

The Development of Helpdesk Ticketing Web-Based Application Integrated with Telegram ChatBot to Handle Customer Complaints

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ABSTRACT

Effective complaint handling is essential for maintaining service quality and ensuring efficient management of service requests. However, CV Mitra Tech Solution, a Managed Service Provider (MSP), previously relied on manual processes to handle customer complaints, creating a need for a more structured and accessible reporting mechanism. This study aimed to develop a web-based helpdesk ticketing system integrated with a Telegram ChatBot to facilitate complaint reporting, ticket management, and service monitoring. The study employed an applied research approach using a Design and Development Research (DDR) design and the Agile development methodology. The system was developed using Node.js, React.js, and PostgreSQL, with the Telegram Bot API enabling users to submit tickets, check ticket statuses, and receive notifications through Telegram. System evaluation involved Black-Box Testing to assess functional requirements and the System Usability Scale (SUS) to evaluate perceived usability. The Black-Box Testing results demonstrated that all tested functional scenarios operated as expected, including authentication, ticket creation, technician assignment, status updates, user management, reporting, and Telegram ChatBot integration. Furthermore, the SUS evaluation involving 10 respondents yielded an average score of 81, categorized as *Acceptable* with a *Grade A*. These findings indicate that the developed system meets the specified functional requirements and provides an acceptable level of perceived usability for supporting structured complaint handling and administrative reporting. The system offers a centralized platform to facilitate ticket tracking, communication, and service documentation. However, further evaluation using long-term implementation data and objective operational performance indicators is necessary to determine its impact on service efficiency and ticket resolution.

Keywords: Helpdesk Ticketing System, Customer Complaint Management, Telegram ChatBot

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INTRODUCTION

Service quality is perceived as a crucial component in maintaining a comparative advantage in the service industry, which is closely associated with customers' evaluations of their service experiences (Osarenkhoe et al., 2017). When service quality does not meet customers' expectations, dissatisfaction arises, leading customers to express their concerns through complaints (Jayasimha & Srivastava, 2017). Customer complaints are an inevitable consequence of service and serve as a means for customers to express dissatisfaction with inadequate service (Adzhigalieva et al., 2022; Hsiao et al., 2016). Rather than being viewed solely as negative feedback, customer complaints provide valuable information that helps service providers identify deficiencies, improve customer relationships, and enhance operational quality (Yilmaz et al., 2016). It shows that customer complaints contribute to continuous service improvement, ultimately supporting organizational performance and profitability (Salam et al., 2025).

The relationship between customer complaints and service quality underscores the importance of effective complaint handling. It is widely believed that managing customer complaints is crucial for companies (Jeanpert et al., 2021). Complaint handling is also regarded as a fundamental concept for responding effectively to customer dissatisfaction, which directly influences brand loyalty and business competitiveness (Nkanu et al., 2025). Another assumption is that complaint handling enables organizations to address service failures, identify areas for improvement, and restore customer confidence in the organization's reliability (Muhamad et al., 2020). It indicates that effective complaint handling is not merely a response to customer dissatisfaction but a strategic mechanism for improving service quality, strengthening customer relationships, and maintaining organizational competitiveness.

The rapid growth of technology provides an abundance of convenient channels for customers to express their complaints, posing the challenge of handling them quickly and efficiently (Helmy et al., 2023; Singh et al., 2016). The challenge is evident from the preliminary observation conducted at CV Mitra Tech Solution, a company operating in the Managed Service Provider (MSP) sector. It shows that the company still relies on a manual process to handle customer complaints. This condition raises concerns regarding the timeliness, consistency, and efficiency of complaint handling. The existing manual process indicates a need for a more structured and accessible complaint-handling mechanism to facilitate the submission, recording, monitoring, and follow-up of customer complaints.

However, the rapid growth of information technology not only creates challenges for organizations in managing the increasing volume of customer complaints but also provides opportunities to address them through digital solutions (Falih et al., 2026; Hermawan et al., 2025). A helpdesk ticketing system is considered a digital solution that enables customer complaints and service requests to be systematically recorded, assigned, tracked, and followed up through unique ticket numbers (Uwimbabazi et al., 2026; Zakiyah & Karim, 2024). A helpdesk ticketing system centralizes complaint information to reduce the risk of duplicated or overlooked reports while facilitating monitoring of ticket status and resolution history (Rayna & Saputra, 2026). It is noted that a helpdesk ticketing system serves as a human resource to solve internal and external problems (Al-Hawari & Barham, 2021; Bahrudin et al., 2019). These show that implementing a helpdesk ticketing system is essential for organizations seeking to improve the systematic management of customer complaints, enhance response efficiency, and ensure effective monitoring of complaints throughout the resolution process.

Furthermore, integrating modern digital tools and platforms is perceived as a strategy to enhance organizations' ability to handle customer complaints and optimize service efficiency (Sulmiah, 2025). In particular, social media and mobile technologies enable two-way communication, rapid responses to customer requests, and more personalized services (Kostiushko et al., 2025). Building on these advantages, integrating a helpdesk ticketing system with a chatbot through an instant messaging platform such as Telegram can provide customers with a more accessible and interactive channel for submitting complaints and checking ticket status without requiring continuous access to the web application (Zalukhu et al., 2026). Such integration can simplify the complaint submission process while supporting more responsive communication and transparent monitoring of complaint progress (Moningkey et al., 2025). It indicates that a web-based helpdesk ticketing application can be enhanced by integrating a Telegram Chatbot, which is proposed as a potential solution to improve the accessibility, responsiveness, transparency, and efficiency of customer complaint handling.

Many scholars have demonstrated the effectiveness of web-based IT helpdesk systems in replacing informal complaint reporting through telephone, WhatsApp, or other messaging platforms. A study has developed a hospital-based IT helpdesk system with multi-status ticket management, Telegram notifications, and API integration with inventory and logbook applications (Purwanto et al., 2026). Another study further focuses on a centralized campus complaint portal to improve ticket distribution, technician monitoring, and service documentation (Muhajir & Darmanto, 2026). Similarly, a study develops a helpdesk monitoring and ticketing system to facilitate complaint submission and managerial supervision (Kurniawan & Munawaroh, 2022). These studies primarily position the web-based helpdesk as the primary

platform for managing complaints, while the potential of integrating a conversational messaging platform as an interactive channel for complaint submission and ticket-related communication remains underexplored. Therefore, this study addresses the gap by developing a web-based helpdesk ticketing application integrated with a Telegram ChatBot to handle customers' complaints. The proposed system is designed not only to record, classify, assign, and track complaints through a structured ticketing mechanism, but also to facilitate more accessible and responsive communication through Telegram. This integration represents the novelty of the study by connecting a centralized helpdesk ticketing system to a conversational communication channel, thereby creating a more systematic, traceable, and responsive approach to handling customer complaints.

METHOD

The current study adopted an applied research approach with a Design and Development Research (DDR) design. It addressed a practical problem in customer complaint handling at CV. Mitra Tech Solution by designing, developing, and evaluating a web-based helpdesk ticketing application integrated with a Telegram ChatBot. The development was conducted over six months through a systematic series of stages based on the Agile development methodology. The research stages consisted of problem identification, literature review, research method design, system implementation, evaluation, and preparation of the final research report. It began with a literature review, followed by system development using the Agile framework, which emphasized an iterative and incremental process. Unlike a linear development approach, the system development process was conducted through repeated cycles of development, evaluation, and improvement based on user requirements and feedback. The developed system was designed to provide key features including ticket creation, ticket status tracking, user management, dashboards, and reporting. The system architecture utilized Node.js as the backend technology, React.js as the user interface framework, and PostgreSQL as the database management system. A third-party series, namely the Telegram bot API, was integrated into the system to establish a more structured, transparent, traceable, and easily monitored workflow for customer complaint handling. The evaluation assessed the functionality and sustainability of the identified needs once the system was developed and deemed ready for evaluation. The final stage involved drawing conclusions and providing recommendations to support the system's sustainability and potential future development.

RESULT AND DISCUSSION

The development was carried out by implementing features for reporting, processing, and service supervision at CV Mitra Tech Solution. The system was also developed using web-based technology with the Agile development method. It covered three main stages: system interface design, system implementation, and evaluation and validation results for the proposed solution. Each stage was presented as follows.

System Interface Design

The system interface was designed as the initial visual reference for the system display and served as guidance during implementation. The interface was expected to provide ease for users in reporting, supervising, and processing ticketing system operations in a structured and effective manner. The system interface design was presented in Table 1.

Table 1. The System Interface Design

Developed Design	Description
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The login page was designed for users to access system, where they were required to register username and passwords as the authentication for verifying user's credentials.

The dashboard page was designed to provide brief information related to the number of incoming tickets, tickets currently being processed, completed tickets, and tickets awaiting further action and to help users and administrators monitor service conditions in real time, enabling faster and more informed decision-making.

No	Subject	Reported By	Technician	Category	Priority	Status	Date

The ticket creation page was designed for users to submit reports or service requests by providing a chance for users to enter the service category, subcategory, ticket title, and problem description, and to attach supporting documents if necessary.

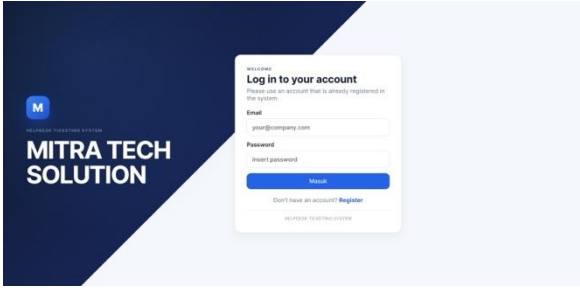
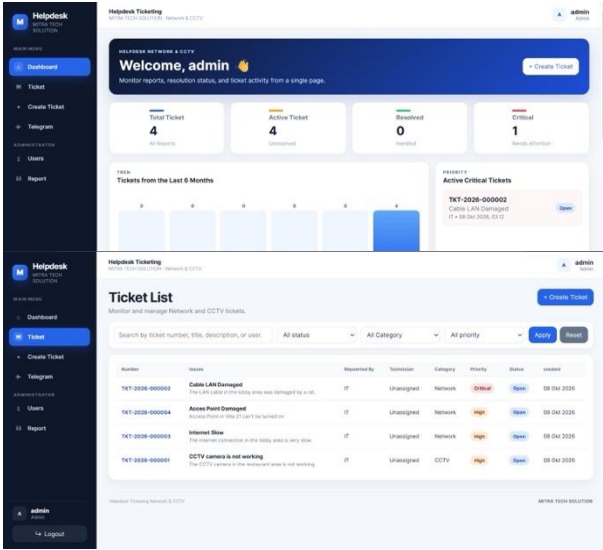
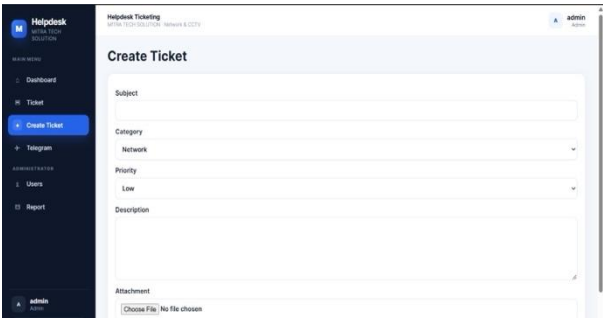
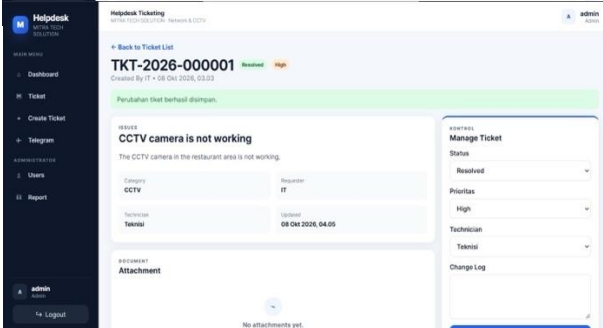
The ticket list page was designed to display all tickets created by users or submitted to the system included the ticket number, ticket title, category, creation date, and ticket status. In addition, search and filtering features helped users to quickly locate specific tickets

Table 1 presented the design of the main pages of the helpdesk ticketing system and described the functions provided on each page. The login page served as the initial authentication interface, allowing users to access the system by entering their registered username and password. The dashboard page provided an overview of ticket conditions, including incoming, ongoing, completed, and pending tickets, to support real-time monitoring and decision-making. The ticket creation page enabled users to submit service reports or requests by entering relevant information, such as category, subcategory, ticket title, problem description, and supporting documents. Meanwhile, the ticket list page displayed submitted tickets along with essential information, including ticket number, title, category, creation date, and status, supported by search and filtering features to facilitate efficient ticket management and tracking.

System Implementation

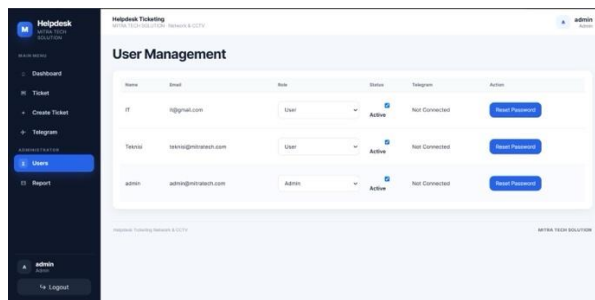
The system implementation stage involved translating the system design into a functional web-based helpdesk ticketing application. At this stage, the system architecture, interface designs, database structure, and functional requirements identified during the previous stages were implemented using the selected technologies. The implementation focused on developing the core features required to support customer complaint handling, including ticket creation, ticket management, status tracking, user management, dashboard monitoring, and reporting. In addition, the system was integrated with the Telegram ChatBot to facilitate complaint notifications and communication between users and the technical support team. The system implementation was presented in Table 2.

Table 2. The System Implementation Development

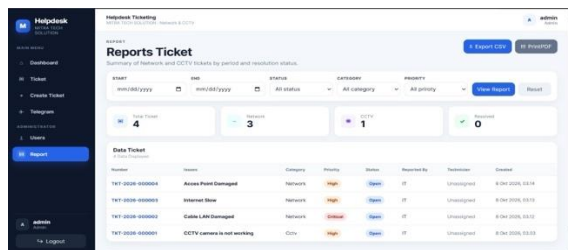
Developed Design	Description
	The developed page served as the authentication gateway for users before they could access the system. Users were required to enter their registered email address and password. Once the authentication process was complete, users were directed to the dashboard based on their assigned access role: Admin, Technician, or User.
	The developed dashboard page was displayed after users successfully logged in to the system. This page served as the main interface, providing a summary of information, including the total number of tickets, the number of tickets by status, and ticket statistics for the past six months. The ticket list page was developed to display all ticket data stored in the system. Users could search for tickets by keyword and filter by status, category, or priority, making it easier and more efficient to find and retrieve specific information.
	The ticket creation page was designed for users to submit new incident reports, requiring them to provide the ticket title, incident category, priority level, and a description of the issue. They were able to attach supporting images or documents if necessary.
	The ticket detail page displayed comprehensive information about a submitted ticket, including the

problem description, ticket status, priority, category, assigned technician, reporter, and status change history. This page was also used by administrators and technicians to update the status of tickets being handled.

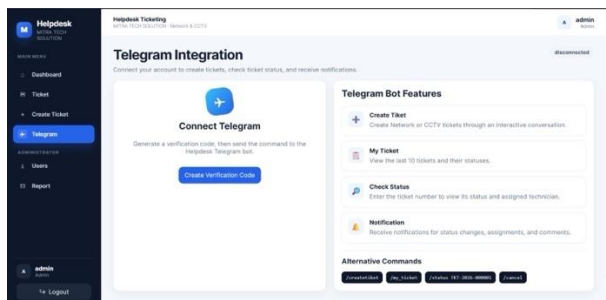
The user management page was developed for administrators to manage user data within the system. Administrators could add new users, update user information, and activate or deactivate user accounts according to the company's requirements.



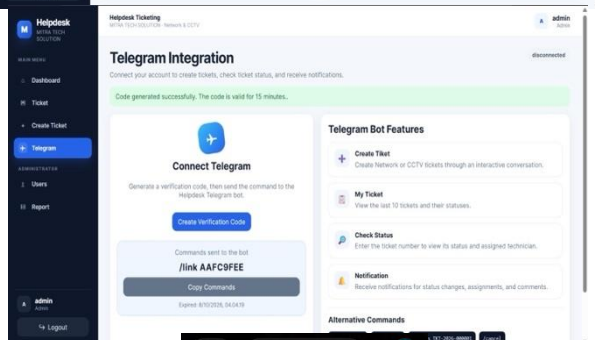
The report page displayed all ticket data and allowed the data to be sorted based on date range, ticket status, category, or priority. In addition, administrators could export the report data in CSV format or print the reports as PDF files for documentation purposes.



The page for generating a verification code was developed to connect the system with the Telegram application. This page also provided information about the features that could be accessed through the Telegram ChatBot.



After the user clicked "Generate Verification Code" button, a link appeared and could be used to connect the system with the ChatBot using the user's respective Telegram account.



When the system had been successfully integrated, it enabled the users to link their Telegram accounts with their application accounts, created tickets through Telegram, check ticket statuses, and receive notifications whenever there is a change in ticket status.

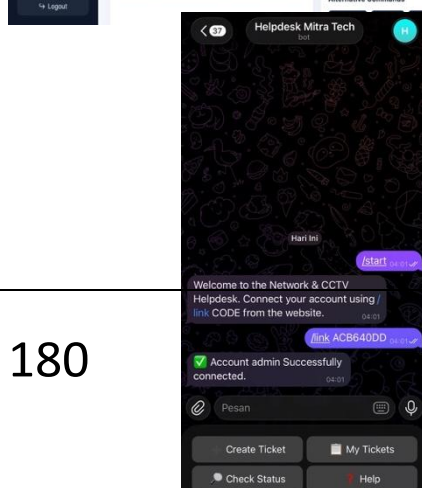


Table 2 presented the developed design of the main features and interfaces of the helpdesk ticketing system, covering authentication, ticket management, user administration, reporting, and Telegram ChatBot integration. The login page functioned as the authentication gateway, allowing users to access the system according to their assigned roles as Admin, Technician, or User, while the dashboard provided an overview of ticket statistics and ticket status trends over the previous six months. The ticket list and ticket creation pages supported incident report management and submission, including search, filtering, priority settings, and attachment features. The ticket detail page provided comprehensive information about each ticket and enabled administrators and technicians to update its status, while the user management page allowed administrators to manage user accounts. In addition, the report page facilitated ticket data analysis based on specific criteria and supported exporting reports in CSV and PDF formats. The system also included Telegram ChatBot integration via a verification code mechanism, enabling users to link their Telegram accounts to their system accounts, create tickets, check ticket statuses, and receive notifications about status changes.

Evaluation and Validation Results

During the evaluation and validation stage, system testing was conducted to ensure that the web-based helpdesk ticketing application, integrated with the Telegram ChatBot, operated in accordance with the research requirements. The evaluation method used was Black-Box Testing, which focused on the system's functionality by examining the application workflow from the user's perspective. Meanwhile, the validation process was conducted using the User Acceptance Test (UAT) method, supported by the System Usability Scale (SUS) to measure the application's usability and ensure it is acceptable to users. The results were presented in Table 3 and Table 4.

Table 3. The Result of Black-Box Testing

Features	Indicators	Descriptors	Status
Login	The user entered the correct email address and password.	The user successfully logged in and was immediately directed to the dashboard page.	Success
Login	The user entered an incorrect email address or password	The system displayed a login failure message	Success
Create Ticket	The user filled out the ticket form.	The ticket data was successfully saved in the system.	Success
Update Status	The administrator changed the ticket status	The ticket status is successfully updated.	Success
Assign Technician	The administrator assigns a technician to handle the ticket.	The technician is successfully assigned to the ticket in the system	Success
User Management	The administrator can change the user's role.	The administrator successfully changes the user's role.	Success
Comment	The user adds a comment to an existing ticket.	The comment is successfully saved and displayed in the system.	Success
Telegram	The user checks the status	The ChatBot displays the	Success

	of a submitted ticket.	ticket status.	
Report	The system can display all ticket data.	The system displays all ticket data and allows reports to be exported in PDF, Excel, and CSV formats.	Success

Based on the results of the Black-Box Testing presented in Table 3, all major features of the developed application were successfully executed and performed as expected. The testing covered the login process, ticket management based on user roles, ticket status updates, user management, integration with the Telegram ChatBot, and report generation. Since all test scenarios were successfully completed, the application is considered to have met the system's functional requirements.

Table 4. The Result of UAT/SUS

Respondents	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Score SUS
R1	3	3	3	3	3	3	3	3	3	3	75
R2	3	3	3	3	3	3	3	3	3	3	75
R3	3	3	3	3	3	3	3	3	3	3	75
R4	3	3	3	2	3	3	3	3	3	2	70
R5	4	4	4	4	4	4	4	4	4	4	100
R6	3	3	3	3	3	3	3	3	3	3	75
R7	4	3	3	3	3	3	3	3	3	3	77,5
R8	3	3	3	3	3	3	3	3	3	3	75
R9	4	3	4	3	4	3	4	3	4	3	87,5
R10	4	4	4	4	4	4	4	4	4	4	100
Total											810

Based on the data collected through the questionnaire, the SUS scores for each respondent were calculated, as presented in Table 4. The average SUS score was calculated by dividing the total SUS score by the number of respondents, yielding the following value.

$$\bar{X} = \frac{\sum SUS}{n}$$

$$\bar{X} = \frac{810}{10}$$

$$\bar{X} = 81$$

The results of the User Acceptance Test using the System Usability Scale (SUS) method obtained an average score of 81. The score fell within the acceptable category with a grade A. Therefore, it could be concluded that the application demonstrated good usability, was easy for users to understand, and was acceptable as a platform for reporting and managing tickets.

Discussion

The findings indicate that the developed web-based helpdesk ticketing system successfully integrated the main functions required to support complaint and service request management at CV Mitra Tech Solution. It is consistent with a study showing that a web-based ticketing system facilitates structured complaint recording, ticket assignment, and real-time

monitoring of complaint status (Himmawan & Wakhidah, 2026). Similarly, web-based helpdesk systems are reported to support ticket creation, assignment, status tracking, notifications, and reporting, thereby facilitating more systematic service request management (Cahyadi & Ramayanti, 2025; Laksono & Anwar, 2025). The system also provides a structured workflow that covers ticket submission, classification, priority setting, technician assignment, status updates, comments, monitoring, and reporting. It is relevant to a study that develops a web-based internal IT helpdesk system that incorporates ticket management, priority and Service Level Agreement (SLA) monitoring, technician assignment, and analytical dashboards (Wibowo et al., 2026). The implementation of role-based access for Admin, Technician, and User also supports the division of responsibilities within the ticket-handling process. In addition, the dashboard provides an overview of ticket conditions and historical statistics, while search and filtering features facilitate retrieving specific tickets. These features indicate that the system is not only designed to record complaints but also to support systematic monitoring and management throughout the ticket resolution process (Devi et al., 2026).

The results of Black-Box Testing further demonstrate that the implemented features met the specified functional requirements. All tested scenarios, including authentication, ticket creation, status updates, technician assignment, user management, commenting, reporting, and Telegram ChatBot integration, are successfully executed. The integration with Telegram also enhances the system's accessibility by allowing users to connect their accounts, create tickets, check ticket statuses, and receive notifications about status changes. This finding suggests that the system provides an alternative communication channel that complements the web-based interface and facilitates interaction between users and the support team (Sulaiman & Sonny, 2026). Furthermore, the reporting feature, which supports data filtering and export into PDF, Excel, and CSV formats, indicates that the system can support both operational ticket handling and administrative documentation. Similarly, a study highlights that filtering and export functions in a web-based helpdesk system facilitated data retrieval, supported data recapitulation through XLSX exports, and provided PDF documents as formal records of ticket handling (Sutikno, 2026). These findings suggest that reporting functionality not only facilitates the monitoring and analysis of ticket data but also supports the preparation of structured administrative documentation and reduces the need for manual report preparation.

The User Acceptance Test using the System Usability Scale (SUS) yields an average score of 81, which is categorized as acceptable and assigned a grade of A. This result indicates that users generally perceive the system as usable and acceptable for reporting and managing service tickets. This finding is consistent with a study evaluating a cinema e-ticket application, which reports an average SUS score of 81.583, corresponding to grade A (Haryanti et al., 2025). Similarly, a study evaluating a web-based reporting management system obtained a SUS score of 81, categorized as good and acceptable, demonstrating that users perceived the system as usable for creating, editing, storing, and exporting reports (Pasiowan et al., 2026). These comparable findings reinforce the usability of the developed helpdesk ticketing system, particularly in supporting service ticket management and report generation for administrative documentation. It suggests that the developed helpdesk ticketing system provides a satisfactory level of perceived usability for supporting service ticket reporting and management.

These findings suggest improving IT service management at CV Mitra Tech Solution by providing a centralized platform for complaint and service request handling, facilitating coordination among users, technicians, and administrators, and supporting more systematic ticket monitoring and resolution. The integration of role-based access, ticket tracking, Telegram ChatBot notifications, and reporting functions enables the organization to manage service requests more efficiently while improving information accessibility and administrative documentation. The SUS score of 81 further indicates that users perceive the system as acceptable and usable for supporting these activities. Theoretically, these findings contribute to the understanding of how web-based helpdesk ticketing systems can support IT service management by integrating ticket lifecycle management, role-based access control, automated notifications, and reporting into a unified platform. The findings also reinforce the relevance of

usability evaluation in system development, demonstrating how the System Usability Scale can be used to assess users' perceptions of a system's ease of use and acceptability.

However, the current study has several limitations. The system is developed and evaluated within a single organizational context, which potentially limits the generalizability of the findings to organizations with different IT service management requirements. Furthermore, Black-Box Testing primarily assesses whether the system's functions operate according to the specified requirements, whereas the SUS evaluation measures users' perceived usability rather than objectively assessing improvements in operational performance. The study also does not assess the system's long-term impact on ticket resolution time, SLA compliance, user satisfaction over an extended period, or overall service management efficiency. Therefore, future research is suggested to evaluate the system through longer-term implementation, involve a broader range of organizations and users, and incorporate quantitative operational indicators to determine its effectiveness in improving IT service management.

CONCLUSION

In conclusion, the web-based helpdesk ticketing system integrated with the Telegram ChatBot was successfully developed to support complaint reporting, ticket management, and service monitoring at CV Mitra Tech Solution. The system integrates essential features, including role-based authentication, ticket creation and tracking, technician assignment, status updates, user management, reporting, and Telegram-based notifications, providing a centralized platform for managing service requests. The Black-Box Testing results confirm that all tested functional scenarios operated as expected, while the User Acceptance Test using the System Usability Scale (SUS) achieves an average score of 81, categorized as acceptable with a grade A. These findings demonstrate that the system meets the specified functional requirements and provides an acceptable level of perceived usability for supporting structured ticket handling and administrative reporting. Nevertheless, further evaluation involving longer implementation periods and objective operational performance indicators is needed to determine the system's long-term effectiveness in improving IT service management efficiency.

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