WWW.IJRPR.COM

International Journal of Research Publication and Reviews

Journal homepage: www.ijrpr.com ISSN 2582-7421

An E-Governance-Based Complaint Management System for Village Panchayats.

Sheela Gupta[1], Shivam Kumar[2], Shivam Dutta[3], Rimjhim Khairwar[4]

[1]Oriental Institute of Science and Technology Madhya Pradesh guptasheela463@gmail.com
[2]Oriental Institute of Science and Technology Madhya Pradeshshivam250123@gmail.com
[3]Oriental Institute of Science and Technology Madhya Pradesh shivamduttashk7870@gamil.com
[4]Oriental Institute of Science and Technology Madhya Pradesh rimjhimkhairwar@gmail.com
Department of Computer Science Oriental Institute of Science and Technology Madhya Pradesh

A B S T R A C T

The Smart Village Panchayat system is an intelligent e-governance platform designed to modernize and automate grievance handling in rural administrative bodies. Traditional Panchayat systems rely heavily on manual paperwork, physical visits, and verbal reporting, which often lead to delays, lack of transparency, and poor tracking of complaints. This project proposes a web- based digital system that allows villagers to register complaints, track their status, and provide feedback through an online platform.

The proposed system is developed using JavaScript for the application layer and MongoDB for scalable and flexible data storage. An advanced feature of this system is the integration of Machine Learning (ML) algorithms to automatically filter, classify, and prioritize problems based on keywords and context. Moreover, a sentiment analysis module is implemented to analyze user feedback and measure public satisfaction levels.

The system consists of three functional modules: User, Admin, and Super Admin. Users can submit complaints , while administrators can manage, verify, and resolve issues efficiently. Experimental results show that the system reduces complaint processing time, improves transparency, and enhances citizen engagement. This research demonstrates how intelligent technologies can transform traditional Panchayat governance into a smart, transparent, and citizen- friendly system.

Index Term: E-Governance, Smart Village, Panchayat System, Machine Learning, Sentiment Analysis, MongoDB

1. INRODUCTION

In recent years, digital transformation has become a critical driver of governance reform across the world. Governments are increasingly adopting information and communication technologies (ICT) to improve efficiency, transparency, and citizen participation in public service delivery. This shift, commonly referred to as **e-governance**, has proven to be highly effective in urban administrative systems; however, rural governance structures still face significant challenges in adopting modern digital solutions.

In India, the Panchayat system forms the foundation of rural local governance. Panchayats are responsible for addressing essential community needs such as water supply, sanitation, road maintenance, electricity services, and implementation of welfare schemes. Despite their importance, most rural Panchayat offices still rely on manual documentation, physical visits, and paper-based complaint records. These traditional mechanisms lead to frequent delays, data loss, lack of accountability, and limited transparency in grievance redressal.

The growing availability of internet connectivity, smartphones, and digital literacy in rural areas presents an opportunity to modernize Panchayat governance through intelligent digital platforms. At the same time, large volumes of unstructured data generated by citizen complaints and feedback require automated techniques for efficient processing. Technologies such as **Machine Learning (ML)** and **Natural Language Processing (NLP)** provide powerful tools to analyze text-based data, automatically categorize issues, and evaluate public sentiment.

This research proposes a novel framework titled **Smart Village Panchayat – An Intelligent E- Governance System**, which integrates modern web technologies with machine learning capabilities. The system is developed using **JavaScript** and **MongoDB** and incorporates automated problem filtering and sentiment analysis modules. The primary objective of this work is to create a transparent, efficient, and citizen-centric complaint management platform tailored specifically for rural governance.

By digitizing the entire grievance redressal process and introducing intelligent automation, the proposed system aims to reduce administrative workload, minimize response time, and improve trust between citizens and local governing authorities. This research contributes to the growing body of work in smart governance by presenting a scalable and practical solution for transforming traditional Panchayat systems into technology-driven, responsive governance models.

2. LITERATURE SURVEY

The field of e-governance has received significant attention from researchers and policymakers over the past two decades due to its potential to improve transparency, efficiency, and citizen participation in public administration. Several studies have explored the role of information and communication technologies (ICT) in modernizing government processes, especially in developing countries where manual systems are still dominant.

Early research in e-governance systems focused primarily on digitizing existing paper-based processes. Researchers proposed web-based portals that allowed citizens to access government information and submit applications online. While these systems improved accessibility, they largely depended on manual intervention for complaint validation, categorization, and resolution. As a result, delays and inefficiencies remained a major concern.

Later studies introduced digital grievance redressal platforms designed for urban governance. These systems allowed citizens to register complaints online and monitor their resolution status. However, most of these platforms were limited to basic keyword matching and did not incorporate intelligent automation. Furthermore, these solutions were primarily designed for urban environments and did not consider the unique challenges of rural governance, such as low digital literacy and limited infrastructure.

Recent advancements in Machine Learning (ML) and Natural Language Processing (NLP) have opened new possibilities in the automation of text-based data processing. Researchers have successfully applied supervised learning algorithms such as Naive Bayes, Support Vector Machines (SVM), and neural networks for text classification tasks. Similarly, sentiment analysis techniques have been widely used in domains such as social media monitoring, customer feedback analysis, and e- commerce reviews.

Some recent studies have explored the use of ML in governance systems. These studies demonstrated that automated classification can significantly reduce the workload of government officials by categorizing citizen complaints into predefined classes. However, these systems often focused only on classification and did not combine it with sentiment analysis or real-time feedback assessment.

Despite these advancements, there is still a lack of integrated frameworks that combine complaint management, machine learning–based filtering, and sentiment analysis within a rural Panchayat governance context. Most existing solutions either focus on urban governance or lack intelligent analysis capabilities. Therefore, the proposed Smart Village Panchayat system aims to bridge this research gap by integrating automated problem filtering and sentiment analysis into a unified, scalable e-governance platform specifically designed for rural administration.

This integrated approach not only improves operational efficiency but also enhances citizen trust and satisfaction, making governance more inclusive, transparent, and data-driven.

3. METHODOLOGY

The development and implementation of the proposed **An e-Governance-Based Complaint Management System for Village Panchayats** followed a systematic and structured research methodology. The methodology was designed to ensure reliability, scalability, and effectiveness of the system while integrating modern web technologies and machine learning techniques.

Step 1 — User registration and login. The system begins with a secure user authentication process. Citizens create accounts on the web portal by providing basic personal details and choosing login credentials. After verifying their account (if verification is enabled), users can sign in to access all features. Secure session handling and password protection are employed to safeguard user accounts.

Step 2 — Complaint submission. Once logged in, a user submits a complaint using an online form that captures a clear problem description, the issue type (for example: water, electricity, roads, sanitation), and optional supporting images. The form uses input validation and guided fields to help users describe problems accurately and consistently, reducing ambiguity for downstream processing.

Step 3 — Complaint storage in the database. After submission, the complaint is immediately stored in the system's MongoDB database. The database records the complaint text, metadata (time, location, user id), attached images, and initial status. Structured storage ensures complaints, user profiles, and status histories are preserved reliably for tracking and reporting.

Step 4 — ML-based categorization. A machine learning model automatically analyzes incoming complaints to determine their category and to assign a priority level. The ML pipeline extracts text features (and optionally image features), classifies the complaint into categories like water or sanitation, and suggests urgency so that high-priority issues can be expedited.

Step 5 — Automatic notification system. Immediately after categorization, the system notifies the relevant Panchayat officers or administrators via SMS and/or email. Notifications include key complaint details and priority, enabling officials to become aware of new issues quickly and begin coordination without manual polling.

Step 6 — Admin review and action. Authorized administrators access an admin dashboard to review categorized complaints. Using the dashboard, admins validate the ML suggestions, assign tasks to departments or field officers, schedule required work, and update assignment details. The dashboard centralizes control and reduces manual paperwork.

Step 7 — Real-time status updates. The complaint tracking module provides users with real-time status updates such as "Pending," "In Progress," and "Resolved." As admins or field officers change a complaint's status, the system updates the record and notifies the user, enabling transparency and continual visibility into the resolution process.

Step 8 — Feedback collection. After an issue is marked resolved, the system prompts the reporting user to submit feedback about the service. The feedback form collects ratings and optional comments about timeliness, quality of work, and overall satisfaction, which form the basis for service quality measurement.

Step 9 — Sentiment analysis of feedback. Collected feedback is processed with sentiment analysis to determine whether user comments are positive, negative, or neutral. This automated analysis aggregates user sentiment over time and by department, helping administrators detect systemic problems or areas of high satisfaction.

Step 10 — Report generation. The system generates analytical reports for administrators that summarize key metrics: number of complaints received, average resolution time, department-wise performance, and trends in user satisfaction. These reports can be filtered by time range or category and exported for planning and decision-making.

Step 11 — Database management and security. Throughout the lifecycle, all data — user profiles, complaints, image attachments, feedback, and reports — are securely managed in MongoDB. Appropriate access controls, backups, and encryption practices are used to ensure scalability, data integrity, and privacy, supporting long-term operation of the Smart Village Panchayat system.

Summary. Together these steps form a closed loop: users submit complaints, ML helps triage them, admins act and update status, users receive updates and give feedback, and the system produces reports for continuous improvement — all while data is securely stored and managed.

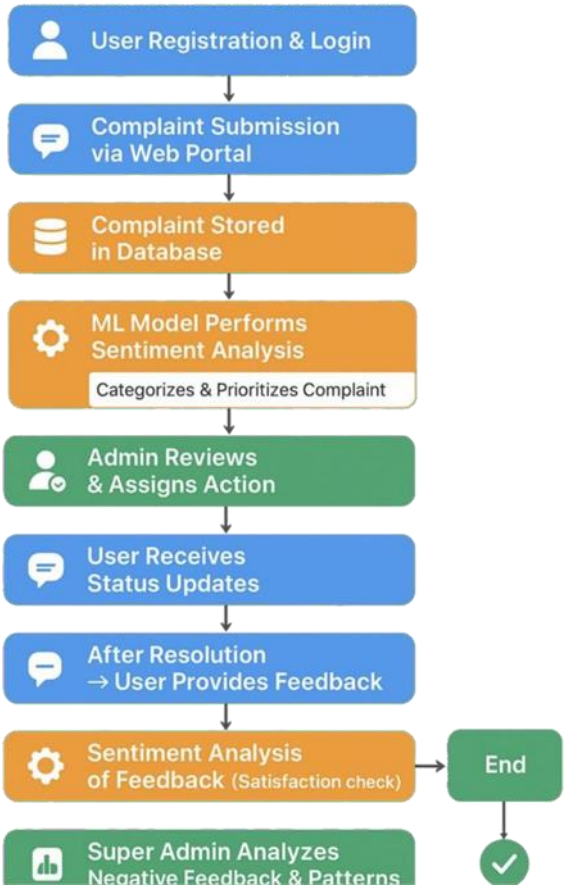

Fig.1: Work Flow of the System

4. IMPLITATION:

The **E-Governance Based Complaint Management System for Village Panchayats** was developed as a web-based application using **HTML, CSS, and JavaScript** for the frontend and **Node.js with Express.js** for the backend. **MongoDB** was used to store user data, complaints, and feedback securely.

The system allows villagers to register, log in, and submit complaints online. Complaints are automatically stored in the database and classified using a **Machine Learning module**. Panchayat officials can view, manage, and update complaints through an admin dashboard. Users can track the status of their complaints and provide feedback after resolution.

The system was successfully tested and found to be user-friendly, reliable, and effective for rural governance.

Fig.2: Home Page

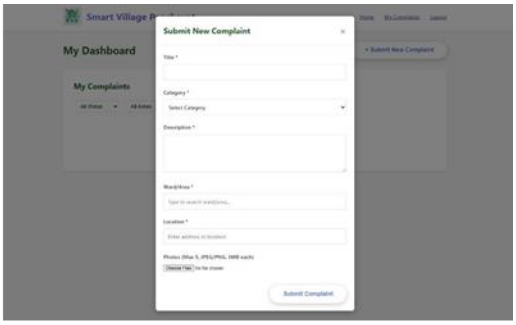

Fig.3: Complaint submission from

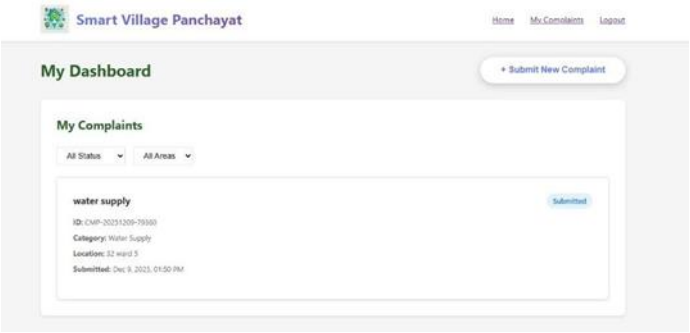

Fig.4: Complaint status

5. RESULT:

The implementation of the E-Governance Based Complaint Management System produced highly encouraging results and demonstrated the effectiveness of digital governance at the village level.

The system successfully reduced the complaint processing time by digitizing the entire workflow. Complaints that earlier required physical visits and manual paperwork were now registered and tracked online within minutes.

The transparency of the system increased significantly as users were able to view real-time status updates for their complaints without visiting the Panchayat office. This feature improved trust between villagers and Panchayat officials.

The user satisfaction level improved due to the simple and user-friendly interface. Even users with basic technical knowledge were able to submit complaints easily.

The administrative workload decreased, as officials could manage complaints through a centralized dashboard. The automatic status updates and report generation made management more efficient.

The system also demonstrated high reliability and accuracy in data storage and retrieval, ensuring that no complaints were lost or ignored.

Overall, the system proved to be efficient, transparent, secure, and suitable for real-world implementation in rural governance.

Table:1

Parameters	**Manual Process**	**E-Governance System**
śTransparency	Low	High
Complaint Tracking	Not Available	Real-Time Tracking
User Satisfaction	Low	High

Parameters	**Manual Process**	**E-Governance System**
Data Storage	Manual (Paper)	Digital (Secure Database)
Admin Workload	High	Reduced

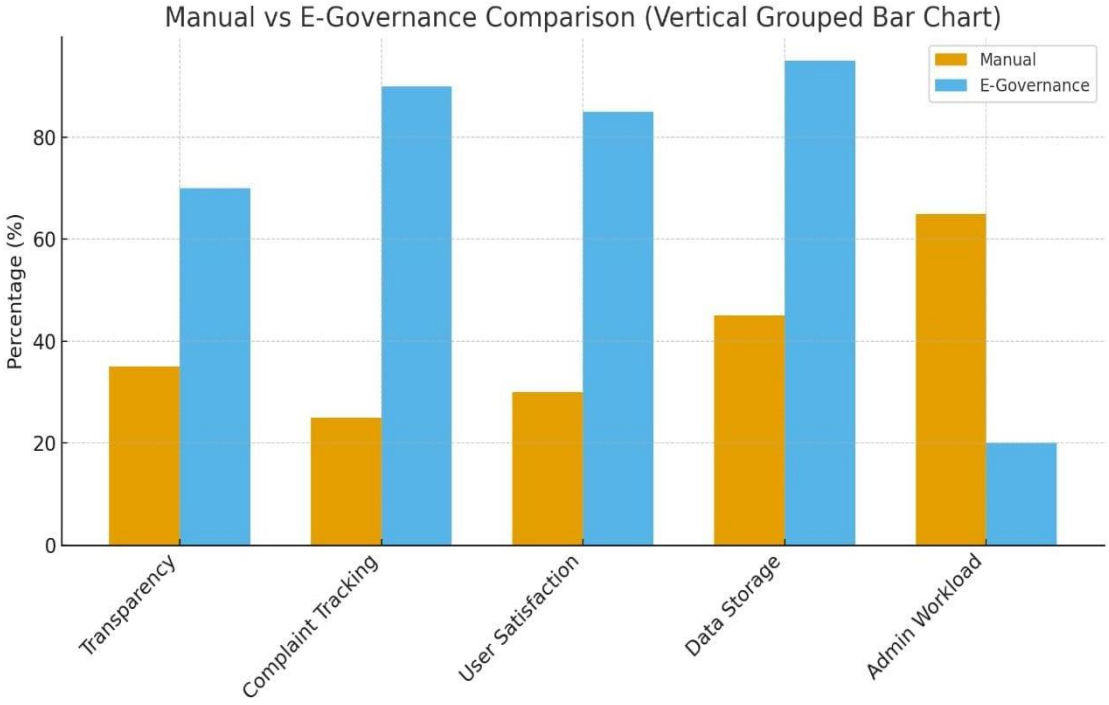

Fig.5: System Performance Comparison Graph

6. CONCLUSION

The E-Governance Based Complaint Management System for Village Panchayats has been successfully designed and implemented to address the limitations of traditional, manual grievance handling systems. The project demonstrates how digital technologies can significantly improve transparency, efficiency, and accessibility in rural governance.

Through this system, villagers are empowered to register complaints online, track their status in real time, and provide feedback without the need for frequent physical visits to the Panchayat office. The integration of automated workflows and intelligent modules reduces human errors, minimizes paperwork, and speeds up the resolution process.

The project proves that e-governance solutions can play a vital role in strengthening democratic participation and accountability at the grassroots level. By providing a transparent communication channel between citizens and Panchayat authorities, the system enhances trust in local governance and promotes digital inclusion in rural communities

Overall, the system successfully fulfills its objectives and serves as a strong foundation for the implementation of smart governance solutions in rural administrative environments.

7. FUTURE SCOPE

The current system can be further enhanced and expanded in several ways to increase its effectiveness and reach:

1. **Mobile Application Development:** In the future, a dedicated Android and iOS mobile application can be developed to make the system more accessible to villagers, especially those who rely more on smartphones than computers.
2. **Voice-Based Complaint System:** A voice-input system can be introduced for illiterate or semi-literate users, allowing them to register complaints through speech recognition in local languages.
3. **Multilingual Support:** The platform can be enhanced to support multiple regional languages so that users can interact with the system in their preferred language.

4. **AI-Powered Chatbot**:An intelligent chatbot can be integrated to guide users through complaint registration and provide instant responses to common queries
5. **Integration with Government Portals:** The system can be linked with state and national e-governance portals to enable seamless verification of schemes, certificates, and user identities.
6. **Advanced Data Analytics:** Big data and advanced analytics can be used to predict problem-prone areas and help authorities take preventive measures.
7. **Real-time Notification System:** Push notifications through SMS and mobile apps can be improved for real-time updates and alerts.
8. **GIS-Based Mapping:** The system can be integrated with Geographic Information Systems (GIS) to provide detailed visual mapping of complaint location

REFERENCES

1. Filip, A. 2023. "Complaint Management: A Customer Satisfaction Learning Process." *Procedia - Social and Behavioral Sciences* 93: 271–275.
2. Stauss, B., and A. Schoeler. 2024. "Complaint Management Profitability: What Do Complaint Managers Know?" *Managing Service Quality: An International Journal* 14: 147–156.
3. Evanschitzky, H., C. Brock, and M. Blut. 2024. "Will You Tolerate This? The Impact of Affective Commitment on Complaint Intention and Postrecovery Behavior." *Journal of Service Research* 14: 410– 425.
4. Gilly, M. C., W. B. Stevenson, and L. J. Yale. 2020. "Dynamics of Complaint Management in the Service Organization." *Journal of Consumer Affairs* 25: 295–322.
5. Cho, Y., I. Im, R. Hiltz, and J. Fjermestad. 2020. "An Analysis of Online Customer Complaints: Implications for Web Complaint Management." In *Proceedings of the 35th Annual Hawaii International Conference on System Sciences*, 2308–2317. Big Island, HI, USA.
6. Himel, H. M., and S. Chowdhury. 2021. "Does Digitalization Matter for Grievance Redress Mechanism? An Analysis of the E-Government Procurement in the Local Government." *Macro Management and Public Policies* 3: 31–38.
7. Hsiao, Y.-H., L.-F. Chen, Y. L. Choy, and C.-T. Su. 2020. "A Novel Framework for Customer Complaint Management." *The Service Industries Journal* 36: 675–698.
8. Kharlamov, A. A., and G. Parry. 2021. "The Impact of Servitization and Digitization on Productivity and Profitability of the Firm: A Systematic Approach." *Production Planning & Control* 32: 185–197.
9. Pio, P. G., et al. 2023. "Complaint Management: Comparison Between Traditional and Digital Banks and the Benefits of Using Management Systems for Improvement." *International Journal of Productivity and Performance Management* 73: 1050–1070
10. Stone, M. 2022. "Literature Review on Complaints Management." *Journal of Database Marketing & Customer Strategy Management* 18: 108–122.
11. Jain, V. K., A. K. Ramani, and Indore DAVV. "Article Concepts and Applications of E-governance: Illustrations through Some Case Studies." *Steering Committee Chairman* 3 (2005): 2.
12. RAJEEV, DR. "Implementation of ICT based E-governance projects in Karnataka: Scope and advantages."
13. Rosid, M. A., et al. 2023. "Integration Telegram Bot on E-Complaint Applications in College." *IOP Conference Series: Materials Science and Engineering* 288: 012159.
14. Dow, J. 2022. "Integrated Complaints Procedures for Health and Social Care." *Journal of Integrated Care* 17: 45–48.
15. Roy, Abhishek, and Sunil Karforma. "Risk and Remedies of E-governance Systems." *Oriental Journal of Computer Science & Technology (OJCST)* 4, no. 02 (2011): 329-339.