



DEVELOPMENT OF A WEB BASED CHRONIC DRUG CLAIMS MANAGEMENT INFORMATION SYSTEM USING THE FAST (FRAMEWORK FOR THE APPLICATIONS OF SYSTEMS THINKING) METHODOLOGY

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ABSTRACT

Delays of chronic drug claims caused delayed payments to the next period. The impact was disrupting the hospital's cash flow, delaying employee incentives, and creating difficulty in providing chronic drugs needed by patients. To address these operational challenges, RSUD Kajeen seeks to implement a computerized drug claims information. This system will streamline processes, resolve existing inefficiencies, and improve overall patient care delivery while ensuring timely claims submission. The implementation of a computerized drug claims information system successfully facilitates claims management and improves services at RSUD Kajeen. The development of the chronic drug claims information system will be conducted using the FAST (Framework for the Applications of Systems Techniques) method. The data collection techniques employed in this research for developing the final assignment include observation, interview and literature study. The data analysis method used is: qualitative Analysis. Qualitative analysis employs content analysis to summarize and obtain an overview of the interview and observation results, which consist primarily of qualitative data based on a conceptual framework. The results of this analysis are used to create a system design that meets users' needs. The result is a comprehensive information system that has been successfully implemented for claims management at RSUD Kajeen. This information system was developed using Java programming language and MySQL database management system. System testing results demonstrate that the information system effectively accelerates the claims management process, enhances chronic drug inventory management, and generates comprehensive managerial and financial reports. A new website-based chronic drug claims management information system has been developed using the FAST method to replace the manual system. The purpose of this study is to develop a claims management information system based on user needs analysis.

Keywords: chronic drug claims; development; FAST method; information system

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INTRODUCTION

Late submission of chronic drug claims refers to claims submitted beyond the maximum deadline for submitting claim files to the verifier (Zulfikar et al., 2023). These delayed submissions result in payment postponements to the next period, disrupting hospital cash flow and delaying employee incentives (Anyaprita, 2020). More critically, this delay creates significant difficulties in providing patients with the chronic medications they required (Wijaya, 2019). When patients cannot access their required chronic medications, they are unable to receive medically indicated treatment. This situation can potentially worsen patient conditions, reduce life expectancy, and increase overall healthcare costs (Sulistiyono et al., 2020).

Previous research by Wijaya (2019) identified that late claims submission problems are influenced by three main factors: hospital policies, information systems capabilities, and human resource management (Wijaya, 2019). A drug claims information system is designed to manage and process claims in healthcare industry. Such systems enhance operational efficiency, enable patient data

integration, support health trend analysis, facilitate decision-making processes, and streamline administrative procedures(Arios & Gautama, 2023).

RSUD Kajen is a regional general hospital providing comprehensive healthcare services including emergency care, polyclinics, and inpatient treatment. Despite being a substantial healthcare facility, the hospital currently lacks a computerized claims management system for chronic drug claims, relying instead on a manual processing system. The existing manual claims management process requires staff to manually input claim files and collect documentation from polyclinic and pharmacy services. This manual approach presents several significant weaknesses: this claims management process takes longer(Agustino & Meliala, 2024), data duplication, vulnerability of paper-based records to damage or loss due to poor organization(Collmann et al., 1997), inaccuracy data and inefficient file management processes(Ramadhan & Ibadi, 2025). These issues frequently result in delayed claims submission and operational inefficiencies. Additionally, the hospital faces challenges in tracking chronic drug inventory, as staff must physically check the pharmacy warehouse to determine stock availability, creating a time-consuming process for both claims officers and verifiers that further impacts operational efficiency. To overcome these operational challenges, the researchers attempted to develop a drug claims management information system at RSUD Kajen based on user needs analysis.

METHOD

This study received ethical approval from the Research Ethics Committee of the Faculty of Public Health, Diponegoro University, No: 131/EA/KEPK-FKM/2025. The development of the chronic drug claims information system will be conducted using the FAST (Framework for the Applications of Systems Techniques) method. The FAST method integrates multiple system development methodologies into a flexible framework that can be adapted for various types of projects. The key advantages of this method include its capability to support robust application development and its compatibility with complementary development techniques(Halim, 2020). The FAST development methodology consists of the following phases(Firmansyah & Bakti, 2022):

- a. Initial Investigation, encompasses activities to define the problem scope, identify potential solutions, and assess the technical and economic feasibility of the proposed system.
- b. Problem Analysis, involves decomposing the complete information system into its constituent components to identify and evaluate existing problems, opportunities, and constraints. This phase also focuses on determining anticipated requirements for system improvement. Comprehensive research is conducted on system components to understand the current system architecture and establish a solid foundation for designing the target system.
- c. Requirements Analysis, during requirements analysis phase, data is systematically collected and analyzed, with particular emphasis on end-user requirements.
- d. Decision Analysis, evaluates alternative system development approaches and technologies to determine the optimal solution that meets identified requirements.
- e. System Design, focuses on creating a comprehensive system architecture that defines how the system will achieve its intended objectives. System design involves configuring and specifying the hardware and software components, user interfaces, database structures, and system integration requirements.
- f. Construction and testing

This is the stage for constructing databases, application programs, and interfaces for system testing. This stage requires substantial resources, including human resources, time, and financial investment(Lusiana et al., 2024)(Azmi et al., 2018).

The testing was conducted using black box testing. Black box testing is an important testing strategy in software testing that focuses on verifying program functionality from the user's perspective, without knowledge of the internal implementation(Wicaksono, 2021)Data Collection Techniques(Ariani et al., n.d.): The data collection techniques employed in this research for developing the final assignment include

a. Observation

Observation is data collection for the researcher, when it serves a formulated research purpose, is systematically planned and recorded and is subjected to controls on validity and reliability(Mazhar, 2021).

Direct observation activities were conducted at RSUD Kajen to gather comprehensive information and data related to the design requirements of a web-based chronic drug claims information system. This observational approach provided firsthand insights into current chronic drug claims, user behaviors, and system functionalities.

b. Interview

Plan to use an interview protocol to ask questions and record answers during the qualitative interview. Researchers record information from interviews by making notes, audio or video recordings(Dewi & I Gusti Ayu Agung Omika, 2022).

Structured interviews were conducted with chronic drug claims staff members and management to obtain detailed information about existing processes, challenges, and user requirements. These interviews provided valuable perspectives from key stakeholders who interact with chronic drug claims systems on a daily basis.

c. Literature Study

The literature study method involved conducting a comprehensive review of existing research and theoretical frameworks by examining relevant academic books, journals, and publications.

Data Analysis

Data analysis is used to describe and summarize the collected data(Dharmawan, 2015). The data analysis method used is: Qualitative Analysis Qualitative analysis employs content analysis to summarize and obtain an overview of the interview and observation results, which consist primarily of qualitative data based on a conceptual framework. The results of this analysis are used to create a system design that meets users' needs.

RESULT

The result is a comprehensive information system that has been successfully implemented for claims management at RSUD Kajen. This information system was developed using Java programming language and MySQL database management system. System testing results demonstrate that the information system effectively accelerates the claims management process, enhances chronic drug inventory management, and generates comprehensive managerial and financial report.

The stages in FAST Methodology:

Initial Investigation

1. Problem

To gather information on the problems faced by chronic drug claims management at RSUD Kajen, direct observation of the current system was conducted. In addition, interviews were conducted with claims officers, the head of the pharmacy, the claims coordinator, and the management team operating the system to obtain data. Based on these observations and interviews, several problems in chronic drug claims management at RSUD Kajen can be identified, including:

- a. Data storage is still performed manually using several applications such as Microsoft Excel, Microsoft Word, and paper-based records. This requires substantial paper usage, often results in data loss, and requires extensive processing time.
- b. Data entry is still conducted manually, resulting in inaccurate data and frequent errors during the input process.
- c. Delays in chronic drug claims processing.

2. Opportunities during direct observations and interviews, claims officers, the pharmacy head, claims coordinator, and management demonstrated enthusiasm for implementing improvements to the claims management information system to ensure that data input, processing, and output operate smoothly while producing accurate, relevant, and real-time data.

3. Scope

The expected outcome is the development of a comprehensive chronic drug claims management information system. This system will be utilized by various stakeholders including claims officers, pharmacy managers, claims coordinators, management personnel, and their respective staff members to facilitate effective decision-making processes.

4. Feasibility Study

Based on the feasibility study results, several factors have been identified that support the successful implementation of the chronic drug claims management system, which include:

- a. Technical perspective, RSUD Kajen possesses adequate information technology infrastructure and maintains a competent IT team capable of effectively managing the system.
- b. From an operational standpoint, the hospital benefits from strong management support and demonstrates staff readiness to operate the new system efficiently.
- c. Economic viewpoint, the implementation of this system will optimize the claims processing workflow by accelerating administrative procedures, expediting claim submissions, reducing overtime expenses, and streamlining reporting processes.

Problem Analysis

At this stage, several weaknesses have been identified within the current system. Based on these findings, various suggestions and solutions have been proposed to address the identified weaknesses. For comprehensive details regarding problem identification and their corresponding solutions, please refer to Table 1:

Table 1.
Identification of Problem Solution

The ongoing system problem	Data is frequently lost and duplicated	Data processing takes considerable time	Data reports are inaccurate, irrelevant, and not provided in real-time
Problem solutions	Implementing chronic drug claims management information system that utilizes a database management system and integrates with electronic medical records	The chronic drug claims management information system displays only the required data, thereby speeding up the data retrieval process	The database management system in the chronic drug claims management information system provides easy access to accurate, relevant, and real-time data

A clear explanation of the problems and solutions has been outlined above, along with a proposed solution utilizing a claims management information system. The information system to be developed is expected to address the challenges previously encountered through the following capabilities:

1. Facilitating claims officers in processing data input and transactions
2. Providing secure data storage in a centralized database
3. Enabling the generation of comprehensive and adequate reports
4. Supporting management in collecting data for informed decision-making

Requirements Analysis

1. User Needs

Identify the program's functional requirements, including use case diagrams and scenarios, related to the proposed chronic drug claims management information system design. Each user type has distinct interaction characteristics with the system and specific information needs, as outlined below:

- a. Claims Officer Needs Scenario:
 1. Login and logout functionality
 2. Input claim files
 3. Extract data integrated with electronic medical records
 4. Manage claim data
 5. Print reports
- b. Claims Coordinator/Head of Pharmacy Installation Needs Scenario:
 1. Login and logout functionality

2. Verify claim data
 3. Print reports
 - c. Director/Management Needs Scenario:
 1. Login and logout functionality
 2. View data reports for strategic decision-making
 3. Print report
 - d. Administrator
 1. Login and logout functionality
 2. Manage claim data
 3. Manage report
2. Computer System Requirements
- Supporting devices consist of hardware and software. The specifications are as follows:
- a. Hardware Specifications
 1. Server: intel xeon, RAM 16 GB, SSD 1TB
 2. CPU: CPU i3 SSD 256 GB, RAM 8GB
 3. Mouse: Optical USB
 4. Keyboard: USB
 5. Monitor: 1366 x 768 screen resolution
 6. Connection: LAN 100Mbps.
 - b. Software Specifications
 1. Operation System: Widows 10
 1. Scripting Language: PHP and HTML
 2. Web Server: Apache
 3. Web Browser: Chrome
 4. Database: MySQL

Decision Analysis

At this stage, the development model, hardware specifications, and software requirements for the chronic drug claims management information system were determined. The selections are as follows:

1. Chronic Drug Claims Management Information System Development Model
The selected development model utilizes object-oriented system development methodology, which facilitates system design and development processes for developers.
2. Hardware Requirements
The minimum hardware specifications required are:
 - Computer processor: Intel Core i3 or equivalent
 - RAM: 8 GB minimum
3. Software Selection
The software components selected for system development include:
 - Programming language: Java (desktop-based application)
 - Database management system: MySQL

System Design

The role of system design is to determine how the new system will be constructed. The purpose of system design is to objectively articulate the needs and requirements of information system users and to provide comprehensive descriptions and blueprints that will guide the development process. UML (Unified Modeling Language) is applied to build systems using object-oriented programming(Azmi et al., 2018). UML is a standardized modeling language widely used in industry to define requirements, conduct analysis and design, and describe architecture for object-oriented programming(Sujarwo et al., 2020). Several design models are implemented in the information system design process, namely:

1. Use Case Diagrams
A use case describes the interaction between one or more actors and the information system

being created. Roughly speaking, use cases are used to identify the functions within an information system and who is authorized to use those functions(Hasanah, 2020).

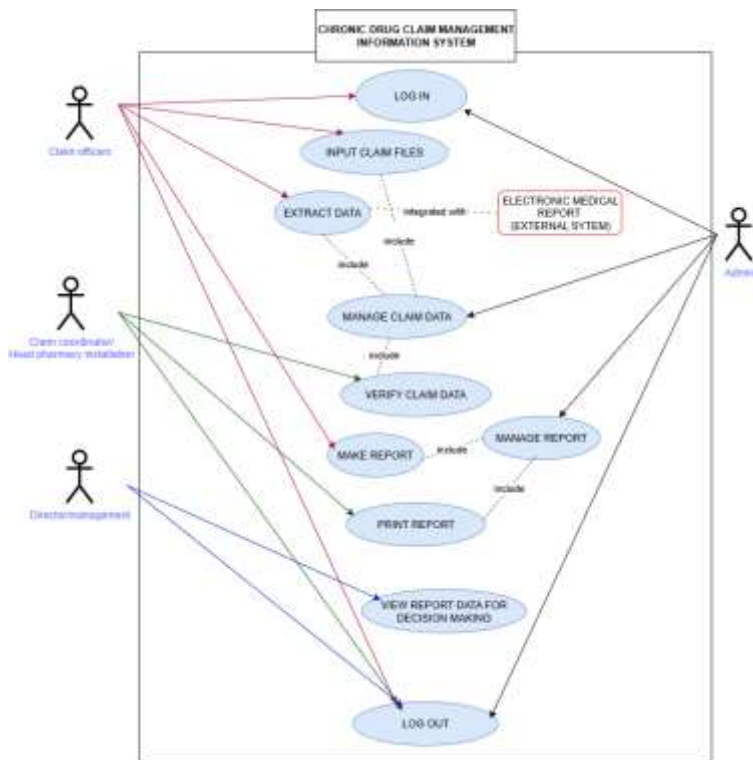


Figure 1. Use Case Diagram Chronic Drug Claim Management Information System

2. Activity Diagrams

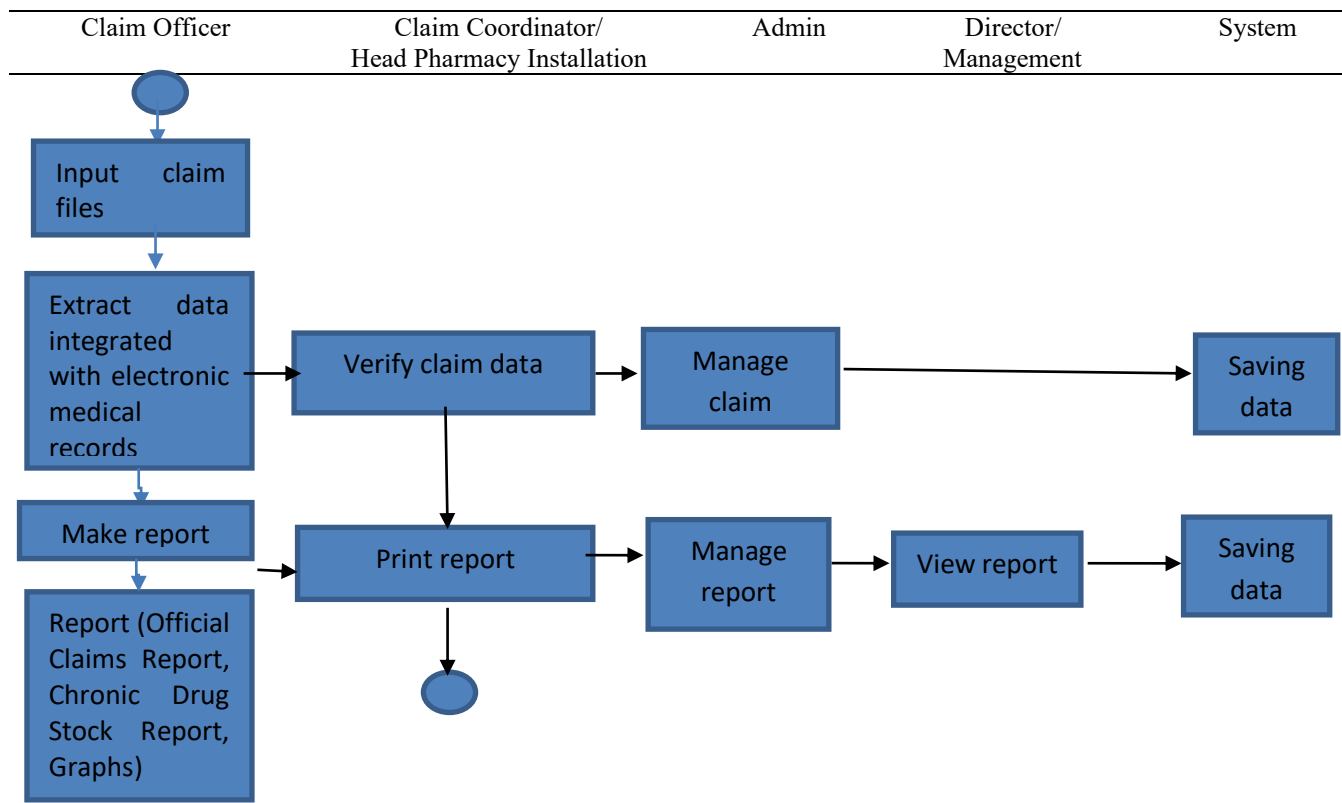


Figure 2. Activity Diagram Chronic Drug Claim Management Information System

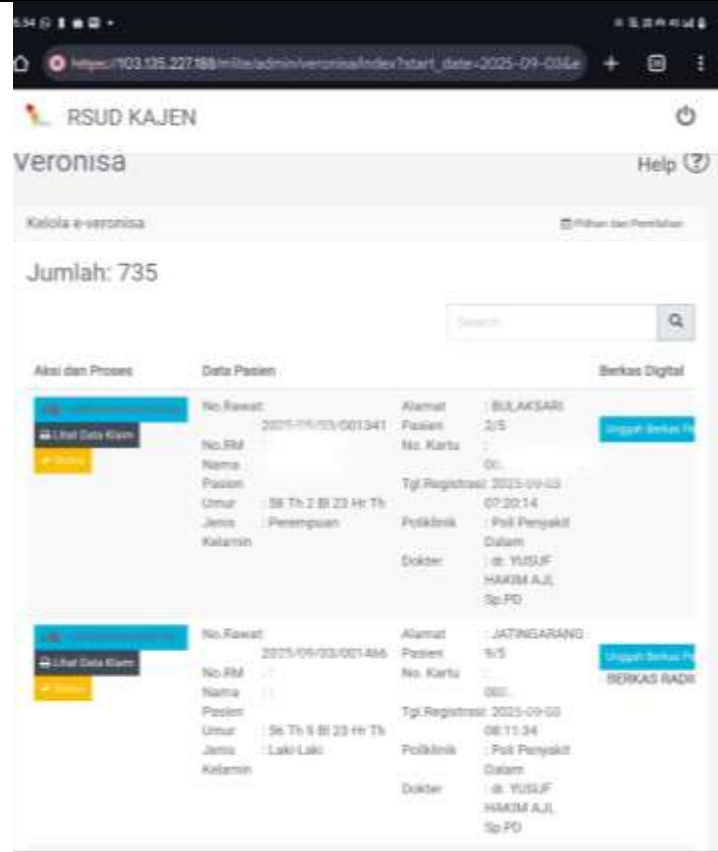


Figure 6. Indeks Interface

See in Figure . This indeks interface displays claim files and validation status, the system makes it easier to view each patient's claim files and claim status

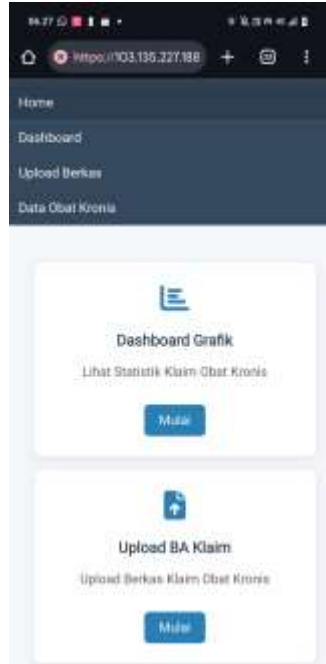


Figure 7. Upload Claim Files Interface

See in Figure 7. This indeks interface displays claim files and validation status, the system makes it easier to view each patient's claim files and claim status

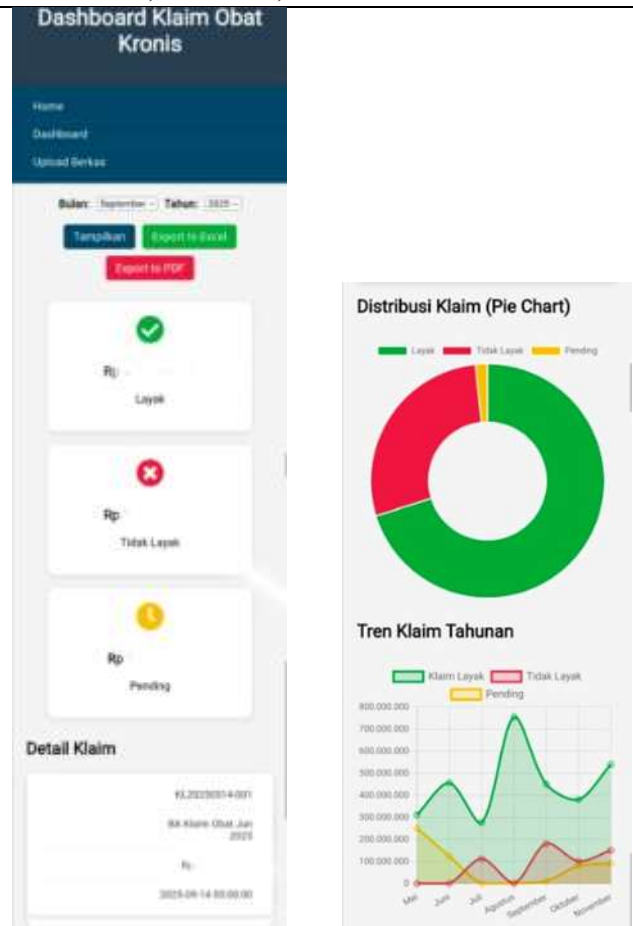


Figure 7. Dashboard Chronic Drug Claim Management Interface
See in Figure 7. This interface display generates comprehensive managerial and financial reports which is designed to make strategic decisions easier for management.

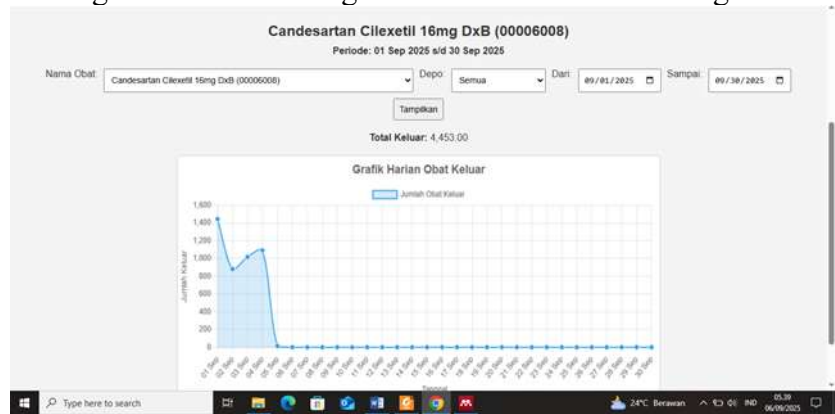


Figure 8. Chronic Drug Stock Interface
See in Figure 8. This interface display chronic drug inventory management, which is designed to make it easier to view chronic drug inventory

2. Testing

Table 2.
The testing was conducted using black box testing

No	Aktivitas	Kondisi Seharusnya	Respon Sistem	Hasil
1	Login	1. Username and password are correct. 2. Username and password are incorrect..	As expected	Valid
2	Logout	Logout Exit the system or return to the login page.	As expected	Valid

No	Aktivitas	Kondisi Seharusnya	Respon Sistem	Hasil
3	Input No RM	Display No RM and Patient Name data.	As expected	Valid
4	Display claim files	Display claim files for each patient	As expected	Valid
5	Check completeness of claim files	Display complete patient files.	As expected	Valid
6	Validasi berkas klaim (checklist)	Tampil tulisan status dan centang warna kuning	As expected	Valid
7	Create claim submission reports	Display monthly claim submission report	As expected	Valid
8	Input claim results according to the BA	Display monthly claim report according to the BA	As expected	Valid
9	Input chronic medication usage data	Display monthly chronic medication usage report	As expected	Valid

DISCUSSION

A chronic drug claims management information system was developed using the FAST (Framework for the Application of System Thinking) methodology, supporting the development of robust applications tailored to user needs. This approach aligns with research that demonstrates how the FAST methodology provides a systematic framework for information system development, encompassing phases from scope definition through delivery, thus facilitating the creation of information systems that meet specific user requirements (Halim, 2020). The FAST method is recognized for its efficiency and ability to produce results quickly while ensuring proper system design alignment with user needs. The stages in FAST Methodology: Initial investigation, problem analysis, requirements analysis decision analysis, system design, construction.

A chronic drug claims management information system was developed using Java programming language and MySQL database management system, because Java is a highly versatile programming language that can be used for various types of applications, including web and desktop applications (Usanto et al., 2022). Meanwhile, the MySQL database management system is used because it is free open source, high-speed, flexible, capable of handling large-scale operations, and accessible from anywhere (Kalsum Siregar et al., 2024). Furthermore, the data is well integrated with the help of PHP programming and MySQL as the database server (Arnomo & Yulia, 2023).

This research uses UML, a modeling language for designing software systems. The advantages of UML include: enabling the reuse of existing objects (reusability), facilitating the development of software with larger constructs, and making object-oriented software generally easier to modify (Haviludin, 2025). The testing was conducted using black box testing. The advantages of black box testing include that the tester does not need to know the program code to perform testing, and software testing is carried out by observing execution results through test data and examining the software's functionality (Handayani Akar, 2021). The use of usernames and passwords in a chronic drug claims management information system is indeed a control mechanism for user authentication in computerized information systems (Komalasari, 2018). Chronic Drug Claims Management Information System which is designed to help claims officers easily access and retrieve claim file information, make it easier to view chronic drug inventory, make strategic decisions easier for management.

CONCLUSION

A new website-based chronic drug claims management information system has been developed using the FAST method to replace the manual system. This system is expected to address issues

such as lengthy data searches, incorrect and duplicated claims data, difficulties in controlling chronic drug inventory, delays in claims submissions, and difficulties in generating reports for management purposes. With this new system, chronic drug claims management is expected to be faster, more efficient, and more effective, producing accurate, relevant, and real-time data and information that is easily accessible and provides prompt reporting. Going forward, the quality of this chronic drug claims management information system needs to be evaluated to identify deficiencies and prioritize them for improvement in future system development.

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