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Queuing and Service Management System with SMS Notification in Southern Leyte State University - College of Agriculture, Food and Environmental Sciences

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Abstract:- This research delves into the integration of technology to mitigate queuing challenges in public institutions, focusing on the Southern Leyte State University's College of Agriculture, Food and Environmental Sciences (SLSU-CAFES). The proposed Queuing and Service Management System (QSMS) seeks to enhance administrative efficiency through technological innovation. It addresses the incongruity between technological advancement and persistent queuing by aiming to optimize queuing experiences, introduce systematic record-keeping, and facilitate timely service delivery. The abstract outlines research objectives, methodologies, and findings, emphasizing the significance of efficient database management, Service Management System principles, and SMS Notifications. Through data analysis, the abstract underscores the system's potential benefits while proposing user training, system management roles, and administrative support for successful implementation as recommendations, highlighting the prospect of alleviating queuing inefficiencies in public institutions.

Keywords:- *Queuing; Service Management System; SMS Notification.*

I. INTRODUCTION

In the contemporary world, technology has revolutionized and expedited various aspects of human life, permeating every facet of our existence [1]. This digital era has transformed how transactions and interactions occur, making them more convenient and efficient [2] [3]. Despite these advancements, the predicament of queuing persists as a formidable challenge in many public institutions, impeding the otherwise seamless nature of technological facilitation.

Technology has become an essential part of our daily lives, significantly improving convenience and accessibility. It has transformed our societies, making information easier to access and enabling global communities to form on the internet [4] [5]. Notably, it has been deeply integrated into various transactional processes, even within government agencies. Tasks such as registrar services and ID issuance, traditionally laborious and time-consuming, have been streamlined due to technological interventions. Despite these evident advantages, the pervasive problem of queues remains a persistent thorn, particularly in the realm of public transactions. Paradoxically, even as technology expedites the process, queues continue to plague efficient service delivery. This discrepancy between technological potential and real-world inconvenience forms the crux of the research problem.

According to [6], the implementation of advanced queuing technologies in retail stores with low customer frequency and short waiting times does not have a statistically significant impact on customers' overall experience, satisfaction, or intention to repurchase. However, customers have reported positive experiences with these technologies, describing their queuing experience as effortless, easy, and quick, indicating general support for their use. A suboptimal queuing experience could deter customers from returning, underscoring the necessity of a refined queuing process.

Queuing, the act of waiting in line for service, is an inherent part of daily life across the globe. The term encapsulates the concept of individuals biding their time until their transactional turn arrives. While the act of queuing is universally understood, a comprehensive record of the services and experiences during this period has not been systematically maintained. This deficiency in documenting the dynamics of queuing experiences within public institutions highlights a gap in our understanding and management of service delivery.

The proposed Queuing and Service Management System (QSMS), tailored for Southern Leyte State University's College of Agriculture, Food and Environmental Sciences (SLSU-CAFES), aims to bridge this gap. The primary objective of this system is to transform and enhance the transactional landscape within the institution's administrative domains. This proposed system seeks to establish a seamless and efficient process by integrating technology into the queuing experience, thus eliminating the inconvenience

associated with traditional queuing methods. The specific objectives of this research are:

- To provide an organized and systematic way of accommodating clients/clienteles.
- To speed up processes in serving clients/clienteles.
- To design a database that records all related processes and services in different areas.
- To design and develop a Queuing and Service Management System with SMS Notification for SLSU-CAFES that features:
  - SMS notification
  - Systematic transactions
  - Timely retrieval of records for queued clients/clienteles
  - Generation of reports corresponding to transactions
  - Allowing services to be viewed in an organized manner
  - A simple interface that all users can easily use
  - Functions that use computer network capability to simultaneously run systems that correlate with each other via network access to the database
  - A system that allows only authorized users
- To evaluate lines of queues and how transactions are sanctioned on a timely basis.

Database management assumes a critical role in the proposed system's efficacy. As emphasized by [7], Database Management Systems (DBMS) are integral to efficiently organizing substantial datasets. This research contends that a robust MySQL database is imperative to manage copious transactional data generated daily. This aligns with [8] assertion that DBMS enhances data accessibility, protection, and utility.

Aligning with this objective, the concept of queuing as described by [9] establishes a foundation for the proposed system. This research acknowledges the importance of systematically recording services rendered during queuing periods, which dovetails with principles of a Service Management System (SMS). Furthermore, incorporating an Electronic Records Management (ERM) System ensures efficient tracking and storage of transactional records.

Additionally, this research integrates Service Management System principles as defined by ISO standard 15489:2001. This underscores significance in systematically controlling records creation, receipt, maintenance, and disposition. Moreover, utilizing SMS Notifications as recommended by [10] transcends geographical limitations and enhances communication during queuing process.

In existing scenario at SLSU-CAFES, challenges associated with manual queuing management are evident in administrative offices. Despite offering queue system, current approach is neither comprehensive nor effective in accommodating diverse transactions resulting in disorganized queues and unsatisfactory service experiences. Additionally, inconsistent data recording exacerbates this problem. Proposed QSMS seeks to address these shortcomings by introducing systematic method for issuing queue numbers and utilizing SMS Notifications to keep individuals informed about their queue status.

By fusing these concepts, this research aspires to contribute holistic solution that augments service delivery efficiency, customer satisfaction, and overall transaction experiences within Southern Leyte State University – College of Agriculture, Food and Environmental Sciences. Therefore, proposed Queuing and Service Management System with SMS Notification endeavors to alleviate challenges associated with queuing inefficiencies in public institutions.

II. RESEARCH METHODOLOGY

This study employed descriptive research methods to gather information about the present Queuing and Service Management System at Southern Leyte State University-College of Agriculture and Environmental Sciences. A questionnaire was used to collect data from respondents, providing insights into their perspectives on the system. The figure below illustrates the research flow.

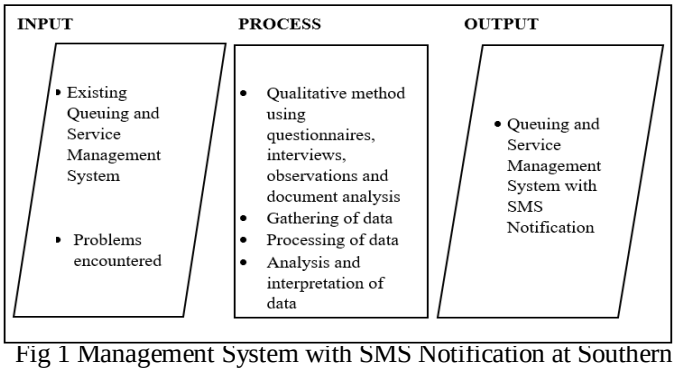

Fig 1 Management System with SMS Notification at Southern Leyte State University-College of Agriculture and Environmental Sciences.

The input includes discussions of the existing queuing management system, problems encountered in the present system, and features of a good Queuing and Service Management System with SMS Notification. The goal is to identify areas for improvement and develop a more effective system.

The process involves the use of descriptive methods, including questionnaires, interviews, observations, and document analysis to gather data. This data is then processed, analyzed, and interpreted using the Systems Development Life Cycle (SDLC) for the Queuing and Service Management System with SMS Notification and one of the advantages of it is that it provides a structure for organizing and controlling a software development project [11]. The aim is to develop a comprehensive understanding of the current system and identify areas for improvement.

The output consists of results attuned to the automated system, incorporating both the input and process flow. The goal is to develop a more effective Queuing and Service Management System with SMS Notification that addresses the identified problems and improves service delivery.

A. Research Environment

This study will be conducted at Southern Leyte State University – College of Agriculture, Food and Environmental Sciences (SLSU-CAFES) in Hinunangan, Southern Leyte.

At the conduct of this research, the institution has grown to include 569 officially enrolled students and 12 buildings. SLSU-CAFES offers four courses: Bachelor of Secondary Education (BSEd), Bachelor of Science in Information Technology (BSIT), Bachelor of Science in AgriBusiness (BSAB), and Bachelor of Science in Agriculture (BSA) with majors in Crop Science and Animal Science. SLSU-Hinunangan Campus is known as the center for agricultural studies among all SLSU campuses and was ultimately instated as SLSU-College of Agriculture, Food and Environmental Sciences.

B. Research Respondents

The study employed stratified proportionate sampling. The stratified proportionate sampling [12] [13] is a probability sampling technique in which the population is divided into distinct subgroups, or strata, and a random sample is selected from each stratum in proportion to its size. This method ensures that each stratum is represented in the final sample according to its relative size within the population, resulting in a sample that is representative of the population. The researchers select a total of 170 students across all departments/courses as respondents along with the 6 respondents from the faculty and staff.

TABLE I. Research Respondents

Respondents	Total	Sample size
Students	569	170
Faculty and Staff	30	6
Total	599	176

C. Research Instrument

In this study, the primary method of data collection was using a questionnaire that was specifically designed by the researcher. The development of the questionnaire was guided by the objectives of the study, ensuring that the questions were relevant and targeted towards achieving the desired outcomes. The use of a researcher-made questionnaire allowed for greater flexibility and customization in the data collection process, enabling the researcher to tailor the instrument to the specific needs and goals of the study. This approach helped to ensure that the data collected was both accurate and relevant to the research question at hand.

D. Research Procedure

The data for this research were collected using a survey questioner regarding the present system which employed stratified proportionate sampling in the selection of data. The survey questionnaire is made by the researchers themselves. The researchers assured confidentiality of their survey sheets since the identities are important.

The gathered data were organized using the correct statistical analysis. Each piece of information was summed up to form a statistical fact so that the survey would help to address each problem possible. The formula to solve the Average Weighted Mean is:

$$X = \frac{\sum f_1 X_1}{N}$$

X – Arithmetic Mean
∑ f1X1 – Sum of all the observations or scores
N – Number of cases

TABLE II. Range for Weighted Mean

Mean	Rating Scale	Points Meaning
3.25 – 4.00	Strongly Agree	Provided and Complete
2.50 – 3.24	Agree	Provided
1.75 – 2.49	Disagree	Needs Improvement
1.00 – 1.74	Strongly Disagree	Not Accurate

For the percentage is:

$$P = \frac{F}{N}$$

F – Frequency
N – Number of cases
P – Percentage

➢ *Scoring Procedure:*

VG – If the system is provided, complete, current, and clear.
G – If the system needs only some changes to improve drastically.
P – If you think that it needs major changes and improvement.
NE – If the means of the study items are not provided and incomplete.

III. PRESENTATION, ANALYSIS, & PRESENTATION OF DATA

In this section, an analysis and interpretation of the data gathered from a survey conducted by the researchers among respondents from each department of Southern Leyte State University's College of Agriculture, Food, and Environmental Sciences is presented. A researcher-designed questionnaire was used to collect data aimed at addressing the research questions posed in this study. The feasibility of designing and developing a Queuing and Service Management System for Southern Leyte State University will be determined based on the results of the survey, which will be discussed in the following sections.

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TABLE III. Statistical Range

Mean Ranges	Point Scale	Rating Scale	Meaning
3.26 – 4.00	4	Strongly Agree	Provided and Complete
2.51 – 3.25	3	Agree	Provided
1.76 – 2.50	2	Disagree	Needs Improvement
1.0 1.75	1	Strongly Disagree	Not Accurate

A. Analyzing the Present Queuing and Service Management System of Southern Leyte State University-College of Agriculture Food, and Environmental Sciences

This section presents the data collected from a survey of 30 respondents, including 10 BSIT students, 10 BSE students, and 10 BSA students. The survey used a numerical scale with values of 4, 3, 2, and 1 corresponding to Strongly Agree, Agree, Disagree, and Strongly Disagree, respectively. The meanings associated with these values were controllable, provided, lacks competence, and inconsistent. The collected data were analyzed using statistical methods such as weighted mean, frequencies, percentages, and ranking to compute and interpret the results.

TABLE IV. Analyzing the status of present queuing and service management system of Southern Leyte State University – Cafes

Present QSMS	Respondents n=176 Mean	Interpretation
1. There is a priority number provided to the client.	2.40	Disagree
2. There is a possibility of overtaking customers.	2.50	Disagree
3. Organizing priorities is observed.	2.50	Disagree
4. Systematic way is observed.	2.33	Disagree
5. The accommodation is accurate and thorough.	2.57	Agree
6. Transacting and billing is done immediately.	2.47	Disagree
7. Enrolment processes takes time.	2.37	Disagree
8. Services and transactions are served time to time.	2.43	Disagree
9. Areas with multiple transactions has priority of service to be served.	2.57	Agree
10. The process takes time on a timely basis.	2.37	Disagree
11. Easily retrieve records.	2.37	Disagree
12. Tracing client's transaction is done immediately.	2.47	Disagree
13. Records the transactions that are being served.	2.43	Disagree
14. Store datum from different aspect of areas involved in the system.	2.40	Disagree
15. Tracing the datum which are successful or unsuccessful.	2.30	Disagree
16. System is user friendly.	2.83	Agree
17. System is provided with SMS notification to clients.	2.32	Disagree
18. System is provided with accessible database over networks.	2.80	Agree
19. Records transaction easily.	2.47	Disagree
20. Generate reports immediately.	2.40	Disagree
21. Allow services to be viewed on which it could be organized.	2.90	Agree
22. Timely retrieval of records of queued client/clienteles	2.50	Disagree
23. System is protected from users with bad intentions	2.70	Agree
24. Easily use system interface	2.37	Disagree
25. Functions that are systematic in which systems are simultaneously running	2.20	Disagree

Based on the table presented, it appears that the respondents, with a sample size of 176, had varying opinions on the different aspects of the Queuing and Service Management System (QSMS). The mean values for each item ranged from 2.20 to 2.90, with several items falling within the "Disagree" range (1.76-2.50) and others within the "Agree" range (2.51-3.25).

For example, items 1-4, which relate to the provision of priority numbers, the possibility of overtaking customers, and the organization and systematic observation of priorities, all received mean values within the "Disagree" range, indicating that there is room for improvement in these areas. Similarly, items 6-8, 10-15, and 17-20, which relate to various aspects of transaction processing and record keeping, also received mean values within the "Disagree" range.

On the other hand, items 5 and 9, which relate to the accuracy and thoroughness of accommodation and the prioritization of service in areas with multiple transactions, received mean values within the "Agree" range. Additionally, items 16, 18, 21, and 23, which relate to the user-friendliness of the system and its features such as SMS notifications and accessible databases over networks, also received mean values within the "Agree" range.

Overall, these results suggest that while there are some areas where the QSMS is performing well according to the respondents' perceptions, there are also several areas where improvements could be made to enhance the overall effectiveness and efficiency of the system.

B. Findings

After the data gathered, tabulated, analyzed, and interpreted the researchers came up with the following findings:

➢ *Existing process of Queuing and Service Management System:*

- Providing an organized and systematic way of accommodating client/clienteles is lack of competence.
- Giving priority numbers to the clients is not provided properly.
- Prioritizing students' needs improvement.
- The weighted mean of the existing process is 2.48 which means need improvements.

➢ *Problem encountered of Queuing and Service Management System:*

- Priority numbers are not provided.
- There is a possibility of overtaking clients.
- Processing the transaction of the students takes a lot of time to serve.
- The record of serving the students is manually done.

IV. CONCLUSION

The system was found to be efficient in its functionalities, performing in accordance with the desired outcomes specified by the administration. The specific offices and areas where the operator would operate and where the queuing machine would be running were carefully determined to optimize the system's performance. As a result, the system was designed and developed to provide an organized queue of clients, reducing waiting times and improving the effectiveness and efficiency of the services provided by the area.

RECOMMENDATIONS

Based on the findings of the study, several valuable recommendations have been proposed. Firstly, it is recommended that users of the system receive proper training in its functions to ensure that they are able to effectively utilize its capabilities. Secondly, it is suggested that there be a designated individual in charge of managing the Queuing and Service Management System and providing assistance to clients as needed. Finally, it is recommended that the administration provide support for the proper implementation of the Queuing and Service Management System to ensure its success. These recommendations aim to enhance the effectiveness and efficiency of the system and improve the overall experience for both users and clients.

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