

Web-Based IT Service Management (ITSM) Design and Implementation for Ticketing Documentation and Troubleshooting

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ABSTRACT

The purpose of this research is to develop a Web-Based IT Service Management (ITSM) system that facilitates centralized ticket handling and troubleshooting documentation. The system is implemented using the Python Django framework with SQLite as its database. To improve fairness and efficiency in task allocation, a request-based assignment mechanism has been implemented, allowing technicians to select and manage their own tickets. The system offers several key features, including role-specific dashboards, a real-time performance monitoring dashboard for technicians, repair logs, notifications for every ticket status update, and articles collectively referred to as a knowledge base that serve as a guide for users. The implementation of this ITSM solution is expected to overcome existing limitations within the IT support unit, accelerate problem resolution in accordance with service level agreements (SLAs), and generate accurate performance data to support future evaluations and continuous improvement of IT services.

Keywords: IT Service Management, Ticketing System, Django framework.

ABSTRACT

Tujuan dari penelitian ini adalah untuk mengembangkan sistem Manajemen Layanan TI (ITSM) Berbasis Web yang memfasilitasi penanganan tiket terpusat dan dokumentasi pemecahan masalah. Sistem ini diimplementasikan menggunakan kerangka kerja Python Django dengan SQLite sebagai basis datanya. Untuk meningkatkan keadilan dan efisiensi dalam alokasi tugas, mekanisme penugasan berbasis permintaan telah diterapkan, yang memungkinkan teknisi memilih dan mengelola tiket mereka sendiri. Sistem ini menawarkan beberapa fitur utama, termasuk dasbor khusus peran, dasbor pemantauan kinerja real-time untuk teknisi, catatan perbaikan, pemberitahuan untuk setiap pembaruan status tiket, dan artikel secara kolektif disebut sebagai basis pengetahuan yang berfungsi sebagai panduan bagi pengguna. Penerapan solusi ITSM ini diharapkan dapat mengatasi keterbatasan yang ada di dalam unit dukungan TI, mempercepat penyelesaian masalah sesuai dengan perjanjian tingkat layanan (SLA), dan menghasilkan data kinerja yang akurat untuk mendukung evaluasi di masa mendatang serta peningkatan berkelanjutan atas layanan TI.

Kata kunci: Management Layanan TI, Sistem Tiket, Kerangka Kerja Django.

INTRODUCTION

With today's technological advances, information technology (IT) services have become an important part of the operations of every organization or institution. In order to support smooth and efficient IT operations, web services are needed that are capable of overcoming related obstacles and problems, starting from problem reporting, recording, and follow up so that they can be monitored systematically. This web-based system will serve as the foundation for developing IT Service Management (ITSM), which manages service tickets and troubleshooting documentation. In this context, the use of a web-based ticketing system is crucial because it offers a structured mechanism for reporting incidents and ensures that each step of the handling process can be clearly recorded and monitored through tickets logged in the system (Adam et al., 2020).

A new study also shows that the success of an integrated ticket management system correlates positively with service quality. In a study evaluating the quality of ticket management software, Ariningsih & Muhammad (2024) found that systems with good time efficiency (Time Behaviour) significantly increase user

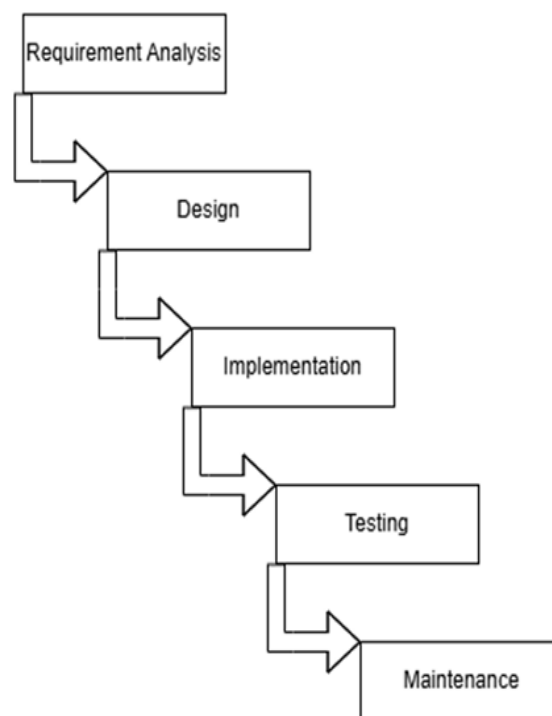
satisfaction. Without a centralized system, organizations may experience a decline in productivity due to slow response times and the loss of device repair history.

Jakarta International University (JIU) is a university located in Cikarang with an IT support department to manage the campus systems. In supporting its academic and operational activities, the campus is highly dependent on IT services, ranging from network connectivity, printing devices, and other administrative support systems. However, until now, JIU has not had a structured documentation and technical trouble management system. This condition causes staff and faculty to experience difficulties when facing problems such as unstable Wi-Fi connections, malfunctioning printers, and other technical issues that may arise. Based on these needs, this research aims to address these issues by proposing the development of a web-based platform to support ticket logging, documentation of handling, and troubleshooting of technical problems. This solution is then formulated in a study entitled "Web-Based IT Service Management (ITSM) Design and Implementation for Ticketing Documentation and Troubleshooting."

In regards to the obstacles encountered at JIU, this study aims to design and develop a web-based IT Service Management (ITSM) platform that can assist in reporting technical issues, managing tickets, and recording technical issues by staff and faculty. With this platform, it is hoped that the process of reporting and handling issues can be carried out in a focused manner and well-documented. In addition, issues recorded in the system can be used as a reference when encountering similar problems. In order for the development of a web-based system to focus on solving the most important problems, the conditions and requirements must be clearly identified.

METODE

Web-based IT Service Management (ITSM) was created so that all reporting, monitoring, handling, and documentation processes for disruptions could be improved and updated. The system can automate all workflows from the initial problem to the problem resolution process. This improves IT service efficiency and reduces delays in responding to user issues. This design has been widely implemented to address the problems of manual ticket management, which is vulnerable to losing history and is difficult to monitor (Amani et al., 2023). The waterfall model was chosen for system development in this research.



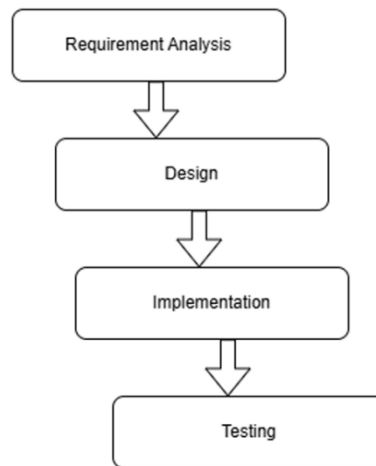
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Figure 1
Waterfall Model

System development uses the waterfall model because functional requirements are defined at the outset, and complete documentation is expected at each stage of development. This method allows the development process to be carried out sequentially, starting from requirements analysis, design, implementation, testing, and maintenance. This ensures that each stage of the process can be completed and documented in accordance with software engineering standards. In addition,

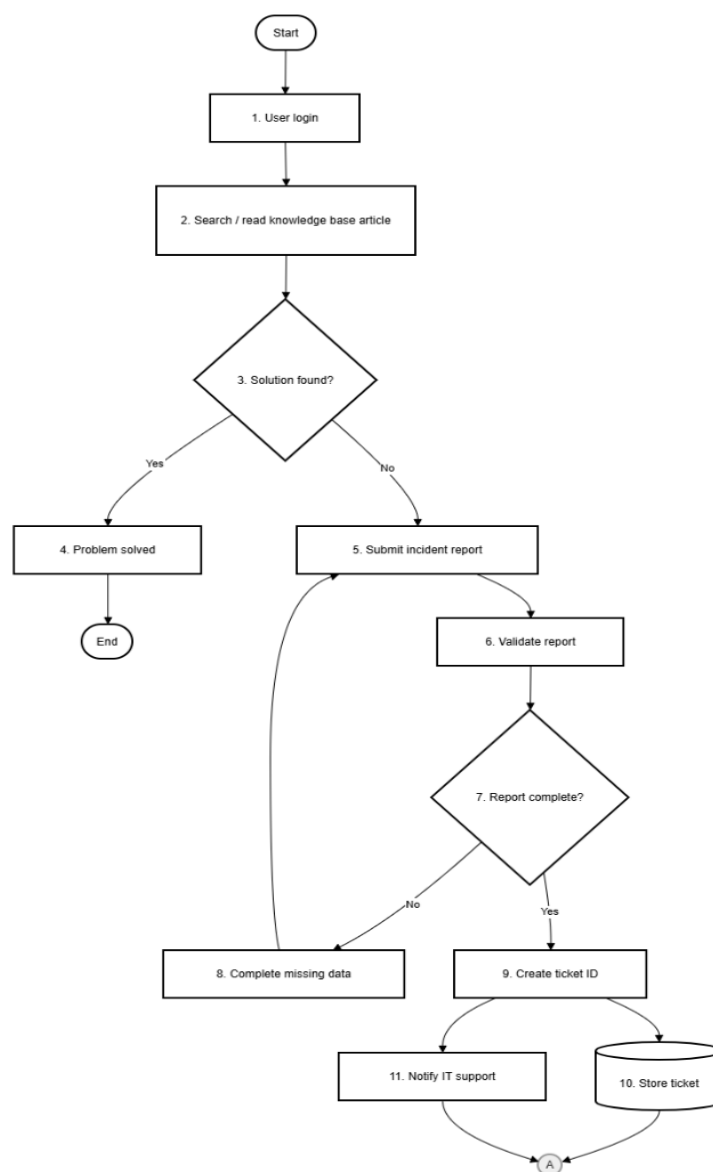
previous research shows that the waterfall approach is a good choice for developing a helpdesk ticketing system due to its structured nature and predictable results (Karwur et al., 2025; Mazia et al., 2021).

The reason why the author chose this method is that the structure is manageable, clear, and has stable requirements, and emphasizes documentation at every phase. The stages of web-based ITSM development are shown in the figure below:



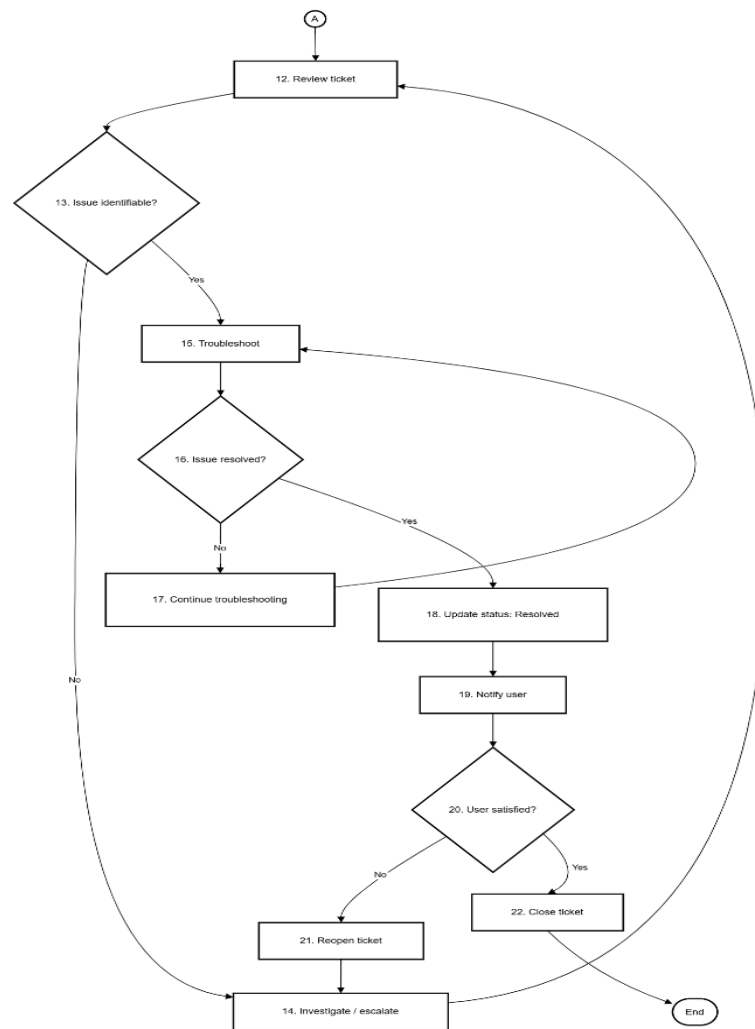
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Figure 2
Waterfall Model (For This Research)



Source: data processed

Figure 3
Reporting and ticket creation phase



Source: data processed

Figure 4
Management and resolution phase

Table 1
Incident Management Description

No.	Action name	Description
1	User log in	User enter the system by logging in with valid credentials
2	Search knowledge base	The user finds the article for a solution
3	Solution found?	The system verifies whether the article resolves the issue
4	Problem solved	Without creating a ticket, the issue is resolved
5	Submit incident report	In the system, the user submit an incident report
6	Validate report	The system verifies the report
7	Report complete?	The system checks whether the report complete all information
8	Complete missing data	The user fills in the incomplete information
9	Create ticket ID	The system generates a ticket identifier
10	Store ticket	The ticket data is stored in the database
11	Notify IT Support	The system notifies the IT support team
12	Review ticket	The ticket is reviewed by IT support
13	Issue identifiable?	IT support determines whether the issue can be identified
14	Investigate/escalate	Further investigation performed
15	Troubleshoot	Troubleshooting performed by IT support
16	Issue resolved	Issue status checks by the system
17	Continue troubleshooting	Additional troubleshooting if necessary
18	Update status: resolved	The ticket status change to resolved
19	Notify user	The user is notified by the system
20	User satisfied	The solution is helpful and confirmed
21	Reopen ticket	If the issue persists, the ticket is reopened
22	Close ticket	After confirmation, the ticket is closed

Source: data processed

A Use Case Diagram in Unified Modeling Language (UML) is commonly used to describe how a system is used by its users and what functions the system provides. At the first time, the admin, the user, and the

IT support must log in to the system so that it can be recognized. Below is an example of the use case diagram shown in Figure 5.



Source: data processed

Figure 5
Use case diagram ITSM

The system has three primary actors: IT support, Administrator, and User. Each actor interacts with the system according to their designated roles in order to ensure systematic incident handling and documentation. The process begins when a user logs into the system. Before submitting an issue, the user can search the Knowledge Base for an already-existing solution. If there is no solution, the user describes the problem and adds the relevant information to a ticket. The user can also provide the system with supporting screenshots. After the ticket is submitted, the user can monitor its progress and provide feedback after the issue has been resolved by using the ticket status function.

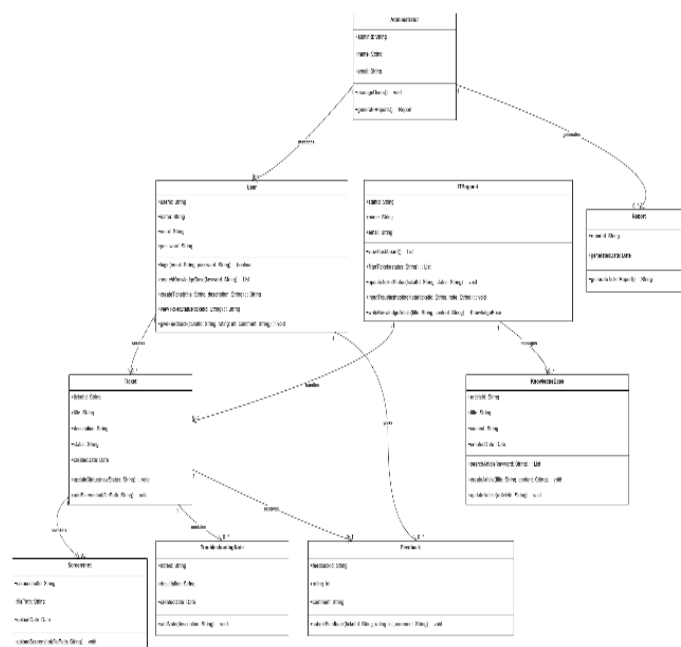
IT Support enters the system. They can search and filter tickets based on certain criteria to prioritize

handling. To ensure accurate documentation, IT Support monitors troubleshooting notes and modifies the ticket status throughout the resolution process. If the resolved issue provides reusable information, IT Support may document the solution in the information base to enable future user self-service. The administrator is responsible for managing user accounts and generating reports. The reporting tool allows the administrator to monitor ticket data, system performance, and service effectiveness. All things considered, the system process ensures that incidents are properly recorded, resolutions are noted, and service quality can be evaluated and continuously improved. Below is a matrix table illustrating the roles of each actor in a web-based ITSM system:

Table 2
User matrix role

Feature/Functionality	User	IT Support	Admin
Create Ticket	☑	—	—
View Personal Ticket Status	☑	—	—
Pull Ticket (Take the Ticket)	—	☑	—
Update Ticket Status (Resolved)	—	☑	—
Input Troubleshooting note	—	☑	—
Submit Feedback & Rating	☑	—	—
Access Management Dashboard	—	—	☑
Generate CSV format report	—	—	☑

Source: data processed



Source: data processed

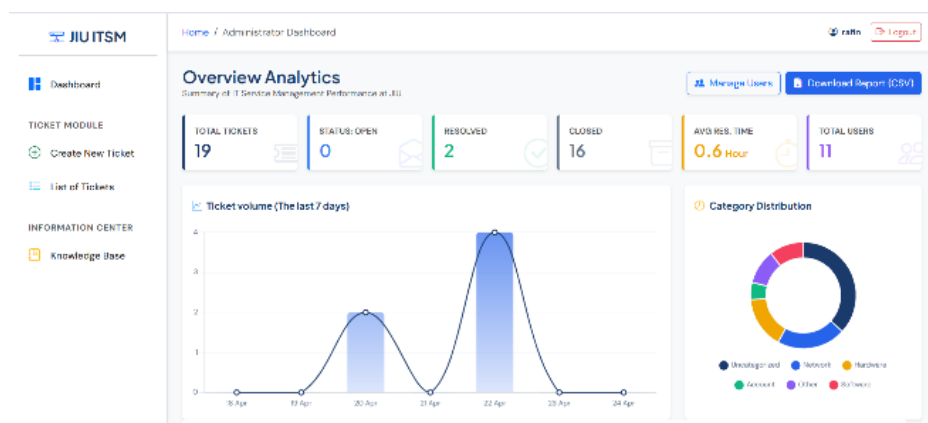
Figure 6
Class diagram of ITSM

The class diagram for the IT Service Management system provides a comprehensive view of the system's architecture. This diagram incorporates several core classes: Administrator, User, IT Support, Report, Ticket, Knowledge Base, TroubleshootingNote, Screenshot, and Feedback. Each of these classes is defined by attributes that store essential data, alongside methods that specify the system's operational procedures. The Administrator class is tasked with user management and the generation of system reports. Conversely, the User class encompasses the individuals interacting with the system, including those who log in, submit service tickets, track ticket status, and offer feedback regarding the services they have accessed. The Ticket class serves as the repository for user-submitted tickets, encapsulating details about reported problems and the subsequent actions taken by IT Support. IT personnel are responsible for tracking and modifying ticket statuses, as well as recording solutions via the TroubleshootingNote.

In addition, IT support staff manages the KnowledgeBase, which stores solution articles to assist in resolving similar issues in the future. After a ticket has been resolved, users can provide evaluations through Feedback, enabling the system to support incident reporting, ticket management, solution documentation, and service evaluation in an integrated manner.

To meet development needs, tools with the following descriptions are used: (1) Python & Django as the backend. This was chosen because it is fast to develop and provides an admin page, which we do not need to build from scratch; (2) HTML, CSS, and Bootstrap as the frontend. This tool offers a clean and professional website; and (3) SQLite as the database. This tool offers functionality to handle data storage professionally.

RESULT

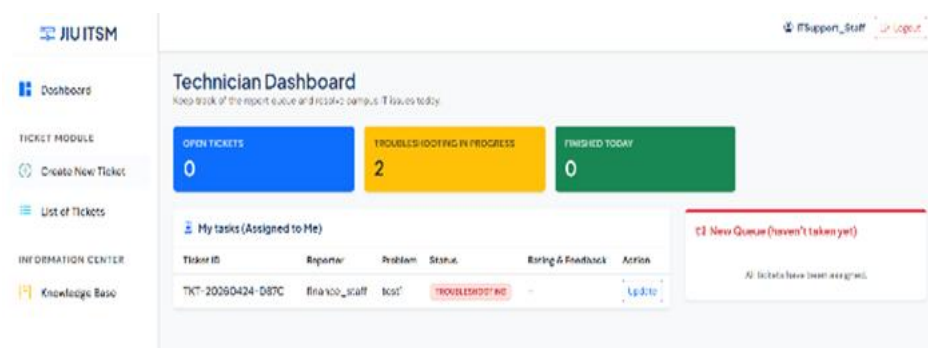


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Figure 7
Administrator dashboard

This admin dashboard displays all user, ticket, and article management within the system. The page includes several features designed to assist admins in their work. There is a graph showing tickets created in the last 7 days, so all tickets can be tracked, and their data is stored in the system. On the right side, tickets are

categorized by type, so all tickets are organized according to their respective categories. The admin also plays a role in maintaining articles, such as adding, editing, and deleting them. To retrieve data from the system in a ready-to-use format, there is also a feature that generates reports in CSV format.

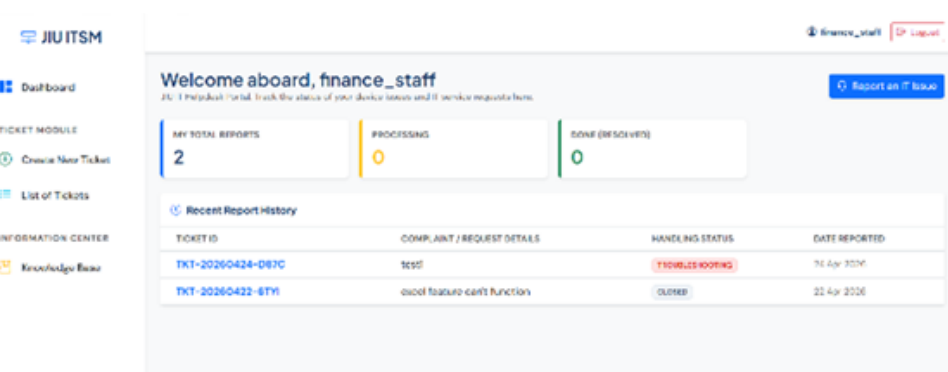


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Figure 8
IT Support dashboard

Next is the IT support dashboard, which displays the tasks assigned to technicians for resolving tickets. When a user creates a ticket, it appears on the IT support dashboard. Here, technicians can view a list of incoming

tickets as well as those that have already been resolved in the "List of Tickets" section. IT support can also write and update articles, but only admins have the ability to delete articles.



Source: data processed

Figure 9
User dashboard

Finally, there is a user dashboard that displays the activity of users logged into the system. The role of users here is to report incidents or issues encountered during IT-related activities. They can view a list of tickets they have created and have access to the knowledge base. Users can first look for solutions in the

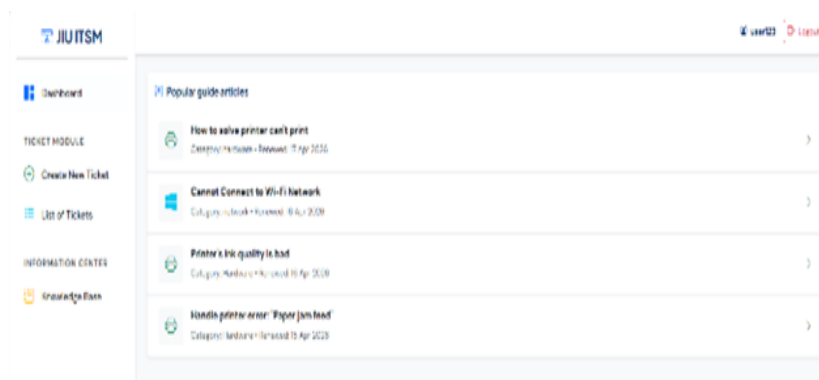
existing articles, and if they are unable to resolve the issue on their own, only then will they create a ticket to report the problem they are facing. They can only read existing articles; they do not have permission to create articles.

Source: data processed

Figure 10
Ticket form submission

In the ticket creation section, users will be directed to the ticket submission form. In the form, there are several fields that must be filled out, such as the title of the issue being reported. Users then provide a detailed description of the problem and select the issue category (hardware, software, network, etc.). After that, the user

can specify their location, which is already provided in the system, and then select the priority-whether the issue is critical and needs to be resolved immediately or not so urgent. Attachments are optional, and there is a “Submit Ticket” button to send the ticket to the system.



Source: data processed

Figure 11
Knowledge base

The knowledge base feature in this web-based IT Service Management system is designed to serve as a repository of information that can be accessed at any time when encountering similar issues. This continuous documentation mechanism ensures that every issue resolution performed by technicians is recorded and

stored in the system, so that both user and technicians can refer to an existing article.

CONCLUSION

Based on the results of the design and implementation carried out, the IT Service Management (ITSM) web system developed has proven capable of

providing a centralized documentation platform for handling various IT issues. This system effectively resolves manual queuing issues through an automated ticket distribution mechanism accompanied by real-time status monitoring. Service transparency has also improved thanks to the issue resolution history feature and the user-rating-based evaluation module.

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