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Schedufix: An Online Preventive Maintenance System for IT Laboratories

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ABSTRACT: IT laboratories at North Eastern Mindanao State University–Cantilan Campus previously relied on manual, paper-based maintenance processes, resulting in delayed repairs, misplaced records, and inefficient equipment monitoring. This study developed Schedufix, a web-based preventive maintenance system designed to digitalize laboratory maintenance operations. A developmental-descriptive research design and Agile Software Development Life Cycle were employed. System evaluation was conducted using the ISO/IEC 25010 software quality model. Results revealed a high level of acceptability with an overall mean score of 4.43, indicating strong usability, reliability, and functional suitability. Schedufix effectively enhances efficiency, accountability, and IT laboratory resource management.

KEYWORDS: Preventive Maintenance; IT Laboratories; Schedufix; ISO/IEC 25010; Laboratory Management

I. INTRODUCTION

Preventive maintenance plays a critical role in ensuring the reliability and longevity of IT laboratory equipment. However, many educational institutions continue to rely on manual maintenance processes, which often lead to delays, misplaced records, and inefficient monitoring of resources [1]. At North Eastern Mindanao State University (NEMSU) Cantilan Campus, maintenance activities were traditionally documented using paper-based records, making it difficult to track equipment status and maintenance schedules.

Studies emphasize that digital preventive maintenance systems significantly reduce equipment downtime and improve operational efficiency by enabling timely inspections and systematic record management [2]. Computerized maintenance solutions also enhance accountability by centralizing maintenance data and standardizing procedures [3]. Despite these advantages, many existing systems are designed for industrial or enterprise environments and are not tailored to the specific needs of academic IT laboratories.

To address these challenges, this study developed Schedufix, an online preventive maintenance system that integrates scheduling, service request management, and equipment monitoring into a single platform. The system aims to improve efficiency, transparency, and decision-making in IT laboratory maintenance operations at NEMSU Cantilan Campus.

II. LITERATURE SURVEY



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Preventive maintenance has been widely recognized as an essential practice in ensuring the proper functioning and longevity of equipment, particularly in IT laboratory environments. Many educational institutions continue to rely on manual and paper-based maintenance procedures, which often result in delayed maintenance actions, incomplete records, and difficulty in tracking equipment conditions. These challenges highlight the importance of adopting computerized systems that support systematic scheduling and documentation of maintenance activities [1].

Previous studies have shown that automated preventive maintenance systems help reduce equipment downtime and prevent costly breakdowns by enabling proactive maintenance planning. Digital maintenance systems provide structured workflows that allow maintenance personnel to monitor equipment status, schedule inspections, and document performed tasks efficiently. These systems improve overall operational efficiency by ensuring that maintenance activities are conducted regularly and consistently [1], [2].

Computerized Maintenance Management Systems (CMMS) have also been reported to enhance maintenance operations through centralized data management and improved scheduling mechanisms. By consolidating maintenance records into a single platform, CMMS solutions allow organizations to improve accountability and accessibility of maintenance information. However, many existing systems are designed for industrial or enterprise environments and may not fully address the specific requirements of academic institutions and IT laboratories [2].

In university and educational settings, studies have emphasized the role of computer-aided maintenance frameworks in improving laboratory management. Research has shown that the integration of technology into laboratory maintenance processes enhances monitoring accuracy and reduces equipment failures. These systems support timely maintenance interventions and help institutions maintain reliable laboratory resources for academic activities [3], [4].

Local studies conducted in educational institutions further emphasize the need for digital reporting and maintenance systems. The digitalization of maintenance records has been found to improve accountability, transparency, and performance monitoring in facility management. Despite these findings, many schools still lack integrated systems that combine preventive maintenance scheduling, service request handling, and equipment monitoring into a unified platform [5].

Based on the reviewed literature, there is a clear need for a web-based preventive maintenance system specifically designed for academic IT laboratories. Existing studies support the effectiveness of digital maintenance solutions, yet gaps remain in terms of system integration, usability, and institution-specific implementation. These gaps justify the development of Schedufix as an online preventive maintenance system tailored to address the maintenance challenges of IT laboratories in educational institutions [1], [3].

Table 1. Summary of Relevant Literature

No.	Focus of Study	Author(s)	Method / System	Key Findings	Identified Gap
1	Preventive maintenance systems	Jaquis [1]	Online maintenance framework	Reduced downtime and costly breakdowns	Limited focus on academic laboratories
2	CMMS in laboratories	Qualer Team [2]	Maintenance management software	Improved scheduling and equipment tracking	Not institution-specific
3	University laboratory maintenance	Zhang and Liu [3]	Computer-aided maintenance framework	Reduced equipment failures	Not fully web-based
4	Preventive maintenance practices	Cisco Networking Academy [4]	ICT maintenance guidelines	Improved system reliability	General ICT focus
5	Facility management in schools	Santos et al. [5]	Digital reporting systems	Improved accountability and performance monitoring	No integrated maintenance system



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III. METHODOLOGY / APPROACH

This study employed a developmental-descriptive research design to design, develop, and evaluate the Schedufix system. The Agile Software Development Life Cycle (SDLC) was adopted to allow iterative development, continuous testing, and user feedback throughout the development process, which is consistent with software development practices used in maintenance management systems.

Schedufix was implemented as a web-based application using PHP and MySQL for backend processing, while HTML, CSS, JavaScript, and Bootstrap were utilized for frontend development. The system features role-based access control, preventive maintenance scheduling, service request handling, equipment status monitoring, and report generation, which support centralized maintenance documentation and monitoring.

System evaluation involved 10–15 respondents, including the IT Head, IT staff, and laboratory personnel at NEMSU Cantilan Campus. Data were collected using a structured questionnaire based on the ISO/IEC 25010 software quality model. Descriptive statistical techniques, such as weighted mean and verbal interpretation, were used to analyze the evaluation results, following standard software quality assessment practices.

IV. RESULTS AND DISCUSSION

System Features

Schedufix was developed as a web-based preventive maintenance system that integrates scheduling, service request management, equipment monitoring, and report generation into a single platform. The system provides role-based access control, allowing administrators, IT staff, and laboratory personnel to perform tasks according to their assigned roles.

The system enables users to schedule preventive maintenance activities, submit service requests, and monitor the status of laboratory equipment. Centralized record management allows maintenance personnel to track maintenance history and equipment conditions efficiently. The integration of these features addresses the limitations of manual, paper-based maintenance processes by improving documentation accuracy and accessibility, similar to findings in related maintenance system studies.

The implementation of Schedufix enhanced accountability and transparency in maintenance operations by ensuring that maintenance activities are properly recorded and monitored. The system supports informed decision-making by providing updated and organized maintenance data for IT laboratory management.

Performance Evaluation

The evaluation results indicate that Schedufix achieved a high level of acceptability across all ISO/IEC 25010 quality characteristics. The summarized results are presented in Table 2.

Table 2. ISO/IEC 25010 System Evaluation Results

Table	Quality Characteristic	Mean Score	Interpretation
1	Functional Suitability	4.42	Strongly Agree
2	Performance Efficiency	4.49	Strongly Agree
3	Compatibility	4.37	Strongly Agree
4	Usability	4.56	Strongly Agree
5	Reliability	4.52	Strongly Agree
6	Security	4.38	Strongly Agree
	Overall Mean	4.43	Strongly Agree

Usability obtained the highest mean score, indicating that the system is easy to use and suitable for users with varying technical skills. The overall evaluation confirms that Schedufix effectively supports preventive maintenance activities and improves maintenance efficiency, consistent with findings from related studies [2], [3].



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V. CONCLUSION

This study successfully developed and evaluated Schedufix, an online preventive maintenance system designed for IT laboratories at North Eastern Mindanao State University Cantilan Campus. The system was developed to address the challenges associated with manual, paper-based maintenance processes that resulted in delayed repairs, misplaced records, and inefficient monitoring of laboratory equipment.

Based on the evaluation results, Schedufix achieved a high level of acceptability across all ISO/IEC 25010 software quality characteristics. The overall mean score indicated that the system is functional, reliable, usable, efficient, and secure. The findings show that Schedufix effectively supports preventive maintenance activities and enhances the management of IT laboratory resources.

The implementation of Schedufix improved maintenance efficiency by providing a centralized platform for scheduling, monitoring, and documentation of maintenance activities. The system also enhanced accountability among maintenance personnel and improved decision-making by providing accurate and accessible maintenance data. These results confirm that Schedufix is an effective solution for improving preventive maintenance management in academic IT laboratory environments.

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