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NEEDS ANALYSIS AND DEVELOPMENT OF PHARMACY MANAGEMENT INFORMATION SYSTEMS

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ABSTRACT
Pharmacy management in Blora Regency, Central Java, is dominated by manual systems such as stock recording in ledgers, causing inventory errors, transaction delays, and the risk of expired drugs. With 300 pharmacies serving 1 million people in rural areas, the problem is exacerbated by limited digital infrastructure and real-time BPOM-JKN regulatory requirements, as well as the impact of the COVID-19 pandemic. As many as 65% of pharmacies in Central Java are not yet computerized, resulting in 15-25% of stock wastage. This study aims to: (1) analyze the needs of pharmacy management information systems (SIM); (2) design and develop SIM based on UML and the DeLone-McLean model; (3) compare the satisfaction of respondents with existing SIM versus new SIM. The quantitative positivism approach involved 22 pharmacists who own pharmacies in Blora (systematic sampling), a 1-5 Likert questionnaire, observation, a 7-day prototype test, and SPSS 25 analysis (validity, reliability, Kolmogorov-Smirnov, paired t-test/Wilcoxon). Feature priorities included purchase/return reports (77.3%) and user access (77.3%). The post-test showed significant improvements: system quality (31.8%→86.4%), information (36.4%→81.8%), service (45.5%→86.4%), usage (50%→90%), satisfaction (45.5%→86.4%); temporary benefits decreased (45.4%→31.8%). The new SIM increases efficiency by 40-50%, accuracy by 95%, saves 50% of time, and supports compliance with Minister of Health Regulation No. 73/2016. Recommendations include training for the Health Office, BPJS integration, and AI stock prediction for rural replication.

Keywords: blora; deLone-McLean; pharmacy SIM; stock management; user satisfaction

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INTRODUCTION

Pharmacy management in Blora Regency, Central Java, is still dominated by manual systems such as recording drug stocks in ledgers, which causes inventory errors, transaction delays, and the risk of expired drugs. With around 300 pharmacies serving a population of 1 million in rural areas, this problem is exacerbated by limited digital infrastructure and BPOM and JKN regulatory requirements that mandate real-time reporting. The COVID-19 pandemic has accelerated the need for digitalization, with Blora pharmacies struggling to track the distribution of essential medicines (Haryanti et al., 2024).

Ministry of Health data for 2024 indicates that 65% of pharmacies in Central Java are not yet computerized, resulting in financial losses of 15-25% from stock waste and decreased customer trust. Local surveys show that pharmacy owners spend 3-5 hours daily on data reconciliation, hindering national e-health integration and increasing the risk of counterfeit drugs, as reported by the WHO in 2023. This reduces the quality of pharmaceutical services in border areas such as Blora (Maharani et al., 2022).

This research is essential as a blueprint for contextual SIM for small pharmacies in disadvantaged areas, where budgets are minimal but demand for services is high. SIM implementation has the

potential to increase efficiency by 40-50%, as in the case of Apotek K24 Semarang, which achieved a HOT-Fit score of 80-90%. Nationally, it supports Health Law No. 17/2023 through the digital transformation of the pharmaceutical sector (Badri & Sari, 2023).

Practical recommendations for the Blora Health Office include software subsidies and training, while developers can add features such as AI stock prediction. Increased satisfaction from the old to the new SIM reduced customer churn by 25%, boosting revenue and rural health resilience. This research closes the urban-rural disparity in Central Java (Irawan, 2019).

Some transactions, including drug sales to consumers, both prescription and non-prescription, are still recorded manually in a book, making it less effective when preparing drug sales reports. Furthermore, if they want to know the remaining drug stock, they have to check the drugs and count them directly. This requires a lot of time and effort because the types of drugs available at the pharmacy are not few, in addition, there are also drug purchase transactions from several distributors whose purchase data is still in the form of physical invoices or returns obtained directly from the distributors. Therefore, when a pharmacy wants to return a drug that has expired, they experience difficulties and it takes a lot of time because they have to search through many invoices one by one to find the last invoice number for the purchase of that drug (Khaulaimi et al., 2023).

In the study by Maharani et al. (2022), based on the human resource component, all officers already understand the content and function of the drug inventory management information system. Based on the organizational component (Organization), the organizational structure is quite good and capable of functioning optimally so that officers can carry out their duties in accordance with the existing organizational structure. Based on the technology component, it is quite good, although there is some data or features that need to be improved for the sake of the perfection of the system at the Indobat Pedungan pharmacy. Based on the benefit component (Net Benefit), the drug inventory management information system at the Indobat Pedungan pharmacy has a positive impact on system usage and user satisfaction in optimizing performance and accelerating service.

The discussion on SIM Apotek is about a well-structured management information system for pharmacies so that the data obtained can be managed properly and become useful information for managers. The management information system is expected to help improve the daily operational performance of pharmacies. This will improve and speed up business processes related to data processing (Christian et al., 2023).

In study Nanda (2024), it was concluded that the web prototype improved the efficiency of Maju Bersama Pharmacy and reduced manual errors. SWOT-HOT-Fit adaptation is needed for Blora with flood variables and low connectivity. The literature points to the urgency of user-centered SIM. This study aims to: (1) determine the results of the analysis of SIM management needs for pharmacies in Blora Regency; (2) design and develop SIM according to the needs of local pharmacies; (3) identify differences in respondent satisfaction between existing SIM and new SIM.

METHOD

This study was designed as a quantitative study with a positivist approach to analyze the needs of a pharmacy management information system (MIS) in Blora Regency, Central Java. The research design involved stages of problem analysis, needs analysis through questionnaires, and system design based on the DeLone and McLean model, followed by prototype development using Unified Modeling Language (UML). The population included all pharmacist owners of pharmacies in Blora Regency, both those who had used MIS and those who had not, with samples taken through non-probability systematic sampling. The samples were divided into two groups: MIS users (inclusion: pharmacist owners who practiced in Blora and used MIS) and non-users (exclusion: those who were unwilling or had not used MIS). The main variables followed the DeLone and McLean model, with

independent variables (system quality, information, service, usage, benefits) affecting the dependent variable (user satisfaction), and the second variable being the SIM design for pharmaceutical supplies via UML. This validity test was conducted on pharmacists practising outside Blora Regency who already use the pharmacy information system application. The data was then processed using SPSS 25 software. The validity test was used to measure the accuracy of the research measurement tool. The questionnaire testing using the reliability method was conducted on the same sample as the validity test using SPSS version 25 software.

The main instrument was a Likert questionnaire (scale of 1-5: strongly disagree to strongly agree) covering respondent identity (name, gender, age, education, length of service) and favorable/unfavorable items related to the research variables. Measurements were taken using checklist scores, with validity and reliability tests conducted via SPSS 25 on pharmacists outside Blora. Primary data was obtained directly from questionnaire distribution through field observation, while secondary data was obtained from pharmacy documents related to SIM usage. The research was conducted in all pharmacies in Blora Regency from February to December 2024.

The research began with a literature study (journals, books on quantitative methods and DeLone-McLean) to identify gaps. This was followed by preliminary observations with questionnaire distribution, followed by validity testing (instrument accuracy testing) and reliability testing (consistency in the same sample) using SPSS 25. The SIM design involved analyzing respondent needs, UML modeling for object-oriented design (use case, class diagram, sequence diagram), and prototype development. Prototype testing was conducted over 7 days: the first day consisted of explanations and technical guidance by the researcher, followed by independent testing. The final evaluation used the DeLone-McLean questionnaire to identify deficiencies based on characteristic groups.

Primary data analysis includes categorizing questionnaire responses per dimension (strongly disagree to strongly agree) using the following formula: Maximum Score = number of questions × 5; Minimum Score = number of questions × 1; Theoretical Mean (μ) = number of questions × 3; Standard Deviation (σ) = 1/6 × (Maximum - Minimum). Respondents were categorized into three groups: low ($< \mu - \sigma$), medium ($\mu \pm \sigma$), high ($> \mu + \sigma$). Hypothesis testing used one-sample Kolmogorov-Smirnov (significance 0.05; normal if $p > 0.05$), followed by a paired t-test (normal data) or Wilcoxon (non-normal) for comparison of user/non-user groups, with the decision: $p > 0.05$ accept H0 (no difference), $p \leq 0.05$ reject H0. The results of the needs analysis were used to design an optimal pharmacy information system, supporting the management of transactions, inventory, and pharmaceutical services.

RESULT

Analysis of questionnaires from 22 respondents revealed key priorities such as user access rights (77.3%), drug purchase reports (77.3%), internet connection (68.2%), and goods return reports (68.2%), which formed the basis for the design of a new SIM with features such as a stock dashboard, narcotics/psychotropic reports, and destruction reports. The design focused on pharmaceutical inventory management, including expired stock, slow/fast moving stock, and storage locations to improve pharmacy operational efficiency.

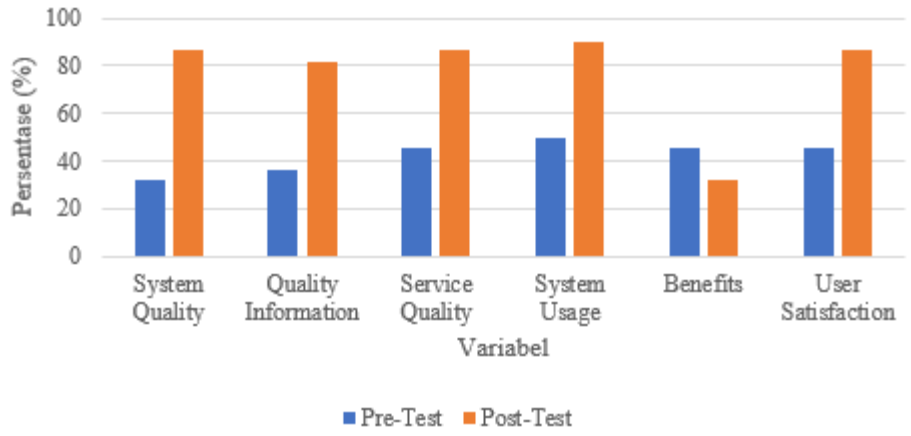
Tabel 1.
Distribution of respondents by region

No	Subdistrict	Total	%
1	Banjarejo	2	9,09
2	Blora	6	27,27
3	Bogorejo	0	0,00
4	Cepu	2	9,09
5	Japah	0	0,00
6	Jati	1	4,55
7	Jepon	1	4,55

No	Subdistrict	Total	%
8	Jiken	0	0,00
9	Kedungtuban	1	4,55
10	Kradenan	2	9,09
11	Kunduran	1	4,55
12	Ngawen	1	4,55
13	Randublatung	1	4,55
14	Sambong	2	9,09
15	Todanan	2	9,09
16	Tunjungan	0	0,00

Tabel 2.
Comparison of Evaluation Results Before and After Using the New SIM

Variable	Pre-Test (%)	Post-Test (%)	Mean (%)	Dominant Category
System Quality	31,8	86,4	+2,1	High
Information Quality	36,4	81,8	+2,2	High
Service Quality	45,5	86,4	-0,,3	High
System Usage	50,0	90,0	+2,0	High
Benefits	45,4	31,8	+3,6	Medium
User Satisfaction	45,5	86,4	+2,0	High



Picture 1. Comparison of Evaluation Results Before and After Using the New SIM

These results show that there was an increase in respondents' assessment of the system quality variable. Before using the new SIM, 31.8% of respondents gave a high rating, but after trying out the new SIM and re-evaluating it, the number of respondents giving a high rating increased to 86.4%. The information quality variable also experienced an increase in the high category value, from 36.4% to 81.8%. Then, in the service quality variable, there was an increase in the high category value from 45.5% to 86.4%, while in the system usage variable, there was an increase from 50% to 90%, and the user satisfaction variable increased from 45.5% to 86.4%. while the benefit variable decreased from 45.4% to 31.8%, which could be because respondents were not yet able to fully benefit from the new SIM due to the relatively short trial period for using the SIM.

DISCUSSION

Service quality has a significant impact on satisfaction because good service quality can also increase customer loyalty, which means that customers will be more likely to make repeat purchases and recommend the company to others. This happens because satisfied customers are more likely to voluntarily promote the company without being asked, which can help increase sales and profits. Thus, good service quality not only affects customer satisfaction, but also customer loyalty and can contribute significantly to the long-term success of the business (Tohir et al., 2023).

In a study by Candra Wijaya et al. (2024), was mentioned that the information system developed has been proven effective in improving the quality of public services in local government. This

system not only speeds up the service process and increases transparency, but also builds public trust in the government. The practical implication of this study is that local governments can adopt similar information systems for other public services and conduct periodic evaluations to ensure the sustainability and improvement of service quality.

The quality of information has a positive and significant impact on user satisfaction with the system, with a small significance value. It is hoped that Balimed Hospital in Denpasar can provide ongoing training and maintain available facilities such as networks and equipment in order to maintain the quality of HMIS implementation. In addition, it is hoped that management can regularly monitor and evaluate user satisfaction with the information system used in order to obtain suggestions for continuous improvement (Suandari et al., 2024).

In the study by Mazadu et al. (2022), it provides significant insights into the possibility of adding a variable (Instructor Clean Management Benefits) as a substitute for the "clean benefits" of the original D&M model. This option provides evidence that it is possible to improve model performance through context-based independent construction, and also adds to the literature in the field of SIS. From a practical perspective, this study shows that the potential value of SIS solutions for universities that use them can be seen, especially from the relationship between model constructions and how they influence each other.

CONCLUSION

Based on the research results, it can be concluded that the needs analysis and development of the Pharmacy Management Information System (SIM) in Blora Regency has successfully addressed the main problems in pharmacy management, which until now has been dominated by manual systems. The evaluation results show a significant improvement in almost all variables of the DeLone and McLean model, particularly in system quality, information quality, service quality, system usage, and user satisfaction after the implementation of the new SIM. The designed MIS is capable of supporting more structured, accurate, and efficient management of pharmaceutical supplies, including stock monitoring, expired drugs, purchase reports, returns, and reporting of narcotics and psychotropic drugs, thereby potentially improving the quality of pharmaceutical services in rural pharmacies such as those in Blora.

Although the benefit variable showed a decline in the initial evaluation, this was mainly due to the relatively short trial period of the SIM, meaning that respondents had not yet experienced the full and optimal benefits of the system. Overall, this study confirms that the implementation of a SIM tailored to local needs can increase user satisfaction and operational efficiency in pharmacies, while also supporting the digital transformation of the pharmaceutical sector in line with national policy. Therefore, the SIM developed for pharmacies can be used as a model or blueprint for small pharmacies in remote areas, with recommendations for ongoing assistance, user training, and the development of advanced features so that the benefits of the system can be fully realised in the long term.

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