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Development of Complaint Management and Tracking System using React Native and Firebase

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Abstract: *The Butuan City Water District (BCWD) customer complaint handling, rely heavily on outdated manual processes such as walk-ins, calls, and social media messages. To address these limitations, the researchers designed and developed a Complaint Tracking and Resolution System featuring an Android mobile app and a web-based admin dashboard. The system allows real-time logging, status tracking, and resolution of service complaints. Technologies such as React Native, Firebase, and JetAdmin were employed to ensure responsiveness, security, and efficient data handling. Testing through alpha and beta stages with actual users showed high usability (SUS score: 84) and improved complaint turnaround times.*

Keywords: Complaint System; Water Utilities; Firebase; Mobile App;

1. INTRODUCTION

Tracking and managing complaints is not just a process for organizations providing services to the community such as the Water District and electric cooperatives. Rather, it is a critical aspect of their operations that can make the difference between success and failure, between customer satisfaction and severe dissatisfaction.

Effective tracking and management of complaints is not just a task to be done. It is a strategic investment that provides many benefits, from improving service quality, strengthening customer relationships, to ensuring the long-term success of an organization serving our community. It is the foundation of continuous improvement and responsibility.

For effective tracking and management of complaints, systematic recording, a clear and fast process, and the use of data for improvement are necessary. These three approaches can help the organization not only solve problems but also strengthen their reputation and trust in the community.

In managing complaints, there are two approaches: the traditional (old) and the modern (new). They differ greatly in efficiency and impact. Traditional methods—walk-ins, phone calls, and social media—often lead to delays, lack of documentation, and unresolved concerns [4], [5]. The modern use involves Complaint Management Software (CMS) / CRM Systems. It includes automated ticketing, real-time updates, and easy report generation. Others utilize Chatbots and AI.

The Butuan City Water District (BCWD), serving residents since 1974, continues to rely on manual systems for recording complaints, which are prone to errors and delays. In January 2025 alone, BCWD received 544 complaints, mostly related to leakage, water meter issues, and water supply interruptions. While 82.55% were resolved on the same day, others took longer, highlighting room for improvement.

Other water districts such as Manila Water, Maynilad, DCWD, and CMWD have started using digital platforms to improve service responsiveness and feedback tracking

[6], [7]. In line with this, BCWD is developing a web and mobile-based Complaint Management System to enhance real-time monitoring, transparency, and customer satisfaction—supporting the government's broader digital governance initiatives [8].

The following statement outlines the key challenges that this study aims to address.

- Consumers who file complaints via text messages or social media often lack a formal reporting structure, making it difficult for BCWD staff to verify the legitimacy of these reports. This can result in ignored or unresolved complaints.
- The manual complaint handling process used by BCWD does not ensure immediate response and resolution, leading to delays and decreased customer satisfaction.
- Due to poor coordination and the absence of real-time updates, many customer concerns remain unresolved or are addressed inefficiently.
- There is no centralized, systematic approach in place for documenting, tracking, and managing customer complaints, which reduces transparency, accountability, and service reliability.

In addressing the identified challenges, this study aims to develop a responsive complaint management system and Android mobile application for tracking and managing complaints and conduct a system evaluation on usability. The use of these tools brings significant changes to operations and customer relations. Implementing this is an investment in the organization's future, leading to better service, happier customers, and a stronger position in the industry.

2. LITERATURE REVIEW:

2.1 EXISTING SYSTEM WORKFLOW

The current complaint handling process of the Butuan City Water District (BCWD) is primarily manual and

consists of several sequential steps. As illustrated in Fig 1, the workflow begins when a customer submits a complaint through various channels such as phone calls, written forms, or social media. The complaint is then received by BCWD staff, who are responsible for processing the request. Once received, a call center form is manually filled out to document the complaint. This record is then forwarded to the appropriate personnel for action. After the issue has been addressed, the action taken and its outcome are documented for internal use. However, the process concludes without a standardized mechanism for collecting customer feedback, limiting BCWD's ability to assess service satisfaction and identify areas for improvement. This manual process presents several inefficiencies, including delayed response times, lack of real-time updates, potential miscommunication, and reduced transparency. These challenges highlight the need for a more modern, automated solution to improve service delivery and customer engagement.

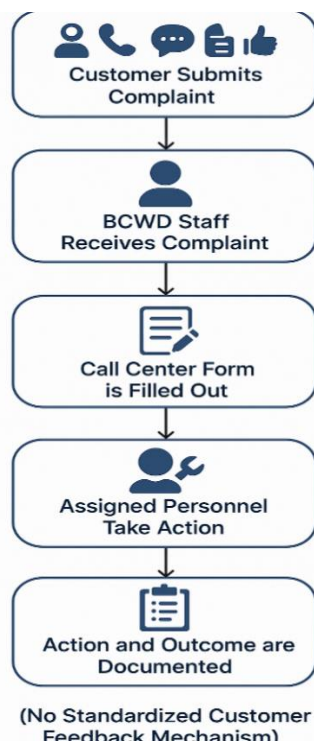


Fig. 1 BCWD Existing System Workflow

2.2 EFFICIENT CONSUMER COMPLAINT MANAGEMENT SYSTEM VIA MOBILE APPLICATION

The widespread adoption of mobile devices, increased internet accessibility, and rising digital awareness have significantly improved the quality of life for the general public. Mobile applications have become integral to daily life, serving various functions across utilities, entertainment, education, and productivity [1]. Unlike traditional software systems that offer limited functionality on desktop platforms, mobile applications provide integrated and accessible services tailored to users' dynamic needs. Adoption in this context refers to users' favorable perception of a mobile application's ability to meet their requirements. Moreover, the frequency and nature of user feedback contribute to determining the application's acceptance rate [2]. Mobile applications are essentially internet-based tools customized for mobile platforms. They are increasingly

used by businesses, social networks, and individuals to facilitate faster communication and broaden economic opportunities. In developing nations, mobile applications are also contributing to the growth of new IT infrastructures, helping improve societal standards of living. As noted in [3], mobile applications influence multiple domains including travel, multimedia, and utilities, streamlining day-to-day operations and enhancing user engagement.

From an organizational standpoint, technological tools such as mobile apps offer cost reduction, minimized human error, and improved efficiency. With increasing consumer adoption, developers have created countless mobile applications to accommodate evolving digital habits. These apps not only provide platforms for information, entertainment, and purchasing decisions, but they also transform how businesses approach marketing, customer acquisition, and engagement strategies. However, due to app saturation, users often abandon apps after minimal use, emphasizing the need for user-centric design and functionality [4].

In the context of public service, mobile applications offer notable advantages. A complaint management system built on the Android platform, for instance, provides an intuitive interface that supports sustainable usage. Android's user-friendly nature allows individuals to complete complaint-related tasks efficiently. Through mobile-based systems, users can conveniently register and monitor the status of their complaints—tracking whether they are accepted, rejected (with justifications), or resolved—without needing to visit an office physically.

This digital method significantly improves communication between users and management. It facilitates real-time monitoring of complaints, supports administrative transparency, and accelerates the decision-making process. Additionally, such systems are cost-effective, scalable, and accessible for both governmental agencies and end-users. Governments and institutions now increasingly recognize mobile apps as essential tools for public interaction due to their accessibility, high adoption rate, and intuitive usability [5].

2.3 DEVELOPMENT TOOLS FOR COMPLAINT MANAGEMENT SYSTEM

Many researchers have examined the progression of tools used in the development of complaint management systems. Khan *et al.* [1] highlight the widespread use of general-purpose programming languages such as Java, Python, and C# due to their scalability and responsiveness in building complex systems. On the other hand, Mohan *et al.* [2] emphasize the advantages of web development frameworks like Ruby on Rails, Django, and ASP.NET, which offer pre-built libraries and features that accelerate development.

Effective complaint management also relies heavily on robust data storage and administration, often implemented through database management systems (DBMS). According to Lee *et al.* [3], MySQL, PostgreSQL, and enterprise-level database solutions are commonly used in such systems. Additionally, Zhang *et al.* [4] suggest that integrating customer relationship management (CRM) tools enhances connectivity with

existing customer data and services. Chen *et al.* [5] further assert that data analysis tools are critical for extracting insights from complaints, identifying recurring issues, and evaluating overall customer satisfaction.

Ultimately, the selection of development tools depends on various factors, including organizational expertise, budgetary considerations, and the complexity of the intended system [1].

3. METHODOLOGY

An overview of the approaches used to create a mobile-based complaint submission system and a web-based complaint monitoring system is given in this section. As was covered in the previous chapter, the researchers examined important research and examined the condition of Butuan City Water District's customer complaint handling at the moment. The research approaches used by the researchers are covered in this chapter, along with the tools and methods utilized to create a solution that successfully satisfies the study's goals.

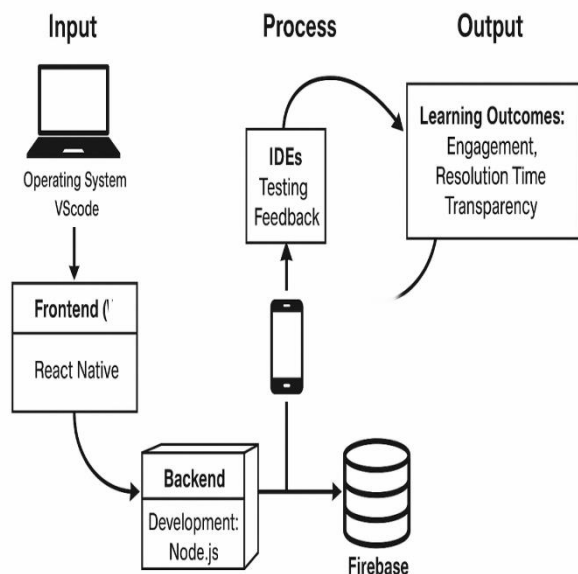


Fig. 2 Conceptual Framework

3.1 AGILE MODEL

Agile methodology was chosen to enable flexibility and collaboration. Development was structured into short sprints, allowing regular evaluation and enhancement of features. Weekly consultations with BCWD staff ensured alignment with their operational needs.

3.2 SYSTEM ARCHITECTURE

For the purpose of complaint monitoring and resolution, the BCWD Complaint monitoring Resolution System uses a disciplined architecture integrating a React JavaScript frontend, a Firebase backend, and an Android-based mobile application. Users mainly interact with the BCWD Complaint App, which links to a frontend/backend server handling and storing Firebase Database data. Through a Jet Admin-powered admin panel that retrieves backend data and enables effective monitoring and resolution, managers of complaints handle them. This design guarantees ideal user-administrator interaction, accordingly, allowing real-time complaint monitoring and effective handling of data. See Fig.3.

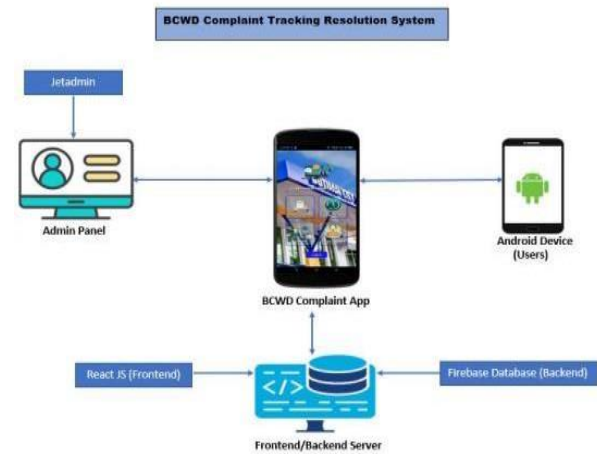


Fig. 3 System Architecture

3.3 TOOLS AND TECHNOLOGIES

- Frontend: React Native (v0.15)
- Backend: Node.js (JavaScript)
- Database: Google Firebase (real-time cloud database)
- Admin Panel: JetAdmin.io
- Development Environment: Visual Studio Code

The system was designed to be responsive and scalable, ensuring support for increasing numbers of users and complaints. Features such as push notifications, image upload, and real-time updates were implemented to enhance usability and transparency .

4. RESULTS AND DISCUSSION

This chapter presents the key findings from the development and evaluation of the Online Consumer Complaints Management System for BCWD. The system was tested and reviewed by users and staff, focusing on how well it handled real complaints and improved overall service.

Data gathered during development helped the team understand complaint trends, system performance, and user satisfaction. Results showed that the new system made it easier to submit, track, and resolve complaints. It also helped staff respond faster and reduced delays caused by manual processes.

User feedback highlighted the system's ease of use, speed, and transparency. These insights guided improvements to ensure the platform met user needs. Overall, the system proved to be a practical solution for modernizing BCWD's complaint handling process and improving customer service.

4.1 BCWD MOBILE APPLICATION

The development of the mobile application using react native has produced significant results in terms of developing consumers and volunteer respondent to address electricity-related issues. Through the mobile application, users can easily file complaints and provide supporting evidence, resulting in a more precise resolution of issues due to the application's user-friendly complaint management process. The consumer service department has benefited from the apps centralized complaint management, which has resulted in faster responses and higher customer satisfaction. Moreover, the app reduces the need for physical visits, making the process of filing a complaint more accessible and

convenient for users. Social media integration enhances user engagement and fosters a sense of community within an application. These results demonstrate the application's efficacy in empowering users, streamlining complaint management, and fostering a positive user experience.

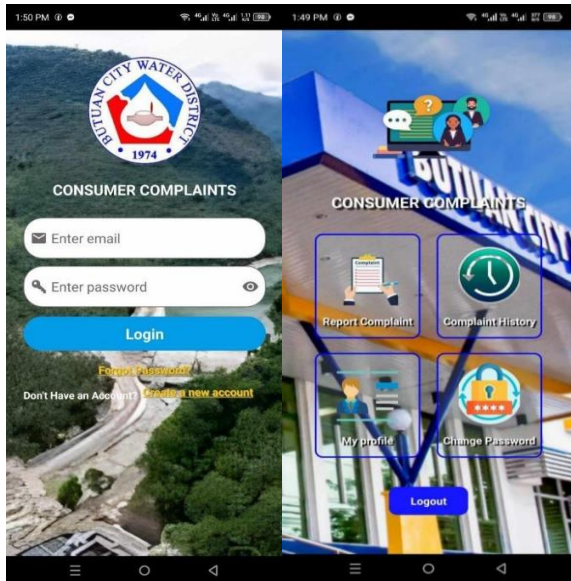


Fig. 4 Log-in (left), BCWD Dashboard(right)

4.2 LOG-IN USER

Since the evolution of the login interface has extremely raised the generality and availability of the online complaint management system. The method increases user involvement and a feeling of responsibility by letting Concerned Citizen members register for accounts and reduce the procedure. Users of the logon interface have access to the system; its usability helps to provide a flawless and unique experience. Also, by means of safe storage and management of user credentials, the system gives top priority to the security and protection of user data. This guarantees user privacy and security, therefore building faith in the users of the system. Essential to the system, the login interface is rather important in creating a safe and user-friendly surroundings. The evolution of the login interface has made the online complaint handling system more easily available to a larger audience, therefore empowering users to actively handle problems connected to electricity. The solution protects user data and offers a simplified registration process, therefore improving user happiness and encouraging a feeling of ownership. Generating a good user experience and facilitating major interaction with the system depends much on the login interface.

4.3 REPORT COMPLAINT

In Fig.5. Illustrates the development of the Report Complaint interface, thereby exactly meeting user needs by way of an appropriate and user-friendly platform for complaint reporting. Including exact components type of complaints, title, location, and connection number helps a complaint processing system to be more efficient and generate better results. The interface enables users to provide visual evidence and comprehensive explanations, therefore increasing knowledge and accelerating the settlement of specific issues. All things considered, the interface enables consumers to

participate more and better as well as the employees in charge of customer support, thereby raising customer satisfaction and strengthening the complaint handling system.

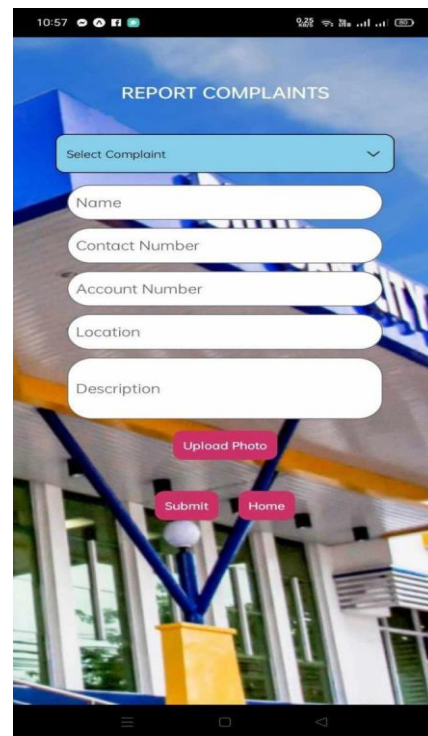


Fig. 5 Report Complaint

5.3 VIEW COMPLAINT AND COMPLAINT HISTORY

As shown in Fig. 6, the integrated interface for Complaint History and View Complaint allows users to monitor the progress and details of their submitted complaints within the Online Complaint Management System. The interface displays the status of each complaint—such as In Progress, Rejected, or Completed—and provides detailed records for every complaint filed. This combined feature enhances transparency, improves communication between consumers and service personnel, and ensures real-time updates, ultimately leading to more efficient complaint resolution and greater user satisfaction.

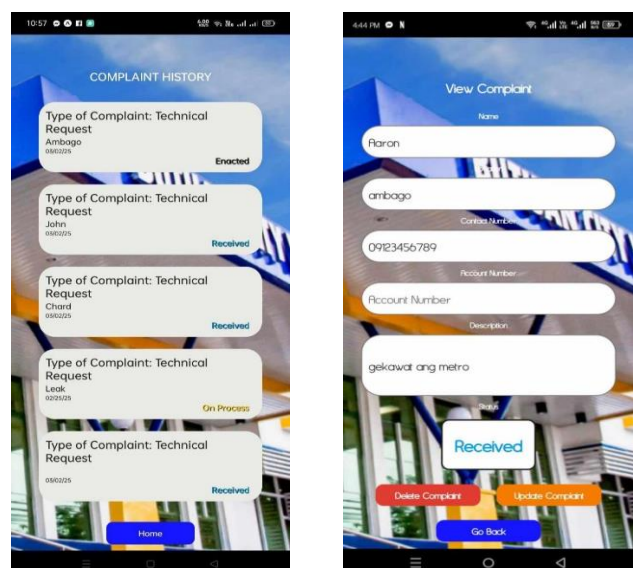


Fig. 6 Complaint History and View Complaint interface

5.4 ADMIN LOG-IN PAGE AND DASHBOARD

As shown in Fig. 7, the integrated interface includes both the BCWD Admin Login Page and the Admin Dashboard, offering a secure and efficient environment for managing consumer complaints. The Admin Login Page provides a clean, user-friendly design where authorized personnel must enter their registered email and password. Built-in authentication mechanisms, such as password masking and error messages for invalid credentials, enhance system security and usability by preventing unauthorized access. Upon successful login, administrators are redirected to the Admin Dashboard, which serves as a centralized platform for complaint management. The dashboard presents visual summaries through pie charts and bar graphs to track complaint categories, statuses, and temporal trends. Additionally, a comprehensive complaints table provides key data such as complaint type, user information, location, current status, and assigned personnel. This setup enables real-time monitoring, rapid issue resolution, and informed decision-making, contributing to a more streamlined and responsive complaint handling process at BCWD.

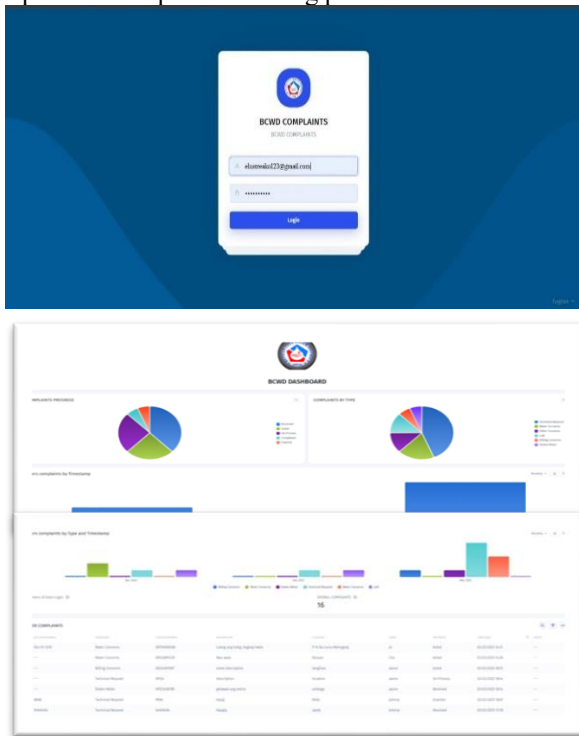


Fig. 7 BCWD Admin Login Page and Admin Dashboard

5. STATISTICAL ANALYSIS

During the beta testing phase of the BCWD Complaint Tracking and Resolution System, a usability evaluation was conducted using the System Usability Scale (SUS) to measure user experience, ease of use, and overall system clarity. The system achieved an average SUS score of **84**, significantly surpassing the industry benchmark score of **68**, which places it within the "Excellent" range according to standard SUS interpretation guidelines. This high score reflects strong user satisfaction and indicates that the system is intuitive, user-friendly, and effectively supports its intended functions. See Fig.8.

A total of **200 individuals** participated in the evaluation. The demographic breakdown showed a higher proportion of **female participants (59%)** compared to **male**

participants (41%), and all respondents were aged **26 and above**, reflecting a more mature user base. 45% were between the ages of 26 and 35, 33% between the ages of 36 and 45, and 22% were 46 years of age and above. This age range implies that consumers perhaps with different degrees of professional and digital expertise evaluated the system.

With regard to responder roles, the group consisted of five ICTD staff members, five concerned citizens, five consumers, and five Complaints Department staff members. This range of involvement assured public officials as well as internal users of a thorough evaluation. The range of age, gender, and user type adds to the dependability of the findings, thereby confirming that the system meets the demands of the intended users and is ready for public publication.

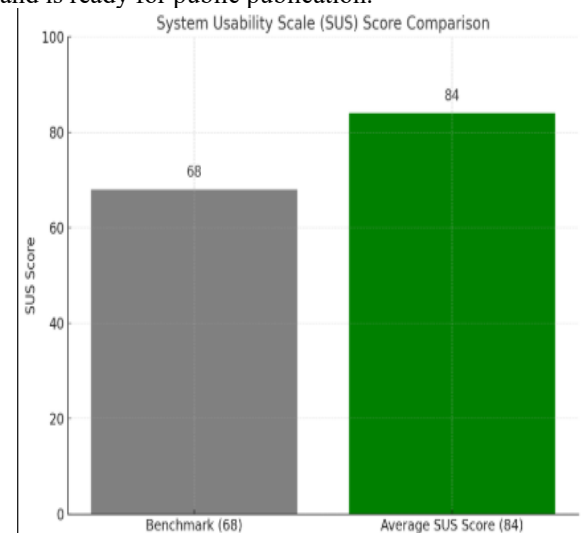


Fig. 8 System Usability Scale (SUS) Evaluation Results

6. SUMMARY

This study presented the design and development of a mobile application aimed at enhancing the complaint handling process for consumers, concerned citizens, and administrative staff of the Butuan City Water District (BCWD). The primary goal was to provide a modern, fast, and user-friendly platform accessible via mobile devices, allowing users to conveniently file, monitor, and receive feedback regarding their complaints.

An iterative design and development methodology was adopted, utilizing Firebase as the backend service due to its scalability, real-time database capabilities, and seamless integration with mobile platforms. Continuous collaboration was maintained with both end users and BCWD personnel through interviews, questionnaires, and usability testing. This participatory approach was instrumental in shaping the application's features, user interface, and overall user experience.

Key features of the BCWD Mobile Complaint Tracking and Resolution System include secure user authentication, a complaint submission module, real-time complaint status tracking, and an administrator dashboard for processing and responding to customer concerns. Users are able to log in, submit detailed complaints, track the progress of their cases, and receive timely notifications. Administrators are provided with tools to categorize, assign, and resolve complaints while maintaining communication with consumers.

User feedback indicated a high level of satisfaction among both customers and BCWD staff. The application

was praised for its simplicity, reliability, and usability, significantly reducing the time and effort required in the previous manual complaint process. Additionally, the system fostered greater community engagement by providing a transparent and responsive platform for voicing concerns.

The study concluded that the mobile application contributed to enhanced operational efficiency within BCWD, improved customer service delivery, and established a more transparent and effective channel of communication between the utility provider and the public. The successful deployment of the system underscores the transformative potential of mobile technologies in the delivery of public utility services.

7. CONCLUSION

The BCWD Complaint Tracking and Resolution Mobile App has really improved the operations of customer service for the agency to really improve rather drastically. The hand-written complaint method is replaced by the real-time digital platform so that customers may promptly send, track, and get updates on their problems. With Firebase as its backend, the application offers a secure and responsive solution that meets the daily operational needs of both users and administrators.

The project has improved communication, reduced resolution times, and promoted transparency within BCWD. Administrative staff can now efficiently manage and prioritize complaints through the integrated dashboard, resulting in a more organized workflow and quicker response to public concerns.

Test user responses confirmed that the method is effective, practical, and user-friendly in increasing customer satisfaction. Its efficient implementation guides other government agencies striving to modernize their systems and highlights the opportunities of digital tools to transform public service delivery.

8. RECOMMENDATIONS

- Create an intuitive and user-friendly interface within the mobile application for consumers to file complaints. Include fields for capturing complaint details such as type of issue, description, and the option to attach relevant documents or images.
- Develop a system to categorize complaints based on their type and urgency. Implement a mechanism to automatically or manually assign complaints to the appropriate resolution department.
- Ensure the web-based system and mobile application are accessible and optimized for various devices and screen sizes. Design the user interface to be mobile-responsive, allowing consumers to access and navigate the system effortlessly from their smartphones.
- Develop a messaging chat feature for the consumers and concern citizen to message the customer service of BCWD.
- Develop an administrative panel for the Consumer Services Department to manage the complaint management system. Provide functionalities for user management, complaint

assignment, system configuration, and generation of reports.

- Offer comprehensive training sessions and documentation for BCWD staff to ensure smooth adoption and usage of the complaint management system. Provide ongoing support and assistance to address any technical or operational issues that may arise.
- The Butuan City Water District and Consumers and the Citizen Complaint Tracking Resolution System will enable BCWD to track and manage consumer complaints efficiently, improving customer service and satisfaction. The system will also provide valuable insights for management decision-making and be a helpful resource for future researchers and IT professionals.

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