate based on the overall review of the SHS-OSA information system's functionality, reliability, usability, efficiency, and maintainability.

Conclusion

Based on the salient findings of the study, the following conclusions were drawn:

1. The researchers conclude that the availability of resources is essential to the SHS-OSA information system.
2. The researchers conclude that the system performs appropriately in all aspects and intentions the end-user needs.
3. The researchers conclude that the system is fully functional and serves its purpose.

REFERENCES

Chua, B.B. & Dyson, L.E. (2004). Applying the ISO9126 model to the evaluation of an e learning system https://www.ascilite.org/conferences/perth04/procs/pdf/chua.pdf

Chien, C. (2020). What is Rapid Application Development? (RAD) https://codebots.com/app-development/what-is-rapid-application-development- rad

Emeritus (2020). What is an Information System? Definition, Examples, & Facts https://emeritus.org/in/learn/information-system/

Lucid Content Group (2017). 4 Phases of Rapid Application Development Methodology https://www.lucidchart.com/blog/rapid-application-development- methodology

NCSMH (2019). Student Information Systems: Issue Brief https://dm0gz550769cd.cloudfront.net/shape/97/9715bd99a6c54cfcbaaba66f78cc8eea.pdf

Mkinga, Majaliwa and Mandari, Herman (2020) "Evaluating Students Information System Success Using DeLone and McLean's Model: Student's Perspective," https://scholarworks.lib.csusb.edu/cgi/viewcontent.cgi?article=1447&context=ji tim

Sales and Inventory Management System for Bentekuatro Motorcycle Accessories and Parts Shop

Go, Roswell M., Gonzales, John Cris D.
Gumapac, Juhaira Mae C. Nolasco, Jerwin R.

I. ABSTRACT

Olivarez College-Tagaytay requires a system to help clients solve their business' main problem. This capstone project aims to create a sales and inventory management system for our client, Bentekuatro Motorcycle Accessories and Parts Shop. It will significantly help them run their business more efficiently and cost-effectively since it can save time, avoid human error, and improve accuracy. It also reduces the need for manual work and repetitive tasks. The system was tested by 3 participants, one (1) of whom from Bentekuatro Motorcycle Accessories and Parts Shop, and two (2) IT professionals. For evaluation the system was evaluated by thirty (30) respondents, comprising twenty (20) students, five (5) IT professionals, and five (5) end users from Bentekuatro Motorcycle Accessories and Parts Shop. Each participant was given a survey questionnaire while the researchers demonstrated the system. Agile Methodology was used as the system developmental method due to its potential to move rapidly and simply in terms of software development; it has six phases: Requirements, Design, Development, Testing, Deployment, and Review. In addition, the users determine if the system's functions are working or need improvement. Data gathered from the 30 respondents is calculated and converted into information. This is used to check if the system satisfies the user and all the requirements are met. For the project testing, the Admin management module, category module, inventory module, login module, and transaction module got the "Passed" remarks from the three (3) tester participants, but the employee module got one (1) "Failed" remark from one (1) IT professional as she stated that "Able to add customer" criteria should only be accessed through admin module. To resolve this issue, the said concerns are now fixed. For the project evaluation, the developed system was classified as "Excellent" based on the overall mean for the criteria included in the evaluation instrument, which produced an average rating of 4.55. The evaluation result implies that the developed system can be helpful to Bentekuatro Motorcycle Accessories and Parts Shop.

Keywords: Bentekuatro Motorcycle Accessories and Parts Shop, Sales and Inventory Management System

II. INTRODUCTION

The information that helps run a business is vital to the survival of that business. That is why many people store sensitive documents in locked cabinets. Companies also want to ensure that their customers trust them with their personal information. The safekeeping of records is a legislative requirement. It is also something that greatly aids the effectiveness of the business. Keeping that information safe is essential for both public and private organizations. The sales and inventory management system is one of the most secure ways to monitor sales, products, and stocks that the business needs. The sales and inventory management system is essential to small businesses because it helps them prevent stockouts and ensure accurate record keeping.

The Bentekuatro Motorcycle Accessories and Parts Shop needs help managing its stocks and products. They only have manual record processing, which turns into tedious work and has the tendency for incorrect recording. Instead of attempting to complete these tasks manually, an inventory and sales system solution makes them more straightforward.

The Bentekuatro Motorcycle Parts and Accessories Shop is a well-established business that operates as the area's sole provider of motorcycle parts and accessories. However, the shop relies on manual processes and monthly inventory checks, often resulting in errors and inefficiencies. These errors can lead to a loss of profit and dissatisfied customers, as the employees must spend valuable time checking the availability of specific items.

The developers have decided to develop a Sales and Management System to address these challenges. This system aims to streamline inventory management, reduce errors, and enhance efficiency. By implementing an automated system, the shop can significantly improve the accuracy and speed of tracking and managing its inventory.

The study's main objective is to develop a sales and inventory management system for

Bentekuatro Motorcycle Accessories and Parts Shop.

Specifically, it aimed to:

1. design a system that will manage and track the business sales and inventory with the following capabilities:
   1.1 management of the shop's inventory;
   1.2 make transactions;
   1.3 monitoring and analyzing of sales;
   1.4 generate report of sales; and
   1.5 print the details of customers' transactions;
2. develop a system using the following hardware and software requirements:
   2.1 ElectronJS is used to combine HTML, JS, and CSS to build a standalone web-based application;
   2.2 Hyper Text Markup Language (HTML) is used for the application body. It serves as the skeleton of the system;
   2..3 Javascript serves as the functions;
   2.4 Cascading Style Sheets(CSS) is use to apply design on HTML;
   2.5 Nodejs serve as the backend of Javascript;
   2.6 NeDB is used for database storage;
   2.7 Desktop computers mainly used for developing and testing applications;
   2.8 Thermal printer used to print transactions;
   2.9 Visual Code an application in which the app has been coded; png to .ico is a function used to change png to ico for the application’s logo;
3. Test the system using the following testing procedures:
   3.1 Unit testing;

3.2 Integration testing; and

3.3 System testing;

4. Evaluate the system using ISO 25010 and
5. Prepare an implementation plan with the manual of instruction.

The developers used the Agile Methodology as the system developmental method due to its potential to move rapidly and simply in software development. Agile would imply a flexible approach that responds rapidly to changes, which is accurate, allowing a developer to go back to a previous stage and make essential adjustments, thereby refining the software without much delay.

Figure 1. Agile Methodology. Source: MLSDev (Anurina, Olha, 2021)

The sales and inventory management system development for Bentekuatro Motorcycle Accessories and Parts Shop started by identifying the input needed for the system development. It is divided into four significant requirements, and they are as follows:

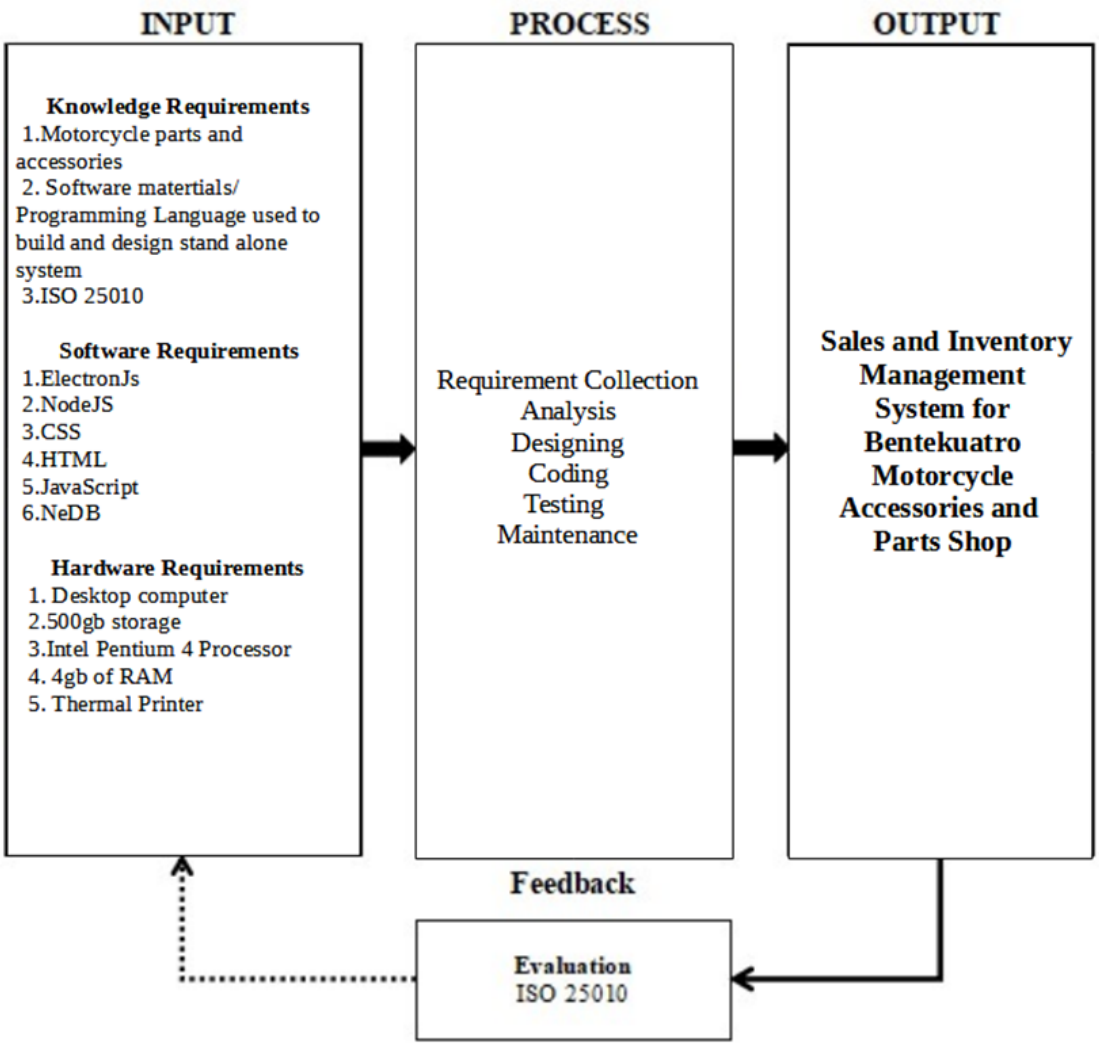


Figure 2. Conceptual Framework of the Sales and Inventory Management System for Bentekuatro Motorcycle Accessories and Parts Shop

This research aims to develop a system for Bentekuatro Motorcycle Accessories and Parts Shop that can simultaneously track sales activity and inventories. A well-designed sales and inventory management system would improve their existing manual record processing method.

The developed system can track sales activity and inventory levels simultaneously. It will provide real-time information on the availability of products, allowing employees to respond to customer inquiries and accurately fulfill orders quickly. The system can also generate detailed reports on sales trends, product popularity, and inventory management, providing valuable insights for

decision-making.

By transitioning from manual record processing to an automated system, the shop expects to achieve several benefits. Firstly, the system will improve operational efficiency by eliminating time-consuming manual checks and reducing errors in inventory management. This will lead to cost savings and enhanced productivity.

Secondly, the system will enable better decision-making by generating comprehensive reports and data analysis. The shop can leverage this information to identify popular products, optimize stock levels, and make informed purchasing decisions.

Lastly, the system will enhance customer satisfaction by providing accurate and real-time information on product availability. Customers will have a smoother shopping experience, resulting in increased customer loyalty.

By engaging in such projects, the researcher learns in an environment that combines theoretical knowledge with hands-on experience, equipping them with valuable skills and enhancing their professional development.

III. METHODS

This chapter presents the research methodology for developing the sales and inventory management system for Bentekuatro Motorcycle Accessories and Parts Shop.

Flow Chart

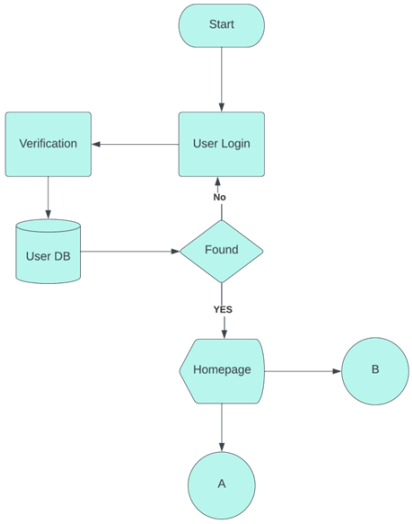


Figure 3. Flowchart of Sales and Inventory Management System for Bentekuatro Motorcycle Accessories and Parts Shop

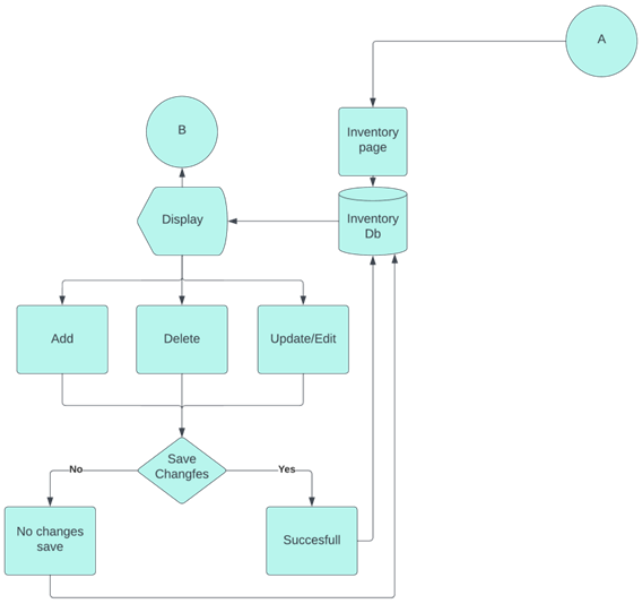


Figure 3.1 Continuation of Flowchart of Sales and Inventory Management System for Bentekuatro Motorcycle Accessories and Parts Shop

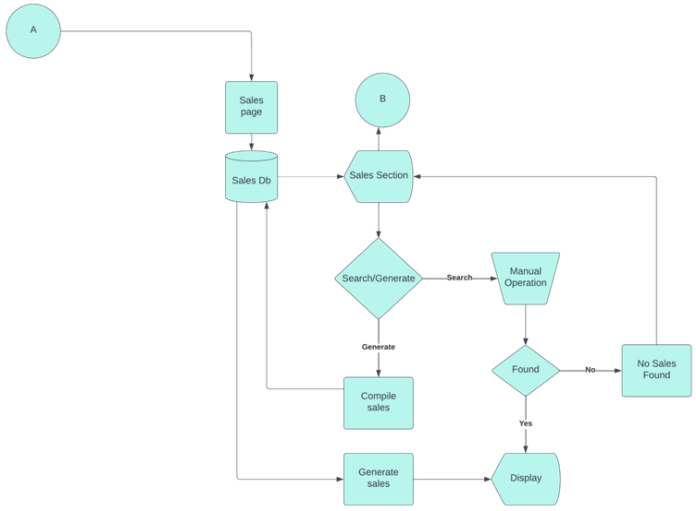


Figure 3.2 Continuation of Flowchart of Sales and Inventory Management System for Bentekuatro Motorcycle Accessories and Parts Shop

Figure 3.3 Continuation of Flowchart of Sales and Inventory Management System for Bentekuatro Motorcycle Accessories and Parts Shop

The user will launch the app, and then the login form will appear; the user will input their username and password, and once the system checks the username and password of the registered user, it will direct the user to the main dashboard. If the system verifies that the user is an admin, it will give the option to manage the whole system and modify it as they see fit. Furthermore, if the user is an employee login, it will direct to the dashboard with the main for sales and sales history only. Users can log out and quit the application.

Data Flow Diagram

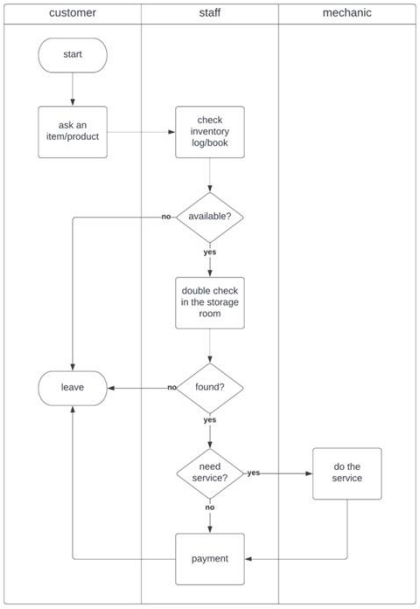


Figure 4. Current flow diagram of the current transaction process of Bentekuatro Motorcycle Accessories and Parts Shop

Illustrates the data flow diagram that depicts the current transaction process of Bentekuatro Motorcycle Accessories and Parts shop. The customer will ask for an item, and then the staff will check the inventory book. When the employee sees that there is still stock, the employee will double check it in the storage room; if available, the employee will ask if a mechanic's service is needed, then if needed, the mechanic will do the service, and lastly, after that, the customer will pay.

The study's target population includes the micro-scale business owners. The study's respondents are micro-scale business owners, IT faculty, IT Experts, and IT students.

The study utilized the ISO 25010 in evaluating the developed system. According to an article from linkedin.com, ISO/IEC 25010 is an international standard defining quality characteristics and sub-characteristics for software products and systems. It is based on the previous standard, ISO/IEC

9126, which was revised and updated in 2011. The standard covers eight quality characteristics: functional suitability, performance efficiency, compatibility, usability, reliability, security, maintainability, and portability. Each characteristic has several sub-characteristics that describe specific aspects of quality. For example, usability includes sub-characteristics such as learnability, operability, user error protection, user interface aesthetics, and accessibility.

Evaluation and Scoring

Level of proposed system's performance was measured in terms of a 5-point scale as follows:

Table 1

Evaluation and Scoring

Assigned Point	Numerical Range	Qualitative Interpretation
5	4.51-5	Excellent
4	3.51-4.50	Very Good
3	2.51-3.50	Good
2	1.51-2.50	Fair
1	1-1.50	Poor

Data Gathering Procedure

The system was evaluated by five (5) IT professionals, five (5) owners, and twenty (20) students. The following procedures were undertaken during the evaluation.

During the project demonstration phases, respondents were provided with a detailed system description: the evaluation tool and the system's use, functions, features, and limitations. The developers thoroughly demonstrated the system's functionality. After the demonstration, respondents are requested to serve as evaluators; they are given time to assess the system before evaluating it, and collecting the assessment sheet from the evaluators happens after the request.

IV. RESULTS

This chapter discusses the research design and methodology of the study and will answer the

procedural operations of the research problem.

By adopting Agile practices, developers can quickly return to a previous stage and make necessary adjustments, which helps refine the software without significant delays. Agile development's iterative and incremental nature ensures that the software meets the client's requirements effectively and reduces the risk of delivering a final product that does not meet expectations. The agile approach for requirement analysis follows Requirements, Design, Development, Testing, Deployment, and Review.

Requirements. During the requirement phase, the researcher collected essential information for the project. They employed various methods to gather data, including conducting face-to-face interviews with the owner, staff, and customers of Bentekuatro Motorcycle Accessories and Parts shop in Sta. Maria, Dayap, Laurel, Batangas. These interviews were crucial in defining the project's scope and clearly understanding the objectives.

Figure 5. Requirement Documentation

Design. During this phase, the developers likely started by creating a conceptual design outlining the application's structure and flow. They translated the requirements gathered in the planning phase into a detailed design with the help of programming languages and visual code to develop the overall visual representation of the system.

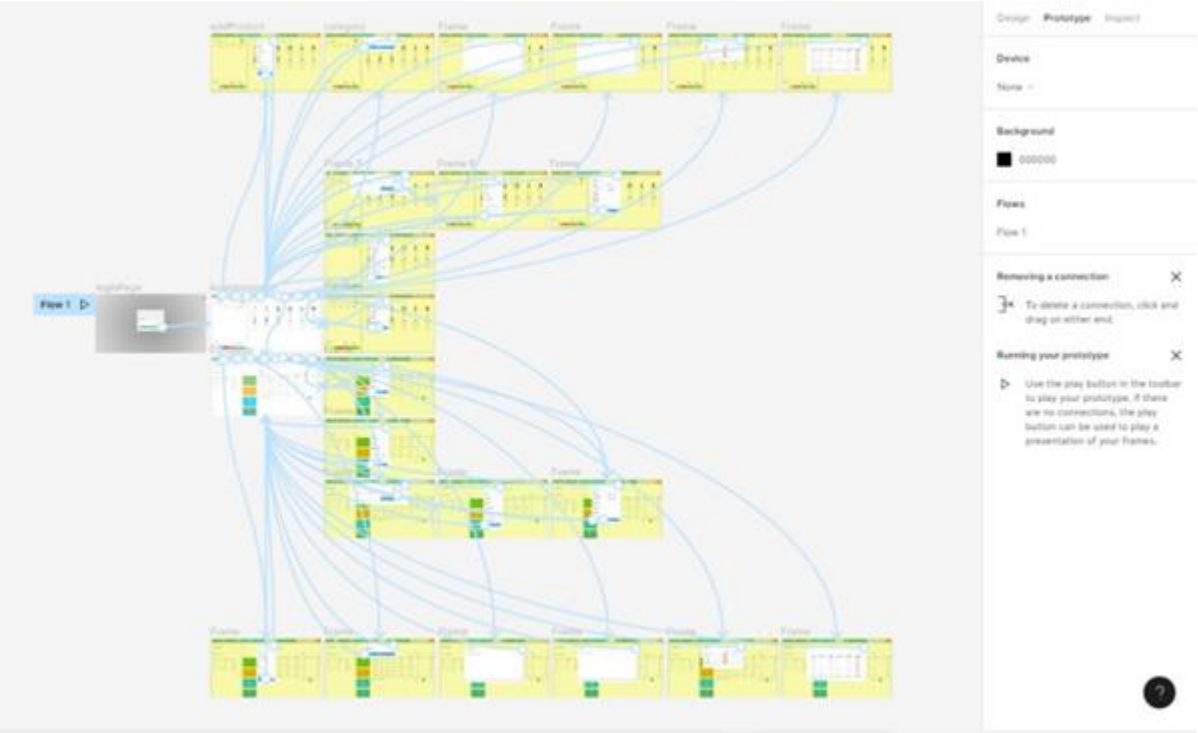


Figure 6. Actual picture of prototyping in Figma

Development. The developers initiated the development phase based on the specifications and user input. They utilized Visual Studio Code as the software application for creating the project and employed several programming languages and frameworks, including ElectronJS, HTML, JavaScript, CSS, Node.js, and NeDB.

Figure 7. Actual picture of Sales and Inventory Management for Bentekuatro Motorcycle Accessories and Parts

Figure 8. Picture of the actual receipt

Point Of Sale

Invoice	Date	Total	Paid	Change	Method	Cashier	View
1684554513	2023 May 20 11:48:33	₱1010.00	₱1020.00	₱10.00	Cash	Administrator	
1684554195	2023 May 20 11:43:15	₱156.55	₱157.00	₱0.45	Cash	Administrator	
1684550176	2023 May 20 10:36:16	₱50.50	₱51.00	₱0.50	Cash	Administrator	
1684550071	2023 May 20 10:34:31	₱151.50	₱152.00	₱0.50	Cash	Administrator	
1684563474	2023 May 20 02:17:54	₱1010.00	₱1100.00	₱90.00	Cash	Administrator	
1684560134	2023 May 20 01:22:14	₱555.50	₱560.00	₱4.50	Cash	Administrator	
1684492350	2023 May 19 06:32:30	₱1010.00	₱1500.00	₱490.00	Cash	Administrator	
1684492339	2023 May 19 06:32:19	₱505.00	₱1000.00	₱495.00	Cash	Administrator	
1684492323	2023 May 19 06:32:03	₱505.00	₱1000.00	₱495.00	Cash	Administrator	
1684492282	2023 May 19 06:31:22	₱262.60	₱500.00	₱237.40	Cash	Administrator	
1684492229	2023 May 19 06:30:29	₱303.00	₱500.00	₱197.00	Cash	Administrator	
1683528105	2023 May 08 02:41:45	₱303.00	₱400.00	₱97.00	Cash	Administrator	
1683527911	2023 May 08 02:38:31	₱151.50	₱159.00	₱7.50	Cash	Administrator	
1683252554	2023 May 05 10:09:14	₱299.97	₱300.00	₱0.03	Cash	Administrator	
1683252269	2023 May 05 10:04:29	₱1010.00	₱1010.00	₱0.00	Cash	Administrator	
1683247186	2023 May 05 08:39:46	₱303.00	₱500.00	₱197.00	Cash	Administrator	
1683247077	2023 May 05 08:37:57	₱404.00	₱404.00	₱0.00	Cash	Administrator	
1683029505	2023 May 02 08:11:45	₱120.00	₱200.00	₱80.00	Cash	Administrator	
1683029013	2023 May 02 08:03:33	₱50.00	₱50.00	₱0.00	Cash	Administrator	
1683028965	2023 May 02 08:02:45	₱98.00	₱100.00	₱2.00	Cash	Administrator	
1683028948	2023 May 02 08:02:28	₱100.00	₱100.00	₱0.00	Cash	Administrator	
1683028809	2023 May 02 08:00:09	₱100.00	₱200.00	₱100.00	Cash	Administrator	

Figure 9. Actual picture of table converted to PDF file

Testing. After the implementation of the project, it is essential to conduct testing to identify and rectify any flaws, bugs, or errors before the application is deployed. The testing process typically involves three main testing types: unit, integration, and system.

Figure 10. Actual picture of Sales and Inventory Management System for Bentekuatro Motorcycle Accessories and Parts Shop

Deployment. Upon the completion of each phase, when the Sales and Inventory Management System for Bentekuatro Motorcycle Accessories and Parts Shop is ready, it is prepared for deployment and evaluation.

Review. This phase focuses on reviewing and validating the work done during development. This phase typically involves several activities to ensure the software's quality, accuracy, and completeness.

Project Design

The Sales and Inventory Management System for Bentekuatro Motorcycle Accessories and Parts is a project developed to enhance the sales and inventory management processes of the business located in Sta. Maria, Laurel, Batangas. This system aimsaims to improve sales performance by providing accurate sales tracking and facilitating informed decision-making for both the owner and employees. The system also aims to enhance customer satisfaction by providing real-time information to employees and customers. The system focuses on effectively managing product stocks to ensure the owner and employees can efficiently monitor and replenish inventory when necessary. An essential

feature of the system is its ability to alert users when products are out of stock, enabling timely restocking and avoiding potential sales disruptions. The Sales and Inventory Management System caters to two primary user roles: the admin and the employee. The admin holds the highest authority within the system and is responsible for creating, selling, adding, and viewing transactions. The admin can also edit product descriptions, manage employee information, update the shop's details, and control user access permissions. On the other hand, employees can log in to the system after the admin creates their accounts. Employees have restricted access by default, allowing them to view products and make sales. However, depending on their assigned access levels, employees may also be able to create, add, delete, and view transactions.

System (Admin Side)

Figure 11. Admin's login page of Sales and Inventory Management System for Bentekuatro Motorcycle Accessories and Parts Shop

Figure 11 shows the Admin's login page, the admin needs to login using the admin's username and password.

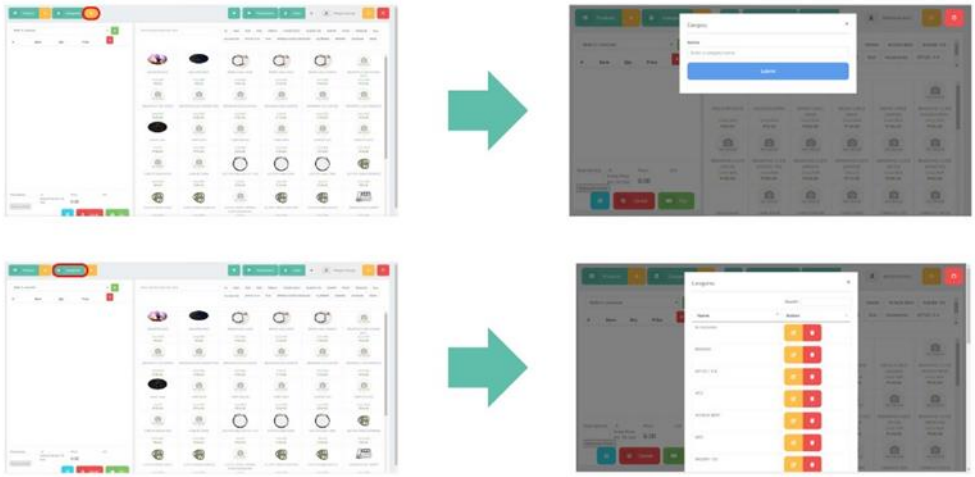


Figure 11.1. Admin's category module of Sales and Inventory Management System for Bentekuatro Motorcycle Accessories and Parts Shop

Figure 11.1 shows the Admin's category module, the Admin can add, edit and delete categories here.

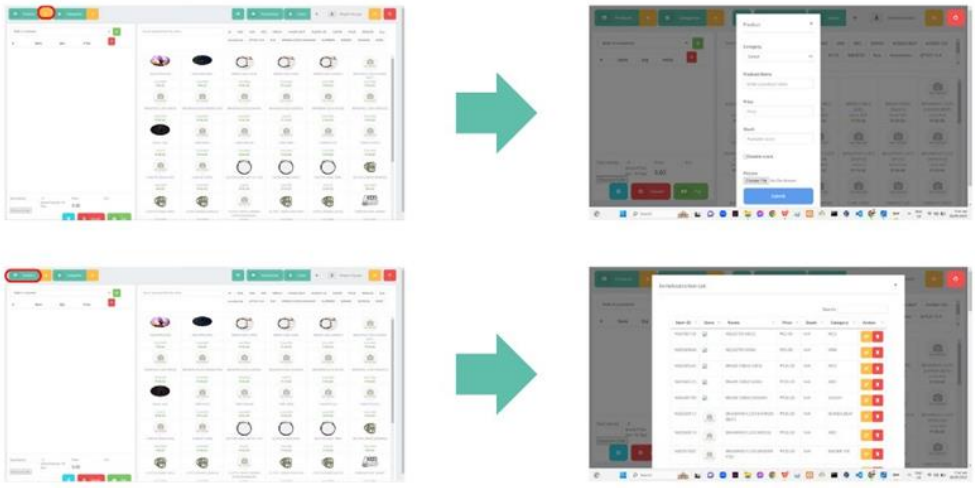


Figure 11.2. Admin's product module of Sales and Inventory Management System for Bentekuatro Motorcycle Accessories and Parts Shop

Figure 11.2 shows the Admin's product module, the Admin can add, edit, and delete products here.

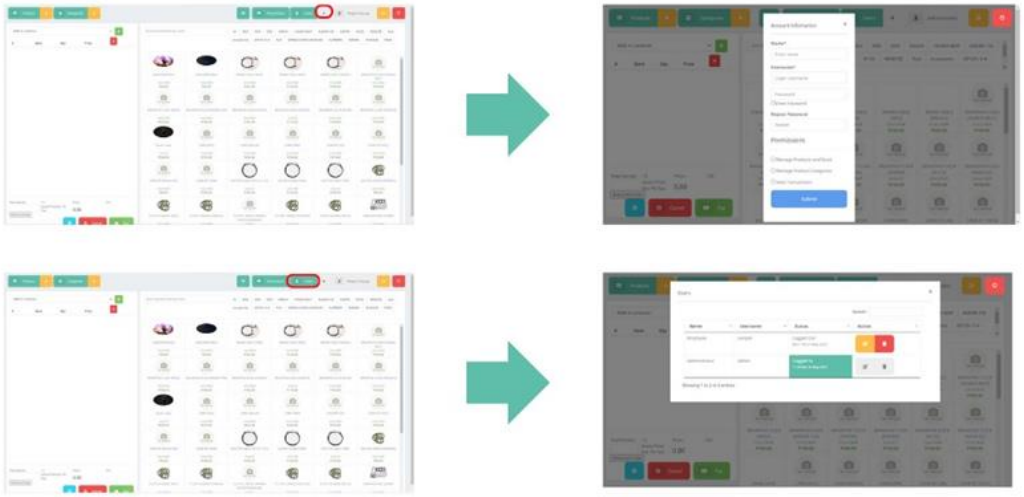


Figure 11.3. Admin's account module of Sales and Inventory Management System for Bentekuatro Motorcycle Accessories and Parts Shop

Figure 11.3 shows the Admin's account module, the Admin can create, edit, and delete employees' accounts here. Here, Admin can also view other accounts' logged out history.

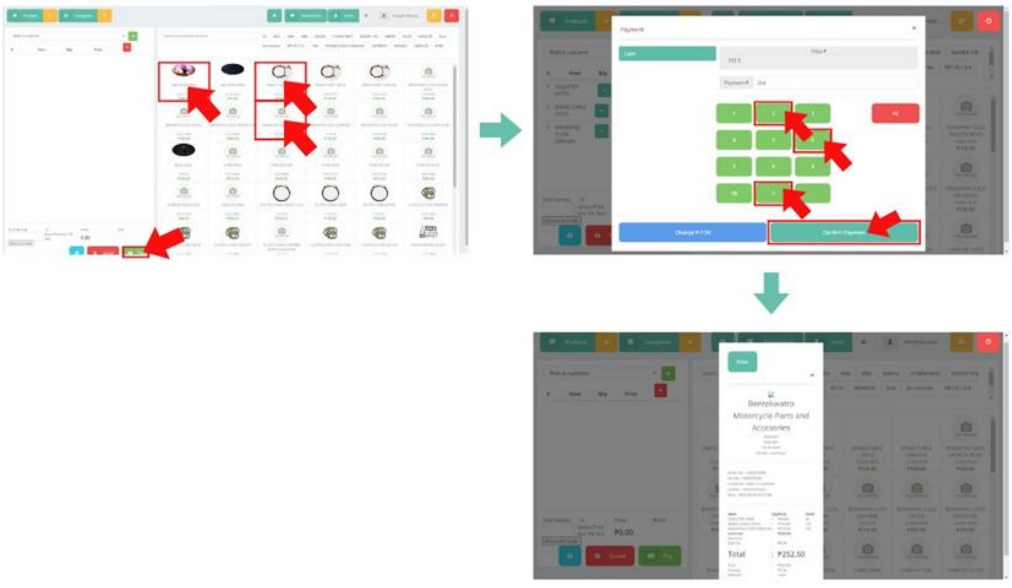


Figure 11.4. Admin's Point of Sale module of Sales and Inventory Management System for Bentekuatro Motorcycle Accessories and Parts Shop

Figure 11.4 shows the Admin's point of sale module, the admin can make a transaction, set

discounts, and print receipt here.

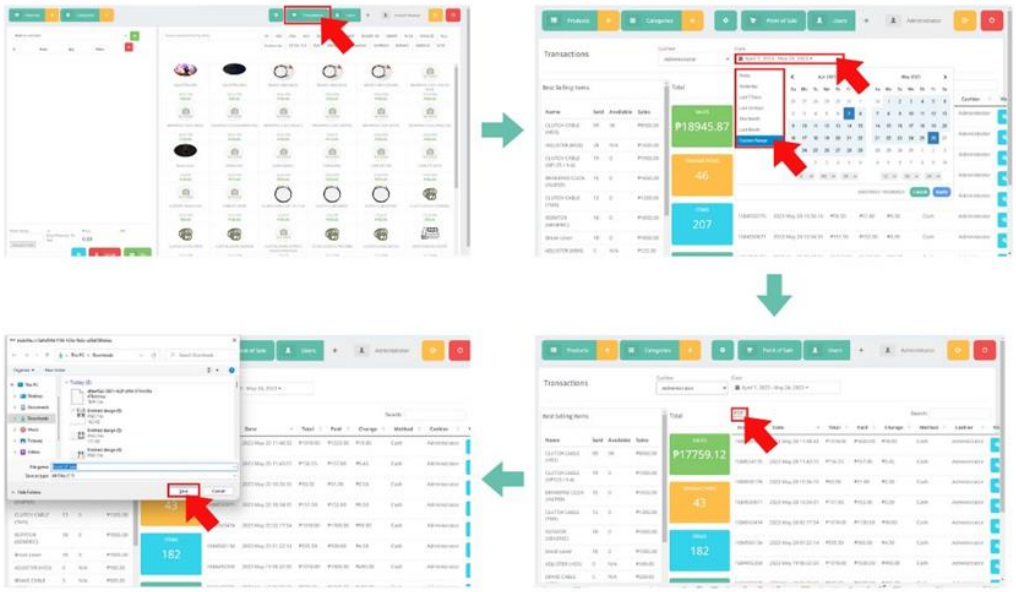


Figure 11.5. Admin's transaction module of Sales and Inventory Management System for Bentekuatro Motorcycle Accessories and Parts Shop

Figure 11.5 shows the Admin's transaction module; the Admin can view sale transactions here. The Admin can filter the transactions by setting a date range and generate sales reports by clicking the PDF button.

System (Employee Side)

Figure 11.6. Employees' login page of Sales and Inventory Management System for Bentekuatro Motorcycle Accessories and Parts Shop

Figure 11.6 shows the employees' login page, the employee needs to login using the given username and password of the Admin.

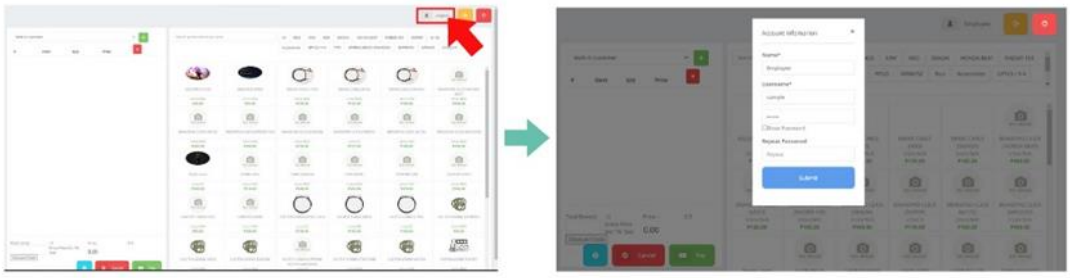


Figure 11.7. Employees' account module of Sales and Inventory Management System for Bentekuatro Motorcycle Accessories and Parts Shop

Figure 11.7 shows the employees' account module; the employee can edit his/her account's information here.

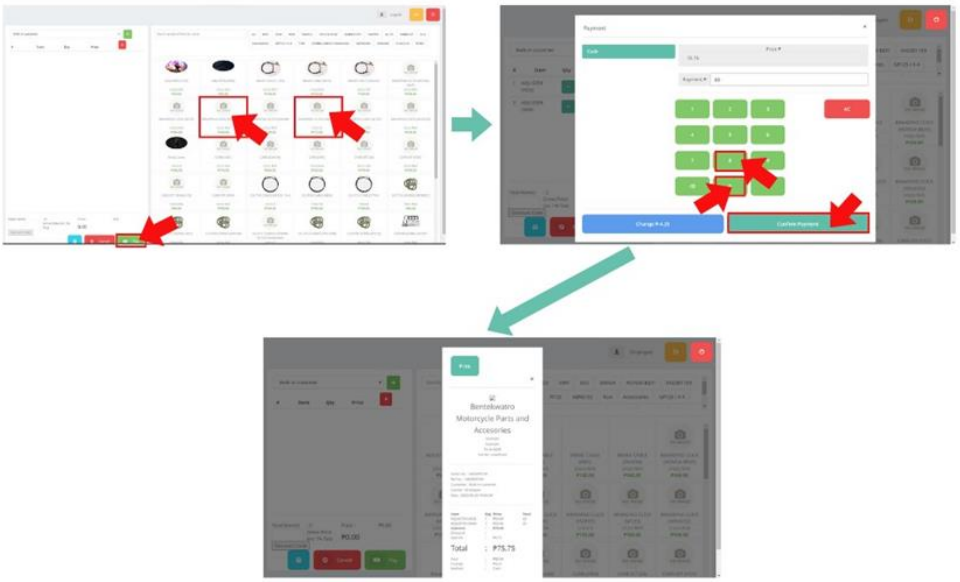


Figure 11.8. Employees' point of sale module of Sales and Inventory Management System for Bentekuatro Motorcycle Accessories and Parts Shop

Figure 11.8 shows the employees' point of sale, the employees can make a transaction, set discounts, and print receipts here.

V. DISCUSSION

This presents the description of the developed system and results from the project testing and project evaluation. Data gathered in this study demonstrates the analysis and interpretation.

Project Testing

Table 2

Unit testing for Admin management module in terms of functionality

CRITERIA	REMARK
1. Able to login as admin	Passed
2. Able to update admin account	Passed
3. Able to create an employee account	Passed
4. Able to delete an employee account	Passed
5. Able to update an employee account	Passed
6. Able to to view employees account's logged out history	Passed
7. Able to make transaction	Passed
8. Able to view sales transaction	Passed
9. Able to view inventory	Passed
10. Able to set discounts	Passed
11. Able to set tax	Passed

Table 3

Unit testing for Admin management module in terms of accuracy

CRITERIA	REMARK
Access privileges is correct	Passed
Access a valid information	Passed

Table 4

Unit testing for category module in terms of functionality

CRITERIA	REMARK

1. Able to add new category	Passed
2. Able to edit all category	Passed
3. Able to delete category	Passed

Table 5

Unit testing for category module in terms of accuracy

CRITERIA	REMARK
1. Access privileges is correct	Passed
2. Access a valid information	Passed

Table 6

Unit testing for inventory module in terms of functionality

CRITERIA	REMARK
1. Able to add new product, details, price, and image	Passed
2. Able to edit all products, details, price, and image	Passed
3. Able to delete products	Passed
4. Able to filter products using category buttons	Passed
5. Able to search products using search bar	Passed

Table 7

Unit testing for inventory module in terms of accuracy

CRITERIA	REMARK
1. Access privileges is correct	Passed

2. Access a valid information	Passed

Table 8

Unit testing for login module in terms of functionality

CRITERIA	REMARK
1. Able to login with correct credentials	Passed
2. Able to deny access with incorrect credentials	Passed
3. Able to recover password with the use of security questions	Passed
4. Not able to proceed in recovering password when the answer is incorrect	Passed
5. Able to exit program using exit button	Passed

Table 9

Unit testing for login module in terms of accuracy

CRITERIA	REMARK
Access privileges is correct	Passed
Access a valid information	Passed

Table 10

Unit testing for transaction module in terms of functionality

CRITERIA	REMARK
Able to view transactions	Passed

Able to filter transactions based on set date range	Passed
Able to filter transactions based on cashier	Passed
Able to generate sales report	Passed

Table 11

Unit testing for transaction module in terms of accuracy

CRITERIA	REMARK
Access privileges is correct	Passed
Access a valid information	Passed

Table 12

Unit testing for employee management module in terms of functionality

CRITERIA	REMARK
Able to edit account's information	Passed
Able to make transactions	Passed
Able to accept orders with multiple items in categories	Passed
Able to cancel items and cancel orders	Passed
Able to add discount on orders	Passed
Able to search item by product name	Passed
Not able to proceed payment if payment is less than the price	Passed
	Passed

Able to add customer	*Failed
Able to print receipt	Passed

*One of the three testers said that the adding the customer should only be accessed through admin module

Table 13

Unit testing for employee management module in terms of functionality

CRITERIA	REMARK
Access privileges is correct	Passed
Access a valid information	Passed

Tables 2– 12 represent the summary of Unit Testing of the Sales and Inventory Management System for Bentekuatro Motorcycle Accessories and Parts Shop. Admin management module, category module, inventory module, login module, and transaction module got the "Passed" remarks from the three (3) tester participants, two (2) IT professionals, and one (1) owner of the shop, but the employee module got one (1) "Failed" remark from one (1) IT professional as she stated that "Able to add customer" criteria should only be accessed through admin module. To resolve this issue, the said concerns are now fixed.

Project Evaluation

The system was evaluated by five (5) IT professionals, five (5) owners, and twenty (20) students. The following procedures were undertaken during the evaluation.

During the Project Demonstration phases, respondents were provided with a detailed system description: the evaluation tool and the system's use, functions, features, and limitations. The

developers thoroughly demonstrated the system's functionality. After the demonstration, respondents are requested to serve as evaluators; they are given time to assess the system before evaluating it, and collecting the assessment sheet from the evaluators happens after the request.

Before calculating the mean for each criterion, each sub-criterion was calculated as part of the final evaluation. The summary of the system performance and interpretation and the overall mean of the Sales and Inventory Management System for Bentekuatro Motorcycle Accessories and Parts Shop are shown in Table 14.

Table 14

Qualitative interpretation of respondents rating for the evaluation of the Sales and Inventory Management System for Bentekuatro Motorcycle Accessories and Parts Shop

Functional Suitability		
CRITERIA	**MEAN**	**QUALITATIVE INTERPRETATION**
Functional Completeness	4.6	Excellent
Functional Correctness	4.6	Excellent
Functional Appropriateness	4.53	Excellent
Performance Efficiency		
Time Behavior	4.57	Excellent
Resource Utilization	4.53	Excellent
Capacity	4.53	Excellent
Compatibility		
Co-existence	4.57	Excellent
Interoperability	4.4	Very Good
Usability		
Appropriateness	4.63	Excellent
Learnability	4.57	Excellent
Operability	4.53	Excellent
User Error Protection	4.37	Very Good
User Interface Aesthetics	4.5	Very Good

Reliability		
Maturity	4.47	Very Good
Availability	4.67	Excellent
Fault Tolerance	4.43	Very Good
Recoverability	4.53	Excellent
Security		
Confidentiality	4.5	Very Good
Integrity	4.67	Excellent
Non-repudiation	4.63	Excellent
Accountability	4.63	Excellent
Authenticity	4.63	Excellent
Maintainability		
Modularity	4.57	Excellent
Reusability	4.5	Very Good
Analysability	4.43	Very Good
Modifiability	4.53	Excellent
Testability	4.7	Excellent
Portability		
Adaptability	4.6	Excellent
Installability	4.57	Excellent
Replaceability	4.57	Excellent
OVERALL MEAN	**4.58**	**Excellent**

Table 14 summarizes the Sales and Inventory Management System for Bentekuatro Motorcycle Accessories and Parts Shop evaluation. Security got the highest mean, 4.61, with an “Excellent” rating. Functional Suitability and Portability with a 4.58 mean, Maintainability with a 4.55 mean, Performance Efficiency with a 4.54 mean, and Usability and Reliability with a 4.52 mean were all rated " Excellent. On the other hand, compatibility was with the lowest mean of 4.48 with a “Very Good” rating as construed. The developed system was classified as "Excellent" based on the overall mean for the criteria included in the evaluation instrument, which produced an average rating of 4.55. The

evaluation result implies that the developed system can be helpful to Bentekuatro Motorcycle Accessories and Parts Shop.

Introducing an automated inventory management system can significantly alleviate the challenges Bentekuatro Motorcycle Parts and Accessories Shop faces. Such a system can provide numerous benefits, including streamlining stock management processes, reducing errors, improving efficiency, and enhancing customer satisfaction.

By implementing an automated inventory management system, the shop can accurately track and monitor the availability of products. This ensures that employees have real-time access to stock information, allowing them to quickly and confidently inform customers about the availability of specific items. Furthermore, the system can provide various features to facilitate efficient inventory management. It can enable the shop to set up reorder points, automatically generating alerts when stock levels fall below a specified threshold. This helps prevent stockouts and ensures the shop always has sufficient quantities of popular products.

An automated inventory management system can provide detailed insights and reports on stock movement, sales trends, and product performance. This information can aid in making informed decisions regarding purchasing, pricing, and restocking strategies. By better understanding their inventory, Bentekuatro Motorcycle Parts and Accessories Shop can optimize their stock levels, minimize excess inventory, and improve profitability.

The face-to-face demonstration of the project was conducted to evaluate its performance and functionality using the Olivarez College Tagaytay instrument, based on ISO 25010. Based on the overall evaluation results, the project has received an "Excellent" rating in all software quality criteria, such as functional suitability, performance efficiency, compatibility, usability, reliability, security, Maintainability, and portability. Based on the positive evaluation results and conclusion, the Sales and Inventory Management System developed for Bentekuatro Motorcycle Accessories and Parts Shop is

considered a viable solution. The project's high performance and excellent adherence to software quality criteria demonstrate its potential to address the needs and requirements of the shop effectively.

REFERENCES

Edgar, Timothy,Monika et al. (2020), Inventory Management Model Based on Lean Supply Chain to Increase the Service Level in a Distributor of Automotive Sector. http://download.garuda.kemdikbud.go.id/article.php?article=1633077&val=13549&title=INVENTORY%20MANAGEMENT%20MODEL%20BASED%20ON%20LEAN%20SUPPLY%20CHAIN%20TO%20INCREASE%20THE%20SERVICE%20LEVEL%20IN%20A%20DISTRIBUTOR%20OF%0AUTOMOTIVE%20SECTO

Gulnara A. Gareeva & Diana R. Grigoreva. (2019). *Reengineering of business processes and improve the sales system by 1c in pharmacies.*https://scholar.archive.org/work/2q4w6qtedjcldhmo2cncp4vabu/access/wayback/https://periodic os.ufpb.br/index.php/ged/article/download/48662/28224

Elin, Rounan. (2019). *The Importance of Successful Inventory Management to Enterprises-A Case Study of Wal-Mart.* https://webofproceedings.org/proceedings_series/ECOM/MFSSR%202019/MFSSR19154.pdf

Intellipaat (2022). *The Importance of Data Security in 2022*.https://intellipaat.com/blog/importance-of-datasecurity/#:~:text=by%20a%20company.,Why%20is%20Data%20Security%20important%3F,trust%20degra dation%2C%20and%20br and%20erosion

Jenkins, A. (2020). *What is Inventory Management? Benefits, Types, & Techniques.*http://103.47.12.35/bitstream/handle/1/1650/17133203027_Raj_Kumar_FinalProjectReport%20%20Raj%20kumar%20pachouri.pdf?sequence=1&isAllowe d=y

John Stephens (2022). *Research Interview: Types and Characteristics.https://warbletoncouncil.org/entrevista-de-investigacion-3260*

Leonard, Kimberly (2019). *Advantages & Disadvantages of a Computerized Inventory Management System.* https://smallbusiness.chron.com/advantages- disadvantages-computerized-inventory-management-system-22513.html

Sisense. (2022). *Data Organization.* https://www.sisense.com/glossary/data-organization/

What is a sales and inventory management system?(2020, January 20). Digital school of marketing. https://digitalschoolofmarketing.co.za/blog/what-is-a-sales-and- inventory-management-system/

Development of Sales Tracking with Point-Of-Sale System for Microscale Cafés in Silang, Cavite

Bondoc, Clarisse, Javier, Lee Ann, Mendoza, Joshua
Rosal, Rafael, Rosal, Samuel

I. ABSTRACT

Olivarez College Tagaytay requires a system that will provide a Database and Record in any field to help the client solve its primary problem in their business. This capstone aims to create a Sales Tracking System with POS to track the client's Daily, Weekly, and Monthly Sales as a small start-up business owner. The participants in this study were five college students from the BSIT department, as they have experience in creating systems. Each college student is given a survey questionnaire while the researchers demonstrate the technique. The developmental research approach for instructional technology analyzes the system user data through three phases: Design and Development, System Architecture, and Testing Procedures. In addition, the users determine if the system's functions are working or need improvement. Data gathered from the 25 respondents is calculated and converted into information. This is used to check if the system satisfies the user and all the requirements are met.

Keywords: *Data Management System, developmental research approach for instructional technology, design, development, system architecture, system.*

II. INTRODUCTION

Asia's second-largest consumer of coffee is the Philippines. The Philippines is currently known for its strong coffee consumption. With the many coffee drinkers in the Philippines, coffee cafes are an incredible business idea. It is also a bizarre opportunity to market other foods and products. It may surprise some people to hear that many customers visit coffee shops for factors other than the coffee, such as the food, pastries, and atmosphere. For Filipinos, coffee is a staple in their everyday life. Coffee is commonly mentioned as the main reason for Filipinos' popularity, affection, and preference for coffee, as it provides them with energy and fuel for the day. Many people see coffee shops as an excellent opportunity to start a small business since it has been becoming a trend for youths to go and visit coffee shops, as its ambiance can be a good place for people to hang out with friends or even study along with enjoying their cup of coffee. Relax and unwind at Cavite's picturesque cafes. The meals and coffee will provide a pleasant experience and be so outstanding that one could wish to return frequently. "Tara, kape?" has been an irresistible invitation for many Filipinos. Due to our commitment to busy schedules, even finding the opportunity to get together with friends and carry out these arrangements calls for a celebration. The 5th district of Cavite has been booming with cafes with incredible menus and a refreshing environment, and about an hour away from Metro Manila, Silang, Cavite is an up-and-coming place for quaint, neighborhood eateries and wonderfully attractive cafes. Enjoy the crisp, clean air while exploring the town's attractions. One can enjoy a relaxing day escape there, superb coffee, and Instagram-worthy décor for one's account.

In addition to serving coffee, tea, and other energizing drinks like milk tea, a café is a type of restaurant that frequently serves light meals like baked goods or snacks. People can often be found reading newspapers and magazines, playing board games, studying, or chit-chatting in a café atmosphere, which is a more relaxed social setting.

Small businesses that are just starting up may have problems tracking their sales, which may

be a problem since small businesses may not notice when they are not making enough profit for their business to continue to grow and for money to properly circulate within the business, by which made the developers come up with the idea of making a POS system with built-in sales tracker.

The technologies that will be used to build the system are the following: First, HTML in version HTML5 will be used as the content or structure of the system. The developers will use CSS in version CSS3 to make the structure attractive. Moreover, to make the system interactive, JavaScript is the programming language to use in the version Node js (v18.14.0), and after making the system, electron JS is the next step because it will convert the webpage into an application.

Through the statements stated, this research intended to establish a system that can function as a POS (Point of Sales) but has a built-in sales tracker for small business owners. Developers develop a Sales Tracking System with POS for Start-up Small Cafes in place to resolve the gap in small businesses that need help tracking their sales.

The study's general objective was to develop a sale tracking with a POS system for microscale cafes in Silang, Cavite.

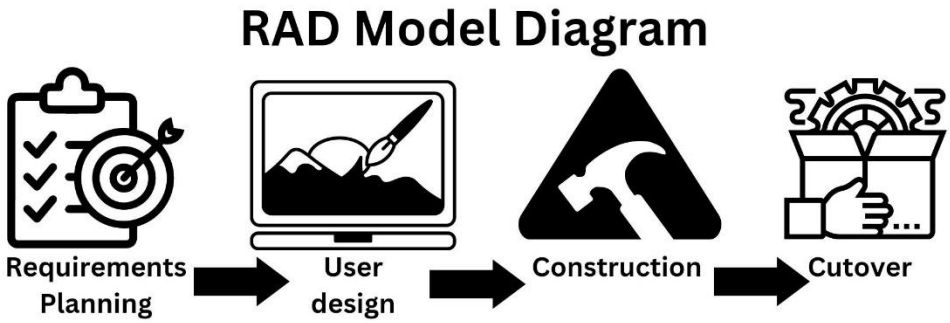
Specifically, it aimed to:

1. Design a system capable of the following:
2. input and accept orders;
3. input sales;
4. display sales report;
5. print sales report;
6. print receipt;
7. add, edit, and delete menu items and attributes, and
8. edit user/business picture and name for a printed receipt
9. develop a system using the following hardware and software requirements:
10. Stand-alone mini personal computer;
11. Thermal printer for printing receipts;
12. Windows 10 and above for operating system;

13. JavaScript as a programming language;
14. Cascading style sheets for design and
15. Hypertext markup language for displaying text, images, and other forms of multimedia
16. test the system using the testing procedures:
17. Unit Testing;
18. Integration Testing; and
19. System Testing
20. evaluate the system using ISO 25010; and
21. prepare an implementation plan with manual instruction.

The developmental method is the methodical study of designing, developing, and evaluating instructional programs, processes, and products that must satisfy internal consistency and effectiveness standards. The chosen Software Development Lifecycle (SDLC) model is the Rapid Application Development (RAD).

Figure 1. RAD Model



RAD model (Fig. 3) was used in developing the developed system. It consists of four phases namely requirements planning, user design, construction and cut over. A version of agile technique that focuses on frequent iterations and prototypes based on user feedback. Instead of following a strict development schedule, it enables you to incorporate updates based on usage.

This research was conducted to produce a solution for the gap of the micro-scale businesses wherein establish a system that can track sales and can track inventory.

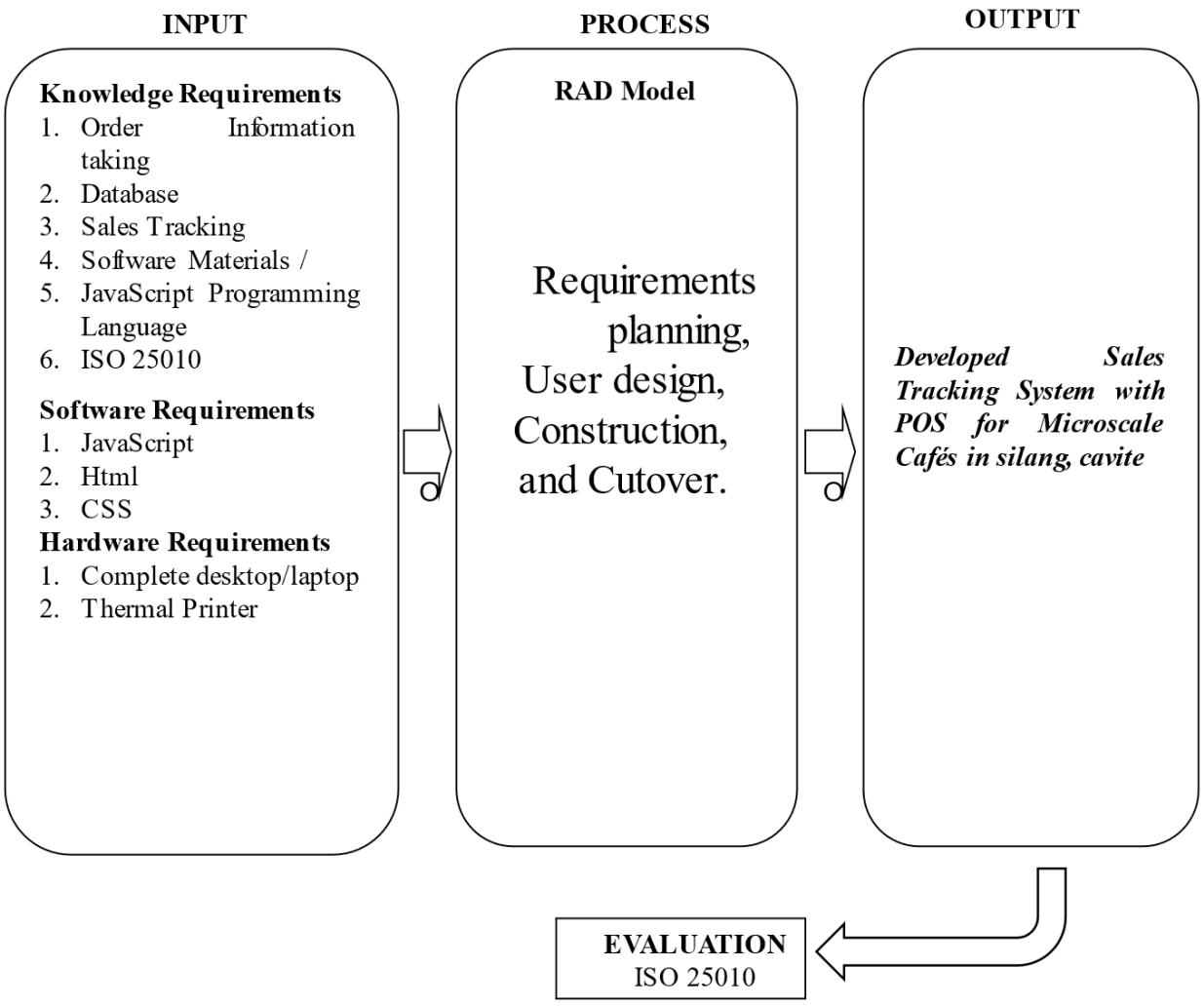


Figure 2. The Conceptual Paradigm

The study's flow was investigated in the POS system's conceptual framework of sale tracking. The three frames comprise input processed or operated on to produce an output. The first frame, INPUT, contains the researcher's knowledge, software, and hardware requirements to build a web-based healthcare facility application. The PROCESS is the conceptual framework's second frame; it discusses the sequence of actions or processes to achieve the output, and the OUTPUT is the result obtained after running the entire process.

A quality-in-use model comprises five characteristics (effectiveness, efficiency, satisfaction, freedom from risk, and context coverage) related to how an interaction will turn out when a product

is utilized in a specific setting. This system concept applies to the entire human-computer system, which includes both software and computer systems. A product quality model comprises eight characteristics—each further broken into more minor characteristics—that relate to the software's static and dynamic qualities. The concept can be used for both software and computer systems.

Functional Sustainability. When utilized under specific circumstances, the characteristic indicates how well a system or product fulfills stated and implied needs.

Performance Efficiency. These qualities represent the performance of the quantity of resources used under the specified conditions.

Compatibility. The extent to which a product, system, or component may communicate with other products, systems, or components and carry out its necessary duties while utilizing the same hardware or software environment.

Usability. The way seamlessly, effectively, and satisfactorily a product or system may be used by specific users to achieve specific goals in a specific usage scenario.

Reliability. The extent to which a system, product, or component carries out particular tasks in particular circumstances for a particular amount of time.

Security. The extent to which a system or product safeguards information and data so that users or other products or systems can access it appropriately, depending on the types and levels of authorization.

Maintainability. The degree of efficacy and deficiency with which a system or product can be altered to enhance, rectify, or adapt to changes in the environment and requirements is represented by this feature.

Portability. The ease and efficacy with which a system, product, or component can be adapted to a different hardware, software, or operating environment.

This study aims to provide the user with daily and weekly sales tracking that can be

summarized into monthly data records. This study aims to ensure and monitor sales activities.

The microscale café business owners benefit greatly from this system. The owners greatly benefit from this system because they will not have the hassle of jotting down the sales manually, wherein businesses may encounter problems monitoring the money they take in and take out.

The employees of Microscale cafés also benefit from the system. It is because it makes them monitor the orders they take in, and the system gives them an easy hand in calculating the compilation of multiple orders.

The system also benefits the developers, for they explore the gaps that microscale start-up business encounters, and with that, the developers use their skills and specialty in planning and programming.

This system can be a reference for future developers with a related study.

III. METHODS

This chapter discusses the requirements analysis, requirement documentation, Design of Software, Systems, Products and/or Processes, development and testing, data analysis, and implementation plan of the proposed study.

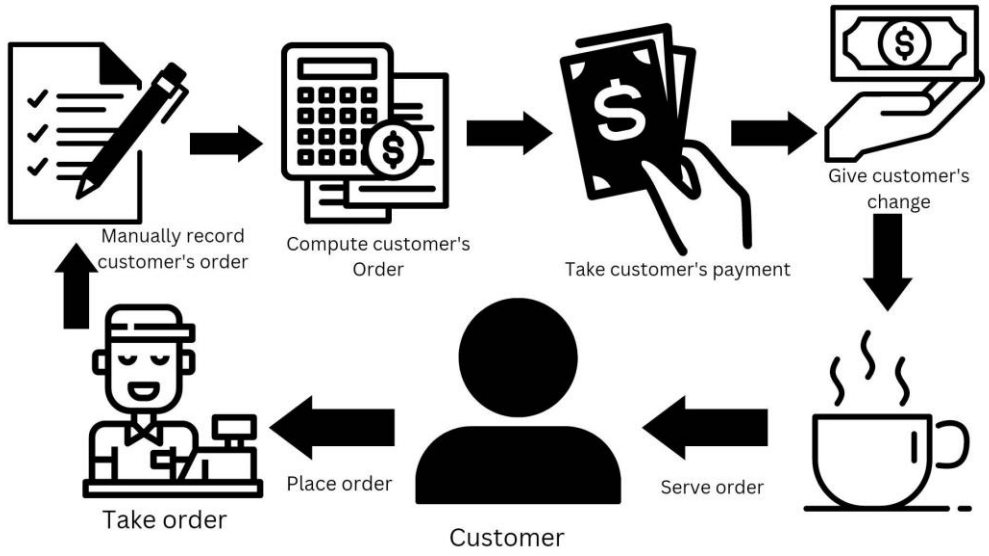


Figure 3. The Current process

Figure 1 shows the current process flow of most microscale cafés. The customer places their order, and then the cashier takes the order and manually or jots down the customer's order. Then, the cashier takes the customer's payment, and the spare change will be given to the customer if there are any. Then, the order will be served to the customer.

Requirement Documentation

The sales tracking with the POS system for microscale cafés in Silang will use several modules such as the Login Module, Admin Management Module, POS module, and Report Module.

Login Module. This module enables users like the admin and employees to log in to their accounts. The login module enables the user to input correct and deny incorrect credentials. The login module is also able to recover forgotten passwords. This module can access privileges with the correct credentials.

Admin Management Module. This module can log in as a user as an admin, in which the admin will be the one who can view and print the sales report. This module can also create an employee account and another admin account. The admin can also update and archive an admin or employee account in this module. This module also has a feature wherein the admin can insert, update, delete, and display items on the POS. This module can also set the discounts that can be applied to specific items. The admin can also edit and update the business name and logo in this module. This module also has the feature that can log out all active accounts.

POS module. This module is the only module that an employee account can access. This module can view items in the menu per category. This module can accept orders with multiple items in different categories. In this module, the employee can cancel items and orders and apply discounts. This module can accept cash and e-money by inputting the reference number. In this module, the

system can print receipts of orders made.

Report Module. This module can print a receipt with the business' logo, purchased items, cashier name, and the total price of an order. The report module can print the sales report.

The diagrams were made to show the developed system for the client, from the menu to the last part of the system. Fig. 3 to 4

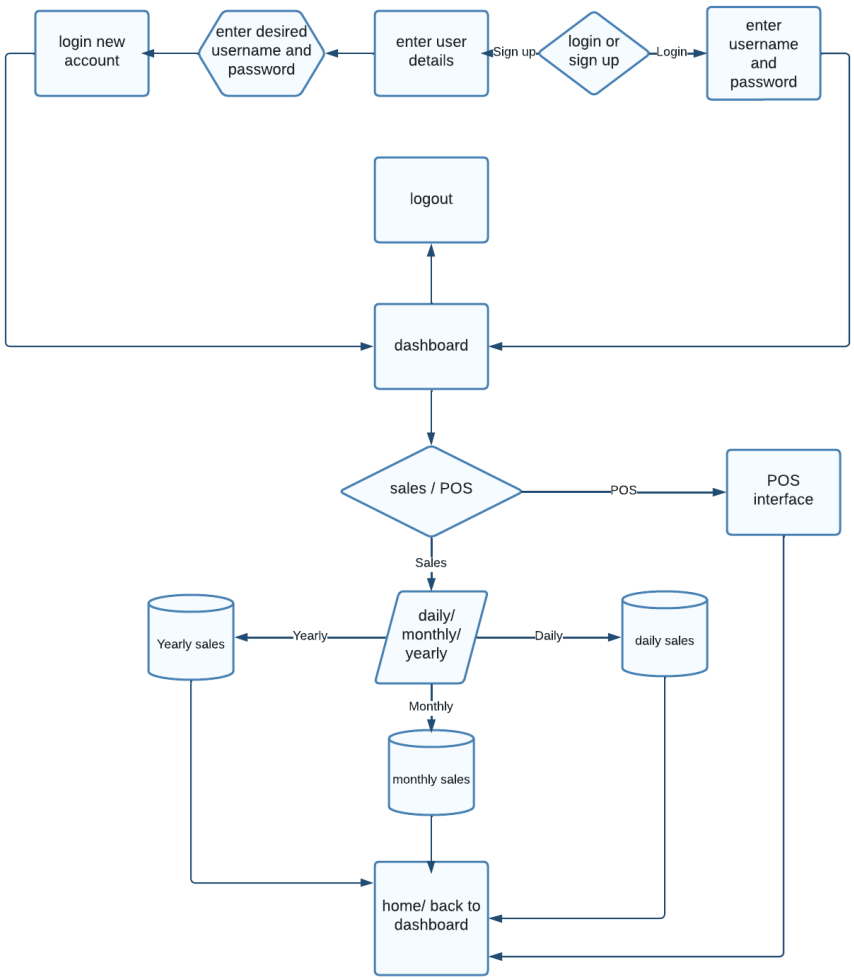


Figure 4. Data flow diagram of the main menu.

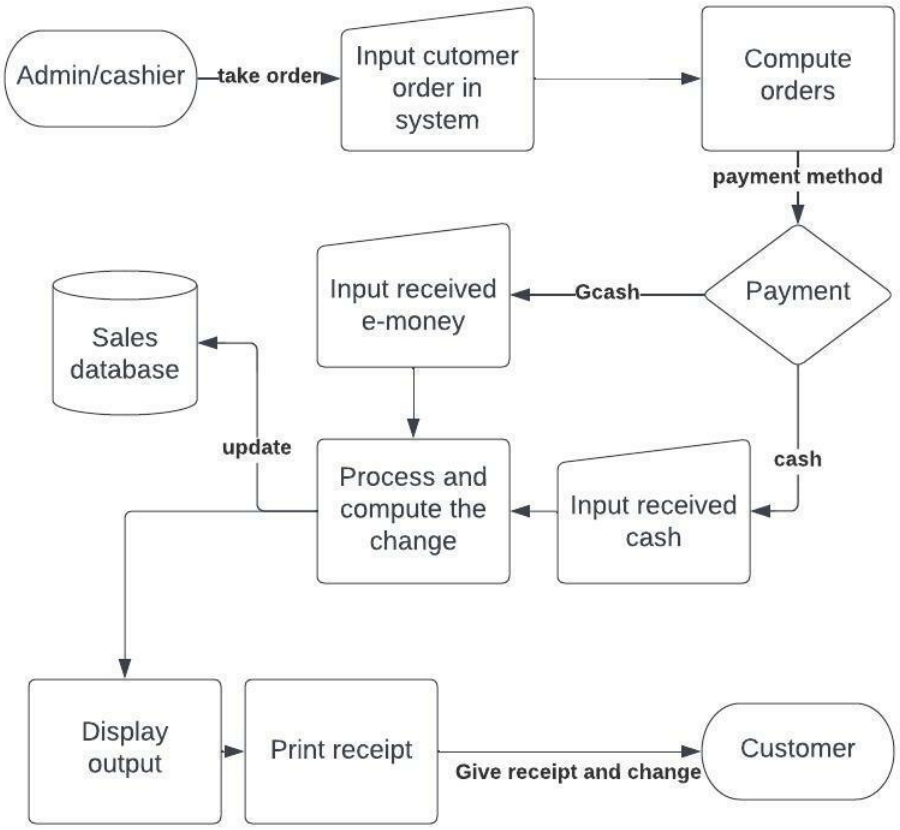


Figure 5. Data flow diagram of the point-of-sale system

As shown in the diagram above, the proposed software has many features that will help the end user to track his sales and inventory. The first diagram is the menu where the end-user can access all the features. It also displays that the users must log in or sign up as per the client's request. The following diagram (Fig.4) is the point-of-sale system proposed to the client to produce accurate sale data and reduce time when taking orders.

Population of the Study

The study's target population includes micro-scale business owners. The study's respondents are micro-scale business owners, IT faculty, IT Experts, and IT students.

Instrumentation

The project was evaluated through a face-to-face demonstration and assessed using the evaluation instrument of Olivarez College Tagaytay, adapted from ISO 25010.

Software quality standards are outlined in ISO 25010. In addition to providing practical advice on how to apply the quality models, it discusses the models, which are made up of traits and traits-within-the-traits, for the quality of software products and software quality in use (Britton, 2021).

According to the overall evaluation results, the project had a verdict that was excellent in most software quality criteria such as functional suitability, compatibility, usability, reliability, security, maintainability, and portability and very good in performance efficiency. The developers concluded the sale tracking with the POS system for microscale cafes in Silang, Cavite.

Evaluation and Scoring

Mean was used to analyze and interpret evaluation results gathered using the ISO 25010 evaluation instrument. Table 1 was the basis for the interpretation of the computed mean.

Table 1

Descriptive interpretation of the mean for the performance evaluation of sales tracking with POS system

NUMERICAL SCALE	INTERPRETATION
4.51-5.00	Excellent
3.51-4.50	Very Good
2.51-3.50	Good
1.51-2.50	Fair
1.00-1.50	Poor

Table 1 shows the interpretation of the mean for the performance evaluation of the sales

tracking with the POS system, where 4.51-5.00 shows as excellent, 3.51-4.50 shows as very good, 2.51-3.50 shows as good, 1.51-2.50 shows as fair, and 1.00-1.50 shows as poor performance.

Data Gathering Procedure

The questionnaire and interview are considered the most appropriate data-gathering instruments for this research study in developing sale tracking with POS systems for microscale cafes in Silang, Cavite.

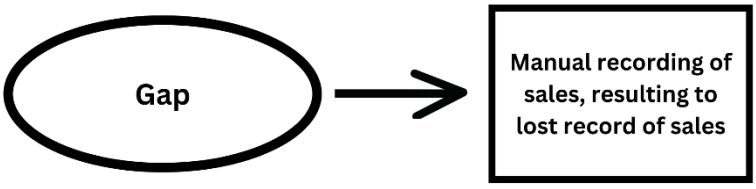


Figure 6. The Gap of the study

Most micro-scale businesses' current and standard process is taking orders and not taking note of the sales owners make in a day, which causes a loss of records. Not having sales records confuses business owners if they profit from their business.

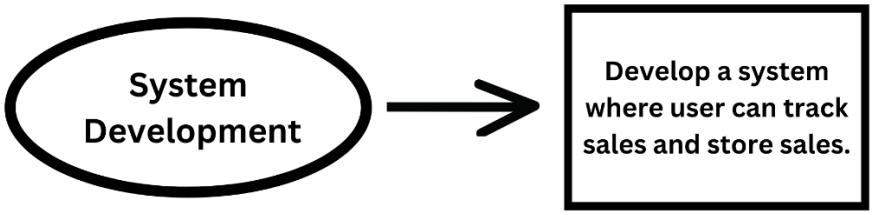


Figure 6.1 Development of sale tracking with POS system for microscale cafes in Silang, Cavite.

The researchers were motivated to develop a sale tracking with a POS system for microscale cafes in Silang, Cavite, that can store the data of the sales made in a day in a database that the admin can only access, which is also connected to a POS where the data of the sales will be coming from.

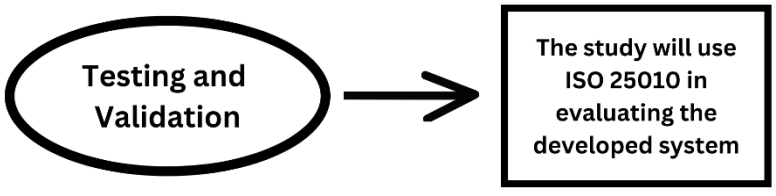


Figure 6.2 Testing of sale tracking with POS system for microscale cafes in Silang, Cavite.

ISO 25010, The requirements of those stakeholders (functionality, performance, security, maintainability, etc.) are precisely what the quality model, which divides product quality into characteristics and sub-characteristics, represents.

IV. RESULTS

In this study, using many iterations and ongoing input, the rapid application development (RAD) methodology aims to produce apps quickly. The need for RAD is growing as the IT sector is pressured to create working solutions more quickly as the fiercely competitive software market highlights a greater demand for innovative applications. (Chien, 2020)

Rapid application development is a software development methodology that uses minimal planning in favor of rapid prototyping. A prototype is a working model functionally equivalent to a product component.

In the RAD model, the functional modules are developed in parallel as prototypes and are integrated to make the complete product for faster product delivery. Since there is no detailed preplanning, it makes it easier to incorporate the changes within the development process.

RAD projects follow iterative and incremental models and have small teams comprising developers, domain experts, customer representatives, and other IT resources working progressively on their components or prototypes.

The most crucial aspect for this model to succeed is ensuring that the prototypes developed are reusable.

Phase 1 is the requirements planning. Through performing this stage, developers communicate and interview possible future clients (system users) to determine the goals and expectations for developing the POS and Sales Tracking System and current and potential issues that need to be addressed during the build. Phase 2 was the user design; the idea of this system was to create a user-friendly system for the users. All the bugs and kinks are worked out in an iterative process. The developer designs a prototype, and the client (user) tests it. This method allows developers to tweak the model until they reach a satisfactory design. Phase 3, rapid construction: The developers work together during this stage to ensure everything works smoothly and that the result satisfies the client/user’s expectations and objectives.

This third phase is essential because the client still gets to give input throughout the process. They can suggest alterations, changes, or even new ideas that can solve problems as they arise. Moreover, lastly, phase 4, cutover, is the implementation phase where the finished system goes to launch. It includes data conversion, testing, changeover to the new system, and user training. All final changes are made while the coders and clients continue looking for system bugs.

The system was designed using the RAD model. A variation of agile methodology that emphasizes frequent iterations and prototypes developed in response to user input. It allows the user

to incorporate updates based on usage rather than adhering to a rigid development timetable. It comprises four stages: requirements planning, user design, construction, and cutover.

Project Design

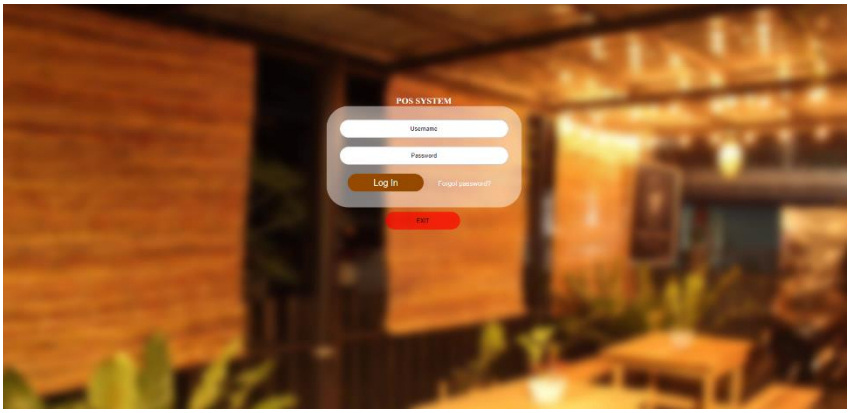


Figure 5. Login Page

The Login page is the opening page where the user is required to enter their username and password. It is also where the user can exit the app or choose to stay and login with another account.

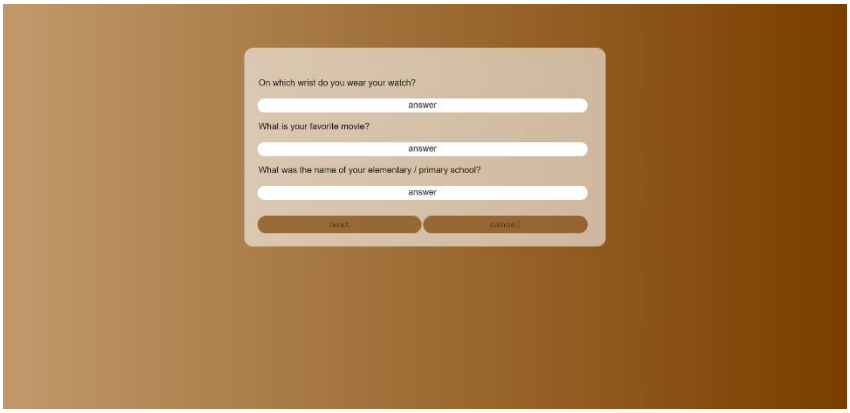
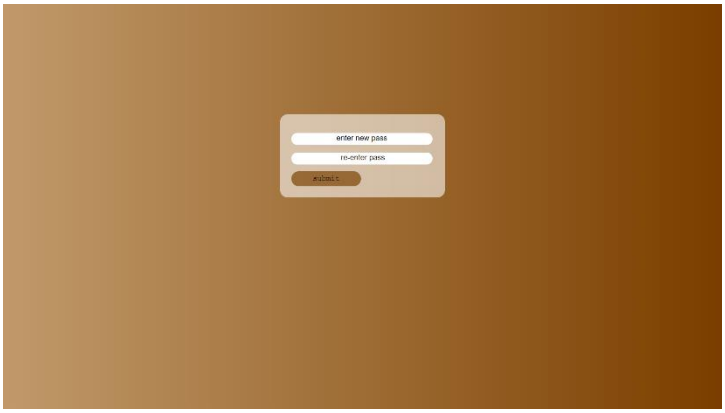


Figure 6. Security Question Page

The Security Questions page is where the user will see if the user wants to change the password of an account. The user is required to enter the answers to the security questions in order to reset their password.



This page is where the user's password can be changed.

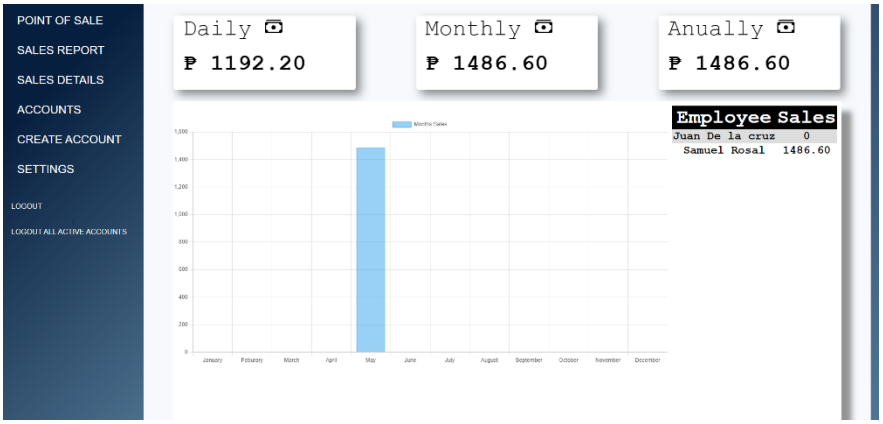


Figure 7. Dashboard

The Dashboard is the page where the admin can immediately see the day, month, and year sales. This is where the admin can browse the sales details, can the accounts of other admins and employees, where the admin can create a new account, where the admin can see the point-of-sale system, and where the admin can log out all active accounts or logout just the admin's account. Only the admin has access to this Dashboard.

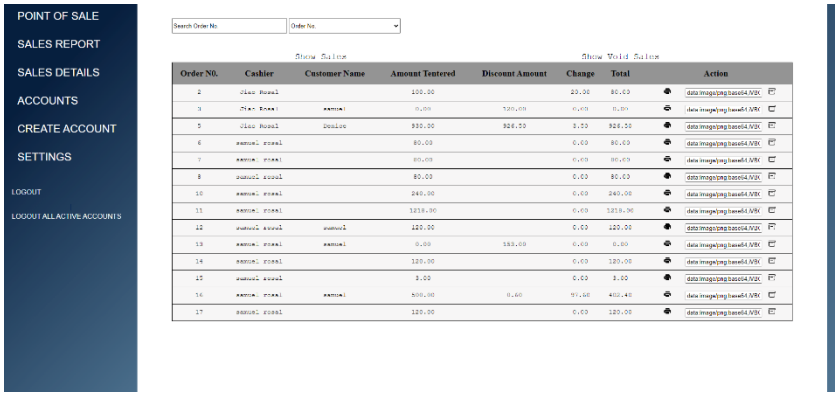


Figure 8. Sales Details page

The Sales Details Page is where the admin can see previous transactions and where admin can archive a past transaction.

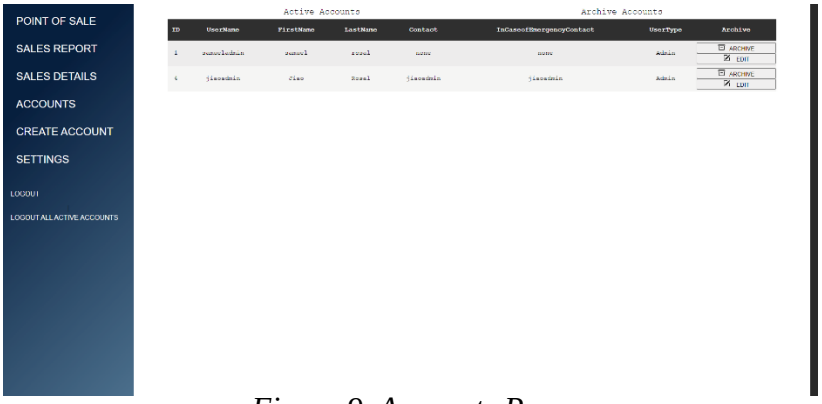


Figure 9. Accounts Page

This is the page where the admin can see all active accounts and where the admin can either edit an account or archive an account. On this page, the admin can also see the archived accounts.

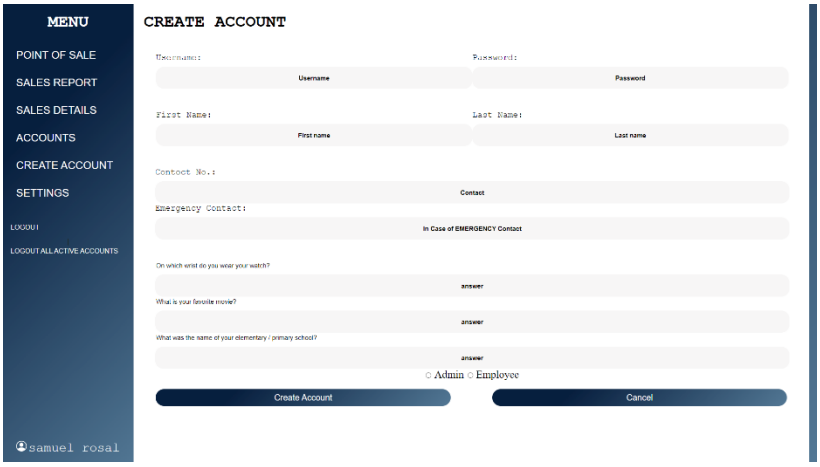


Figure 10. Create Account Page

This is the page where the admin can create an account for an employee or another admin.

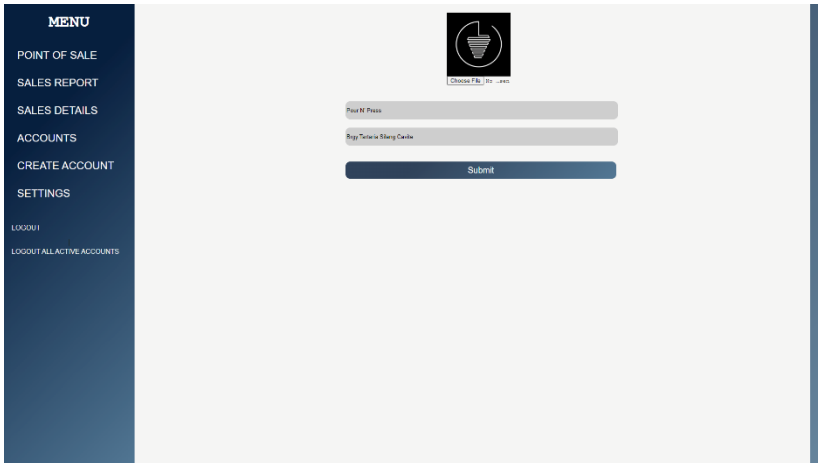


Figure 11. Settings Page

The Settings page is where the admin can change the name, logo, and address of the business for the details to be printed on the receipts.

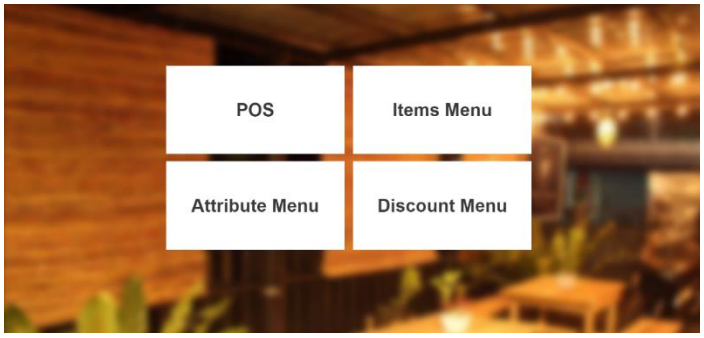


Figure 12. POS dashboard Page

The POS dashboard page is where the admin can see the item menu, attribute menu for add-ons on the items menu, and discount menu.

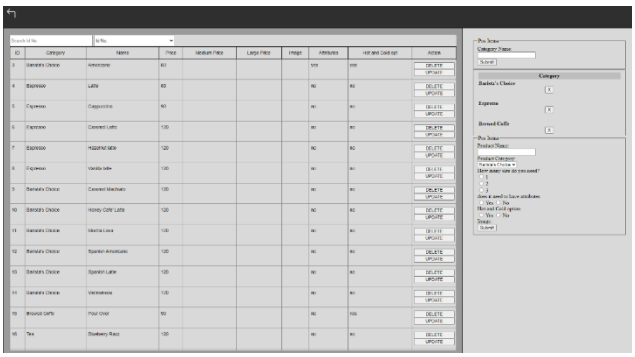


Figure 13. Items menu Page

The Items menu page is the page where the admin can add, update and delete an item in the POS.

Figure 14. Attribute Page

This is the page where the admin can edit available add-ons for the items on the menu.

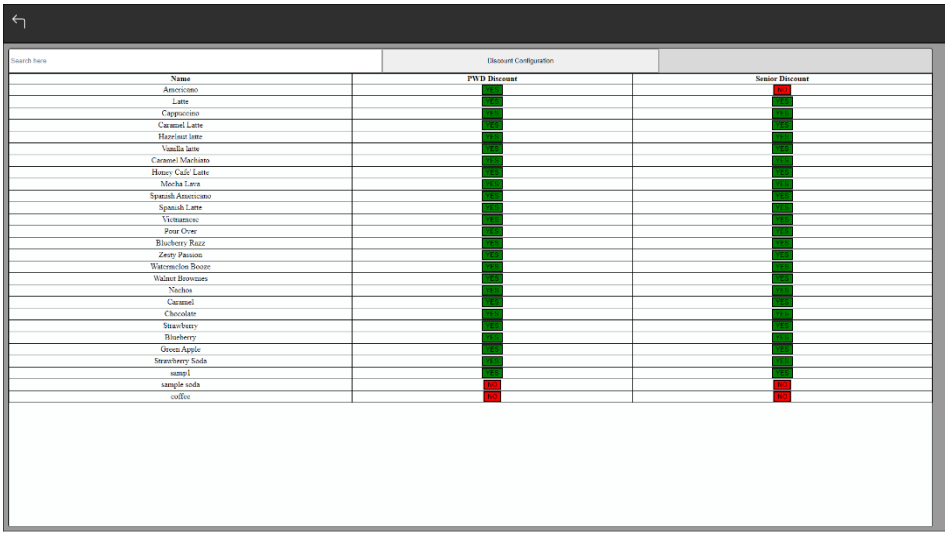


Figure 15. Discount menu Page

This is the page where the admin can edit which items a discount can be applicable.

Figure 16. POS Page

The Point of Sales page is the page where the admin and employees can input a customer's order and log an on-going transaction. This is also the only page that an employee will see first when an employee logs in.

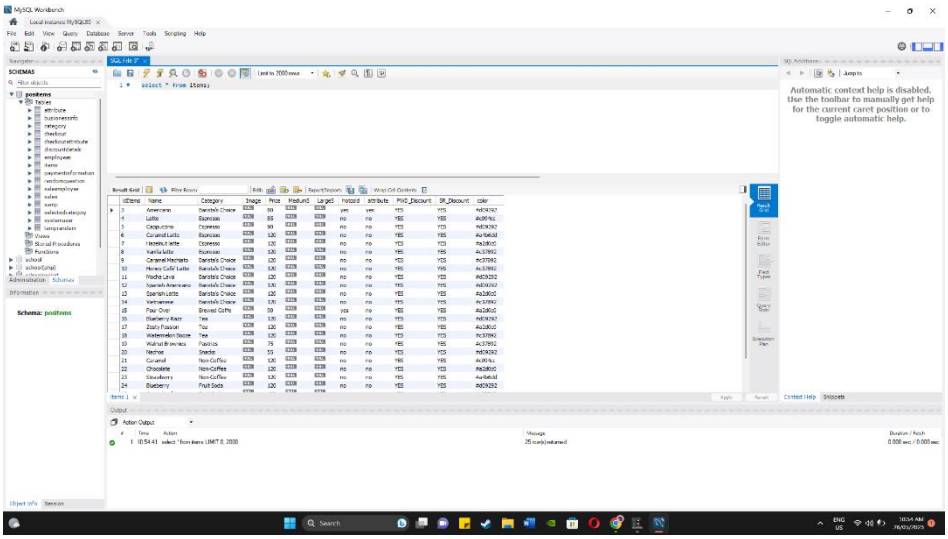


Figure 17. Database

The database is where the admin stores other employee's information.

V. DISCUSSION

This presents the description of the developed system, respondents' profiles, and results from the survey. Data gathered in this study demonstrates the analysis and interpretation.

1. System assessment by the User

Face-to-face demonstration was given to micro-scale business owners who may be possible clients in the future. The Users have given feedback on what a first-time user needs to make the work fast and easy. The systems served the functions that the User was looking for, and the system was user-friendly, which positively impacted the users who assessed the system.

2. System assessment by the IT Professional

According to the survey, the researchers discussed sales tracking with point-of-sale systems with IT Professionals. The system is functional, can input and output data, and does what it is supposed to do; the usability result revealed that the user interface is simple to assess. In contrast, the survey revealed that the system could save time and offer data and information efficiently.

3. System assessment by the Teachers

According to the responses of the Olivarez College Professors in Olivarez College Tagaytay, the system is efficient in handling reports and calculations and less time-consuming when doing transactions.

4. Results from the Respondents

The tables below measure verbal interpretations of functionality, user interface, design, and database based on the face-to-face demonstration. The mean score is measured from 5 (best) to 1 (needs improvement).

Table 2

Evaluation and Scoring

SUCCESS CRITERION	**MEAN SCORE**	**V.I.**
A. Functional Suitability		
1. **Functional completeness** - Degree to which the set of functions covers all the specified tasks and user objectives.	4.60	H.A.

2. **Functional correctness -** Degree to which a product or system provides the correct results with the needed degree of precision.	4.67	H.A.
3. **Functional appropriateness -** Degree to which the functions facilitate the accomplishment of specified tasks and objectives.	4.60	H.A.
MEAN SCORE FOR FUNCTIONAL SUITABILITY	**4.62**	**H.A.**
B. **Performance Efficiency**		
1. **Time behavior -** Degree to which the response and processing times and throughput rates of a product or system, when performing its functions, meet requirements.	4.47	H.A.
2. **Resource utilization -** Degree to which the amounts and types of resources used by a product or system, when performing its functions, meet requirements.	4.50	H.A.
3. **Capacity -** Degree to which the maximum limits of a product or system parameter meet requirements.	4.53	H.A.
MEAN SCORE FOR PERFORMANCE EFFICIENCY	**4.50**	**H.A.**
C. Compatibility		
1. **Co-existence -** Degree to which a product can perform its required functions efficiently while sharing a common environment and resources with other products, without detrimental impact on any other product.	4.63	H.A.
2. **Interoperability -** Degree to which two or more systems, products or components can exchange information and use the information that has been exchanged.	4.47	H.A.
MEAN SCORE FOR COMPATIBILITY	**4.55**	**H.A.**
D. Usability		

1. **Appropriateness recognizability -** Degree to which users can recognize whether a product or system is appropriate for their needs.	4.67	H.A.
2. **Learnability -** Degree to which a product or system can be used by specified users to achieve specified goals of learning to use the product or system with effectiveness, efficiency, freedom from risk and satisfaction in a specified context of use.	4.73	H.A.
3. **Operability -** Degree to which a product or system has attributes that make it easy to operate and control.	4.70	H.A.
4. **User error protection-** Degree to which a system protects users against making errors.	4.67	H.A.
5. **User interface aesthetics -** Degree to which a user interface enables pleasing and satisfying interaction for the user.	4.57	H.A.
MEAN SCORE FOR USABILITY	**4.67**	**H.A.**
E. Reliability		
1. **Maturity -** Degree to which a system, product or component meets needs for reliability under normal operation.	4.70	H.A.
2. **Availability -** Degree to which a system, product or component is operational and accessible when required for use.	4.67	H.A.
3. **Fault tolerance -** Degree to which a system, product or component operates as intended despite the presence of hardware or software faults.	4.47	H.A.
4. **Recoverability -** Degree to which, in the event of an interruption or a failure, a product or system can recover the data directly affected and re-establish the desired state of the system.	4.63	H.A.
MEAN SCORE FOR RELIABILITY	**4.62**	**H.A.**

F. Security		
1. **Confidentiality -** Degree to which a product or system ensures that data are accessible only to those authorized to have access.	4.57	H.A.
2. **Integrity -** Degree to which a system, product or component prevents unauthorized access to, or modification of, computer programs or data.	4.73	H.A.
3. **Non-repudiation -** Degree to which actions or events can be proven to have taken place so that the events or actions cannot be repudiated later.	4.60	H.A.
4. Accountability - Degree to which the actions of an entity can be traced uniquely to the entity	4.67	H.A.
5. **Authenticity -** Degree to which the identity of a subject or resource can be proved to be the one claimed.	4.67	H.A.
MEAN SCORE FOR SECURITY	**4.65**	**H.A.**
G. Maintainability		
1. **Modularity -** Degree to which a system or computer program is composed of discrete components such that a change to one component has minimal impact on other components.	4.80	H.A.
2. **Reusability -** Degree to which an asset can be used in more than one system, or in building other assets.	4.73	H.A.
3. **Analysability -** Degree of effectiveness and efficiency with which it is possible to assess the impact on a product or system of an intended change to one or more of its parts, or to diagnose a product for deficiencies or causes of failures, or to identify parts to be modified.	4.73	H.A.
4. **Modifiability -** Degree to which a product or system can be effectively and efficiently modified without introducing defects or degrading existing product quality.	4.77	H.A.

5. **Testability -** Degree of effectiveness and efficiency with which test criteria can be established for a system, product or component and tests can be performed to determine whether those criteria have been met.	4.70	H.A.
MEAN SCORE FOR MAINTAINABILITY	**4.75**	**H.A.**
H. Portability		
1. **Adaptability -** Degree to which a product or system can effectively and efficiently be adapted for different or evolving hardware, software or other operational or usage environments.	4.73	H.A.
2. **Installability -** Degree of effectiveness and efficiency with which a product or system can be successfully installed and/or uninstalled in a specified environment.	4.57	H.A.
3. **Replaceability -** Degree to which a product can replace another specified software product for the same purpose in the same environment.	4.70	H.A.
MEAN SCORE FOR PORTABILITY	**4.67**	**H.A.**

Legend:
3.26 - 5.00 = Highly Acceptable
2.51 - 3.25 = Acceptable
1.76 - 2.50 = Moderately Acceptable
1.00 - 1.75 = Not Acceptable

As shown in Table 2, the researchers got 4.67, verbally interpreted as Highly Accepted. Below are the results based on the:

Functionality

The average score was 4.62 because it can function, calculate, create discounts, create a menu, and track sales created per day, month, and year. The login system can create two types of users: the admin and the user.

Reliability

The average score was 4.62 for security purposes and being able to separate the admin account

and user account.

The login system is reliable enough that the admin/owner can only see the total sales and list of transactions, and employees can only see the POS menu.

Usability

The average score was 4.67; the system was tested and was able to function as intended.

Efficiency

The average score was 4.50. With a minimalist design and proper sorting, The system can better show all data and information and be a friendly user system.

Maintainability

The average score was 4.67. The system can be easily modified; for functionality, users can add or remove items in the POS; for Usability, the owner can change the logo and the name of their shop.

Summary of Findings

The sales tracker with POS for microscale cafés in Silang, Cavite, was built to allow the café owners to manage and track the sales in their café. Giving them an application that can showcase a user-friendly user interface to help them with their business venture struggle gives them ease in properly taking orders, which will automatically direct them to their database and be inputted in their sale. By creating a generic system that can cater to changes in terms of its user interface and business

The software was developed from February 2023 to May 2023 at Olivarez College Tagaytay. Significant data, related literature, and studies were gathered from the Internet and through personal visitation.

The application was developed using JavaScript as a programming language, Cascading style sheets (CSS) for the designs, and Hyper Text Markup Language for displaying text, images, and other forms of multimedia. Finally, the application was tested for functionality and accuracy and evaluated using the ISO 25010 evaluation instrument for functional suitability, performance efficiency, compatibility, Usability, reliability, security, maintainability, and portability.

The project was tested by five participants, one of whom was from microscale cafés owners/employees in Silang, Cavite, and two were IT professionals. For evaluation, there were thirty

(30) respondents, comprising twenty (20) IT students, five (5) IT professionals, and five (5) microscale cafés owners/employees in Silang, Cavite. The overall result of the evaluation was “Excellent,” with an average mean of 4.63, so the desired output was implemented.

Conclusion

Taking orders from customers and manually writing the sales can be very tricky since there may be an instance where many customers arrive, and the owner cannot keep track of writing the sales down individually, which would make business owners lose track of their sales, and this is the common problem that microscale cafés encounter. For that reason, the developers developed a system that can help microscale café owners keep track of their sales and have a POS that comes with it.

Having a POS and sales tracking system helps the café owners have a record of their sales, whether printed or only displayed digitally. By having a POS with a sales tracker, the system will automatically input the sales from orders that come, and with that, the time and effort of manually inputting or writing down the individual sales will be less, and the hassle of manually writing the sales down will be gone.

The project was evaluated through a face-to-face demonstration and assessed using the evaluation instrument of Olivarez College Tagaytay, adapted from ISO 25010. According to the overall evaluation results, the project had a verdict that was excellent in most software quality criteria such as functional suitability, compatibility, Usability, reliability, security, maintainability, and portability and very good in performance efficiency. The developers concluded that the sale tracking with the POS system for microscale cafes in Silang, Cavite.

REFERENCES

Britton, J. (2021). What Is ISO 25010? Performance Software. https://www.perforce.com/blog/qac/what-is-iso-25010

Chien, C. (2020, February 4. What is Rapid Application Development (RAD)? Codebots. https://codebots.com/app-development/what-is-rapid-application-development-rad

Development of Sis Ems Bulaluhan Restaurant Point-of-Sale System

Acosta, Erin Russette , Agustin, Vidalle Angelo Braga, Justin Red, Cabungcal, Arvin, Licup Kian

I. ABSTRACT

The rise of technology, particularly mobile devices and cloud computing, has significantly impacted various aspects of our lives, particularly in the food and restaurant industry. The current approach to restaurant operations often relies on manual labor, leading to inefficiency and time consumption. This has a direct impact on the restaurant's productivity. The aim is to develop an electronic restaurant management system that is easy to use, allowing the establishment to track cash flow, monitor customers, and manage employees. The owner of Sis Ems Bulaluhan aims to adopt a modern management system to track daily sales. A management system is a virtual database used in business for gathering, storing, processing, and exporting data for thorough analysis, particularly in sales and stock status. Technology offers tangible and intangible benefits, helping businesses make money and meet customer demands. The owner or system administrator can control the management system, allowing them to make necessary changes. This approach will help the restaurant meet customer demands and improve overall business operations.

Keywords: *Development of Sis Ems Bulaluhan Restaurant Point-of-Sale System*

III. INTRODUCTION

Technology has significantly impacted our lives, and any corporation that wants to improve its organizational and management characteristics must adopt the technology. A management system refers to a virtual database commonly used in business for its tools of gathering, storing, processing, and exporting data to the users for a thorough analysis of all data, especially in sales and the status of stocks. Technology has tangible and intangible benefits that will help make money and produce significant impact and results on customer demand. To meet the constantly changing preferences of the more efficient business, management should continue investing in new technologies to stay up-to-date and be in industry trends. An easy-to-use restaurant management system also allows the establishment to run well, enabling them to track their cash flow, monitor their inventory, and manage their employees. This will help run a restaurant business more efficiently to satisfy the customers and the management. Khanna et al. (2021) stated that efficiency is one of the favorable characteristics of the electronic payment system. Electronic payment is gaining appeal among significant retailers because of the safety, efficiency, and added energy it offers to the end-user, enhancing their satisfaction with their overall purchase. By giving high transaction efficiency, consumers are more likely to adopt E-wallets, making deals in their daily lives (Kumar & Mozar, 2018). Effectiveness can be substantially improved by decreasing transaction expenses, enabling trade on items and services with much-reduced values. The performance of the online payment can be even more improved based on the following referrals: Effort needs to be made to verify the input information to ensure the system's integrity.

Most restaurants' existing strategies concentrate on manual labor, and most Human initiative is used to carry out operations. Due to this, the entire company process could be more efficient and time-consuming since the operations of the current system take more time. Managing restaurant lines is crucial to increasing customer satisfaction and improving revenue and table turnover. Prior studies have shown that, despite customers' high significance of service speed, customers' perceptions of wait times impact every client interaction, and engagement must be managed. However, most customers make their purchasing decisions after moving to the front of the line.

However, a study by Hasan (2023) states that having a POS is costly for small restaurants, reliant on their internet connection, may have malware infections, may have security risks, and may need upgrades at a specific time later. Another study says repairing hardware issues in physical POS

systems can be difficult and expensive. When problems arise, vendors must contact the manufacturer to troubleshoot the problem. However, issues may still require a costly, time-consuming visit from a specialized service technician to fix the problem (Clark, 2022).

It is challenging for businesses to operate in the modern world to successfully navigate the market without adopting current technology. Modern technology is so essential that it has changed how people shop. The selling mechanism is so simple that it may be completed with a single button.

The main objective of the study is to develop Sis Ems Bulaluhan Restaurant Management System.

Specifically, it aimed to:

A. Design a system with the following capabilities:

1. Accept or make an order;
2. Display dashboard of customer's order;
3. Record received payment
4. Print receipt;
5. Update and delete customer orders
6. Generate overall report and analytics;

B. Development of a system using the following hardware and software requirements:

1. Php Programming Language for functionality.
2. Javascript and CSS for design.
3. My SQL for database
4. Complete desktop setup

Windows 7 operating system, Intel Core i3 550 3.20 GHz, 1.7GB Intel HD Graphics, 4GB RAM, and 250GB HDD DATA.

5. Thermal Printer

C. Test the system using the testing procedures:

1. Unit testing
2. Integration testing; and
3. System testing;

D. Evaluate the system using ISO 25010; and

E. Prepare an implementation plan with manual instructions

III. METHODS

This chapter discusses the requirements analysis, requirement documentation, Design of Software, Systems, Products and/or Processes, development and testing, data analysis, and implementation plan of the proposed study.

Requirements Analysis

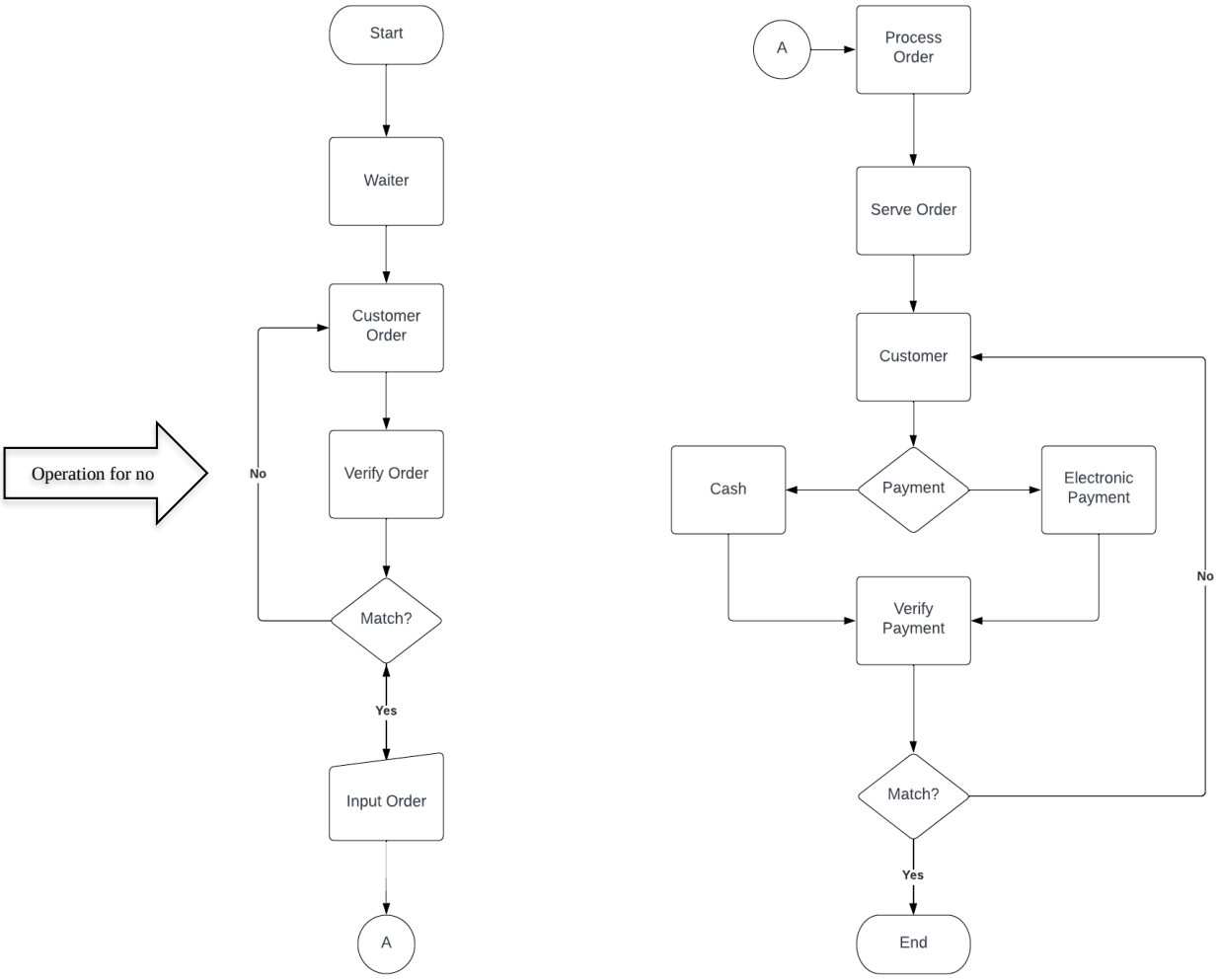


Figure 1. Current Ordering Process Flow of Sis Ems Bulaluhan

The figure shows the current ordering process flow of Sis Ems Bulaluhan. The waiter will immediately entertain and take the order upon the customer's arrival. To proceed, the waiter will verify whether the order matches or not. The process will recur upon verifying the order if it does not match. Afterward, it is when the cashier will input the order.

After processing the order, it will now be ready to serve. After enjoying the food, the customer

will ask for the receipt of their order (bill out). It is when the waiter asks if the payment will be made via cash or GCash. If the payment is cash, the waiter will give them the receipt, take it, and bring it to the cashier, wherein the cashier will process it. Meanwhile, on GCash, the customer will go to the cashier to scan the code. In the end, the payment must be verified and matched to avoid the repetitive process of the transaction.

Requirements Documentation

This phase discusses what the software will do. It includes the modules of the proposed system/solution with the description.

Log-in module. A module to let registered users enter the system to input or modify data for the restaurant management system.

Administrator module. A module is responsible for managing essential sales reports and managing the registered users. Admin can add or delete users.

Report module. This module is responsible for giving a proper rundown of the system's sales by exporting the data to an Excel file.

Filter Module. For the admin's convenience, a filter module is installed to filter the records by a specific date range for export sales. Another is included for user's convenience; they can filter product categories so it will be easier to navigate the restaurant's menu.

Sales Module. A module to properly collect the sales records and report to the main dashboard.

Print Module. A module for printing a physical copy of the order's transaction.

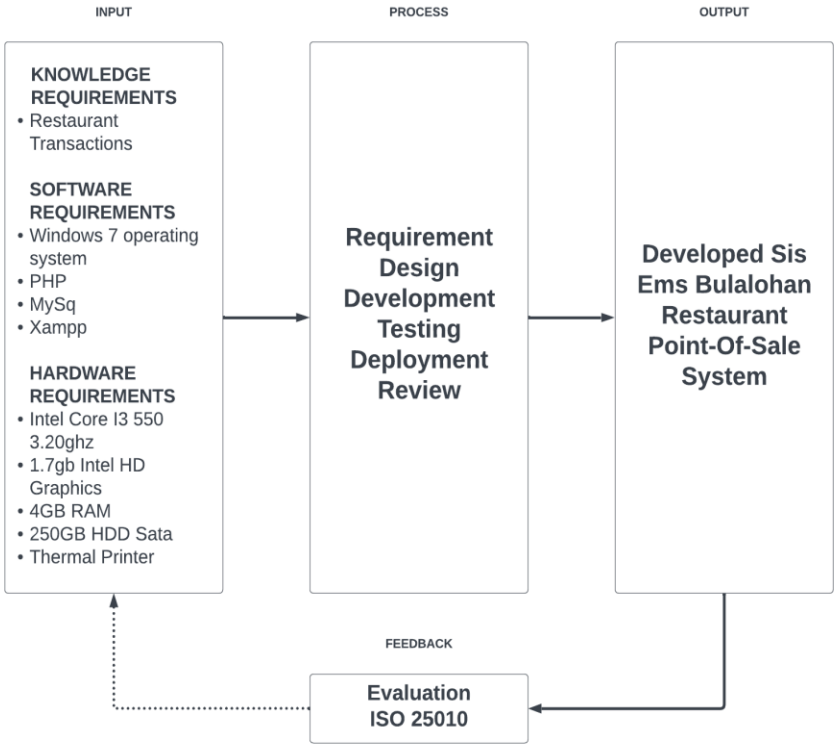


Figure 2. Conceptual Framework Paradigm

The study's conceptual framework showcases an IPO model (Input-Process-Output) to establish the required elements for developing the proposed system. According to the figure above (Figure 1), the Input involves the requirements, such as knowledge requirements from the establishment, since our proposed system deals with the management of essential details like the records of transactions. *Software requirements* are the tools needed to create the proposed system. The programming languages that are used. Known as PHP and MySql help make database systems, while the Operating system required for this is the most common and most accessible for anyone to access is Windows 7. Hardware requirements focus on the tools for output, like the thermal printer, which has a vital role in printing invoices or receipts. The other specifications enlisted are the minimum requirements for a system unit. Since the proposed system is lightweight, the researchers decided to list those requirements.

The following procedure is the process phase, in the exact figure, which involves the five primary phases of the Agile model: requirements, design, development, test, and deployment. Another figure segment has the evaluation phase, which the restaurant owner and IT professionals will evaluate. The final phase is output, which is the result of all of the preparations of the researchers, a functional system for Sis Ems Bulaluhan's Point-of-Sale.

Development and Testing

The developers used the agile model to develop the expected output of the system.

Project Development Methodology

SDLC is a set of activities followed for a particular development project. It generally includes planning, analyzing, designing, implementing, and supporting an information system. The cycle defines a methodology to improve the software's quality and overall development process. Several SDLC models are designed and followed based on various aspects like availability of resources, size of the project, or even time constraints. One is the Agile model.

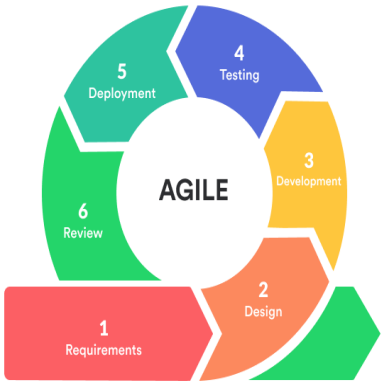


Figure 3. AGILE Model

Figure 3 shows the agile model used to develop the developed system. Agile SDLC functions very much like a train. The train wheels symbolize each movement as a sprint. As the Agile software development life cycle's planning, implementation, testing, evaluation, and deployment phases are completed for each sprint rotation, new demands are added to the backlog. The technique prioritizes group decision-making, customer satisfaction, and progress through several brief cycles or sprints instead of a top-down procedure with a single set of steps.

Project Testing

After developing the system in the building phase, the system was subjected to Unit, Integration, and System testing. The result of testing was then used as the basis for improvement that will be done by going through each phase iteratively.

Functional Sustainability. The characteristic represents the degree to which a product or system provides functions that meet stated and implied needs when used under specified conditions.

Performance Efficiency. These characteristics represent the performance relative to the number of resources used under stated conditions.

Compatibility. The degree to which a product, system, or component can exchange information with other products, systems, or components and perform its required functions while sharing the same hardware or software environment.

Usability. The degree to which specified users can use a product or system to achieve specified goals with effectiveness, efficiency, and satisfaction in a specified context of use.

Reliability. The degree to which a system, product, or component performs specified functions under specified conditions for a specified period.

Security. The degree to which a product or system protects information and data so that persons or other products or systems have the degree of data access appropriate to their types and levels of authorization.

Maintainability. This characteristic represents the degree of effectiveness and deficiency with which a product or system can be modified to improve it, correct it, or adapt it to changes in environment and requirements.

Portability. Degree of effectiveness and efficiency with which a system, product, or component can be transferred from one hardware, software, or other operational or usage environment to another.

Mean was used to analyze and interpret results gathered using the ISO 25010 evaluation instrument. The Numerical Scale Table 1 was the basis for interpreting the computed mean.

Table 1

Descriptive interpretation of the mean for the performance evaluation of Sis Ems Bulaluhan Point-of-Sale System

NUMERICAL SCALE	INTERPRETATION
4.51-5.00	Excellent
3.51-4.50	Very Good
2.51-3.50	Good
1.51-2.50	Fair

1.00-1.50	Poor

Table 1 shows the interpretation of the mean for the performance evaluation of the Sis Ems Bulaluhan Point-of-Sale System, where 4.51-5.00 shows as excellent, 3.51-4.50 shows as very good, 2.51-3.50 shows as good, 1.51-2.50 shows as fair, and 1.00-1.50 shows as poor performance.

IV. RESULTS

This chapter presents the project description and structure, capabilities and limitation of project evaluation.

Project Design

The developmental methodology uses the Agile model to keep the client in touch and ensure they are actively involved at every level of the software development process.

Description of the Prototype

The prototype contains a variety of modules to create the purpose of the system; modules included are the following: Login Module, Administrator Module, Report Module, Sales Module, Print Module, and Filter Module.

First is the standard module to create security and define each user's level. The Login module serves as the first page to let users enter the system's core, whether the user is the Administrator or the Employee. Furthermore, the module provides prompting capabilities to inform users of incorrect credentials. Lastly, this module lets the user know that to recover their forgotten password, they must contact the administrator to change it.

The administrator Module contains the admin's necessary controls by viewing the dashboard and adding or modifying product details like name, price, category, and image. The administrator is also responsible for adding or modifying the employee's user info, and they are the sole users who can recover and change the employee's forgotten password.

Report Module allows the administrator to view the table of transaction records as well as to export the data within the compiled transaction records. The data is converted into an Excel file depending on the administrator's option, whether they want a month's data or the whole transaction record.

The Sales Module is another crucial factor in the structure of the Point-of-Sale system, as this module deals with inputting data from the customer's orders and payment validation. One of the features in this module is the ability to turn off the Print button whenever the user has not entered a certain amount of Tendered Cash compared to the calculated Total Price of the order. The following module is interconnected with this. The Print Module can print physical copies made from the Sale Module; upon printing, the transaction has been saved through the administrator's dashboard.

Finally, is the Filter Module, which filters or sorts menu categories presented on the employee's side whenever taking the customer's orders. This module serves as a convenience for them so that they will not be bothered to scroll through each menu item.

Users of the Study

The users of this study will be the owner of the said establishment and also their cashiers during the shift.

Table 2

The Level of Access one is editing, uploading, updating, and deleting. The level of Access Two is just for inputting data

Level of access	User
I	Owner / Manager
II	Employees

Owner / Manager

Acts as the administrator of the system as they have complete control over the management of the data. They have access to the reports of sales and inventory.

Employees

They are the staff who are present during the shift. They have limited access to the system as their main focus is inputting the orders of the customers, and eventually, that data is transferred to the database. They are allowed to check the availability of inventory stock for the orders.

User Design

The following figures displayed are features in the system. The Log-in flow, Admin flow, and Employee and Sales Flow for the proposed system.

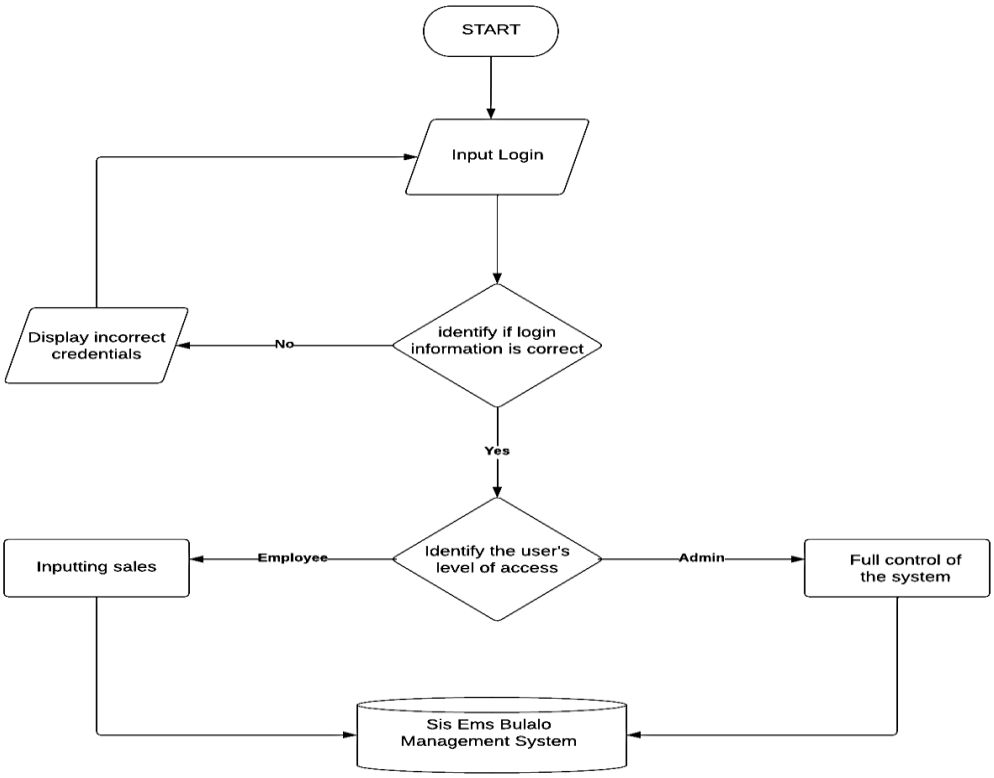


Figure 4.1. Login Flow

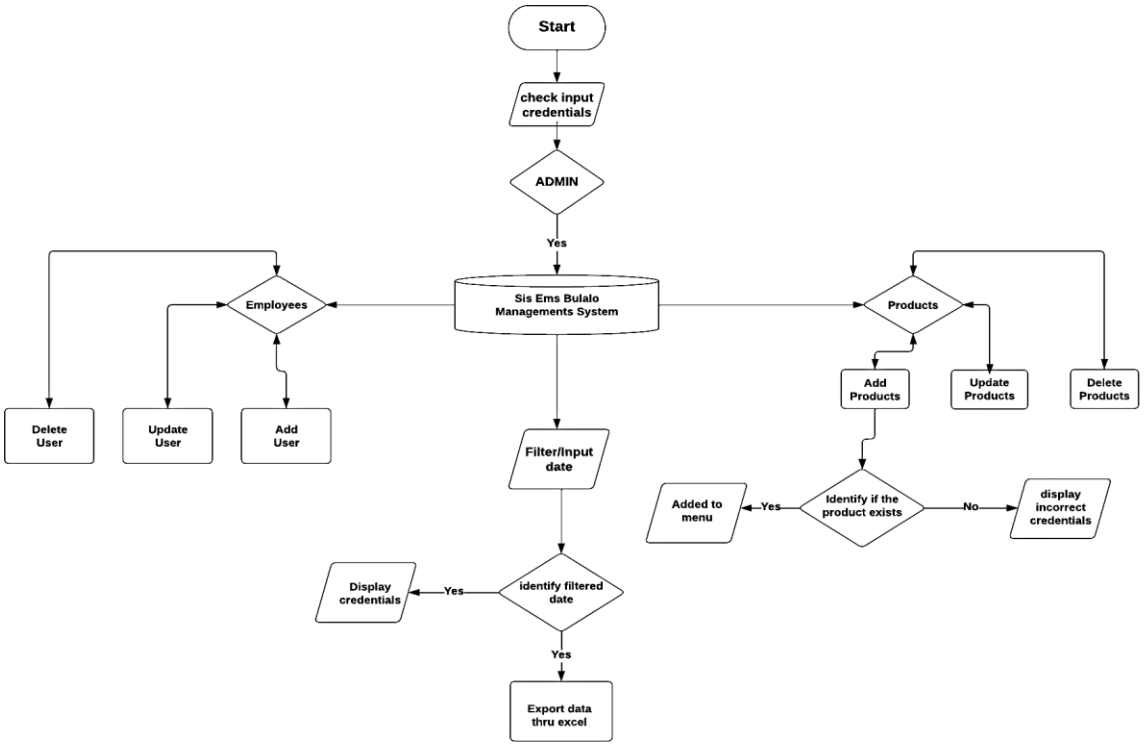


Figure 4.2. Admin Flow

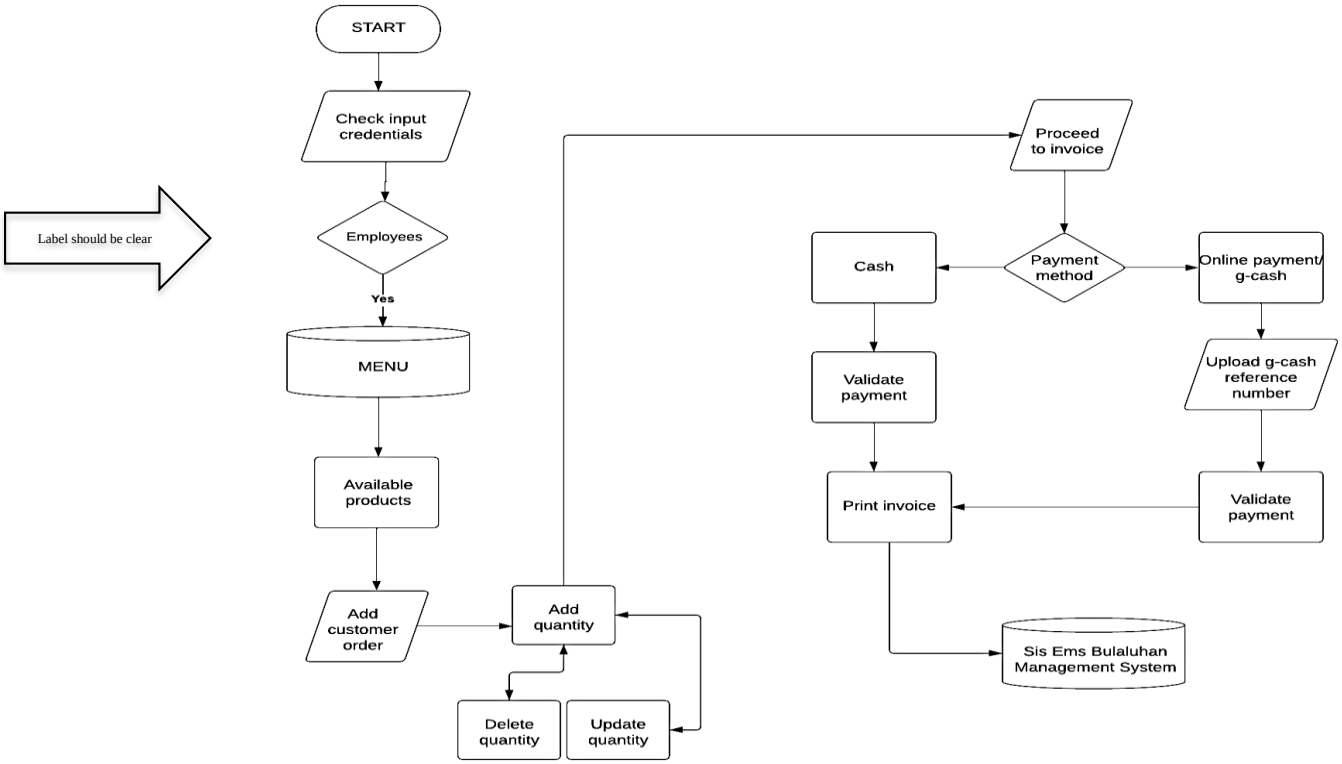


Figure 4.3. Employee and Sales Flow

Diagrams are the developed system flows of an admin or employee logging in to the management system (Fig.4.1). If incorrect details are encoded, the user will be given an error and will not proceed further inside the system for security measures. The following diagram is the admin flow (Fig.4.2), displayed upon the users logging in to the system; it is shown to have different access levels depending on whether the user is an employee or the owner.

Next is Employee and Sales Flow (Fig.4.3), mainly the direction of how the sales record is saved into the system. Also, the Customer Invoice displays the transaction process and printing of the invoice for the customer; on the other hand, the system records that data to report to the Owner/Manager through the Sis Ems Bulaluhan Management System.

Screenshot of the System

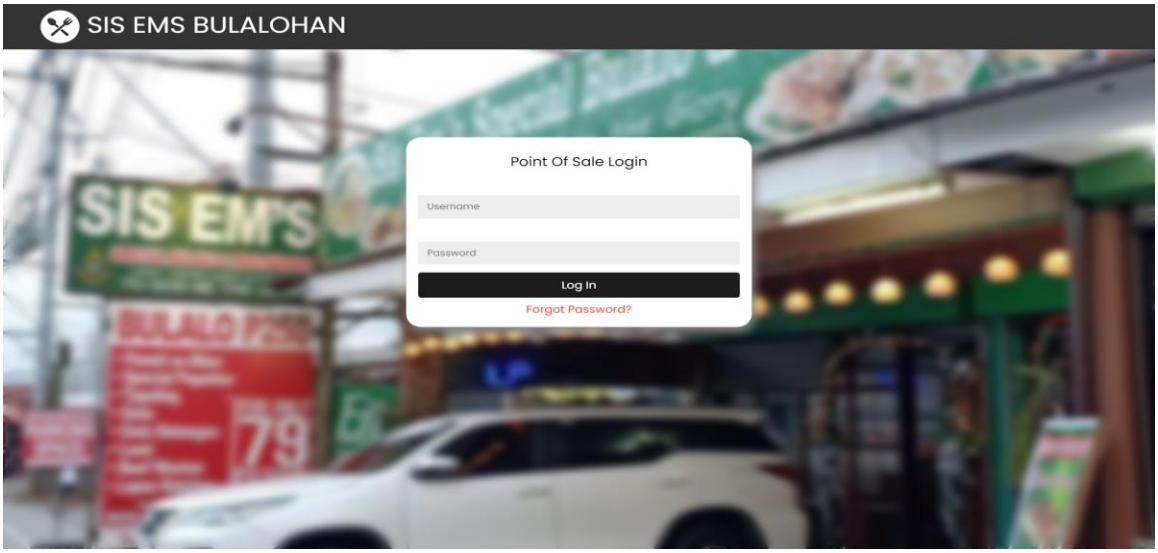


Figure 5. Log-In Page

The site allows access to users after entering their username and password. After validation, the user will be directed to either the system's Administrator or Employee side. In addition, it is only possible to change or recover the password by contacting the Administrator.

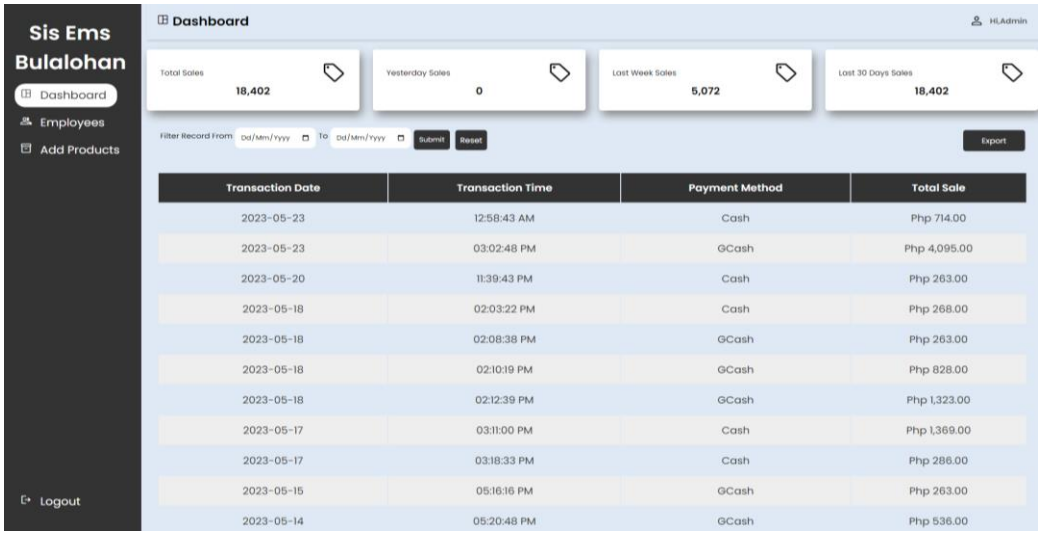


Figure 6. Admin Dashboard

The dashboard has many features for the administrator's convenience. Firstly, they can view the Total Sales, Yesterday's Sales, Last Week's Sales, and the Last 30 Days' Sales. The transaction table fetches the recorded transactions made by the Employee side. The filter feature is helpful to find a specific date range of transactions, and finally, the Export feature is to create an Excel file of the specific records needed.

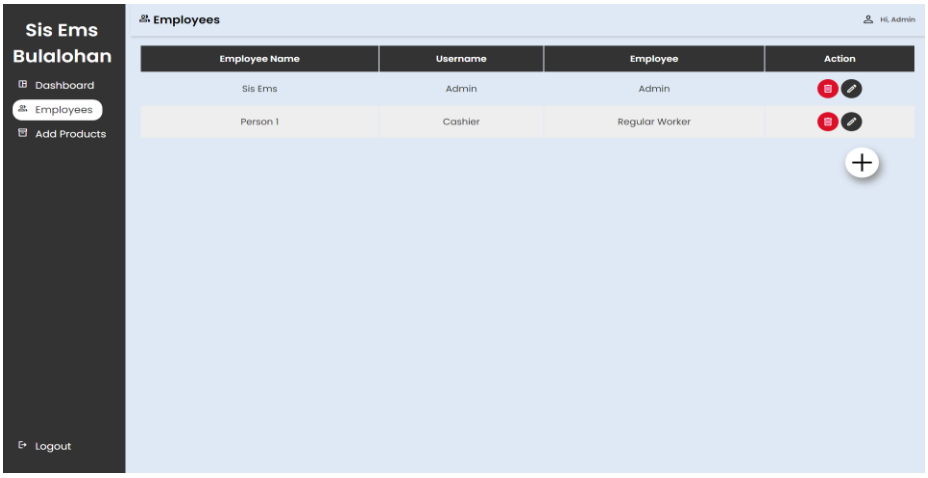


Figure 7. Employee Account Management

This site is only limited to the Administrator to create or modify their employee’s accounts, wherein the owner can add, delete, and edit the information of the employees.

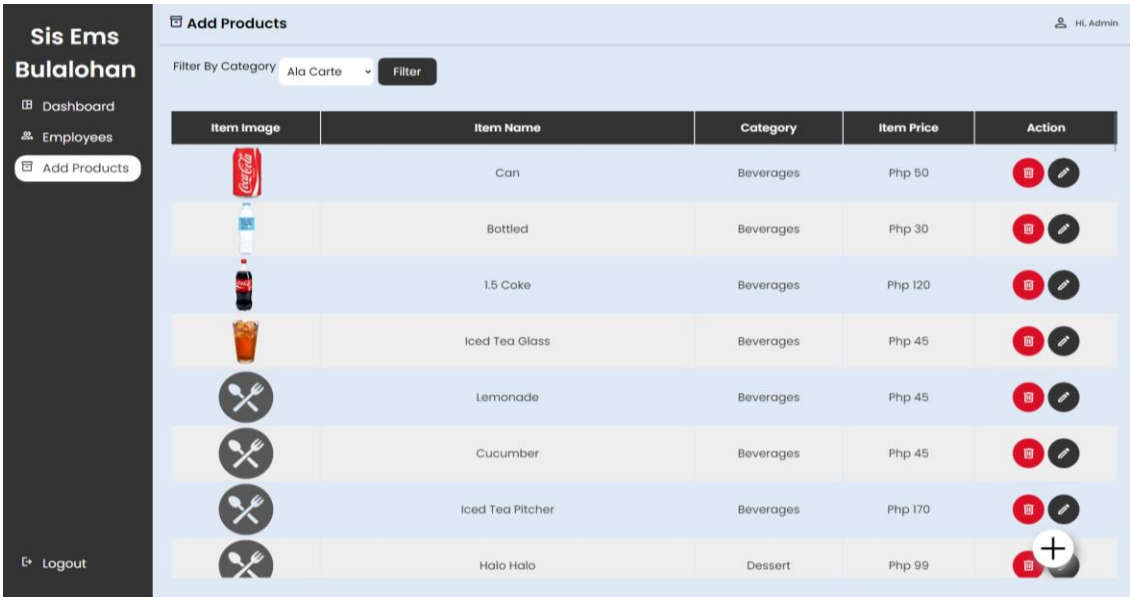


Figure 8. Product Management

This is another site limited to the administrator, and they get to modify or add products to the restaurant's menu. This list will also be shown to the employee to let them take the customer's orders.

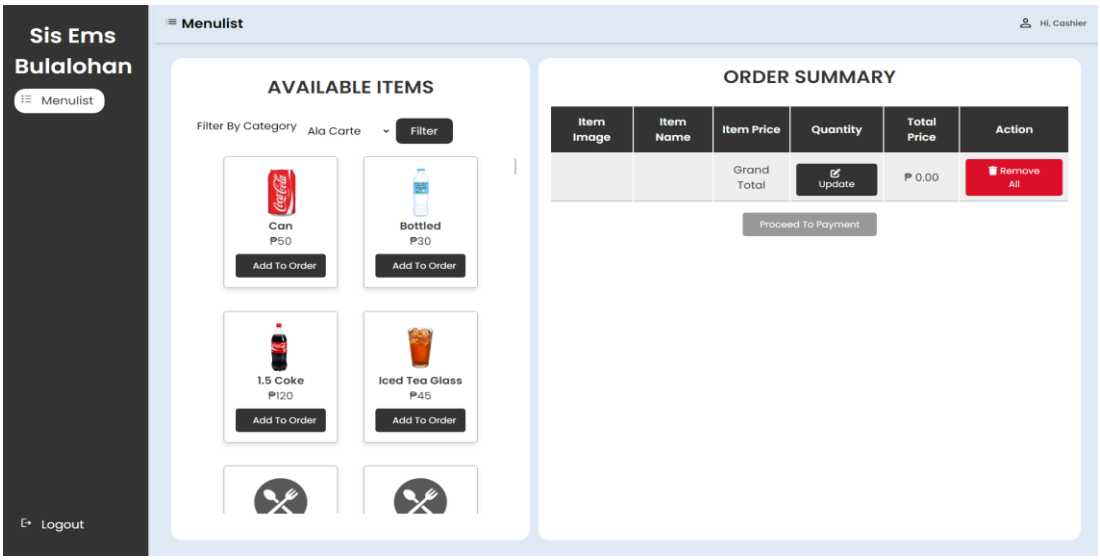


Figure 9. Order Summary Page

This is the landing page for the Employees. They can view and select the necessary items from the customer orders, and it is also possible for them to update quantities or remove items from the summary if needed.

Figure 10. Order Invoicing Page

The page acts as a form to let the cashier enter the essential details of the order so that the payment can be validated and added to the system's records. The employee can input if the customer paid by cash or by e-wallet, specifically by GCash, which is the only available payment method of e-wallet from the restaurant itself.

Project Capabilities and Limitation

The following are the capabilities of the Developing Sis Ems Bulaluhan Restaurant Point-of-Sale System using the Localhost database server:

1. The admin can view transaction records based on the date and time it was recorded,
2. The admin can export weekly, monthly, and all transactions through an Excel file,
3. Employees are given a filter option to filter through the menu while taking customer's orders as well as automatically calculating the total by its quantity,
4. The employees can also enter the necessary details for validating the customer's payment and return a printed invoice for the customer.

The following are the limitations of the system:

1. The system is localhost only, and no one can remotely access it,
2. The system is directly connected to a power source; any data without being submitted can result in data loss,
3. The system is reliant on being connected to Wi-Fi or data connection.

Project Development

System development starts with the researchers planning what they aim for the client's needs; with that as a foundation, it helps the team's programmer to lay the necessary modules for the developing system. The next phase is gradually building the system's structure, starting with its core functions like the login module, administrator's side, point-of-sale module, and invoicing. It is also beneficial to the team's programmer to collect valuable criticism to improve the system's functionality and ease of access, as the system is intended for users not accustomed to a system's assistance.

Planning. In this phase, the researchers gathered all the necessary information for the project. Data gathering was done using various methods, such as face-to-face interviews with the owner and staff of the Restaurant, to define the project's scope clearly. It explains the objectives and outlines what was needed for the project application.

Figure 11. Requirements Planning

Figure 11 shows team members and clients communicate to establish the project's goals and standards as well as to discuss the problems that may arise and need to be fixed during development.

Analysis and Design. The researchers designed the modules and prototypes of the application. They followed the needs of the users and the features identified in the planning phase with the help of Figma for wireframing.

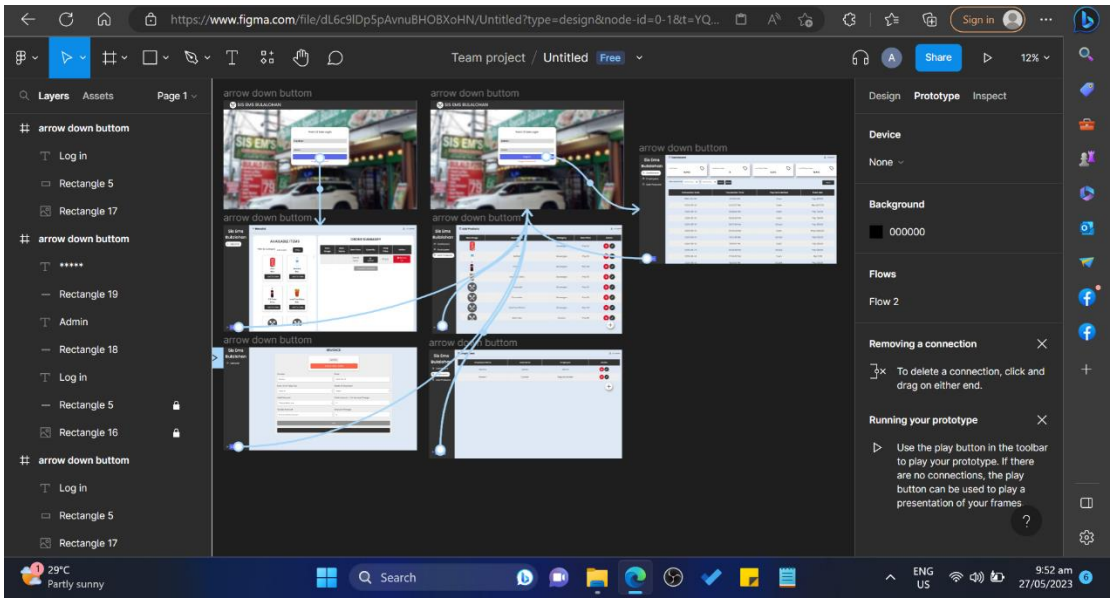


Figure 12. Prototype System

Figure 12 shows the prototype of the system using the Figma software to show how the system will flow and the functions of the respective buttons.

Implementation. The researchers begin the development process with the specified specifications and user input. Researchers used the programming language of PHP for the database structure, HTML and CSS for the basic layout of necessary elements to fulfill its user-friendly requirements, and JavaScript for dynamically updating contents and other system elements.

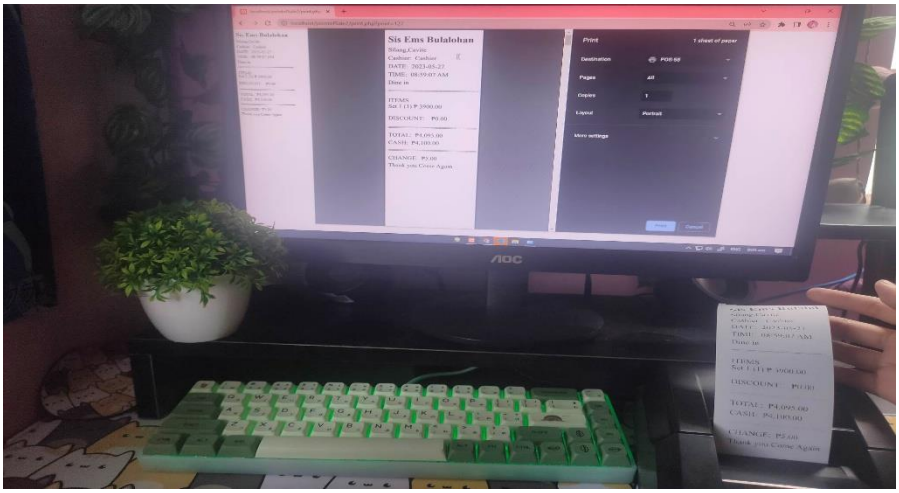


Figure 13

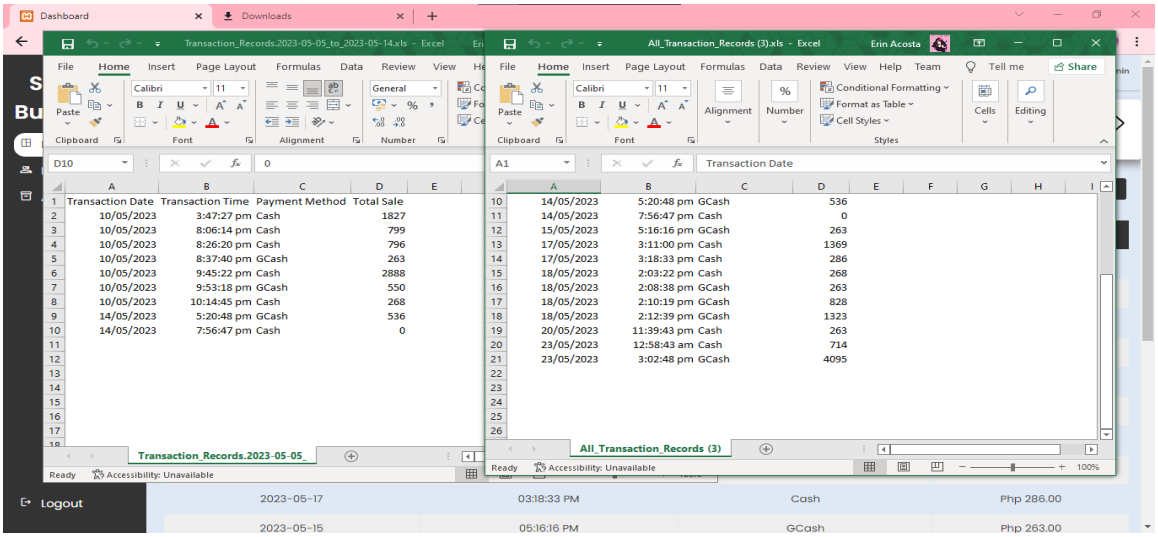


Figure 14

Testing. After implementing the project, it undergoes unit, integration, and system testing to detect any flaws, bugs, or errors before deployment. The testing process involved direct interaction, with researchers guiding participants in navigating the Sis Ems Bulaluhan Restaurant Point-of-Sales System, ensuring efficient testing in each phase.

Evaluation. Upon completing each phase, the Sis Ems Bulaluhan Restaurant Point-of-Sales

System is prepared for deployment and evaluation.

Project Testing

Table 3 represents the summary of Sis Ems Bulaluhan Restaurant's Point-of-Sale System. Login Module, Administrator Module, Sale module, and Report Module received the "Passed" remarks from the two (2) tester participants, two (2) IT Professionals, one (1) owner of Sis Ems restaurant, and one (1) Sis Ems restaurant staff.

Table 3.1

Module: Log-in Module

Test Conducted	Test Result	Remarks
FUNCTIONALITY		
Able to log in with correct credentials	Was able to login to system	Passed
Able to deny access with incorrect credentials	Can deny access to user	Passed
Able to prompt errors of input fields	Can prompt errors as stated	Passed
Able to logout of account	Can log out of the account	Passed
Recover password by contacting Administrator	Can recover password after contacting Admin	Passed
Accuracy		
Access privileges is correct		Passed
Access a valid information		Passed

Table 3.2

Module: Administrator module

Test Conducted	Test Result	Remarks
FUNCTIONALITY		
Able to login as admin	Can login as admin	Passed
Able to view sales report	Can view sales report	Passed
Able to export by range of date for sales report	Can export necessary sales report	Passed
Able to export all records of sales	Can export all records of sales	Passed
Able to create an employee account	Can create an employee account	Passed
Able to update an employee account	Can update employee account	Passed
Able to remove an employee account	Can remove an employee account	Passed
Able to insert items	Can insert items	Passed
Able to update items	Can update items	Passed
Able to delete items	Can delete items	Passed
Able to display items	Can display items	Passed
Accuracy		
Access privileges is correct		Passed
Access a valid information		Passed

Table 3.3

Module: Sales Module

Test Conducted	Test Result	Remarks
FUNCTIONALITY		
Able to view items per category	Can view items per category	Passed
Able to accept orders with multiple items in different categories	Can accept orders with multiple in different categories	Passed
Able to cancel items and cancel an order	Can cancel items and cancel an order	Passed
Able to add discount to order	Can add discount to order	Passed
Able to accept cash	Can accept cash	Passed
Able to accept e-money	Can accept e-money	Passed
Able to print receipt	Can print receipt	Passed
Accuracy		
Access privileges is correct		Passed
Access a valid information		Passed

Table 3.4

Module: Report Module

Test Conducted	Test Result	Remarks
FUNCTIONALITY		
Able to print a receipt with purchased items, cashier name and total price	Can print receipt with the necessary information	Passed
Able to print sale	Can print sale	Passed

Accuracy		
Access privileges is correct		Passed
Access a valid information		Passed

Project Evaluation

Table 4

Evaluation Results

CRITERIA	MEAN	QUALITATIVE INTERPRETATION
Functionality Sustainability	4.69	Excellent
Performance Efficiency	4.67	Excellent
Compatibility	4.68	Excellent
Usability	4.72	Excellent
Reliability	4.61	Excellent
Security	4.67	Excellent
Maintainability	4.66	Excellent
Portability	4.62	Excellent
OVERALL MEAN	4.66	EXCELLENT

Table 4 summarizes the Sis Ems Bulaluhan Restaurant Point-of-Sale System Usability, with the highest mean of 4.72 with an “Excellent” rating. Functionality Sustainability with a 4.69 mean, Compatibility with a 4.68 mean, Performance Efficiency and Security with a 4.67 mean, Maintainability with a 4.66 mean, and Portability with a 4.62 mean. Reliability with 4.61 mean. The established device was classified as "Excellent" based on the overall mean for the criteria included in the evaluation instrument, which produced an average rating of 4.66. The evaluation result implies that

the developed Sis Ems Bulaluhan Restaurant Point-of-Sale System.

The application was evaluated by five (5) IT professionals, five (5) owners, and twenty (20) Students. The following procedures were undertaken during the evaluation.

The responders were given a comprehensive system description during the Project Demonstration phases—the application use, operation, capabilities, limitations, and evaluation tool. The researchers thoroughly showed the system's functionality. Requesting that responders serve as evaluators, allowing them time to review the application prior to evaluating it, and collecting the assessment sheet from the evaluators all happen after the request.

Implementation Plan

Table 5

Implementation plan of the project

STRATEGY	ACTIVITIES	PERSONS INVOLVED	DURATION
Approval from the owner	Letters	Researchers, Administrators	1 day
System’s Installation	Installation of the required software	Researchers, Administrators	1 hour
System’s Installation	Manuals	Administrators, Employees	1 day
2-3– days training	Hands on Training & Lectures	Administrators, Employees, Researchers	2-3 days

Table 5 shows the implementation of the plan for the augmented reality platform for the Sis Ems Bulaluhan Restaurant Point-of-Sale System. It starts with requesting permission from the owner and laying out a thorough plan demonstrating the application's advantages. After receiving clearance, the emphasis switches to system installation, ensuring that the required hardware and software components are bought and seamlessly incorporated into the hardware device. At the same time, a

well-thought-out information distribution strategy is created to inform users about the benefits and features of the application. Finally, a training session will give employees the information and abilities to use the application properly. This all-encompassing strategy guarantees a seamless changeover, improves user adoption, and leverages the potential advantages of the new system**.**

IV. DISCUSSION

The Sis Ems Bulaluhan POS System was built to give the owners an easy way to track their daily, weekly, and monthly sales by giving them a system application that can showcase a user-friendly interface. It is easier for them to appropriately take orders, which are then inputted into their system, automatically directed to their database, and automatically saved to the sales.

The software was developed from February 2023 to May 2023 at Olivarez College Tagaytay. Significant data, related literature, and studies were gathered from the Internet and through personal visitation.

The application was developed using PHP to create a connection from the system and to a localhost database, along with JavaScript as a programming language for making dynamic content, Cascading style sheets (CSS) for the designs, and Hyper Text Markup Language for displaying text, image and other forms of multimedia. Finally, the application was tested for functionality and accuracy and evaluated using the ISO 25010 evaluation instrument for functional suitability, performance efficiency, compatibility, usability, reliability, security, maintainability, and portability.

The project was tested by five participants, one of whom were the Owner of Sis Ems Bulaluhan Restaurant, and two were IT professional. For evaluation, there were thirty (30) respondents, comprising fifteen (15) IT students, five (5) IT professionals, and ten (10) Sis Ems employees. The

overall result of the evaluation was "Excellent," with an average mean of 4.66, which means that the desired output was implemented.

In conclusion, taking orders from customers and manually recording the sales can be very challenging because there may be times when many customers arrive, and the owner needs help to keep track of each sale separately. This is a common issue that many restaurants run into. Researchers have developed a solution to enable restaurant operators to keep track of their sales and have a POS that goes along with it.

It allows the proprietor's Restaurant to have a record of their sales, whether it be printed or merely presented digitally, by having a system that has a POS and sales tracking system.

The project was evaluated through a face-to-face demonstration and assessed using the evaluation instrument of Olivarez College Tagaytay, adapted from ISO 25010. According to the overall evaluation results, the project had a verdict that was excellent in most software quality criteria such as functional suitability, compatibility, usability, reliability, security, maintainability, and portability and very good in performance efficiency. The researchers concluded that the sale tracking with the POS system for Sis Ems Bulaluhan Restaurant.

REFERENCES

Achebe P. N. (2018) The prospects and challenges of electronic finance in nigeria. (n.d.). *International Journal of Science and Management Studies*, *01*(04), 60. The Prospects and Challenges of Electronic Finance in Nigeria (ijsmsjournal.org)

Ahmed, A. (2022, May 19). Importance of Sales Management For your Business – Sokrio. *Sokrio*. https://sokrio.com/importance-of-sales-management/

Clark, J. (2022). The Key Disadvantages of POS Systems Every Business Owner Should Know. *National Processing*. https://nationalprocessing.com/blog/the-key-disadvantages-of-pos-systems

Gebre, F (2018). Factors affecting the adoption of point-of-sale terminals by the business organization: The case of commercial bank of ethiopia POS machine. (n.d.). *ST. MARY'S UNIVERSITY SCHOOL OF GRADUATE STUDIES*. http://repository.smuc.edu.et/bitstream/123456789/4102/1/Download%20File.pdf

Guenzi, P., & Habel, J. (2020). Mastering the Digital Transformation of Sales. *California Management Review*, *62*(4), 57–85. https://doi.org/10.1177/0008125620931857

Hasan, R. (2023). What are the Disadvantages and Advantages of POS system in Restaurant *www.linkedin.com*.https://www.linkedin.com/pulse/what-disadvantages-advantages-pos-system-restaurant-rajib-hasan/?fbclid=IwAR2UoOBTHxgRe-Nbukb8vNhnjFjfs8yfh-cH_6Tro8n24j1GoW9w7_XlHjE

Hossain, M. S., & Zhou, X. (2018). Impact of m-payments on purchase intention and customer satisfaction: perceived flow as mediator. *Zenodo (CERN European Organization for Nuclear Research)*. https://doi.org/10.5281/zenodo.1408692

Jondhale, & Khairnar, D. T. (2018) Impact of inventory management on productivity with special reference to medium-scale manufacturing industries of nasik industrial estate. (n.d.). *Research India Publications*, *13*(5). http://www.ripublication.com/ijaerspl2018/ijaerv13n5spl_06.pdf?fbclid=IwAR3PR K6d-0KVEOUvSx6DgGockYeBydwbvzx4S9zVrH1CFNBAK10Up6WU34

Joshi, M. (2023). Daily Sales Tracker – What to Track and How? *LeadSquared*. https://www.leadsquared.com/daily-sales-tracker/

Khanna, A., Gupta, D., Pólkowski, Z., Bhattacharyya, S., & Castillo, O. (2021). *Data Analytics and Management: Proceedings of ICDAM*. Springer Nature. Proceedings of Data Analytics and

Management : ICDAM 2021, Volume 1 | SpringerLink

Kingston, D-H. (2018) *The Prospects and Challenges of PoS as Electronic Payment System in Nigeria - PDF Free Download*. (n.d.). https://docplayer.net/129537081 The-prospects-and-challenges-of-pos-as-electronic-payment-system-in-nigeria.html

Kocaman, E. M. (2021) Operational effects of using restaurant management system: An assessment according to business features. (n.d.). *International Journal of Gastronomy and Food Science*, *25*. https://www.sciencedirect.com/science/article/abs/pii/S1878450X21001074

Kocaman, E. M. (2019). Restaurant Management System (RMS) and Digital Conversion. In *Advances in hospitality, tourism and the services industry (AHTSI) book series* (pp. 70–98). IGI Global. https://doi.org/10.4018/978-1-5225-8494-0.ch004

Kumar, A., & Mozar, S. (2018). *ICCCE 2018: Proceedings of the International Conference on Communications and Cyber Physical Engineering 2018*. Springer. ICCCE 2018: Proceedings of the International Conference on Communications and Cyber Physical Engineering 2018 | SpringerLink

Reeves, S. (2023). 7 Key Benefits of Systems Integration for Businesses. *GoodCore Blog*. https://www.goodcore.co.uk/blog/benefits-of-systems-integration/

Silva, W. a. R. S. (2022). *Restaurant Management System (FineDine)*. https://dl.ucsc.cmb.ac.lk/jspui/handle/123456789/4319?fbclid=IwAR2DV_KGSmRLEg6ej0xuHCDvwz0g9DPGz985Ich2RlJXjO5TuFqqkRE1d1Q

Digitized School Inventory and Reservation Management System for Olivarez College Tagaytay Bookstore

Alab, Frix Gerald., Barral, Noah Alexander.,De Gala, Angel Lowyza., Alcaraz, Mark KC Bulawin, Dynna., Canja, Julia Ortega., Alegado, Bren Julius., Dalanon, Mike Kerby.,Conteñente, Jhona Joy., Andaya, John Dominic., Dela Vega, Jaypee., Fradejas, Maxine Grace

I. Abstract

Digitized School Inventory and Reservation Management System for Olivarez College Tagaytay Bookstore is a system that includes a digital recording system as well as reservation management. The system aims to provide students with a reservation system they may use to conveniently purchase items. For the convenience of the bookstore employee, the system also provides hassle-free, accurate, and data loss-free management. The researchers used the Capstone Project as the research design since the study focuses on developing a system. A total of 20 Senior High School students, five IT experts, and one bookstore employee were selected with the use of the Quota Sampling technique. In gathering the needed data, the researchers used survey questionnaires. Also, different statistical treatments such as frequency, percentage, and weighted mean score were utilized. The evaluation's results showed that the system for the bookstore, which is used by IT experts, obtained great marks in each of the six (6) categories that were evaluated, demonstrating that the system is capable of carrying out all necessary functions and effective in terms of giving accurate information about the system, while also being considered excellent by both students and bookstore employee. Future researchers are advised to concentrate more on security since this will help them maintain and improve the system.

Keywords: *inventory, reservation management, system, security, capstone project, digital*

II. Introduction

Digitized School Inventory and Reservation Management System for Bookstore in Olivarez College Tagaytay is a system that provides a digital recording system with reservation management in it. The digital inventory system automatically records data, enabling the school to monitor inventory control. The system also enables the school and the student to view the remaining stock, the availability of the products, and student records on a computer dashboard. As a result, they can avoid delays and waste of time and money.

According to the interview conducted by the researchers, the bookstore's current system has a big problem. Because of the late stock or unsure amount of stock coming from the supplier, the bookstore employee was unable to update the quantity or amount of the current stock of a certain product to the students or consumers with the current system the bookstore has. That has the effect that the only information the customers or students had was the pick-up schedule, there was no guarantee that they would receive it, this led to time and money being wasted, and that is why the bookstore receives so many complaints. Based on the study by Lucas B. et al., (2019), electronic implementation increased the availability of structured anamnesis and treatment information, in conclusion, electronic implementation helps increase the development of a business.

The system's objective is to give students a convenient way to make reservations for purchases at the Olivarez College Tagaytay Bookstore. They can do so right away to guarantee that it will be in stock and available when they wish to purchase it. The product availability in the bookstore system is also visible to the users. Additionally, the system offers hassle-free accurate, and data loss-free management, which is advantageous for bookstore staff. This study can benefit the students to avoid the time they can lose if they do not get the item they wanted. It can also benefit the staff members by lessening the workload and making sure that the data is protected and can be easily accessed. As for future researchers, this study can benefit them as an additional insight to their future study, this can also help them pin out incoming issues that may occur during the current situation.

The researchers concluded that the current system at the bookstore was the main issue after conducting an interview. The employee of the bookstore is unable to inform students or customers of the number or amount of the current stock of a certain product using the technology the bookstore currently employs. Time and money were spent because there was no guarantee that customers or students would receive the item and because they just knew the pick-up schedule, which is why the bookshop gets so many complaints. Online booking systems can help to reduce the burden and enhance

overall time management, according to Tjoe (2021). In order to spend less time on customer care and more time interacting with customers, automation, and integrations are here to help.

The purpose of the system is to provide the students with a reservation system that they can use to buy items from the Olivarez College Tagaytay Bookstore without having problems. They can reserve it immediately to make sure that the item is still available or in stock, on the day they want to buy it. Also, they can track the time or day when they can get the item they bought. The students can also see the availability of the products in the bookstore system. The system also provides hassle-free accurate and data-loss-free management, which can benefit the bookstore employee. A study by Amato G et al., (nd) MILOS: A Multimedia Content Management System is flexible in the management of documents containing different types of data and content descriptions; it is efficient and scalable in the storage and content-based retrieval of these documents.

Specifically, this study aims to answer the following questions:

1. What is the level of acceptability of the Digitized School Inventory and Reservation Management System in terms of:

    1.1 Functionality;

    1.2 Reliability;

    1.3 Usability;

    1.4 Efficiency;

    1.5 Maintainability?

2. What is the level of effectiveness of the Digitized School Inventory and Reservation Management System in terms of:

    2.1 Functionality;

    2.2 Reliability;

    2.3 Usability;

    2.4 Efficiency;

    2.5 Maintainability;

    2.6 Portability?

This study is supported by the theory of Frenken K. (2012) the technological innovation and complexity theory. Complexity theory is the study of complex and chaotic systems and how they can produce order, pattern, and structure that has had an impact on recent social science models. Most applications in the context of innovations and new technologies have focused on technology adoption and diffusion, while the topic of the innovation process has received less attention. Three types of technological innovation complexity models: fitness landscape models, network models, and percolation models. The models can analyze complex interaction structures (between technological components, between agents engaged in the collective invention) while avoiding 'over-parameterization.' The paper concludes by discussing the remaining methodological challenges and critiques regarding the application of complexity theory.

Conceptual Framework

INPUT	**PROCESS**	**OUTPUT**
KNOWLEDGE REQUIREMENTS They must know what programming language they will use in creating their system. Know how to store and retrieve data from a database using MySQL. Knowledgeable in designing a website SOFTWARE REQUIREMENTS a. Platform Visual Studio Code b. Identification: PHP, CSS, Javascript, HTML, Bootstrap, SQL HARDWARE REQUIREMENTS Laptop Specifications: • Processor: Intel® Core™ i5-3317U, 1.7G/2.6G, T, 3M • Operating System: Windows 8.1 • Memory: 4GB • Display/Resolution: 13.3" (1600 x 900) IPS display with wide viewing angle, 16:9 • Dimensions: 333.4 x 224.8 x 16.9 mm / 13.4x8.85x 0.66 inch • Weight: 1.54kg / 3.40lbs • Video Graphics:Intel® HD Graphics	PLANNING The current inventory system is time-consuming, manual, and prone to human error, resulting in incorrect inventory counts and stockouts. SYSTEM ANALYSIS An information system manages data and transactions related to the school and can be used by students and the bookstore's admin. It provides hassle-free, accurate, and data-loss-free management, which can benefit the bookstore employee. SYSTEM DESIGN Layout Flow Chart DEVELOPMENT Coding \ Programming	Effectiveness of Digitized School Inventory and Reservation Management System for Bookstore in Olivarez College Tagaytay

4000 • Battery life: Greater than 8 hrs • Integrated Communication: WLAN:802.11 b/g/n, Bluetooth® 4.0 • Connectors: 1xUSB 2.0 , 1xUSB 3.0 , 2in1(headphone and mic)/ 3in1 (SD, MMC) card reader WIFI Specifications PLDT/GLOBE/CONVERGE/DATA	Initial Testing IMPLEMENTATION Deployment of the project	

Figure 1. Research Framework

III. Methodology

Researchers used the Capstone Project as the research design since the study focuses on developing a system called a Digitized School Inventory and Reservation Management System. The capstone project has evolved into a crucial component of academic programs at universities. The capstone project offers a singular chance to do independent group study and provide a creative answer to a pressing practical issue (Stephanie L., 2022).

Researchers used the Quota Sampling technique. According to Nikolopoulou (2022), Quota Sampling is a non-probability sampling method that relies on a predetermined number or proportion of units being chosen at random. Thus, the respondents of the study are twenty (20) Senior High School students in Olivarez College Tagaytay, five (5) IT experts, and one (1)1 bookstore employee.

The researchers asked the principal for permission to conduct this study and prepared concept notes for the dissertation supervisor and participants. Secondly, the researchers let the respondents use the system. The researchers then distributed the survey questionnaires to the respondents. Lastly, the researchers counted and analyzed the data containing the respondents' answers.

The statistical treatments that were used are frequency distributions that determine the demographic profile of the respondents. The percentage was used to get the percentage of frequency distribution per category or data set. Weighted Mean was used to determine the level of effectiveness

and acceptability of the Digitized School Inventory and Reservation Management System for the Bookstore in Olivarez College Tagaytay. To arrive at a definite result, a mean score range was used.

RANGE	QUALITATIVE DESCRIPTION
3.26 - 4.00	Highly Effective
2.51 - 3.25	Effective
1.76 - 2.5	Slightly Effective
1.00 - 1.75	Not Effective

RANGE	QUALITATIVE DESCRIPTION
3.26 - 4.00	Highly Acceptable
2.51 - 3.25	Acceptable
1.76 - 2.5	Slight Acceptable
1.00 - 1.75	Not Acceptable

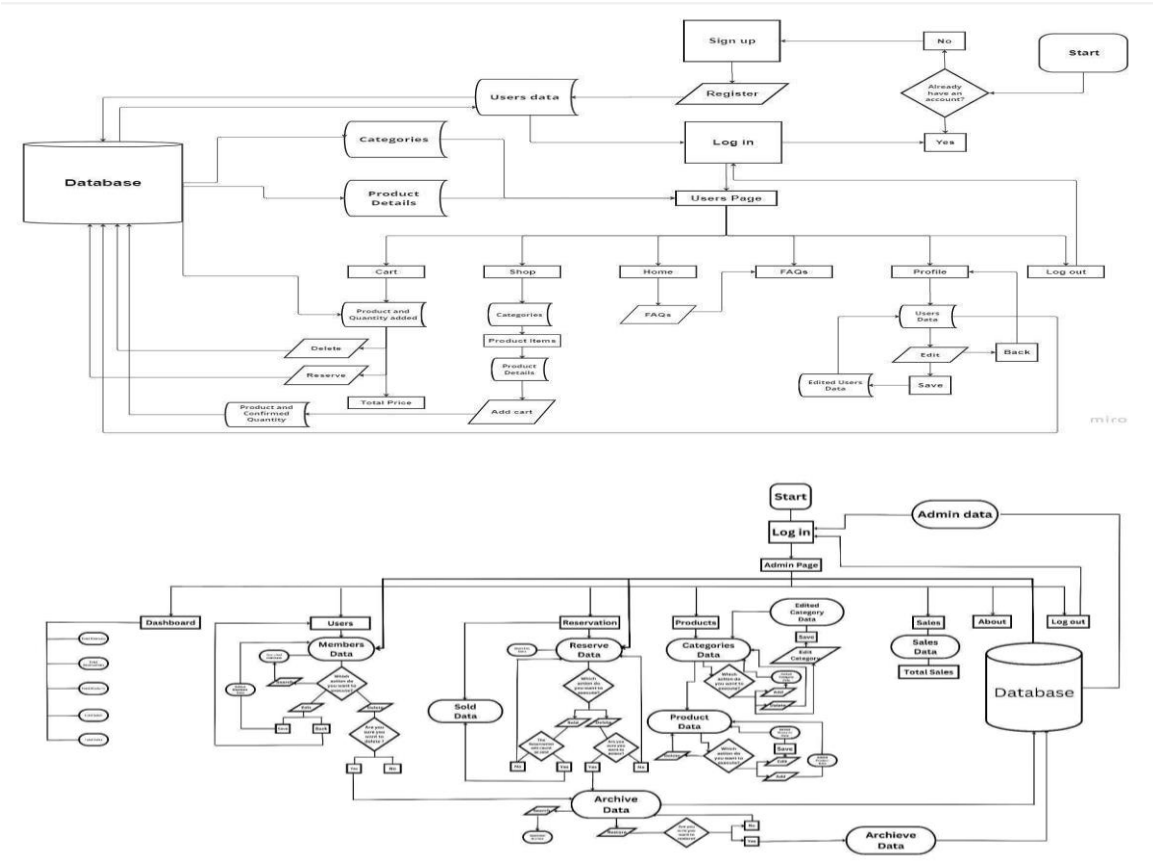


Figure 2: User Database and Figure 3: Admin Database

IV. Results

Problem 1. What is the level of acceptability of Digitized School Inventory and Reservation Management System in terms of;

1.1 Functionality,

1.2 Reliability,

1.3 Usability,

1.4 Efficiency,

1.5 Maintainability?

Table 1: Level of Acceptability of the Program

Indicators:	**Weighted mean**	**Verbal Interpretation**
A. Functionality (The system will be tested if)		
1. It can perform all tasks required	3.90	Highly Acceptable
2. It can perform correct results based on its intended functions	3.86	Highly Acceptable
Total Weighted mean	**3.88**	**Highly Acceptable**
B. Reliability		
1. It meets the needs for reliability under normal operations such as inventory and reservations	3.71	Highly Acceptable
2. It provides identification and authentication of users through their username and password	3.81	Highly Acceptable
Overall Weighted Mean	**3.76**	**Highly Acceptable**
C. Usability		
1. It is appropriate for the users' need	3.76	Highly Acceptable
2. It is easy to operate based on the reservation procedure	3.81	Highly Acceptable
3. Its interface looks good and it is not stressful.	3.67	Highly Acceptable
4. Its frequently asked questions (FAQS) provide proper Information about the system	3.86	Highly Acceptable

Total Weighted mean	**3.77**	**Highly Acceptable**
D. Efficiency		
1. It provides appropriate response time, processing time, and through output rates when performing various tasks	3.76	Highly Acceptable
2. Its system has been used to perform its functions and produce its needed output in reserving items.	3.76	Highly Acceptable
Total Weighted mean	**3.76**	**Highly Acceptable**
E. Maintainability		
1. It applies changes to the entire system using its content management feature.	3.81	Highly Acceptable
2. It can identify the specific parts that shall be modified	3.76	Highly Acceptable
Overall Weighted Mean	**3.79**	**Highly Acceptable**

Table 1 presents the level of acceptability of users at Olivarez College Tagaytay. First, in terms of functionality as acceptability by users, among the two (2) specific indicators, "*It can perform all tasks required."* attained the highest score of 3.90 which is verbally interpreted as highly acceptable while *"It can perform correct results based on its intended functions."* attained the lowest weighted mean with the score of 3.86 but still verbally interpreted as highly acceptable. This means that the system is capable of executing all required tasks. However, executing the results depending on the desired functions comes with slight difficulty. According to Ismail et al. (2020), functionality is a critical factor that determines its adoption and usage. It should be designed to offer a wide range of functionalities that meet the needs of different users.

Second, in terms of reliability as acceptability by users, among the two (2) specific indicators, *"It provides identification and authentication of users through their username and password."* attained the highest weighted mean with a score of 3.81, which is verbally interpreted as highly acceptable while *"It meets the needs for reliability under normal operations such as inventory and reservations."* attained the lowest weighted mean with the score of 3.71 but still verbally interpreted as highly acceptable. It indicates that users can be identified and authenticated using their login and password.

However, there is a minor difficulty when it comes to the requirements for dependability under typical activities, such as inventory and reservations. According to Johnson & Olshavsky (2018), users found reservation confirmation emails to be helpful and informative, particularly when they contained details such as the date, time, location, and any other pertinent information.

Third, in terms of usability as acceptability by users, among the four (4) specific indicators, *"Its frequently asked questions (FAQS) provide proper."* attained the highest weighted mean with a score of 3.81, which is verbally interpreted as highly acceptable while *"Its interface looks good and it is not stressful."* attained the lowest weighted mean with the score of 3.67 but still verbally interpreted as highly acceptable. The usability of an interface is a crucial role in the overall user experience. This result shows that the system is easy to use for users because it has a frequently asked question (FAQS) that provides them with information about the system. However, some users find that the interface looks of the system is slightly not appealing but it is still rated as highly effective. According to Holden & Butler (2014), the system provides a collection of design principles that can be applied to create products and systems that are easy to use.

Fourth, in terms of efficiency as acceptability by users, among the two (2) specific indicators, *"It provides appropriate response time, processing time, and through output rates when performing various tasks."* and *"Its system has been used to perform its functions and produce its needed output in reserving items."* equally attained a weighted mean score of 3.76, making it both verbally interpreted as highly acceptable. The results show that the system is efficient at providing adequate response times, processing times, and output rates when completing various tasks. It also shows that it performs its function and produces the needed output when reserving things, both of which are highly accepted by the users. Smith & Johnson (2018) found that users are willing to tolerate longer processing times if the system provides clear and accurate feedback on its progress.

Lastly, in terms of maintainability as acceptability by users, among the two (2) specific indicators, *"It applies changes to the entire system using its content management feature."* gained the highest score of 3.81, and *"It can identify the specific parts that shall be modified."* gained the lowest score of 3.76, however, they both resulted in a highly acceptable verbal interpretation. It implies that it is easier to use because of the content management feature that helps the system identify the specific parts that need to be modified which makes the system highly acceptable. However, there is a slight

difficulty in identifying the specific parts that shall be modified. Atalag, et.al (2014), found that modeling alone was not sufficient to bring about improvements. It is clear how architectural variances affected maintainability across change requests when comparing relative measurements of time and software size change inside each application.

As a result of all categories, functionality obtained a total weighted mean score of 3.88, reliability gained a total weighted mean score of 3.76, usability gained a total weighted mean score of 3.77, efficiency gained a total weighted mean score of 3.76, and maintainability gained a total weighted mean score of 3.79. Therefore, all five categories are considered highly acceptable regarding verbal interpretation. This means that the digitalized school inventory and reservation management system had an overall high level of acceptability from the user's perspective, in the sense that it functions easily enough for the user to navigate and remember each button, get information through reading the Frequently Asked Questions (FAQs), identify specific parts that need to be modified because of the content management feature. According to Cipresso, et.al (2019), treatment acceptability, which is defined as the level of user satisfaction or comfort with service and willingness to utilize it, has been highlighted as a crucial factor for IBTs (Internet-Based Treatments) for ethical, methodological, and practical reasons. Moreover, acceptability includes the idea that the remedy is seen as appropriate, fair, reasonable, and non-intrusive for a certain issue.

Problem 2. What is the level of effectiveness of Digitized School Inventory and Reservation Management System in terms of: 2.1 Functionality; 2.2 Reliability; 2.3 Usability; 2.4 Efficiency; 2.5 Maintainability; 2.6 Portability?

Table 2. Level of Effectiveness of the Program

Indicators:	**Weighted mean**	**Verbal Interpretation**
A. Functionality (The system will be tested if)		
1. It can perform all tasks required	**3.20**	**Highly Effective**
2. It can perform correct results based on its intended functions	3.60	Highly Effective
Total Weighted mean	**3.40**	**Highly Effective**
B. Reliability		
1. It meets the needs for reliability under normal operations such as inventory and reservations	3.40	Highly Effective
2. It provides identification and authentication of users through their username and password	3.60	Highly Effective

Total Weighted mean	**3.50**	**Highly Effective**
C. Usability		
1. It is appropriate for the users' need	3.80	Highly Effective
2. It is easy to operate based on the reservation procedure	3.80	Highly Effective
3. Its interface looks good and it is not stressful.	3.60	Highly Effective
4. Its frequently asked questions (FAQS) provide proper Information about the system	3.80	Highly Effective
Total Weighted mean	**3.75**	**Highly Effective**
D. Efficiency		
1. It provides appropriate response time, processing time, and through output rates when performing various tasks	3.60	Highly Effective
2. Its system has been used to perform its functions and produce its needed output in reserving items.	3.60	Highly Effective
Total Weighted mean	**3.60**	**Highly Effective**
E. Maintainability		
1. It applies changes to the entire system using its content management feature.	3.20	Highly Effective
2. It can identify the specific parts that shall be modified	3.60	Highly Effective
Total Weighted mean	**3.40**	**Highly Effective**
F. Portability		
It can be accessed easily	3.80	Highly Effective
It can be updated easily	3.60	Highly Effective
It can be easily tested	3.80	Highly Effective
It can easily restore data through archiving	3.80	Highly Effective
Overall Total Weighted Mean	**3.57**	**Highly Effective**

Table 2 presents the level of effectiveness of IT experts and bookstore employees at Olivarez College Tagaytay. First, in terms of functionality, among the two (2) specific indicators, *"It can perform correct results based on its intended functions."* attained the highest weighted mean score of 3.60 which is verbally interpreted as highly effective while *"It can perform all tasks required"* attained the lowest weighted mean with the score of 3.20 but still verbally interpreted as highly effective. The system was rated highly effective when it comes to functionality because it can perform correct results based on its intended function, however, the system is still slightly lacking its function when it comes to performing all the tasks that the system is required to do. According to the study of Salleh et al. (2017), the quality of software functionality refers to how closely it meets a given design or specific requirements. It can also be defined as the suitability of software for its intended purpose, or how it stacks up against similar products in the market.

Second, in terms of reliability, among the two (2) specific indicators, *"It provides identification and authentication of users through their username and password."* attained the highest weighted mean score of 3.60, which is verbally interpreted as highly effective, while *"It meets the needs for reliability under normal operations such as inventory and reservations."* attained the lowest weighted mean score of 3.40, with the result being verbally interpreted as highly effective. This means IT experts and the bookstore employee finds that the system is reliable when it comes to providing identification and authentication of users through their username and password, however, during normal operations, they may find some shortcomings when it comes to the inventory and reservation of the system. According to Johnson & Nilsson (2013), although there is a substantial body of research on quality, disagreement remains as to the effect of reliability, or things went wrong, as opposed to customization, or things went right, on customer satisfaction with goods and services

Third, in terms of usability, among the four (4) specific indicators, *"It is appropriate for the users' need.", "It is easy to operate based on the reservation procedure."*, and *"Its frequently asked questions (FAQS) provide proper Information about the system."* equally attained a weighted mean score of 3.80 which is verbally interpreted as highly effective while *"It interface looks good and it is not stressful."* attained a weighted mean score of 3.60 but still verbally interpreted as highly effective. This shows that the system is usable for the users because it is appropriate for the users' needs, the operation procedure in reserving items is easy to use and its frequently asked questions (FAQS) provide proper information about the system that helps the user but for the looks of the interface of the system, they may not find it as good for the users but still rated as highly effective. Usability testing is an approach that involves inviting product users to carry out specific tasks to evaluate the ease of use, time taken to complete tasks, and overall experience with the product (Niranjanamurthy et al., 2017).

Fourth, in terms of efficiency, among the two (2) specific indicators, *"It provides appropriate response time, processing time, and through output rates when performing various tasks."* and *"Its system has been used to perform its functions and produce its needed output in reserving items."* equally attained a weighted mean score of 3.60 which makes it verbally interpreted as highly effective. The result shows that the system is efficient because when it comes in, providing appropriate response time, processing time, and through output rates when performing various tasks and performing its function and producing its needed output in reserving items, both have an equal mean and are highly effective. The concept of trust is also one of the most crucial components in developing long-term relationships with consumers, particularly with respect to upholding the confidentiality of client

information and vows to consistently deliver the finest service/product. Efficiency, or skill in providing the service, and attention to consumer interest are often how trust is built between a business and its customers (Al-dweeri et al., 2017).

Fifth, in terms of maintainability, among the two (2) specific indicators, *"It can identify the specific parts that shall be modified."* attained the highest weighted mean score of 3.60 which is verbally interpreted as highly effective while *"It applies changes to the entire system using its content management feature."* attained the lowest weighted mean score of 3.20 but still verbally interpreted as highly effective. The data indicates that the system is highly effective when it comes to maintainability because it can identify the specific parts that shall be modified, however, they may find a slight flaw when it applies changes to the entire system using its content management feature. Software maintainability refers to the degree of ease with which a software system or component can be altered, whether to fix errors, enhance performance, adjust to changing conditions, or modify other attributes (Chen et al., 2017).

Lastly, in terms of portability, among the six (6) specific indicators, *"It can be accessed easily.", "It can be easily tested."* and *"It can easily restore data through archiving."* equally attained a weighted mean score of 3.80 which is verbally interpreted as highly effective while *"It can be updated easily."* attained the lowest weighted mean score of 3.60 but still verbally interpreted as highly effective. Based on the IT experts and the bookstore employee, the system is easily accessible and can be easily tested. The data can be easily restored through archiving, so the data will not lose in case the admin accidentally deletes the data or needs the data back, however, they experience slight difficulty when it comes to updating but still verbally interpreted as highly effective. According to the study of Syamranata et al., (2019), the importance of checking portability is to assess how a new system will perform under different environmental and situational conditions. By considering the impact of changes to the system in different environments, we can ensure that any modifications will enhance both the user experience and the overall quality of the system's operation.

As a result of all categories, functionality obtained a total weighted mean score of 3.40, reliability obtained a total weighted mean score of 3.50, usability obtained a total weighted mean score of 3.75, efficiency obtained a total weighted mean score of 3.60, maintainability obtained a total weighted mean score of 3.40, portability obtained a total weighted mean score of 3.75. This means the I.T. Teachers agree on how the system may perform when it comes to performing results based on its intended function, the system can perform all tasks that are required. The system provides identification and authentication of users using their username and password. According to Zhenhai et

al, (2018), book purchasers can quickly buy their favorite books. Bookstore administrators can deal with orders formed after book buyers' books for the first time and update books in bookstores in time. The development of such an APP (Application) is of great significance for economic development and is much more convenient for consumers to use.

V. Discussion

Generally, the Digitized School Inventory and Reservation Management System have a high degree of acceptance in terms of functionality, reliability, use, efficiency, and maintainability. This means that the system is capable of executing all required tasks. However, executing the results depending on the desired functions comes with slight difficulty. According to Mungara (2016), the booking procedure may now be more transparent in terms of things like the availability of slots filled and vacant, the prices paid, tax deductions, and so on. As a result, there is no need to doubt the person behind the counter extracting extra costs from you.

On the other hand, the effectiveness of the Digitized School Inventory and Reservation Management System is high in terms of functionality, reliability, use, efficiency, maintainability, and portability. According to IT experts, the system was rated as highly effective when it comes to functionality because it can perform correct results based on its function. However, the system is still slightly lacking its function when it comes to performing all the tasks that the system is required to do. The majority of software functions, according to Richard Schmidt (2013), are designed to convert inputs into an output or finished product. Instead of input, some functions will instead receive control flow.

The system, Effectiveness of Digitized School Inventory and Reservation Management System for Bookstore in Olivarez College Tagaytay S.Y 2022-2023, only focuses on the records and reservations of the products that the bookstore has. The system does not include the payment transaction. The system is only capable of reserving your desired items, and you can proceed with your payment to the bookstore. Furthermore, the system does not have a cancel option; however, the researchers provide FAQs, which state that once the reservation was confirmed, the users may not be able to cancel their reservation. For cancellation, the users are going to be directed to the registrar and request form to admin. Furthermore, the system does not support report sales and receipt printing.

The researchers are responsible for ensuring that the system does not cause harm to others or violate ethical standards. Examine problems like privacy, data security, and consent. It is essential to preserve openness and communicate freely and effectively. It is also necessary to keep current, have

a thorough grasp of the system, engage with many specialists, undertake thorough testing, and ensure ethical procedures.

The researchers recommend future researchers to focus more on security. This will enable them to manage and enhance the system, particularly in logging in since the researcher used the official Olivarez College email account to be able to login into the system. Moreover, the researchers advise utilizing student IDs for logging in and adding a super admin to the system to make it more efficient. This study can benefit them as an additional insight to their future study, this can also help them pin out incoming issues that may occur during the current situation.

References:

Al-dweeri, R. M., Obeidat, Z. M., Al-dwiry, M. A., Alshurideh, M. T., & Alhorani, A. M. (2017). The impact of e-service quality and e-loyalty on online shopping: moderating effect of e-satisfaction and e-trust. *International Journal of Marketing Studies*, *9*(2), 92-103. Retrieved from: https://www.ammanu.edu.jo/English/pdf/StaffResearch/business/962/The%20Impact%20of%20E-Service%20Quality%20and%20E-Loyalty%20on%20Online%20Shopping%20Moderating%20Effect%20of%20E-Satisfaction%20and%20E-Trust.pdf

Amato G., Genraro C., Rabitti F., & Savino P. (2013). Milos: A Multimedia Content Management System for Digital Library Applications. *ECDL 2004: Research and Advanced Technology for Digital Libraries.* Retrieved from: https://link.springer.com/chapter/10.1007/978-3-540-30230-8_2

Atalag et.al (2014). Evaluation of software maintainability with *open*EHR – a comparison of architectures. Retrieved from: https://www.sciencedirect.com/science/article/abs/pii/S1386505614001415

Catelani, M., Ciani, L., & Venzi, M. (2016). Component reliability importance assessment on complex systems using credible improvement potential. *Microelectronics Reliability*, *64*, 113-119. Retrieved from: https://www.sciencedirect.com/science/article/abs/pii/S0026271416301998

Chan, A. H. Y., & Honey, M. L. (2022). User perceptions of mobile digital apps for mental health: Acceptability and usability-An integrative review. *Journal of Psychiatric and Mental Health Nursing*, *29*(1), 147-168. Retrieved from: https://onlinelibrary.wiley.com/doi/abs/10.1111/jpm.12744

Lucas, B., Schladitz, P., Schirrmeister, W., Pliske, G., Walcher, F., Kulla, M., & Brammen, D. (2019). The way from pen and paper to electronic documentation in a German emergency department. *BMC health services research*, *19*, 1-8. Retrieved from: https://link.springer.com/article/10.1186/s12913-019-4400-y

Mungara C. (2016) How Online Booking and Reservation System is Changing Our Life for the Better. Retrieved from: https://www.digitaldoughnut.com/articles/2016/september/how- online-booking-and- reservation-system-is-chang

Nikolopoulou K., (2022). What is a Quota Sampling. Retrieved from: https://www.scribbr.com/methodology/quota-sampling/#:~:text=Quota%20sampling%20is%20a%20non,until%20you%20reach%20your%20quota.

Pervasive Computing Paradigms for Mental Health: 9th International Conference, MindCare 2019, Buenos Aires, Argentina, April 23–24, 2019, Proceedings. (2019). Germany: Springer International Publishing. Retrieved from: https://www.researchgate.net/publication/336990697_Pervasive_Computing_Paradigms_for_Mental_Health_9th_International_Conference_MindCare_2019_Buenos_Aires_Arge ntina_April_23-24_2019_Proceedings

Stephanie L. (2022). What is a capstone project? And why is it important?. Retrieved from: https://www.topuniversities.com/student-info/careers-advice-articles/what-capstone-project-why-it-important

Tark, R., Metelitsa, M., Akkermann, K., Saks, K., Mikkel, S., & Haljas, K. (2019). Usability, acceptability, feasibility, and effectiveness of a gamified mobile health intervention (Triumf)

for pediatric patients: qualitative study. *JMIR serious games*, *7*(3), e13776. Retrieved from: https://games.jmir.org/2019/3/e13776/

Tjoe, K. (2021). The Purpose Of Online Booking System. Retrieved from: https://rezdy.com/blog/what-is-online-booking-system/?fbclid=IwAR18t-ceq9tDuku1h61znZS1K1wx364XeFi4LsAD0WA0ZCiwbU_ZGs-1PXE

Zhao, C., Xu, X., Chen, J., Wang, G., & Yang, F. (2014). Highly effective antifouling performance of PVDF/graphene oxide composite membrane in membrane bioreactor (MBR) system. *Desalination*, *340*, 59-66. Retrieved from: https://www.sciencedirect.com/science/article/abs/pii/S0011916414000873

Z. Mu and L. Jiang, "Online Bookstore Management System Based on Android," 2018 International Conference on Virtual Reality and Intelligent Systems. Retrieved from: https://ieeexplore.ieee.org/Abstract/document/8531455/authors#authors

OLIVAREZ COLLEGE TAGAYTAY

Emilio Aguinaldo Highway, Brgy. San Jose, Tagaytay City

(046) 860-2301
(+63) 921 535 7977
OC Tagaytay Official
www.olivarezcollegetagaytay.edu.ph