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RESEARCH ARTICLE

Case Witness Data Management Information System at the Military Court I-01 Banda Aceh

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Abstract
The Case Witness Data Management Information System is an integral component of the operations at the Military Court I-01 Banda Aceh. The primary objective of this system is to manage and organize case witness information, ensure the efficient distribution of evidence, and facilitate information accessibility. This research focuses on the Case Witness Data Management Information System at the Military Court I-01 Banda Aceh, developed using Microsoft Visual Basic.NET as the programming language and Microsoft Office Access as the database management system. The aim of this research is to design and analyze this system using the Microsoft Visual Basic.NET and Microsoft Office Access platform. Data collection was conducted through literature review (examining relevant literature) and field research (interviews and direct observation). The system is managed by one primary administrative staff member, supported by two additional administrative staff, who are responsible for recording and inputting witness data. Research findings indicate that the Case Witness Data Management Information System has been implemented according to established procedures. The system utilizes computer technology, employing Visual Basic.NET and Microsoft Access 2010 as its database management system.

Keywords
Information System; Data Processing; Case Witness; Court Efficiency.

1 | INTRODUCTION

Indonesia, as a nation founded on the principle of the rule of law (rechtsstaat), enshrines legal supremacy as the primary foundation governing all aspects of societal, national, and state life. This affirmation is constitutionally embedded in Article 1, paragraph (3) of the 1945 Constitution of the Republic of Indonesia, which explicitly states that "The State of Indonesia is a state based on the rule of law." A logical consequence of this principle is the state's obligation to ensure the establishment of an effective, efficient, and accountable judicial system as a pillar for upholding law and justice. Within this framework, the military judiciary plays a strategic and crucial role, particularly in maintaining discipline, order, and law enforcement within the Indonesian National Armed Forces (TNI), which in turn contributes to the nation's sovereignty and the overall security and order of society. The existence and authority of the military judiciary are specifically regulated by various laws and regulations, including the Republic of Indonesia Law Number 34 of 2004 concerning the Indonesian National Armed Forces, which outlines the special jurisdiction of military courts in handling criminal cases involving TNI personnel. The structure of the military judiciary in Indonesia itself comprises several tiers, starting from the Military Court as the court of first instance, the High Military Court as the appellate court, the Supreme Military Court as the court of cassation, up to the Ad Hoc Military Tribunal for specific circumstances.

The Military Court I-01 Banda Aceh, as one entity within Indonesia's military judicial structure, bears the duty and responsibility of administering justice for TNI members within its jurisdiction. In line with the rapid advancements in information and communication technology (ICT), the demand for modernizing judicial administration has become increasingly urgent. The Military Court I-01 Banda Aceh has endeavored to adopt information technology to support its various operational activities, including case data management. However, one crucial aspect whose management still faces significant challenges is case witness data. Witnesses play a central role in the evidentiary process in court, where their testimony, especially that based on direct experience (audi et vide), holds high probative value in uncovering the material truth of a criminal case. Therefore, the accurate, complete, easily accessible, and secure management of witness data is vital for the smooth running of trial proceedings and the attainment of justice. Currently, preliminary observations indicate that the management of case witness data at the Military Court I-01 Banda Aceh still tends to rely on standard office applications or semi-manual methods. Although computer technology has been utilized, its use is not yet integrated into an information system specifically designed for the needs of witness data management. This situation potentially leads to various operational problems. Searching for specific witness data can be time-consuming, especially as the volume of cases increases. Processing data for reporting or analysis purposes becomes more complex and prone to human error. Furthermore, the risk of data loss due to physical damage to storage media or the lack of systematic backup mechanisms, as well as the potential for data duplication leading to informational inconsistencies, are tangible obstacles that can hinder the efficiency and effectiveness of the court's performance. These limitations align with findings from other research highlighting the importance of structured information systems within judicial and public administration environments, such as those implemented at the Mempawah District Prosecutor's Office (Aliska, Safriadi, & Prihartini, 2018) and the Special Criminal Investigation Directorate of the West Sumatra Regional Police (Kennedy, 2015), which demonstrated significant benefits from applying information systems in case file management and data processing. Even within the Military Court I-01 Banda Aceh itself, there has been an effort to develop an information system for trial guest registration (Ardian, Machlan, & Ikhwani, 2022), indicating an awareness of the importance of digitalization, yet it has not specifically addressed the vital aspect of witness data management.

To overcome these challenges, a dedicated information system solution is required. The concept of a "system" itself, as defined by experts, refers to a collection of elements or components that are interconnected, interact, and cooperate to achieve a common goal (Wahyudi Kumorotomo & Subando Agus Margono, 2001; Gordon B. Davis, 2002; L. Ackof, 2000). In this context, an "Information System" can be understood as a structured framework that coordinates resources – including hardware, software, databases, operational procedures, and human resources (brainware) – to collect, process, store, and distribute relevant and quality information to support organizational decision-making and operations. Information, as the output of this system, is data that has been processed into a more meaningful and useful form for its recipients. Data itself is the raw representation of facts, events, or concepts, which can be in the form of text, numbers, images, audio, or video. The quality of information is highly determined by its accuracy, relevance, timeliness, and completeness, as quality information is a vital asset for making sound decisions.

Therefore, this research proposes the development of a "Case Witness Data Management Information System at the Military Court I-01 Banda Aceh." This system is designed with the primary goal of enhancing efficiency, accuracy, and accessibility in managing witness data. The choice of technology is a critical factor in this system's development. Microsoft Visual Basic .NET (VB.NET) has been selected as the primary programming language. VB.NET is an object-oriented programming language developed by Microsoft, offering a visual and feature-rich integrated development environment (IDE), and supporting the rapid and efficient development of Windows-based applications (Petroutsos, 2006; Vick, 2004). VB.NET's strengths in building intuitive user interfaces and its ability to interact with Windows

operating system components make it a suitable choice for desktop applications in office environments like a court. For database management, this research will utilize Microsoft Office Access. Access is a relational database management system (RDBMS) that is part of the Microsoft Office suite. Although often considered for small to medium-scale applications, Access provides sufficiently robust features for designing data tables, creating queries for data retrieval, designing forms for data input, and generating reports for information presentation (Conrad, 2013; Beynon-Davies, 2004). Its ease of use, good integration with other Office applications, and its capability to manage data structurally make it a practical database platform for the specific needs of this witness data information system. The use of flowcharts as an analysis and design tool will be employed to visualize the business process flow and data flow within the system logically and systematically, ensuring that the system design aligns with user requirements and operational procedures at the Military Court I-01 Banda Aceh.

The implementation of such computerized information systems is not novel and has proven beneficial across various sectors. Case studies on the development of management information systems in diverse fields, such as church congregation services (Rupilele, 2018), workshop management (Audrilia & Budiman, 2020), credit sales accounting (Vidiasari & Darwis, 2020), data management for special needs students (Suryanto, Ananda, & Yuniarsa, 2012), civil registration services (Siregar, Aknuranda, & Pramono, 2018), as well as the management of criminal case files at the Police Sector level (Humam, Afriliana, & Khumedi, 2016) and the design of applications for creating criminal case files at the General Criminal Investigation Directorate (Fiarni, Sipayung, & Martiana, 2015), all indicate a positive trend in utilizing information technology to enhance efficiency, accuracy, and service quality. Thus, the development of the Case Witness Data Management Information System at the Military Court I-01 Banda Aceh is expected to make a similar contribution, overcoming the constraints of existing manual or semi-manual systems, and ultimately supporting the realization of a faster, more precise, and accountable judicial process. This research will focus on requirements analysis, system design using VB.NET and Access, prototype implementation, and an initial evaluation of the proposed system..

2 | BACKGROUND THEORY

The development of the Case Witness Data Management Information System for the Military Court I-01 Banda Aceh is grounded in several fundamental theoretical concepts spanning information systems, software technology, database management, and the specific context of the judicial system. At its core lies the concept of a system, defined as an organized assembly of interconnected and interdependent elements or variables working collaboratively towards a specific objective (Wahyudi Kumorotomo & Subando Agus Margono, 2001; Gordon B. Davis, 2002; L. Ackof, 2000). Central to modern organizational systems is information, which represents processed data transformed into a meaningful and useful format for its recipients, distinct from raw data (unprocessed facts). An Information System (IS) integrates hardware, software, databases, procedures, and human resources into a cohesive framework designed to collect, process, store, retrieve, and disseminate quality information—characterized by timeliness, relevance, value, and reliability—thereby supporting operational efficiency and effective decision-making. Within the specific domain of criminal justice, witnesses play an indispensable role, as their testimony constitutes crucial evidence; consequently, efficient and secure management of witness data is vital for the smooth progression of trials and the pursuit of justice. To address this need, the proposed system leverages Microsoft Visual Basic .NET (VB.NET) as the primary development language. VB.NET, a modern object-oriented language within the .NET ecosystem (Vick, 2004; Utley, 2002), offers a rich visual Integrated Development Environment (IDE) via Visual Studio that facilitates Rapid Application Development (RAD) (Petroutsos, 2006), supports structured coding through Object-Oriented Programming (OOP) principles (Davis, H., 2006), provides access to the extensive .NET Framework libraries, and integrates seamlessly with other Microsoft technologies, making it highly suitable for developing functional Windows desktop applications (Nilsson, 2002). For data storage and management, Microsoft Access is employed. As a Relational Database Management System (RDBMS) within the Microsoft Office suite (Beynon-Davies, 2004), Access provides comprehensive tools for designing tables, establishing relationships, formulating queries (using SQL or a visual designer), creating user-friendly forms for data entry, and generating formatted reports (Conrad, 2013). While suited for small to medium-scale applications, its ease of use, structural capabilities, and integration potential (Reichardt, 2000) make it a practical and efficient choice for the specific requirements of managing witness data in this context, allowing structured data storage accessible via VB.NET (e.g., through ADO.NET). The application of IS in the legal and criminal justice fields is well-established, with numerous studies demonstrating significant benefits in managing case files in prosecutor's offices (Aliska, Safriadi, & Prihartini, 2018; Setiawan & Effiyaldi, 2022), processing criminal data and police reports (Kennedy, 2015; Putra, Negara, & Nyoto, 2017; Dewi, Sulhan, & Santhia, 2020; Humam, Afriliana, & Khumedi, 2016; Fiarni, Sipayung, & Martiana, 2015), mapping crime geographically (Nurdiati, Barus, & Prasetyo, 2008), and managing court administrative tasks (Ardian, Machlan, & Ikhwani, 2022). This research aligns with this trend, aiming to apply these technological advantages specifically to witness data management within the military court setting. This theoretical foundation thus provides the

necessary conceptual framework for the subsequent phases of detailed user requirement analysis, system architecture and database design, application development, and system testing and evaluation.

3 | METHOD

The research methodology employed in the development of the Case Witness Data Management Information System for the Military Court I-01 Banda Aceh is Research and Development (R&D). The R&D approach was selected because the primary objective of this research is to produce a functional information system product capable of addressing specific problems in witness data management within the Military Court I-01 Banda Aceh, and subsequently to test the effectiveness of this product. The system development process follows structured stages, adapting a System Development Life Cycle (SDLC) model, specifically utilizing an approach similar to the Waterfall model or a modified Prototyping model tailored to the project's needs. The main stages undertaken include:

1) Requirements Analysis
   This initial phase involves data collection to gain a thorough understanding of user and system needs. Qualitative data collection techniques were used, including:
   a) Observation
      Direct observation of the current witness data management processes at the Military Court I-01 Banda Aceh to identify workflows, constraints, and areas requiring improvement.
   b) Interviews
      Conducting structured or semi-structured interviews with relevant stakeholders, such as court clerks, judges, administrative staff, or other parties involved in handling witness data, to elicit functional and non-functional requirements for the proposed system.
   c) Document Study
      Analyzing relevant documents, such as existing witness data recording formats, case workflows, or related regulations, to understand the context and data requirements. The collected qualitative data was analyzed to define detailed system requirement specifications.
2) System Design
   Based on the requirements analysis results, the design of the system architecture, database, and user interface was carried out. This included:
   a) Designing the relational database using Microsoft Access, encompassing the creation of table structures, definition of relationships between tables, and determination of data types and keys (primary/foreign).
   b) Designing the application's user interface (UI) using Microsoft Visual Basic .NET, focusing on user-friendliness and efficiency in data input/output.
   c) Designing the system's process flow and application business logic.
3) Implementation (Coding)
   This stage involves translating the design specifications into functional program code. Application coding was performed using the Visual Basic .NET programming language, and the physical database was created using Microsoft Access according to the design.
4) Testing
   The developed system was systematically tested to ensure its functionality operates as expected and is free from errors (bugs). Testing comprised:
   a) Unit Testing
      Testing individual modules or program components separately.
   b) Integration Testing
      Testing the interaction between combined modules.
   c) System Testing
      Testing the system as a whole against the initial requirement specifications.
   d) User Acceptance Testing (UAT)
      Involving potential end-users (court staff) to try the system and provide feedback, ensuring the system meets their needs and is easy to use.
5) Evaluation and Revision: Based on the testing results, particularly from UAT, the system was evaluated. If shortcomings or areas needing improvement were identified, revisions were made to the design or implementation. This cycle could be iterative (especially if using a prototyping approach) until the system was deemed adequate.

4 | RESULT AND DISCUSSION

4.1 Results

The Military Court I-01 Banda Aceh has a long history since the Dutch era, with structures and tasks that have continued to develop over time. Its organizational structure includes elements of leadership, staff, and implementers, each of whom has clear duties and responsibilities. Although there have been reforms in the judicial system since the fall of the New Order, implementation is still under discussion. The vision of this court is to realize independence, credibility, and transparency, while its mission includes maintaining judicial independence, increasing credibility and transparency, improving the quality of leadership, and providing equitable legal services. The system analysis highlights problems in recording case witnesses, such as inefficient file storage and slow reporting problems, and offers input on data needed for better information processing. The output of this system is a case witness report that can be accessed further for more detailed information. The Case Witness Information System designed on the Windows operating system uses Visual BASIC.NET. The implementation process of this application requires basic requirements such as .Net Framework, Microsoft Office Access, and Visual Studio 2008. This system aims to facilitate the Military Court I-01 Banda Aceh in recording case witnesses from defendants, judges, witnesses, to recording cases. The author uses Visual Studio 2008 as a complete application package consisting of Visual BASIC and other supporting applications in the system requirements installation process. The next step is to realize the system design that has been created by implementing it. The menu design in the Witness Case Information System Design program separates users and admins into certain pages, according to the following program menu structure:

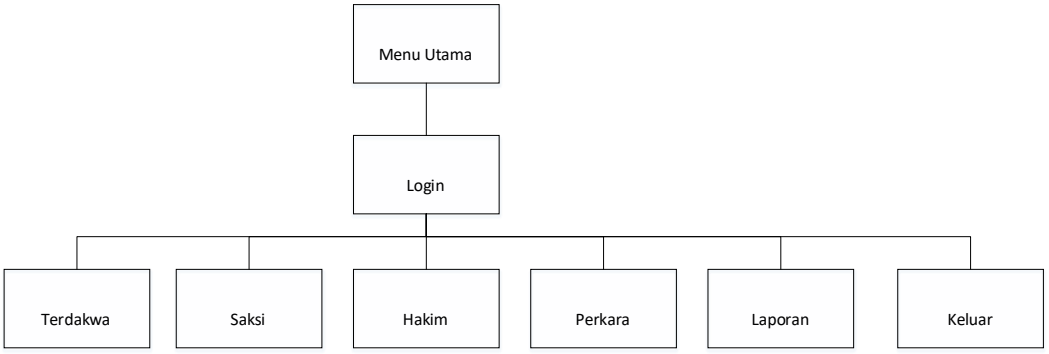

Figure 1. User/Admin Menu Structure

Proposed System Analysis is an activity that details the system plan that will be created based on previous needs identification. In conducting a system design analysis, we can estimate the amount of work to ensure the smooth creation of the system.

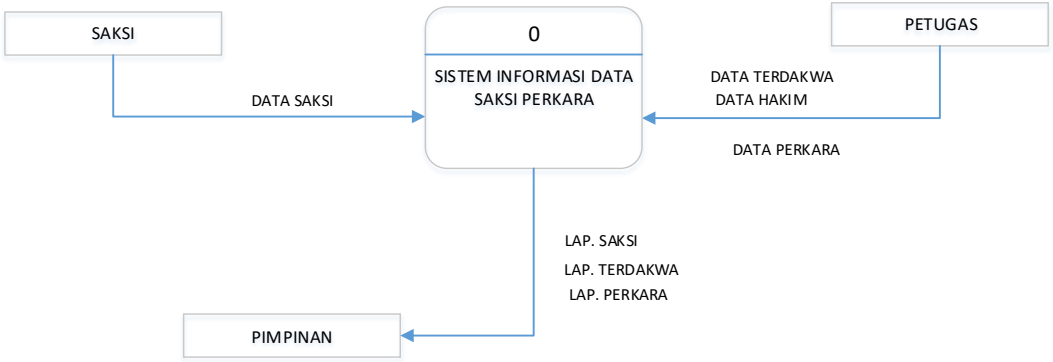

Figure 2. Context diagram of the proposed system

From the context diagram, the officer or person responsible for the witness data collection process records the witness. Then, the officer records each witness data into the system, and each witness report will be reported periodically. Based on the proposed system hierarchy diagram, there are five processes in the witness information system. The five processes are the defendant data entry process, witness data entry, judge data entry, case data entry, and report creation. These processes are interrelated and contribute to the running of the system.

After the user has authenticated and is authorized by the system, the page will be directed to the main menu. On the main page, the user can select the appropriate menu to enter a new transaction or create a report.

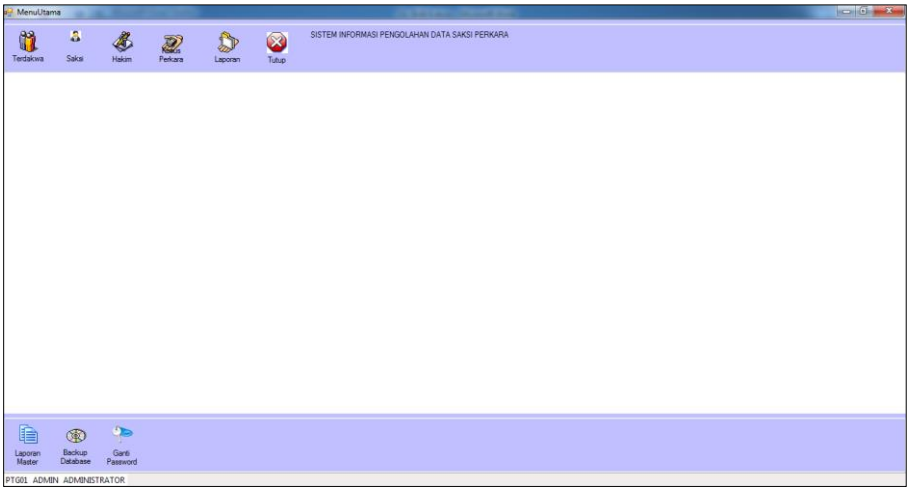

Figure 3. Main Menu Form

The Main Menu Form is the main interface in the Case Witness Information System application. Here, users, especially administrators, have access to perform several important actions related to data management. Specifically, administrators can add new data related to various entities involved in the legal process, such as defendants, witnesses, judges, and cases. The presence of this menu allows administrators to carry out various administrative tasks efficiently. With access granted, administrators can easily add new users to the system, thereby expanding the scope of use of this application. In addition, the ability to add defendant data provides flexibility in recording individuals involved in the legal process. Furthermore, the ability to add witness data allows administrators to make comprehensive records of individuals who act as witnesses in a case. This is very important to maintain the accuracy and sustainability of the ongoing legal process. Then, the feature for adding judge data allows administrators to enter information related to the judges responsible for deciding a case. The existence of this data is an important foundation in maintaining transparency and integrity of the legal process. Finally, the case form provides access to add important details about a legal case, starting from the case number, date, to information about the defendant, witnesses, and judges involved. In this way, administrators can easily track and manage various ongoing cases at the Military Court I-01 Banda Aceh. Overall, the Main Menu Form and Case Form are important parts in running the operational application of the Case Witness Information System. The presence of these features allows administrators to perform administrative tasks efficiently and in an organized manner, thus helping to increase the effectiveness and efficiency of the ongoing legal process.

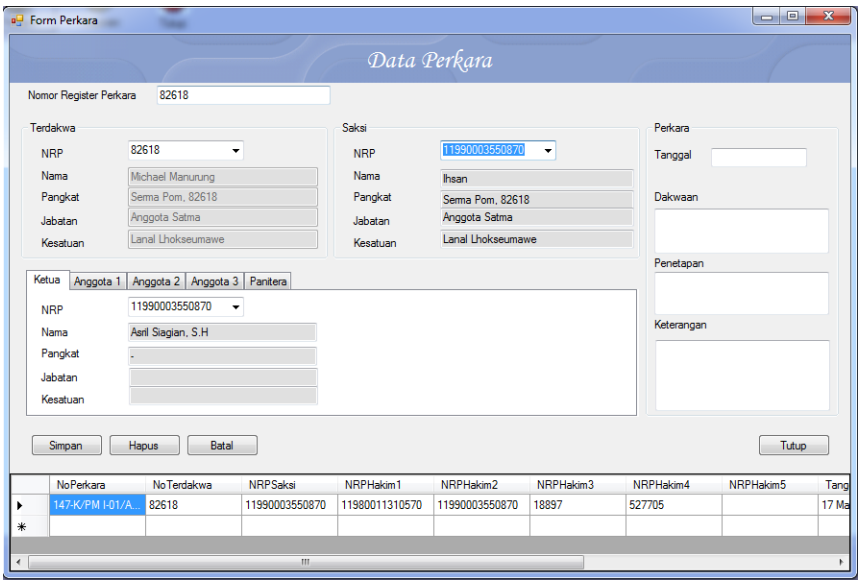

Figure 4. Case Form

The hardware specifications required to use the case witness system program include a minimum Pentium 3 CPU with a speed of 633 Mhz, 256 MB of RAM, and a minimum hard disk of 1 GigaByte. In addition, other hardware such as a monitor, keyboard, mouse, and printer are also required for smooth use of the program. Meanwhile, for software, users need Framework version 3.5.1 to 4.5.2, Microsoft Visual Studio 2008, and Microsoft Office Access 2010. By ensuring that these hardware and software specifications are met, users can access and use the case witness system program effectively and efficiently. The Case Witness Information System that has been designed and implemented can make a significant contribution to facilitating the process of recording case witnesses at the Banda Aceh Military Court I-01. With an organized data structure and intuitive interface, it is hoped that this system can help efficiency and accuracy in handling legal cases. In addition, with the hardware and software specifications listed, this system can be easily accessed by users who meet these requirements. The Case Witness Information System designed and implemented aims to facilitate the Banda Aceh I-01 Military Court in recording case witnesses, starting from defendants, judges, witnesses, to case recording. The implementation process of this application requires basic requirements such as .Net Framework, Microsoft Office Access, and Visual Studio 2008. The author uses Visual Studio 2008 as a complete application package consisting of Visual BASIC and other supporting applications in the system requirements installation process. The program menu structure has been designed to separate users and admins into certain pages, making it easier for users to navigate. The proposed system analysis conducted previously detailed the system plan based on the identification of needs, allowing for the determination of accurate work volumes for the smooth running of the system. The data structure design has been prepared for various entities in the system, such as officers, defendants, witnesses, judges, and cases. The system interface display is arranged intuitively, with a login menu and main menu that make it easy for users to access the available features. The hardware and software specifications required have also been determined, ensuring that users can access and use the system smoothly as long as they meet these requirements. Thus, it is hoped that this Case Witness Information System can make a significant contribution to increasing efficiency and accuracy in handling legal cases at the I-01 Banda Aceh Military Court.

4.2 Discussion

This study successfully designed and implemented a Case Witness Data Processing Information System for the Banda Aceh Military Court I-01 using Visual Basic .NET and Microsoft Access. The results of the study indicate that this system is designed to address specific problems faced by the court, namely inefficiency in storing files and delays in the process of reporting case witness data. The development of this system is a response to the need for modernization of judicial administration, in line with the court's vision to realize independence, credibility, and transparency. The main findings of the needs analysis identified that the previous manual process was prone to inefficiency and potential data loss. The proposed system, as depicted in the context diagram (Figure 2) and hierarchy diagram, offers a structured solution by dividing the process into logical modules: defendant data entry, witnesses, judges, cases, and report generation. The menu structure that separates user and admin access (Figure 1), as well as interface designs such as the Main Menu Form (Figure 3) and Case Form (Figure 4), are designed for ease of use and organized data management. The implementation using Visual Studio 2008, .NET Framework, and Microsoft Access as the database shows the choice of technology commonly used at that time for Windows-based desktop applications, with relatively standard hardware and software specifications (minimum Pentium 3, 256MB RAM, MS Access 2010), ensuring that the system can run on infrastructure that is likely to be available in court.

The development of information systems to support the operation of judicial institutions is not new and is in line with the digitalization trend in various government agencies. Research by Aryani *et al*. (2022) on the use of the Case Tracking Information System (SIPP) at the Boyolali District Court shows how a similar system has been implemented and utilized to improve case management in general courts. Likewise, Wahyuni (2021) developed a web-based information system for services at the Angkinang Police, which also aims to improve the efficiency of public services in the law enforcement environment. The system developed in this study, although specifically focused on witness data in military courts, contributes to the same narrative about the importance of adopting information technology for the modernization of legal administration. The system's focus on witness data management is particularly relevant given the crucial role of witnesses in the judicial process. As discussed by Fachrodin (2019), the effectiveness of criminal law, including witness protection, depends on good information management. This system, by providing a structured platform for recording witness data accurately and easily accessible, indirectly supports efforts to maintain data integrity which is essential for the smooth running of the judicial process and the protection of witness rights. Although it does not directly address the intelligence aspect as discussed by Harahap *et al*. (2021) in the context of the prosecutor's office, the availability of organized and accurate witness data is an important foundation for analysis and decision-making in handling cases.

From a system development methodology perspective, the approach used, from needs analysis to design

(as seen in the context and hierarchy diagrams) and implementation, follows standard principles in software engineering. This is similar to the system analysis and design approach that is also applied in different contexts, for example in the student association chairman election system by Rahayu (2016), which emphasizes the importance of a thorough analysis and design stage before implementation. Although Oiszy (2021) developed an Android-based application for crime-prone location information, which has a different platform and focus, the study also highlights how information technology can be utilized for specific needs related to security and law. The Case Witness Data Processing Information System produced in this study offers a practical solution to improve the efficiency and accuracy of witness data management at the Banda Aceh I-01 Military Court. By providing a structured interface, clear data entry process, and faster reporting capabilities, this system has the potential to make a significant contribution to the smooth administration of cases and support the achievement of the court's vision and mission. Its implementation is expected to reduce the burden of manual administrative work and minimize the risk of errors or data loss that often occur in conventional systems.

5 | CONCLUSIONS AND FUTURE WORK

The implementation of the Case Witness Data Management Information System at the Military Court I-01 Banda Aceh leads to the conclusion that this system is designed to significantly aid in the creation of accurate and effective case witness information. By introducing this information system, the processes of data collection and processing are expected to become faster and more efficient, consequently reducing the potential for errors inherent in manual recording methods. This addresses the previously identified challenges of inefficient file storage and slow reporting within the court. Based on observations during this research and implementation, several suggestions are proposed for future consideration. Firstly, the utilization of computer resources within the court should be optimized more broadly. This involves moving beyond a primary reliance on standard office software (like Microsoft Office) and exploring the potential of various other software applications that could further enhance data processing and management capabilities. Secondly, to maximize the benefits of technological tools, including this system, there is a need to enhance the skills and knowledge of the users (personnel). Investing in training and development to improve user competency will enable more effective interaction with the system and lead to optimal outcomes. Continuous focus on both technological infrastructure and user proficiency is essential for the ongoing improvement and successful long-term support of operations at the Military Court I-01 Banda Aceh.

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