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Development of Consumer Complaint Management System with AI Segmentation for Electric Cooperatives

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Abstract: Electric cooperatives in the Philippines remain vital to rural electrification, yet many continue to rely on manual complaint-handling methods such as walk-in transactions, phone calls, and handwritten logbooks. These practices often result in delayed responses, fragmented documentation, and weak accountability, which in turn erode consumer trust. This study designed, developed, and evaluated a Consumer Complaint Management System (CCMS) enhanced with artificial intelligence (AI)-based segmentation to address these challenges. The system was built using the Agile Development Model, allowing iterative refinement through continuous feedback from IT experts and end-users. Core features include mobile and web-based complaint submission, automated categorization and prioritization using supervised machine learning, geotag-enabled reporting, workflow dashboards for staff and management, and role-based access control to ensure data security. Evaluation was conducted in two phases: IT experts assessed the system using ISO/IEC 25010 software quality standards, while Member-Consumer-Owners (MCOs) and cooperative personnel evaluated functional suitability, performance efficiency, usability, and overall acceptability. Results demonstrated excellent ratings across all quality dimensions, with end-users reporting faster complaint resolution, improved accessibility, and high satisfaction with the system's usability. The findings confirm that AI-driven segmentation enhances complaint management efficiency, reduces delays caused by manual routing, and strengthens transparency and accountability in service delivery. Beyond improving daily operations, the CCMS supports compliance with government mandates such as Republic Act No. 11032 and NEA reporting requirements. Ultimately, the system fosters stronger relationships between cooperatives and their consumers by ensuring that complaints are systematically recorded, properly addressed, and resolved in a timely manner.

Keywords: *Consumer Complaint Management System, Artificial Intelligence, Electric Cooperatives, Agile Development, ISO/IEC 25010.*

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I. INTRODUCTION

Electric cooperatives have long been central to the Philippines' rural electrification program, serving as vital partners in extending electricity to communities that would otherwise remain underserved. Since the establishment of the National Electrification Administration (NEA) in 1973, cooperatives have played a critical role in improving access to energy, stimulating local economies, and enhancing the daily lives of millions of Filipinos. Today, there are more than 121 electric cooperatives nationwide, covering over 36,000 barangays and approximately 14 million consumer connections. With this expansion, however, comes a growing expectation from consumers—not only for reliable electricity but also for responsive and efficient customer service.

One of the most visible indicators of service quality is how consumer complaints are managed. Issues such as billing discrepancies, meter malfunctions, and power interruptions are common in any distribution utility. While these concerns are often unavoidable, the speed, accuracy, and transparency with which they are addressed directly influence consumer trust and satisfaction. Unfortunately, many cooperatives continue to rely on traditional complaint-handling methods, including walk-in transactions, phone calls, and handwritten logbooks. These manual processes, once sufficient, have become increasingly inadequate in today's fast-paced and service-oriented environment. As complaint volumes grow, manual handling often leads to delayed responses, repetitive follow-ups, and inconsistent documentation.

Accessibility further compounds the problem. Consumers in rural areas frequently face barriers to reporting

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issues, such as long travel distances to cooperative offices or limited access to communication channels outside regular business hours. These challenges discourage timely reporting and contribute to unresolved or undocumented complaints. Moreover, the absence of a standardized system for categorizing and routing complaints means that urgent concerns may be delayed, records misplaced, and operational resources used inefficiently. Without proper segmentation, complaints are often forwarded manually from one office to another, resulting in bottlenecks and wasted effort.

Government policies underscore the urgency of addressing these inefficiencies. Republic Act No. 11032, known as the Ease of Doing Business and Efficient Government Service Delivery Act of 2018, mandates faster, more transparent, and accountable service delivery in public and quasi-government institutions. Compliance becomes difficult when complaint handling remains fragmented and largely manual. Similarly, NEA requires cooperatives to monitor response times, track unresolved complaints, and evaluate staff performance. These tasks are challenging without a centralized system that organizes and stores complaint data consistently.

International experiences provide evidence that digital complaint management systems can significantly improve service efficiency. Studies in India, Singapore, and Norway have shown that automated categorization reduces response times and enhances customer satisfaction. For example, Mehta (2022) reported that Indian power distribution firms using AI-based complaint classification achieved a 35% reduction in response time. Lim and Ong (2021) documented improvements in public utility monitoring in Singapore after implementing AI-assisted dashboards. Johansen and Pedersen (2019) found that Norwegian municipalities using AI-driven issue tracking experienced higher levels of public trust. These findings highlight the potential of intelligent systems to transform complaint management from reactive problem-solving into structured, data-driven service delivery.

In the Philippine context, however, many cooperatives remain reliant on manual or partially digital systems. While some have adopted SMS hotlines or social media reporting, these channels often operate independently and lack integration into centralized databases. Alvarez (2022) noted that without system integration, complaint data cannot be analyzed effectively to support decision-making or preventive maintenance. The Department of Information and Communications Technology (DICT) has encouraged the adoption of ICT-based systems to improve transparency and efficiency, but implementation remains uneven across cooperatives.

Artificial intelligence offers a practical solution to these challenges. Specifically, supervised machine learning models can be trained to categorize complaints into predefined classes such as billing, outage, or technical concerns. Unlike sentiment analysis, which focuses on emotions, segmentation prioritizes functional categorization and routing, making it more suitable for operational environments. By automating complaint segmentation, cooperatives can reduce manual sorting, minimize delays, and ensure that urgent issues are routed to the appropriate department more quickly. This approach aligns with existing workflows and organizational structures, making it easier to implement and sustain.

The present study therefore seeks to design, develop, and evaluate a Consumer Complaint Management System (CCMS) with AI-based segmentation tailored to the operational realities of Philippine electric cooperatives. The system provides consumers with accessible digital channels for submitting complaints, complete with descriptions and supporting images. On the management side, it offers centralized dashboards for monitoring, task assignment, and progress tracking. Security features such as role-based access control ensure data protection, while analytics reports support compliance with NEA monitoring requirements.

By focusing on effective complaint segmentation and centralized monitoring, this study contributes to ongoing digital transformation efforts in the Philippine power distribution sector. Ultimately, the CCMS aims to strengthen the relationship between cooperatives and their Member-Consumer-Owners by ensuring that concerns are heard, properly addressed, and systematically recorded. In doing so, it supports the broader goal of providing not only reliable electricity but also service that is efficient, accountable, and centered on the needs of the community.

II. METHODOLOGY

This study adopted a mixed-method research design integrating developmental and descriptive–evaluative approaches to design and assess the Consumer Complaint Management System (CCMS) with AI segmentation for electric cooperatives. System development followed the Agile Software Development Life Cycle, enabling iterative design, prototyping, and refinement based on continuous user feedback.

The study was conducted in selected electric cooperatives in Nueva Ecija, Philippines, representing typical operational environments where manual complaint-handling processes remain prevalent. Respondents were purposively selected and consisted of ten (10) IT experts and five (5) end-users (Member-Consumer-Owners and cooperative personnel). IT experts evaluated the system using the ISO/IEC 25010 Software Product Quality Standards, while end-users assessed functional suitability, performance efficiency, usability, and acceptability through structured questionnaires, interviews, and system testing.

The CCMS incorporated supervised machine learning classification to automate complaint segmentation into predefined categories such as billing, outage, and technical concerns. This AI approach was chosen for its practicality and alignment with cooperative workflows. Data collection instruments included expert evaluation forms and user surveys, both employing a four-point Likert scale.

Data analysis employed weighted mean statistics to determine system compliance and acceptability, with an

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acceptance threshold of 2.50. Qualitative feedback from respondents supported system validation and refinement. The study was anchored on the ISO/IEC 25010 Quality Model and the Agile Development Framework, organized through an Input–Process–Output (IPO) conceptual framework. Inputs included system requirements and resources; processes involved agile development and evaluation; and outputs consisted of a validated, user-centered, and standards-compliant complaint management system tailored to cooperative operations.

III. RESULTS

The Consumer Complaint Management System (CCMS) with AI segmentation was developed following the Agile Development Life Cycle, progressing through iterative phases of requirements gathering, design, development, testing, deployment, and refinement. During the planning stage, requirements were identified through consultations with cooperative personnel and Member-Consumer-Owners (MCOs), focusing on challenges in manual complaint handling, accessibility, and compliance reporting. These consultations provided valuable insights into recurring issues such as delayed responses, misrouted complaints, and difficulties in monitoring performance, which shaped the functional and non-functional requirements of the system.

The design phase produced use case diagrams, data flow diagrams, and database models that structured workflows, complaint categories, and user roles. These artifacts ensured alignment with cooperative operations and data governance standards, while also serving as a blueprint for developers and stakeholders to visualize how the system would operate in practice. Particular emphasis was placed on integrating complaint segmentation rules, security protocols, and reporting mechanisms to ensure both operational efficiency and compliance with NEA standards.

In the development phase, the system was incrementally built through sprints, resulting in modules such as mobile and web-based complaint submission, AI-driven segmentation using supervised machine learning, geotag-enabled reporting, workflow dashboards, and role-based access control. Each sprint cycle delivered functional prototypes that were tested and refined, ensuring that features remained responsive to user needs. Testing was conducted continuously across unit, integration, and user acceptance levels, involving IT experts and end-users to validate functionality, usability, and security. This iterative approach allowed early identification of issues and rapid adjustments, strengthening the reliability of the final product.

Deployment involved pilot implementation in selected cooperatives, where the system was installed and evaluated in a controlled operational environment. Feedback from cooperative staff and consumers confirmed that the system improved complaint routing, reduced delays, and enhanced transparency. Maintenance was addressed through monitoring, bug fixes, and updates to ensure sustained performance and scalability, with provisions for future enhancements such as expanded segmentation categories and predictive analytics.

Collectively, these phases demonstrate that the Agile approach effectively supported the successful development and evaluation of the CCMS in a real-world cooperative setting. The iterative process not only ensured technical robustness but also fostered user-centered design, resulting in a system that is practical, efficient, and aligned with the operational realities of Philippine electric cooperatives.

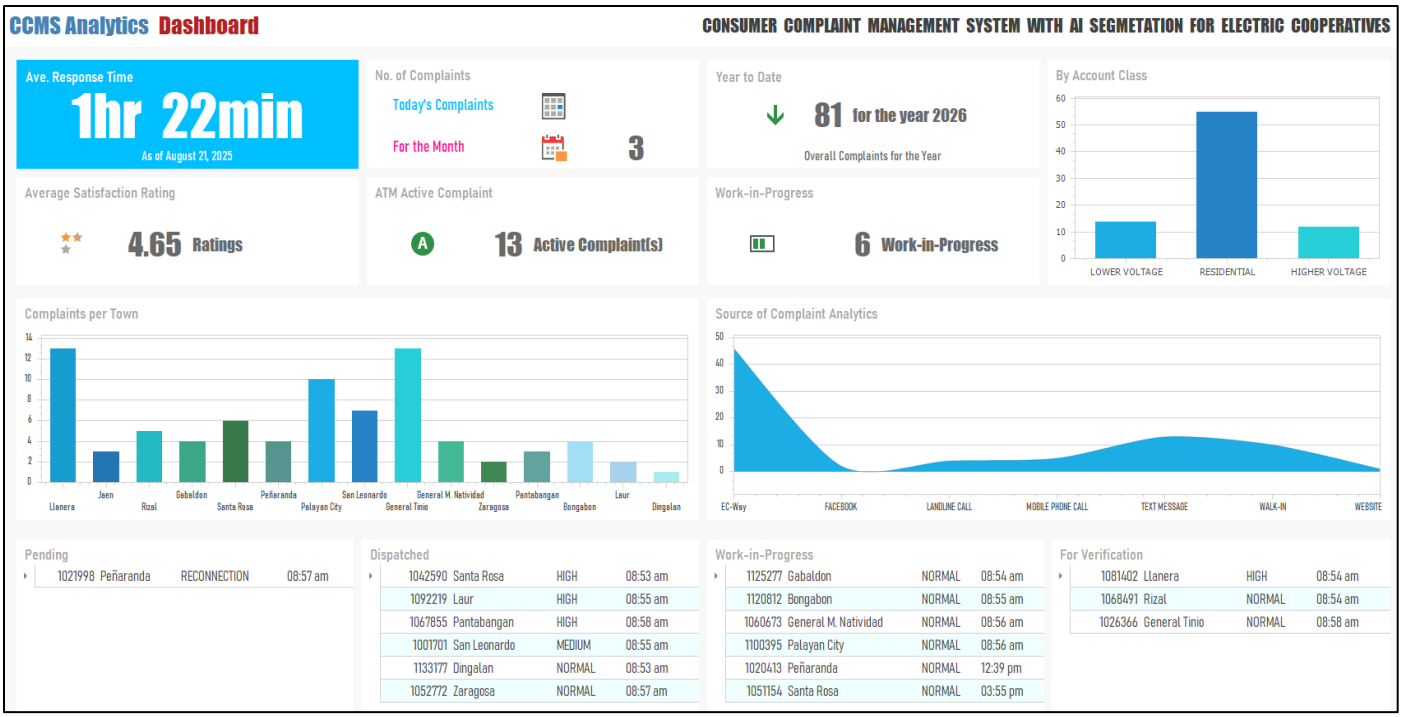

Fig 1 CCMS Analytics Dashboard Showcasing AI-Driven Segmentation, Complaint Distribution, and Performance Metrics for Electric Cooperatives.

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The CCMS Analytics Dashboard (*Figure 1*) provides a visual representation of the system's operational strengths, complementing the quantitative evaluations presented in *Tables 1–3*. The dashboard highlights real-time monitoring features such as average response time, active complaints, satisfaction ratings, and segmentation by account class and geographic location. These visualizations directly reinforce the high usability and functional suitability scores reported by both IT experts (*Table 1*, Usability = 3.83) and end-users (*Table 2*, Usability = 3.55).

Moreover, the dashboard's ability to track complaints by source (e.g., EC-Way, walk-in, mobile calls) and by town demonstrates the system's compatibility and efficiency, aligning with IT experts' ratings of Highly Compatible (3.84) and Highly Efficient (3.78). The inclusion of transaction monitoring, pending and dispatched complaints, and work-in-progress tracking further validates end-users' strong acceptability ratings (*Table 3*, Transaction Monitoring = 3.69; Record Management Efficiency = 3.63).

By integrating these analytics into a centralized interface, the CCMS not only supports transparency and accountability but also provides actionable insights for cooperative personnel. This visual evidence strengthens the claim that the system achieved a balance between technical robustness and operational relevance, as confirmed by the excellent quality ratings across all evaluation dimensions.

Table 1 Summary of the IT Experts' Evaluation of CCMS with AI Segmentation

CCMS Quality Attribute	Overall Mean	Descriptor
Functional Suitability	3.78	Highly Functional
Performance Efficiency	3.78	Highly Efficient
Compatibility	3.84	Highly Compatible
Usability	3.83	Highly Usable
Reliability	3.74	Highly Reliable
Security	3.86	Highly Secured
Grand Mean	**3.80**	**Excellent Quality System**

Source/s: IT Experts' Evaluation Tool Based on the ISO 25010 Software Product Quality Standards

Table 1 summarizes the IT Experts rated the CCMS as an Excellent Quality System (Grand Mean = 3.80). The highest scores were in Security (3.86) and Compatibility (3.84), reflecting strong safeguards and effective integration. Usability (3.83) also scored highly, confirming that the system is intuitive and accessible. These results validate compliance with ISO/IEC 25010 standards and highlight the system's robustness in protecting consumer data and supporting cooperative workflows.

Table 2 Summary of the End-Users' Evaluation of CCMS with AI Segmentation

CCMS Quality Attribute	Overall Mean	Descriptors
Functional Suitability	3.54	Highly Functional
Performance Efficiency	3.50	Highly Efficient
Usability	3.55	Highly Usable
Grand Mean	**3.53**	**Excellent Quality System**

Source/s: End Users' Evaluation Tool based on the ISO 25010 Software Product Quality Standards

Table 2 presents the summary of the End-Users evaluated the CCMS with a Grand Mean of 3.53, interpreted as Excellent Quality. They emphasized Functional Suitability (3.54) and Usability (3.55), confirming that the system aligns with cooperative workflows and is easy to navigate. These results demonstrate that the CCMS improved accessibility and efficiency for Member-Consumer-Owners, validating its practicality in real-world cooperative operations.

Table 3 End-Users' Evaluation of the Acceptability of CCMS with AI Segmentation

Acceptability	Mean	Descriptors
The system searches, updates, archives and retrieves records efficiently.	3.63	Highly Acceptable
It records accurate personal details of the user.	3.58	Highly Acceptable
It monitors/tracks the user's transaction.	3.69	Highly Acceptable
It generates report accurately and in real-time.	3.65	Highly Acceptable
It provides data and relevant information for decision-making process easily.	3.65	Highly Acceptable
It provides an environment that is easy to use and access by the Users.	3.68	Highly Acceptable
It secures the files through opening and retrieval of records.	3.63	Highly Acceptable
It will help the Government agencies in tracing the audit trail of the users.	3.49	Highly Acceptable
It provides an entertaining feature that makes the user engaging in using the program.	3.45	Highly Acceptable
Overall Mean	**3.60**	**Highly Acceptable**

Source/s: End Users' Evaluation Tool on the Level of Acceptability

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Table 3 reveals that end-users' Acceptability ratings yielded a Grand Mean of 3.60, interpreted as Highly Acceptable. Strong ratings were given for transaction monitoring (3.69), ease of use (3.68), and record management efficiency (3.63). Even audit trail support (3.49) and user engagement (3.45) were positively received, showing broad acceptance across criteria. These results highlight that the CCMS is not only technically sound but also operationally relevant, supporting transparency, accountability, and compliance with Republic Act No. 11032 and NEA reporting requirements.

IV. OVERALL DISCUSSION

The evaluation of the CCMS with AI Segmentation demonstrates that the system achieved high ratings across both technical and user-centered criteria. IT Experts confirmed compliance with ISO/IEC 25010 standards, particularly in Security (3.86) and Compatibility (3.84), which highlight the system's robustness in safeguarding consumer data and integrating with cooperative infrastructure. Usability (3.83) also scored highly, underscoring the intuitive design and accessibility of the interface.

End-Users provided similarly strong ratings, with a grand mean of 3.53, interpreted as Excellent Quality. Their emphasis on Functional Suitability (3.54) and Usability (3.55) indicates that the CCMS effectively supports cooperative workflows and simplifies complaint handling. These findings confirm that the system is not only technically sound but also practical and user-friendly in real-world operations.

The Acceptability evaluation further reinforces these strengths, yielding a grand mean of 3.60, interpreted as Highly Acceptable. Users valued features such as transaction monitoring (3.69), ease of use (3.68), and record management efficiency (3.63). Even secondary features like audit trail support (3.49) and user engagement (3.45) were positively received, showing broad acceptance across diverse criteria.

Taken together, these results demonstrate that the CCMS achieved a balance between technical robustness and operational relevance. IT Experts validated its compliance with international software quality standards, while End-Users confirmed its effectiveness in daily cooperative operations. Acceptability ratings highlight strong user approval, particularly in efficiency, accessibility, and integration with cooperative workflows.

These outcomes are consistent with international literature emphasizing the importance of intelligent complaint categorization, centralized monitoring, and user-centered design in improving service delivery. By integrating AI segmentation, geotagging, and dashboards, the CCMS enhances transparency, accountability, and consumer trust. Limitations include connectivity challenges in rural areas and the need for user training to maximize adoption. Future improvements may involve expanding segmentation categories, predictive analytics, and multilingual support to further strengthen adaptability and scalability.

V. CONCLUSIONS AND RECOMMENDATIONS

The development of the Consumer Complaint Management System (CCMS) with AI Segmentation for Electric Cooperatives was successfully accomplished through the Agile Development Life Cycle, ensuring iterative refinement, stakeholder collaboration, and continuous validation. The system was designed to address persistent challenges in manual complaint handling, fragmented documentation, and limited accessibility, particularly in rural cooperative settings. By integrating mobile and web-based complaint submission, AI-driven segmentation, geotag-enabled reporting, workflow dashboards, and role-based access control, the CCMS provided a comprehensive solution that modernized complaint management processes and aligned with cooperative governance standards.

Evaluation results confirmed that the CCMS met both technical and user-centered expectations. IT Experts rated the system with a grand mean of 3.80, interpreted as Excellent Quality System, highlighting strengths in security, compatibility, and usability. End-Users likewise assessed the CCMS with a grand mean of 3.53, also interpreted as Excellent Quality, emphasizing functional suitability and usability. The Acceptability evaluation yielded a grand mean of 3.60, interpreted as Highly Acceptable, with users recognizing the system's efficiency in record management, transaction monitoring, and integration with cooperative infrastructure.

Collectively, these findings demonstrate that the CCMS achieved a balance between technical robustness and operational relevance. IT Experts validated its compliance with international software quality standards, while End-Users confirmed its practicality and usability in real-world cooperative operations. Acceptability ratings further reinforced strong user approval, particularly in efficiency, accessibility, and transparency. These outcomes are consistent with global studies emphasizing the importance of intelligent complaint categorization, centralized monitoring, and user-centered design in improving service delivery.

In summary, the CCMS represents a validated, standards-compliant solution that strengthens consumer trust, enhances accountability, and supports digital transformation initiatives in Philippine electric cooperatives.

Although the CCMS was successfully developed and attained excellent quality ratings, continuous enhancement is essential to ensure sustainability and adaptability. Future refinements should focus on expanding segmentation categories and integrating predictive analytics to strengthen decision-making capabilities. Incorporating standardized data exchange protocols such as HL7 or FHIR would improve interoperability and allow seamless integration with external systems. Reliability can be further enhanced through automated backup, recovery mechanisms, and stronger user

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error protection to minimize risks of data loss and downtime.

Equally important is the provision of regular training and orientation programs for cooperative personnel and Member-Consumer-Owners to ensure optimal utilization of system features and maximize adoption. Institutional policies should also be updated to support full deployment of the CCMS, ensuring alignment with Republic Act No. 11032 and NEA reporting requirements. Finally, future research may extend the system by integrating advanced analytics, multilingual support, or decision-support features, and by validating its scalability in other cooperative or utility settings.

REFERENCES

[1]. Abedin, M., & Sultana, R. (2020). Artificial intelligence in rural service management: Enhancing complaint handling through mobile technology. Journal of Digital Governance, 12(2), 55–68. https://scholar.google.com/scholar?q=Artificial+intelligence+in+rural+service+management+complaint+handling

[2]. Abdul-Hamid, H., Hassan, S., & Said, R. (2020). Artificial intelligence adoption and customer engagement in public service platforms. International Journal of Service Science, 11(3), 201–217. https://scholar.google.com/scholar?q=Artificial+intelligence+adoption+customer+engagement+public+service+platforms

[3]. Almeida, F., & Correia, A. (2021). Digital transformation and organizational performance: The role of information systems. Journal of Information Systems Management, 38(4), 310–322. https://scholar.google.com/scholar?q=Digital+transformation+organizational+performance+information+systems+Almeida+Correia

[4]. Alvarez, J. P. (2022). Digitalization challenges in Philippine electric cooperatives. Philippine Journal of Energy Policy, 7(2), 41–56. https://scholar.google.com/scholar?q=Digitalization+challenges+Philippine+electric+cooperatives

[5]. Azzam, R., Hassan, N., & Noor, M. (2021). Artificial intelligence-driven ticketing systems for public services. International Journal of Information Systems Innovation, 13(2), 66–81. https://scholar.google.com/scholar?q=AI+driven+ticketing+systems+public+services

[6]. Bautista, J., & Peralta, M. (2020). Digital transformation initiatives of Philippine electric cooperatives. Philippine Journal of Energy Studies, 18(1), 33–47. https://scholar.google.com/scholar?q=Digital+transformation+Philippine+electric+cooperatives+Bautista+Peralta

[7]. Bautista, L., & Ramos, D. (2023). Analytics-driven decision support systems in electric utilities. Journal of Utility Management and Technology, 15(1), 89–104. https://scholar.google.com/scholar?q=Analytics+driven+decision+support+electric+utilities

[8]. Chen, L., & Li, X. (2021). Automated complaint segmentation using machine learning techniques. Journal of Artificial Intelligence Applications, 10(4), 55–68. https://scholar.google.com/scholar?q=Automated+complaint+segmentation+machine+learning

[9]. Chen, L., Zhang, Y., & Wu, H. (2022). Natural language processing applications for consumer complaint analysis in smart energy systems. International Journal of Artificial Intelligence and Applications, 11(3), 102–118. https://scholar.google.com/scholar?q=NLP+consumer+complaint+analysis+smart+energy+systems

[10]. David, R., Flores, K., & San Juan, P. (2021). Digital complaint management systems: Bridging customer relations and technology in local government units. Journal of Philippine Information Systems, 10(2), 78–90. https://scholar.google.com/scholar?q=Digital+complaint+management+local+government+Philippines

[11]. DeLone, W. H., & McLean, E. R. (2016). Information systems success measurement. Foundations and Trends in Information Systems, 2(1), 1–116. https://scholar.google.com/scholar?q=DeLone+McLean+Information+Systems+Success+Model

[12]. Department of Information and Communications Technology (DICT). (2022). Philippine e-Government Master Plan 2022. DICT. https://www.dict.gov.ph

[13]. Department of Information and Communications Technology (DICT). (2023). Digital governance initiatives and innovation roadmap. DICT. https://www.dict.gov.ph

[14]. Elmasri, R., & Navathe, S. B. (2020). Fundamentals of database systems (7th ed.). Pearson. https://scholar.google.com/scholar?q=Elmasri+Navathe+Fundamentals+of+Database+Systems

[15]. Ferraiolo, D., Kuhn, D. R., & Chandramouli, R. (2022). Role-based access control (2nd ed.). Artech House. https://scholar.google.com/scholar?q=Ferraiolo+Role+Based+Access+Control

[16]. Gatchalian, R., & Llamas, M. (2022). Transparency and trust in digital public service platforms. Philippine Journal of Public Administration, 66(1), 97–114. https://scholar.google.com/scholar?q=Transparency+trust+digital+public+service+Philippines

[17]. Garcia, R., Mendoza, L., & Flores, C. (2021). Challenges in implementing digital complaint tracking among rural utilities. Energy Management Review, 16(3), 23–40. https://scholar.google.com/scholar?q=Digital+complaint+tracking+rural+utilities

[18]. Jurafsky, D., & Martin, J. H. (2023). Speech and language processing (3rd ed.). Pearson. https://scholar.google.com/scholar?q=Jurafsky+Martin+Speech+Language+Processing

[19]. Kumar, N., & Gupta, R. (2021). Using sentiment analysis for effective customer complaint triage in AI systems. Journal of Information and Decision Sciences, 13(4), 87–98. https://scholar.google.com/scholar?q=Sentiment+analysis+customer+complaint+triage

[20]. Kumar, R., & Singh, P. (2020). Dual-platform systems

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/26feb1447

for public service applications. International Journal of Computing and Digital Systems, 9(2), 145–156. https://scholar.google.com/scholar?q=Dual+platform+systems+public+service

[21]. Labrador, M., & Castillo, J. (2020). Accessibility barriers in public utility complaint reporting. Philippine Journal of Social Services, 12(1), 61–74. https://scholar.google.com/scholar?q=Accessibility+barriers+complaint+reporting+Philippines

[22]. Lee, S. (2021). Intelligent automation in customer service: Enhancing public utility responsiveness. Journal of Smart Systems and Technologies, 19(2), 112–128. https://scholar.google.com/scholar?q=Intelligent+automation+customer+service+public+utilities

[23]. Lewis, J. R., & Sauro, J. (2022). Quantifying the user experience (2nd ed.). Morgan Kaufmann. https://scholar.google.com/scholar?q=Lewis+Sauro+Quantifying+the+User+Experience

[24]. Mantaring, A. V., Espinoza, M. A. P., & Gabriel, A. G. (2021). Complaint management in public sector organizations in the Philippines. Philippine Journal of Public Administration, 65(1), 45–62. https://scholar.google.com/scholar?q=Complaint+management+public+sector+Philippines+Mantaring

[25]. Mehta, S. (2022). Artificial intelligence in power distribution complaint systems. Energy Informatics Journal, 5(1), 1–14. https://scholar.google.com/scholar?q=AI+power+distribution+complaint+systems

[26]. Müller, J., & Schneider, F. (2019). Integrating geotagging and predictive analytics in European consumer service platforms. European Journal of Technology and Society, 8(1), 73–88. https://scholar.google.com/scholar?q=Geotagging+predictive+analytics+consumer+service+platforms

[27]. National Electrification Administration (NEA). (2021–2023). EC modernization framework and annual reports. NEA. https://www.nea.gov.ph

[28]. National Privacy Commission. (2021). Data Privacy Act of 2012 IRR. NPC. https://privacy.gov.ph

[29]. Pressman, R. S., & Maxim, B. R. (2020). Software engineering: A practitioner's approach (9th ed.). McGraw-Hill Education. https://scholar.google.com/scholar?q=Pressman+Maxim+Software+Engineering

[30]. Putra, A., Wijaya, R., & Santoso, D. (2023). AI-based feedback systems in rural electric cooperatives. International Journal of Smart Infrastructure, 6(2), 55–70.https://scholar.google.com/scholar?q=AI+feedback+systems+rural+electric+cooperatives

[31]. Rahman, M., & Dey, T. (2023). Artificial intelligence in complaint handling and service automation. International Journal of Advanced Computer Science, 15(2), 77–92. https://scholar.google.com/scholar?q=AI+complaint+handling+service+automation

[32]. Richey, R. C., & Klein, J. D. (2019). Developmental research: Studies of instructional design and development. In Handbook of Research on Educational Communications and Technology. Springer. https://scholar.google.com/scholar?q=Richey+Klein+Developmental+Research

[33]. Sah, S., & Gregor, S. (2022). Intelligent triage systems for service management. Journal of Information Technology Theory and Application, 23(1), 41–58. https://scholar.google.com/scholar?q=Intelligent+triage+systems+service+management

[34]. Shneiderman, B., et al. (2021). Designing the user interface (6th ed.). Pearson. https://scholar.google.com/scholar?q=Shneiderman+Designing+the+User+InterfaceSommerville, I. (2021). Software engineering (10th ed.). Pearson. https://scholar.google.com/scholar?q=Sommerville+Software+Engineering

[35]. Venkatesh, V., Thong, J. Y. L., & Xu, X. (2012). Consumer acceptance and use of information technology. MIS Quarterly, 36(1), 157–178. https://scholar.google.com/scholar?q=UTAUT+Venkatesh

[36]. Whitman, M. E., & Mattord, H. J. (2021). Principles of information security (7th ed.). Cengage Learning. https://scholar.google.com/scholar?q=Whitman+Mattord+Information+Security

[37]. Zhang, X., Li, Q., & Zhou, M. (2021). User-centered AI systems. International Journal of Human–Computer Interaction, 37(8), 690–707. https://scholar.google.com/scholar?q=User+centered+AI+systems

[38]. Zhou, X., Li, Y., & Wang, H. (2021). Artificial intelligence applications in public service complaint management. Journal of E-Government Studies, 9(3), 101–118. https://scholar.google.com/scholar?q=AI+public+service+complaint+management