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Development of a Real-Time Web-Based Battalion Picket Activity Monitoring System: A Case Study of the INFO GIAT Application

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Abstract

Operational effectiveness in a Battalion environment depends heavily on the discipline and orderly execution of picket duties. However, reliance on manual administration such as physical journals and fragmented data recapitulation creates bottlenecks in the flow of vital information, increases the risk of data loss, and limits leadership's ability to supervise unit activities in real-time. This research develops INFO GIAT (Informasi Gerakan Internal Anggota Terpadu), a web-based information system designed to transform battalion picket management into an integrated digital ecosystem. The Prototyping development method was adopted to build the system iteratively and responsively to user needs, while Blackbox Testing was used to validate system reliability. The system incorporates Role-Based Access Control (RBAC) to manage access for three user types: Administrator, Organik/Atasan (supervisor), and Kadet (picket officer). A key security feature is a two-factor authentication (2FA) mechanism via Telegram API. Results indicate that INFO GIAT significantly improves the efficiency of picket administration, automates personnel strength recapitulation, and provides a real-time monitoring dashboard for leadership, while minimizing human error and ensuring data transparency and accountability.

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1. Introduction

The rapid advancement of information technology has significantly transformed organizational management systems across various sectors, including military institutions. Digital transformation has encouraged organizations to adopt information systems capable of improving operational efficiency, accelerating communication, enhancing data accuracy, and supporting strategic decision-making processes. In military organizations, information systems play an essential role in supporting operational readiness, personnel administration, supervision, and internal coordination processes. Effective information management enables commanding officers to monitor

activities more systematically and improve organizational responsiveness to operational needs (Laudon & Laudon, 2021).

Within the Battalion environment, picket duty represents one of the fundamental operational activities aimed at maintaining discipline, security, orderliness, and continuity in the implementation of daily standing operational procedures (PHST). Picket personnel are assigned based on rotational schedules distributed across several sections and units. The execution of picket duties not only involves physical attendance but also includes activity recording, documentation, reporting mechanisms, monitoring of personnel movements, and submission of reports to commanding officers. Therefore, effective picket administration becomes a critical component in ensuring the smooth execution of Battalion operational activities and maintaining organizational control systems (Sutabri, 2020).

However, despite the increasing need for efficient administrative systems, many Battalion environments still rely heavily on conventional manual methods for managing picket administration. Duty schedules are often recorded in physical notebooks, attendance reports are documented manually, and communication between officers frequently depends on verbal instructions or simple spreadsheet files. This manual process creates several significant challenges, including data duplication, document loss, recording errors, slow report recapitulation, and difficulties in retrieving historical activity records. According to Bolung and Tampangela (2017), conventional administrative systems are highly vulnerable to inefficiency due to repetitive manual processes and limited integration between reporting components.

The limitations of manual administrative systems become even more problematic in environments that demand speed, accuracy, accountability, and real-time supervision. In many cases, commanding officers encounter difficulties in monitoring picket activities directly because reports are not integrated into a centralized digital system. Delays in report submission often disrupt operational coordination and hinder leadership decision-making processes. Furthermore, the absence of real-time monitoring mechanisms reduces organizational effectiveness in evaluating personnel discipline and operational performance. Mahendra and Yanto (2018) explained that web-based information systems significantly improve data accessibility, reporting speed, and managerial supervision because information can be accessed centrally and simultaneously by authorized personnel.

The utilization of web-based information systems has become increasingly relevant in supporting modern organizational administration. Web-based systems provide advantages such as centralized databases, automated scheduling, real-time information access, secure data storage, multi-user accessibility, and integration with reporting systems. These systems also minimize human error caused by manual data entry processes while increasing operational transparency and accountability (Kadir, 2019). In addition, web technologies enable organizations to conduct more effective monitoring and evaluation processes through structured digital dashboards and automated reporting mechanisms (Pressman & Maxim, 2020).

Several previous studies have demonstrated the importance of implementing information systems in organizational administration and operational management. Research conducted by Bolung and Tampangela (2017) highlighted that computerized administrative systems improve efficiency in recording and recapitulating operational data. Similarly, Mahendra and Yanto (2018) found that web-based management systems accelerate information distribution and improve monitoring effectiveness within institutional environments. Other studies also indicate that digital transformation in organizational administration contributes positively to operational effectiveness, organizational productivity, and data management quality (Susanto, 2021; Hutahaean, 2020).

In military organizational environments, the implementation of integrated information systems is particularly important because military operations require discipline, structured communication, and rapid coordination. Manual administrative systems are often inadequate for supporting complex operational activities involving multiple units and hierarchical supervision structures. Consequently, the adoption of digital management systems can assist leadership in

conducting supervision more efficiently while improving the accuracy and reliability of operational information. Real-time monitoring systems also enable faster response mechanisms when operational issues or disciplinary violations occur (Jogiyanto, 2019).

Based on these challenges, this research proposes the development of the INFO GIAT (Informasi Gerakan Internal Anggota Terpadu) system, a web-based Battalion Picket Management Information System designed to improve the effectiveness and efficiency of picket administration processes. The system is expected to facilitate automated scheduling, digital attendance recording, activity documentation, report generation, and centralized supervision by commanding officers. Through the implementation of INFO GIAT, Battalion leadership can monitor picket activities in real time, accelerate the dissemination of operational information, and simplify evaluation processes related to personnel performance and discipline.

In addition, the INFO GIAT system is expected to reduce the risk of data loss, minimize human error, and improve data security through centralized digital storage mechanisms. The integration of web-based technology into Battalion operational management also contributes to the modernization of military administrative systems and supports the broader digital transformation agenda within defense institutions. This study therefore not only contributes practically to improving Battalion operational management but also enriches the development of information system research in military organizational contexts.

To achieve these objectives, this study focuses on designing and developing a web-based information system tailored to Battalion operational requirements. The research also evaluates how the implementation of the INFO GIAT system can improve administrative efficiency, strengthen supervisory mechanisms, and support leadership decision-making processes. By integrating digital technology into picket administration management, this study seeks to provide an innovative and sustainable solution for enhancing operational effectiveness in military environments.

2. Research Methodology

Research Design

This research employs the Information System Design and Development approach by adopting the Prototyping Method to develop and implement a functional prototype of the INFO GIAT system. The Prototyping method was selected for its iterative and user-responsive nature, allowing the system to be refined based on direct feedback from prospective users. This approach is particularly suitable for projects with tight timelines that require flexibility, efficiency, and adaptability to changing user and organizational needs (Pricillia & Zulfachmi, 2021).

The designed system consists of two main interfaces: (1) a Web Dashboard Application serving as the input, data management, and reporting interface for authorized users (Administrator and Organik/Atasan); and (2) a Telegram-integrated Two-Factor Authentication (2FA) mechanism serving as the security and access validation layer for Kadet (picket officer). The primary focus of the design is the implementation of Role-Based Access Control (RBAC) to ensure data integrity and separation of authority across three user roles.

System validation will be conducted through Black Box Testing to verify that core system functionalities such as login with 2FA, picket data input, documentation upload, schedule management, and monitoring dashboard operate according to design specifications. Additionally, the research will include evaluation steps to assess the system's impact on administrative efficiency and data accuracy received by leadership, as well as overall system usability.

Alternatives and Criteria

This study compared several alternative methods for managing picket administration at the Indonesian Defense University Battalion, based on system analysis and direct observation. The first alternative, the Conventional Method, involves verbal reporting and physical notebooks or spreadsheets; however, this method is inefficient, prone to human error, and hampered by data fragmentation across messaging platforms. The second alternative considered was a Simple Web

System Without Automation, which only provides a dashboard for data input but lacks real-time monitoring and automated recapitulation features. As the most optimal solution, an Integrated Web-Based System with RBAC and Telegram 2FA integration was selected, which combines a centralized dashboard for multi-role management with automated reporting and real-time leadership oversight.

The evaluation of alternatives is based on five key criteria:

- Reporting Efficiency: Speed and ease of submitting and accessing daily picket reports.
- Data Accuracy and Recapitulation: Accuracy of personnel strength data and automated generation of periodic reports.
- Data Integrity and Access Security: Protection against unauthorized data changes through RBAC and 2FA.
- Multi-Role Performance Optimization: Ease of use for Administrators, real-time oversight for Organik/Atasan, and secure input mechanisms for Kadet.
- Real-Time Monitoring Capability: Availability of an instant dashboard for leadership to monitor personnel status and activity documentation.

Based on the evaluation of these criteria, the Integrated Web-Based INFO GIAT System with RBAC and Telegram 2FA was selected as the optimal solution to improve the efficiency of picket administration and real-time information distribution within the Indonesian Defense University Battalion.

Technical Data Analysis

The data analysis in this study was designed to evaluate the effectiveness of the web-based INFO GIAT system design. The evaluation was conducted through the following stages:

1. Initial Data Collection - Conducting observations and interviews within the Indonesian Defense University Battalion, and reviewing documents related to conventional picket administration systems as a basis for comparison.
2. Functionality Testing (Black Box Testing) - Conducting tests to verify that the functionality of the Web Dashboard (login, input, data management, authorization) and the Kadet interaction simulation (2FA authentication, apel input, documentation upload, schedule viewing) were running according to system design specifications.
3. Accuracy and Recapitulation Analysis - Evaluating the accuracy of picket data managed through the dashboard and analyzing the effectiveness of the automated recapitulation mechanism for daily, weekly, and monthly report generation.
4. System Performance Evaluation - Comparing the time efficiency required by officers to submit picket reports and by leadership to access real-time monitoring information, before and after the implementation of the system design prototype.
5. Validation of Results - Confirming research findings through discussions with Battalion Staff and information systems experts to verify the usability and relevance of the developed solution.

With this approach, this study aims to demonstrate that the implementation of a web-based system can optimize the efficiency, accuracy, and transparency of picket administration in the Indonesian Defense University Battalion, while also supporting the enforcement of time discipline and command accountability.

3. Results and Discussion

The system design results demonstrate that the INFO GIAT web-based Battalion Picket Management Information System significantly improves the efficiency, accuracy, and transparency of picket administration at the Indonesian Defense University Battalion. This system enables centralized activity recording, personnel strength recapitulation, and documentation management via the Web Dashboard, while ensuring automated and real-time information access for leadership through a role-specific monitoring interface.

Based on testing results, the picket reporting process—which previously relied on time-consuming manual methods such as physical notebooks, spreadsheets, and fragmented messaging—is now automated upon data entry by the Kadet through the Web Dashboard. Furthermore, the potential for data inaccuracies and recording errors (human error) common with manual methods is drastically minimized because source data is centrally managed with backend validation. The implementation of 2FA via Telegram API also ensures that only authorized, scheduled personnel can access the input system, strengthening data accountability. Leadership can now access real-time personnel recapitulation and activity documentation directly through the monitoring dashboard, without waiting for manual reports.

Table 1. Comparison of Conventional Methods with the INFO GIAT Web-Based Picket Management System

Evaluation Aspect	Conventional Method	INFO GIAT System
Picket Report Submission	Manual (notebook/spreadsheet, time-consuming)	Automated via Web Dashboard with validation
Data Accuracy Level	Low (prone to human error & data loss)	High (centralized, backend-validated data)
Leadership Access to Information	Difficult (requires physical reports or messaging)	Easy & Real-time (via monitoring dashboard)
Data Recapitulation	Manual, fragmented, error-prone	Automatic, centralized via Web Dashboard
Access Security	Vulnerable (no access control)	Secure (RBAC + 2FA via Telegram)
Documentation Management	Unorganized (mixed with chat messages)	Structured (categorized in system with timestamps)

The Black Box Testing results across all three user roles (Administrator, Organik/Atasan, and Kadet) confirmed that all core functionalities operated according to design specifications. Key test scenarios including login with 2FA validation, apel data input with backend error handling, documentation upload with file type and size validation, schedule management with access control, and real-time monitoring with detailed modal pop-ups all produced results consistent with expected outcomes. The RBAC mechanism successfully prevented unauthorized access, as verified by tests attempting to access restricted URLs from lower-privileged accounts.

The monitoring dashboard provides Organik/Atasan with real-time personnel statistics presented as visual cards and bar charts, enabling rapid assessment of unit readiness across all four Battalions. The integration of a contact feature within the duty roster display further supports immediate coordination without the need for manual contact lookup a significant operational advantage in time-sensitive military environments

4. Conclusion

The implementation of the technology-based INFO GIAT Picket Management Information System has been proven to significantly improve the efficiency, accuracy, and transparency of picket administration in the Indonesian Defense University Battalion. With a web-based architecture featuring centralized data management, automated recapitulation, and a real-time leadership monitoring dashboard, the system effectively addresses the core challenges of the conventional manual approach: data loss risks, slow reporting cycles, and limited supervisory capacity. The integration of two-factor authentication (2FA) via Telegram API provides a robust security layer that ensures only authorized and scheduled personnel can access the input system, thereby strengthening data accountability and integrity. The RBAC-based access control system further ensures that each user role Administrator, Organik/Atasan, and Kadet operates within a clearly defined and secure scope of authority. These advantages collectively support the enforcement of time discipline and reduce the potential for human error in administrative processes. With these characteristics, the

INFO GIAT system can serve as a model for other discipline-based military and institutional environments seeking modern, structured, and digitally adaptive solutions for activity administration and real-time command oversight.

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