

Web-Based Case File Management System for Motor Vehicle Theft Crimes

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Abstract

This study addresses the inefficiencies in managing motor vehicle theft case data at the West Java Police Department by developing a web-based file management system. The current manual process, which relies on Microsoft Excel, is prone to human error, data duplication, and reporting delays. Our research introduces a system that automates data categorization, detects data similarities (such as duplicate chassis or engine numbers), and streamlines the verification and validation process, which was previously a time-consuming manual task. By employing object-oriented programming principles, the system accommodates diverse data types and dynamic reporting needs. The system's novelty lies in its specific focus on vehicle theft cases and the integration of a multi-level verification process. User Acceptance Testing (UAT) using the UTAUT model showed high user acceptance, with a behavioral intention of 87.5%, performance expectancy of 84%, and effort expectancy of 82%. This new system significantly improves data accuracy, accelerates reporting, and enhances the overall efficiency of criminal case handling.

Keywords: File Management System; Service System; Police Department; UAT; UTAUT

1. Introduction

Crime is any act that violates both legal statutes and social norms, leading to public opposition. Perpetrators often act impulsively without considering the full consequences of their actions, sometimes going as far as to injure or even kill their victims [1]. In Indonesia, the West Java Regional Police is a key government institution responsible for protecting the public from all forms of criminal activity. The high rate of motor vehicle theft in West Java is a particularly serious concern for law enforcement. According to data from the Central Statistics Agency (BPS), West Java was among the top three provinces with the highest number of thefts in 2021, accounting for 47.05 percent of all cases. The following year, in 2022, the crime rate in West Java surged even further, increasing by up to 69 percent [2], [3].

Archive systems are designed to show how data from a specific file is stored, how the file is organized or structured, and how its records can be retrieved [4]. Poor archiving systems have been shown to cause several issues, including difficulty in locating stored information, errors in categorizing files, and ultimately, hindrances to subsequent work processes. These problems lead to frequent data loss and complicated searches, resulting in long retrieval times when data is needed. Therefore, the urgency for

implementing effective and efficient archiving systems has been increasing [5].

This study addresses the inefficiencies and inaccuracies in managing motor vehicle theft case files at the West Java Regional Police. The current manual archiving process, which relies on Microsoft Excel, is prone to errors and data duplication and is time-consuming, especially when reports are needed. This manual system hinders the effective handling of cases and the preparation of accurate reports. A good archiving system is crucial because it can easily help identify crime patterns and the modus operandi of perpetrators, which ultimately supports more targeted prevention and law enforcement efforts. Furthermore, well-managed data provides a foundation for comprehensive criminal analysis that can be used for policy-making. Moreover, A large number of digital files in it makes the search process even longer, so it is necessary to optimize the search features [6].

In contrast to other studies, this research has a more specific focus and a more integrated solution. Previous research, such as those that discuss methods for restructuring business processes, tend to focus more on theoretical frameworks for generating innovative ideas in process redesign. For example, a case study showed its application in the Surabaya civil registry office for redesigning teaching processes [7]. Prior studies addressed the complexity of the Indonesian Criminal

Code (KUHP) by developing a prototype using wildcard queries and binary trees [8]. Another study proposed redesigning HR business processes with Camunda BPMN and Chatbot integration [9].

Our research not only proposes a theoretical business process redesign but also provides the implementation of a functional, web-based system specifically for motor vehicle theft cases. The main advantage of the system we developed is its ability to detect data duplication, automate the multi-level verification and validation process, and provide an informative dashboard accessible to various actors within the West Java Regional Police. These features directly address the real-world problems faced by the Information and Communication Technology (ICT) Division of the West Java Regional Police, thus making a more significant and practical contribution to improving the effectiveness of criminal case handling.

2. Research Methods

2.1. Research Objectives and Scope

The research is specifically aimed at optimizing the archiving process for motor vehicle theft cases within the West Java Regional Police's Information and Communication Technology (ICT) Division through the development of a new information system. The existing system was analyzed using Business Process Improvement (BPI) principles to identify opportunities for enhancement. The overall scope of this study is divided into three main stages: (1) analyzing the existing system with a BPI approach, (2) designing a new system solution based on the analysis findings, and (3) evaluating the results of the system's development.

The initial stage involved an in-depth analysis of the existing system using the BPI approach to identify areas for improvement. This included identifying and mapping the current business processes for collecting, grouping, storing, and accessing theft case files. The analysis critically evaluated the performance of these processes, identifying the root causes of issues such as bottlenecks, redundancies, and non-value-added activities. We also employed concepts from Operational Research (OR), specifically queueing theory, to minimize redundant processes and reduce activity cycle times, thereby preventing bottlenecks [10]. By mapping existing bottlenecks, this study establishes a baseline that proves efficiency gains: the system's design inherently eliminates redundant manual steps, providing a logical verification of improvement even without a formal before-and-after trial.

The second stage involved designing the new system. Based on gap analysis and findings from the existing system, a new information system was designed to simplify processes, automate manual tasks, improve data integration, and enhance information accessibility

for authorized users. The design adhered to user-centered principles to ensure the proposed system is user-friendly and meets all functional requirements.

Finally, the third stage involved system implementation and evaluation. The performance of the designed system was assessed through technical testing (e.g., performance and security testing) and a User Acceptance Test (UAT). The same metrics used in the analysis stage were reapplied to measure the improvements achieved. The new system is intended not only to archive data but also to significantly enhance the efficiency, effectiveness, and transparency of the entire process, from data collection and processing to storage and reporting. The web-based nature of the system further facilitates better coordination and collaboration among different departments.

2.2. Analysis of the Existing System

The Information and Communication Technology (ICT) Division of the West Java Regional Police plays a crucial role in handling criminal cases, including motor vehicle theft. The unit is responsible for managing data and information from vehicle theft reports received from all police precincts and stations across West Java. Each month, the ICT Division receives and processes around 250 reports, which account for approximately 75 motor vehicle theft cases [11].

Tabel 1. Gap Analysis of the Research

Focus Area	Existing	Desired State
Method	Checking for data similarity and completeness is time-consuming. Manual verification and validation are done by comparing reports. Report categorization is performed manually, one by one. The system provides notifications for data similarity or incompleteness. The system ensures report completeness and conformity, eliminating the need for manual verification and validation. The system automatically categorizes reports based on five categories (status, modus operandi, location, vehicle type, and time).	Checking for data similarity and completeness is time-consuming. Manual verification and validation are done by comparing reports. Report categorization is performed manually, one by one. The system provides notifications for data similarity or incompleteness. The system ensures report completeness and conformity, eliminating the need for manual verification and validation. The system automatically categorizes reports based on five categories (status, modus operandi, location, vehicle type, and time).
Information	There is no notification for duplicate vehicle data (chassis/engine number). There is no comparative information on data volume by category. The system provides	There is no notification for duplicate vehicle data (chassis/engine number). There is no comparative information on data volume by category. The system provides notifications for

	notifications for duplicate vehicle data (chassis/engine number). A dashboard with pie charts and bar charts displays comparative data volumes by category.	duplicate vehicle data (chassis/engine number). A dashboard with pie charts and bar charts displays comparative data volumes by category.
Material	Ineffective and inefficient use of paper.	Paper usage is reduced because data errors can be corrected directly in the system and verification/validation is done online, eliminating the need to repeatedly print reports.

Those data is processed and categorized into five key areas: vehicle type (car, motorcycle, bus, truck), crime scene location (public roads, parking lots, residences, offices, schools, and places of worship), modus operandi (robbery, fraud, fake key, and damage), vehicle status (missing, found, suspected, and heavily damaged), and time of the incident. The data is currently processed by the Data Collection and Processing Section using Microsoft Excel. The workflow involves data entry, manual categorization, report printing, verification by the Data Collection and Processing Officer, validation by the Head of the Data Collection and Processing Unit, and final signing by the Head of the ICT Sub-Division (*Kasubbid* TIK). However, the existing manual system has several significant drawbacks. The process of checking for data completeness and duplication is time-consuming, and manual verification and validation are susceptible to human error.

The current system cannot detect duplicate data, especially for vehicle identification numbers like chassis or engine numbers. These challenges lead to delays and inaccuracies in data processing, which ultimately hinder decision-making and the dissemination of information. By replacing manual Excel entries with automated 'Similarity Checks,' the system provides real-time validation that immediately eliminates duplicate chassis and engine numbers—errors that the previous manual process was physically unable to detect. Therefore, a new application is needed to solve these problems and improve the effectiveness of managing motor vehicle theft case files. To understand the gap between the current state and the desired future state, a gap analysis was conducted. This analysis was essential for formulating the right strategies and solutions for developing the new archiving system. The findings from this gap analysis are summarized in Table 1.

2.3. Proposed System Design

The implementation of Business Process Improvement (BPI) aims to enhance the efficiency and effectiveness of business processes. Within the context of

developing a criminal case file archiving system for the West Java Regional Police's ICT Division, BPI plays a crucial role in optimizing workflows and improving unit performance. The new system will introduce several changes to the existing business processes:

- **Report Printing:** The general staff will print reports only after they have been verified and validated within the system, a shift from the previous process where printing occurred beforehand.
- **Data Input:** Motor vehicle theft data will be directly stored into the system's database upon entry.
- **Data Access:** Authorized officers can view motor vehicle theft data directly within the system.
- **Informative Dashboard:** The Head of the ICT Sub-Division can access an interactive dashboard to gain further insights into ongoing cases.

The dashboard is a key component, designed to provide a concise and visual overview of critical organizational information on a single screen. Its design focuses on data presentation, personalization, and user collaboration. A dashboard's purpose is to measure performance, monitor processes, and forecast future conditions [12]. For this system, the dashboard uses pie charts and donut charts to show the proportions of case file categories, while bar charts are used to display comparisons of case attributes, such as location.

The designed application system aims to solve the problems of inaccuracy and delays in archiving motor vehicle theft case files within the West Java Regional Police's ICT Division. This system enables general staff to input data on the reporter, vehicle, incident, and report, which will then be verified by the Data Collection and Processing Officer and validated by the Head of the Data Collection and Processing Unit. The system is also equipped with features for checking data similarity, automated report categorization, and notifications to minimize errors and accelerate the data processing workflow. In addition, the system provides an informative dashboard that can be accessed by the Head of the ICT Sub-Division to monitor the number of cases by category. With this new system, the archiving process for motor vehicle theft cases is expected to become more efficient, accurate, and informative, thereby supporting better decision-making and improving the effectiveness of case handling.

After all necessary analysis and following the BPI approach described in Figure 1, a proposed system model was designed to be implemented. This is illustrated in Figure 2.

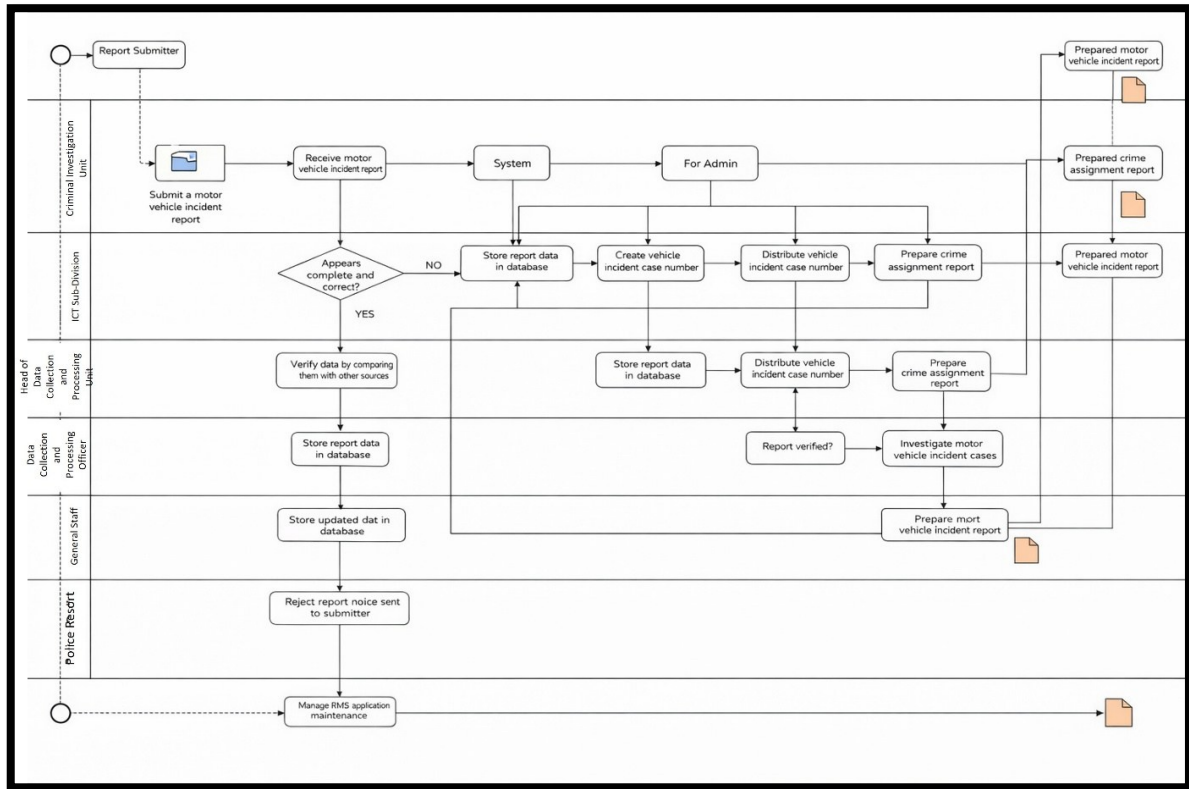


Figure 1. Business Process Improvement of The Proposed System

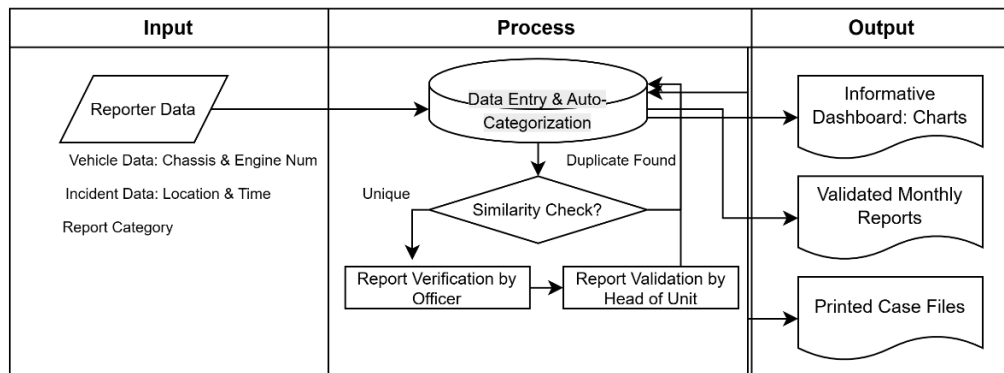


Figure 2. Proposed Information System Model

3. Results and Discussions

3.1. System Design

Based on the analysis and modeling of the proposed system, which followed data processing and BPI analysis, the next step was to implement the proposed system model. The design aims to enhance the efficiency and accuracy of archiving motor vehicle theft cases at the West Java Regional Police's ICT Division.

The use case diagram for this system illustrates how four key actors—General Staff/Civil Servants (PNS), the Data Collection and Processing Officer, the Head of the Data Collection and Processing Unit, and the Head of the ICT Sub-Division—interact with the

system. This interaction includes inputting data, editing data, reading data, filtering data by category, verifying and validating reports, and printing reports. This diagram provides a clear overview of each actor's workflow and responsibilities within the system.

The system will also include notification features to detect data similarities and incomplete data. It is expected that this will help the ICT Division of the West Java Regional Police produce accurate and timely reports, thereby supporting better decision-making

3.2. Implementation

This section details the user interface design for the criminal case file application and its subsequent

implementation. The system's design is tailored to different user roles, as illustrated in the Use Case Diagram in Figure 2, ensuring that each user has access to functionalities relevant to their specific business process role. The proposed system's user interface is designed to provide clear insights into reporting and archiving performance, as shown in Figure 3.

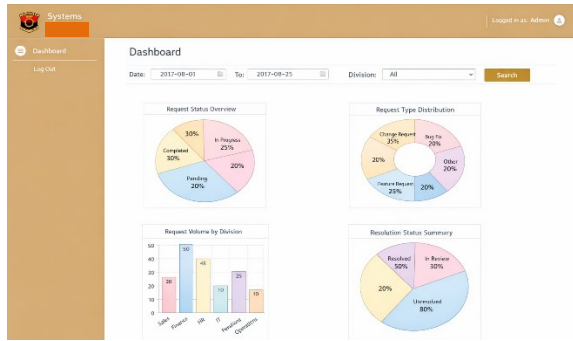


Figure 3. Dashboard of Proposed System

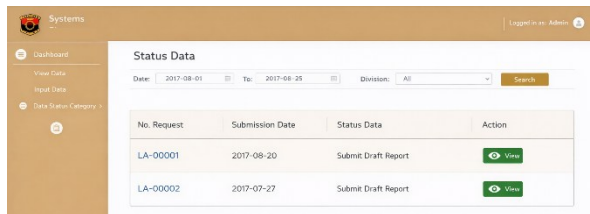


Figure 4. Show Status Data Modul

Figure 4 displays the reporting page categorized by incident status, allowing users to view data according to a specific status. Similarly, Figure 5 shows the page for displaying motor vehicle theft data, where users can view data they have created. This page includes a date picker to filter data and an "input" button for adding new theft data. A "data status" button is also available to check whether the report has been verified or validated.

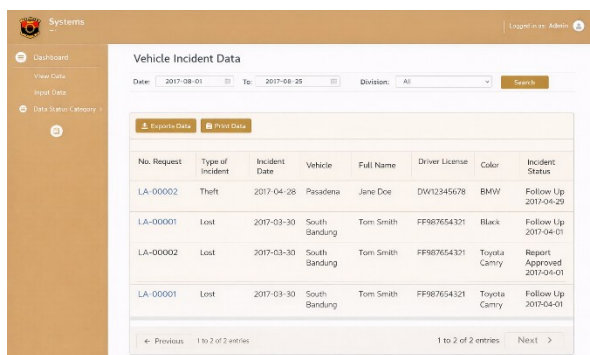


Figure 5. Use Case Proposed Information System

Figure 6 illustrates the report verification page. This verification process is critical to ensuring the accuracy and completeness of the data before it is validated by the Head of the Data Collection and Processing Unit. Once verified, the Head of the Data Collection and Processing Unit performs the final validation. After the report is validated, the Head of the ICT Sub-

Division can access the dashboard to view the processed information and reports. This system is designed to guarantee data quality and streamline the workflow for handling motor vehicle theft cases.

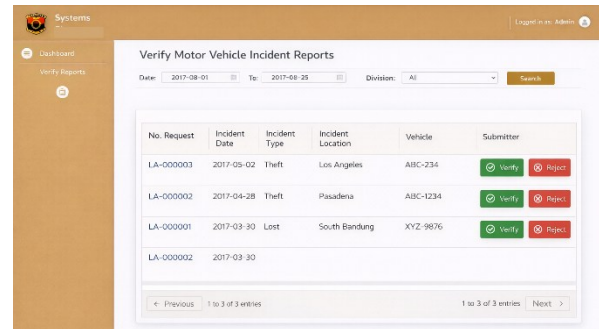


Figure 6. Use Case Proposed Information System

3.3. Evaluation

To test the system's functionality, its effectiveness was measured by assessing user acceptance of the proposed technology. The Unified Theory of Acceptance and Use of Technology (UTAUT) model was used to measure user acceptance. This model posits that technology acceptance is influenced by four key factors: Performance Expectancy, which is a user's belief that the system will improve their job performance; Effort Expectancy, or the perceived ease of using the system; Social Influence, which is the degree to which other users influence someone's decision to use the system; and Facilitating Conditions, which is the availability of supporting infrastructure [13]. These variables were measured through a User Acceptance Testing (UAT) questionnaire, with the UAT results serving as evidence that the system is accepted and meets user needs. Demographic factors, user experience, and the voluntary nature of use were also considered, as they can influence the test results.

Tabel 2. User Acceptance Test

Variable	User				Average
	General Staff	Officer	Head of Unit	Head of Sub Division	
Performance Expectancy	88%	84%	84%	80%	84%
Effort Expectancy	84%	80%	80%	84%	82%
Behavioral Intention	90%	90%	90%	80%	87.5%

The results of the User Acceptance Testing (UAT), shown in Table 2, demonstrate a high level of user acceptance for the new web-based system. An analysis of the three key UTAUT variables reveals positive outcomes:

- Performance Expectancy: Users have a high-performance expectancy of 84%, which

indicates their strong belief that the system will improve their work efficiency and effectiveness.

- **Effort Expectancy:** With a score of 82%, this variable suggests that users find the system relatively easy to use. However, this score is slightly lower than the other variables, indicating that further improvements to the user interface and user experience could make the system even easier to use.
- **Behavioral Intention:** The high score of 87.5% for behavioral intention shows that users have a strong desire and willingness to adopt and use the system.

The high-Performance Expectancy score of 84% further validates the claim of improved efficiency, as it reflects a professional consensus among users, that have extensive experience with the prior manual workflow. The new system's automated categorization significantly reduces the time required for case filing and reporting. Overall, the UAT results provide a very positive indication of the potential success of the system's implementation. While the findings are encouraging, some refinements are needed to optimize ease of use and maximize overall user acceptance.

4. Conclusion

This research successfully designed and developed a web-based criminal case file management system for motor vehicle theft at the West Java Regional Police's ICT Division. Unlike previous witness management systems built on Visual Basic.NET and Microsoft Access [14], our research introduces a web-based architecture specifically optimized for motor vehicle theft cases. While prior systems focused on basic data recording for witnesses, our proposed solution implements a multi-level verification workflow and automated similarity checks to enhance data accuracy and reporting efficiency. The system was specifically created to address the inaccuracies and delays in archiving caused by inefficient manual processes. The developed system significantly improved the efficiency and accuracy of case filing by automating categorization, checking for data similarities, and streamlining data validation. Features like notifications for duplicate or incomplete data minimize input errors, while an informative dashboard facilitates better monitoring and data analysis.

The significance of this research lies in its specific focus on motor vehicle theft cases, distinguishing it from prior work that proposed a more general information system for the Directorate of General Criminal Investigation [5]. Furthermore, while other studies have focused on the cluster analysis of criminal acts [15], our research concentrates on developing a dedicated archiving system. The system developed also includes a multi-level verification and validation process involving various actors within the West Java

Regional Police, along with unique features like data similarity notifications and an information dashboard.

The User Acceptance Testing (UAT) using the UTAUT method showed a high level of user acceptance. The results were promising, with a behavioral intention score of 87.5%, an effort expectancy of 82%, and a performance expectancy of 84%. To further improve user experience, the user interface and overall user experience should be optimized. Providing comprehensive user guides is also necessary to help users fully utilize the system's features. This system could even be integrated with applications like "PRESISI Polri" to provide information to the public and encourage their participation in crime prevention. Ultimately, the implementation and optimization of this system are expected to enhance the management of motor vehicle theft data, improve the effectiveness of case handling, and contribute to a safer community.

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