



CUSTOMER COMPLAINT TRACKING SYSTEM

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Abstract: Customer complaints provide valuable information about problems in products, services, delivery, support, and customer experience. However, organizations often receive a large number of complaints through websites, email, social media, call centers, and mobile applications, making manual processing slow and difficult to manage. A customer complaint tracking system can improve this process by automatically collecting, classifying, prioritizing, routing, monitoring, and resolving complaints. This paper presents a review of recent approaches based on Natural Language Processing (NLP), Machine Learning (ML), Deep Learning (DL), sentiment analysis, topic modelling, and transformer-based models for intelligent complaint management. NLP techniques can convert unstructured complaint text into useful information, while machine learning algorithms can classify complaints according to category, urgency, department, or severity. Sentiment analysis can identify customer emotions and support priority assignment, whereas automated routing can forward complaints to the appropriate department. Recent research has also explored BERT and AI-enabled complaint-handling systems. The review identifies important research gaps related to multilingual complaints, limited labelled datasets, explainability, privacy, real-time tracking, integration with existing business systems, and human-AI collaboration. Future systems should combine NLP, explainable AI, large language models, sentiment analysis, automated escalation, and real-time dashboards to provide faster and more transparent complaint resolution.

Keywords: Customer Complaint Tracking, Complaint Management, Natural Language Processing, Machine Learning, Sentiment Analysis, Text Classification, BERT, Topic Modelling, Automated Routing, Customer Service.

I. INTRODUCTION

Customer complaints are an important source of information for organizations because they reveal weaknesses in products, services, delivery processes, customer support, and business operations. A complaint can indicate dissatisfaction, but it can also provide an opportunity for an organization to identify recurring problems and improve its services.

Traditional complaint-management systems generally depend on employees to read complaints, determine their category, assign them to the appropriate department, monitor their status, and communicate the resolution to the customer. When the number of complaints is large, manual processing can result in delayed responses, incorrect categorization, duplicate complaints, and unresolved cases.

The increasing availability of digital customer interactions has created large volumes of unstructured text. Complaints can contain informal language, abbreviations, emotional expressions, spelling errors, and domain-specific terminology. NLP provides methods for processing this unstructured information and extracting useful information automatically. Recent research identifies NLP and text analytics as important technologies for customer-service automation, including complaint categorization, sentiment analysis, topic discovery, and automated responses.

Machine learning can be used to classify complaints into predefined categories such as billing, delivery, refund, product quality, technical support, or service quality. Algorithms such as Logistic Regression, Support Vector Machine, Random Forest, Naïve Bayes, and neural networks can learn classification patterns from previously labelled complaints.

Deep learning and transformer-based models provide more advanced language understanding. For example, BERT-based models can capture contextual relationships between words and have been applied to automatic complaint classification. A 2025 telecom study reported **92.5% accuracy** using a transformer-based approach on a 6,000-record dataset containing six complaint categories.



Sentiment analysis is another important component of a complaint tracking system. It can identify whether a complaint expresses negative, neutral, or positive sentiment and can help determine complaint urgency. Research has also combined sentiment analysis with statistical process control to monitor customer complaints and identify changes in service quality.

A complete intelligent complaint tracking system can therefore be designed as a pipeline:

Complaint Collection → Text Preprocessing → Classification → Sentiment Analysis → Priority Assignment → Department Routing → Status Tracking → Escalation → Resolution → Customer Feedback

The objective of this paper is to review recent developments in intelligent customer complaint management and identify the technologies and research directions required for developing an effective automated complaint tracking system. A Customer Complaint Tracking System provides a centralized platform for managing these activities. Customers can register, log in, submit complaints, receive a complaint ID, and monitor the status of their complaints. Administrators and customer-service staff can access complaint details, assign complaints, update their status, and record resolution information. The system therefore provides a systematic connection between customers and the organization throughout the complaint-resolution process.

The proposed system also maintains complaint records in a structured database. Important information such as customer details, complaint description, product or service information, submission date, assigned staff, complaint status, resolution details, and feedback can be maintained for future reference. This centralized approach can reduce paperwork and provide easier access to complaint information.

II.EXISTING SYSTEM

The existing complaint-management process in many organizations is based on manual communication and separate record-maintenance methods. Customers may contact an organization through phone calls, email, social media, websites, or directly through customer-service personnel. Employees receive the complaint and manually record the information before forwarding it to the appropriate department.

In this type of system, customers may not have direct access to the current status of their complaints. They may need to contact customer-service representatives repeatedly to obtain updates. When many complaints are received simultaneously, employees may find it difficult to identify pending complaints and ensure that every complaint receives an appropriate response.

Another limitation is the lack of centralized information. Complaint details may be stored in different files, registers, emails, or spreadsheets. Searching for previous complaints can therefore consume time. Manual systems can also make it difficult to generate reports regarding complaint categories, pending cases, resolved cases, and department performance.

The existing approach is particularly difficult to manage when complaint volume increases. Incorrect categorization or assignment may cause additional delays, while incomplete records can make it difficult to determine the actions already taken on a complaint. These limitations create the need for a centralized complaint tracking system.

III.PROPOSED SYSTEM

The proposed Customer Complaint Tracking System is designed to provide a centralized and organized platform for complaint registration and resolution. The system allows customers to create an account and securely log in before submitting complaints. During complaint submission, customers can provide relevant details about the product or service and clearly describe the problem they experienced.

After a complaint is submitted, the system generates a unique complaint ID. This ID helps customers identify and track their complaints. The complaint is stored in the database and becomes available to authorized administrators or customer-service personnel for review. The responsible staff member can examine the complaint and take the necessary action.

The system maintains different stages of complaint processing, such as submitted, under review, in progress, resolved, and closed. Updating the status at each stage provides customers with clear information about the progress of their complaints. Administrators can also monitor complaints that remain pending and take appropriate action when necessary.



The proposed system reduces dependence on manual record keeping and provides a structured method for maintaining complaint information. It can also support reports and dashboards that help administrators understand complaint volumes and resolution activities.

IV. LITERATURE SURVEY

Kim and Lim (2021) Kim and Lim proposed an integrated approach for monitoring customer complaints using customer review data. The study combined **sentiment analysis and statistical process control** to identify complaint patterns and changes in service quality. Customer reviews were treated as a source of customer feedback and analyzed to identify negative opinions and potential service problems. The approach demonstrated how customer-generated text can be transformed into useful information for continuous service-quality monitoring. The study is particularly relevant to complaint tracking because it moves beyond simply classifying complaints and focuses on identifying changes in complaint patterns over time..

Inference: Sentiment analysis combined with monitoring techniques can help organizations detect emerging customer problems earlier.

Gupta et al. (2021) Gupta et al. developed **RailNeural**, a neural-network-based system for categorizing railway complaints. Indian Railways receives complaints through several channels, and manual classification can delay resolution. The proposed system automatically categorized complaints into multiple classes using neural networks. The study demonstrated the usefulness of machine learning for handling large volumes of service complaints and supporting faster complaint redressal.

Inference: Neural networks can automate complaint categorization and reduce the workload associated with manual complaint processing.

Bozyiğit, Doğan, and Kılınç (2022) The authors investigated customer complaint categorization in the **food industry** using machine learning. A significant contribution of the study was its focus on complaints written in **Turkish**, addressing the limitation that many NLP studies focus primarily on English. Complaint texts were classified according to product-related problems using machine learning techniques. The study demonstrated the importance of domain-specific and multilingual complaint datasets for developing practical complaint-management systems.

Inference: Multilingual and domain-specific NLP models are important for real-world complaint management.

Koruyan (2022) Koruyan investigated the use of **BERTopic** for classifying customer complaints. Complaints submitted to a consumer electronics retailer during 2020 were analyzed to identify major complaint topics. Dynamic topic modelling was also used to examine how complaint topics changed over time. The approach provides organizations with an automated method for discovering common problems without requiring every complaint to be manually categorized.

Inference: Topic modelling can reveal hidden complaint categories and changing customer concerns.

Koruyan and Ekeryilmaz (2022) Koruyan and Ekeryilmaz developed a machine learning approach for classifying customer complaints collected from an online complaint platform. The study focused on complaints related to consumer electronics and created four categories: **return/exchange and refund, delivery/shipping, customer relations/services, and warranty/service**. Logistic Regression, Linear Support Vector Machines, and Stochastic Gradient Descent were evaluated. Logistic Regression achieved approximately **80% accuracy**.

Inference: Traditional machine learning models can effectively categorize large collections of customer complaints when suitable complaint categories are defined.

Blümel and Zaki (2022) Blümel and Zaki investigated NLP techniques for automatically **prioritizing customer complaints**. The study compared classical and deep-learning-based approaches and examined feature representations such as **Term Frequency, TF-IDF, and Word2Vec**. The objective was to identify complaints that require greater attention from customer-service agents. This work is particularly relevant to tracking systems because classification alone does not determine which complaint should be handled first.

Inference: Complaint prioritization can improve resource allocation and help organizations handle urgent complaints more efficiently.

Banga and Peddireddy (2023) Banga and Peddireddy proposed an **AI-based customer complaint management system** that uses NLP to understand and classify customer complaints. The system was designed to identify common complaint patterns, provide appropriate responses, and generate suggestions for improving products and services. The



research demonstrates how complaint classification can be integrated with automated response generation rather than treating classification as the final stage.

Inference: AI can support an end-to-end complaint-management process by combining classification, analysis, and response generation.

Shah et al. (2023) Shah et al. reviewed the application of **NLP in contact-centre automation**. The review examined how NLP can support customer-service activities such as interpreting customer interactions, categorizing incoming messages, analysing conversations, and generating responses. The study highlights the importance of NLP for managing the large volumes of text generated by customer-service operations.

Inference: NLP provides a broad technological foundation for automating different stages of customer complaint management.

NLP for Online Customer Reviews (2024) A comprehensive survey reviewed **154 publications** on NLP-based analysis of online customer reviews. The study categorized applications into sentiment analysis, review management, customer experience, user profiling, and marketing/reputation management. It identified BERT, LSTM, and ensemble models as important recent approaches. The review also highlighted challenges involving datasets, language understanding, and future NLP research.

Inference: Modern complaint systems can benefit from advanced contextual language models rather than relying only on traditional keyword-based methods.

Kiwa and Muduva (2024) Kiwa and Muduva developed a **BERT-based complaint classification model** for ZB Bank in Zimbabwe. The study collected customer complaints, performed text preprocessing, and trained a BERT model using an 80:20 training-test split. The model achieved approximately **88% accuracy** and was designed to improve the speed and consistency of complaint classification.

Inference: BERT can provide effective contextual complaint classification for financial-service applications.

Lamir et al. / Machine Learning Complaint Prediction (2023) A machine learning study analyzed consumer complaints using data from the **Consumer Financial Protection Bureau (CFPB)**. Logistic Regression and Support Vector Machine were used to predict and analyze complaint patterns across different time periods. The study found that SVM produced the strongest results for a one-month dataset, while Logistic Regression performed better for a three-month dataset.

Inference: Machine learning can be used not only to classify complaints but also to identify complaint trends over different time periods.

Alyahya, Agag, and Abdelwahab (2026) Alyahya et al. investigated an **AI-enabled complaint-handling system** implemented by a large UK omnichannel retailer. The system automated complaint triage, routing, and structured process updates. The study examined customer recommendation, perceived provider competence, and complaint emotional intensity. This research is particularly relevant to complaint tracking because it considers AI throughout the complaint-handling workflow rather than only classification.

Inference: AI-enabled triage, routing, and process tracking can transform complaint management from a reactive process into a more structured and proactive system.

Zhao, Song, and Cai (2026) Zhao et al. examined whether customer complaints should be handled by AI agents or human agents. Across four experiments, the researchers compared AI and human responses under different complaint-response conditions. The results showed that the effectiveness of AI and human agents depends on the type of response and complaint situation. Human-delivered apologies produced better recovery outcomes in the studied conditions, while AI-delivered denials performed better in certain conditions.

Inference: A practical complaint tracking system should support **human-AI collaboration** rather than automatically replacing human agents.

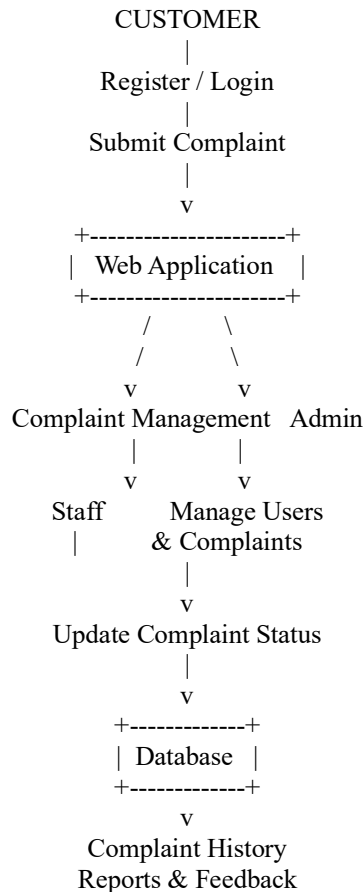
Khlaf (2026) Khlaf proposed an automated complaint analysis and classification system called **Triago**. The system uses NLP and machine learning to automate complaint intake, text cleaning, classification, and sentiment-based priority assignment. The proposed architecture uses technologies including Scikit-learn, TensorFlow, PyTorch, NLTK, and spaCy, with PostgreSQL for data management.

Inference: Combining complaint classification with sentiment-based priority assignment provides a practical foundation for an automated complaint tracking platform.

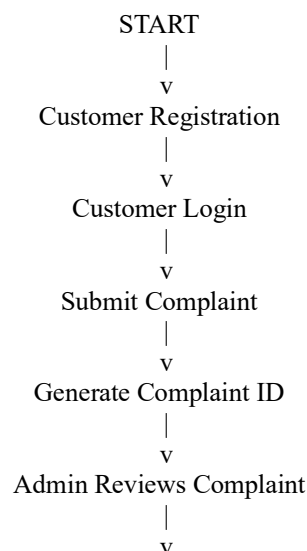


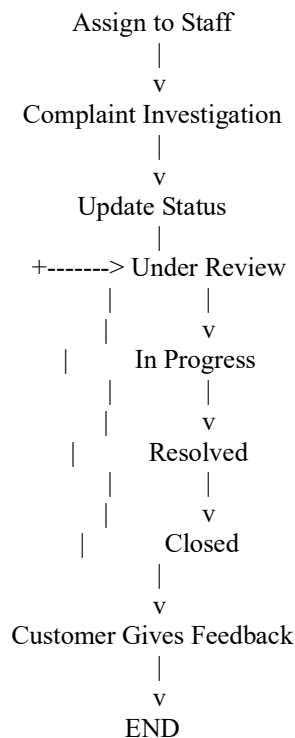
Telecom Complaint Classification (2025) A 2025 IEEE study investigated automatic customer complaint classification in telecommunications using a **6,000-record dataset containing six complaint categories**. The study compared traditional machine learning, BiLSTM, and BERT-based transformer models. The transformer approach achieved **92.5% accuracy** and demonstrated production-level inference speed of approximately 12 milliseconds.

Inference: Transformer-based models can provide accurate and fast complaint classification suitable for real-time customer-service applications.



Img-1





Img-2

V.RESEARCH GAP

The literature indicates several important research gaps in intelligent customer complaint management. Many existing studies primarily focus on complaint classification, while providing limited support for real-time tracking of the complete complaint lifecycle, from submission to final resolution. In addition, classification, sentiment analysis, complaint routing, escalation, and resolution are often developed as separate components rather than being integrated into a unified system. Multilingual support also remains a significant limitation, as many advanced NLP systems are designed mainly for English, while complaints expressed in regional and morphologically rich languages are comparatively underrepresented. Another major challenge is the limited availability of high-quality labelled datasets, particularly datasets containing reliable complaint categories and priority levels.

Explainability and human-AI interaction are also important research gaps. Deep learning and transformer-based models can provide accurate predictions but may not sufficiently explain why a particular complaint was assigned a specific category or priority. This lack of transparency can make it difficult for administrators to trust and verify automated decisions. Furthermore, fully automated systems may not be appropriate for emotionally sensitive, complex, or exceptional complaints that require human intervention. Privacy and security are additional concerns because customer complaints may contain personal information, financial details, account information, and other sensitive data. Therefore, intelligent complaint management systems need appropriate mechanisms for protecting customer information while maintaining useful automated analysis.

Another significant gap is that existing research concentrates mainly on complaint classification rather than resolution-time prediction and resolution strategy recommendation. The automatic detection of duplicate complaints is also relatively underexplored, even though multiple customers may submit complaints related to the same underlying problem. In addition, practical integration with business systems, such as CRM platforms, help-desk applications, email services, databases, and notification systems, remains challenging. These gaps highlight the need for an integrated, secure, explainable, multilingual, and intelligent customer complaint tracking and resolution system capable of supporting the complete complaint management process from submission and classification to routing, resolution, and closure.

Furthermore, many complaint management approaches emphasize advanced analytical techniques, while less attention may be given to the development of a practical, lightweight system suitable for organizations that require basic complaint registration and tracking. The proposed Customer Complaint Tracking System addresses this gap by



concentrating on essential functions such as customer registration, complaint submission, unique complaint identification, status tracking, staff assignment, resolution recording, feedback collection, and report generation. The system provides a structured and centralized approach that can reduce manual record keeping and improve transparency in the complaint-handling process.

V. CHALLENGING ISSUES

- **Unstructured Text:** Customers may use spelling mistakes, abbreviations, slang, mixed languages, and informal expressions, making automated interpretation difficult.
- **Sentiment and Emotion:** A complaint may contain strong emotions such as anger, frustration, or urgency. Correctly identifying these emotions is challenging.
- **Complaint Priority:** Not every complaint requires the same response time. A system must distinguish normal, urgent, and critical complaints.
- **Classification Errors:** Incorrect classification can route a complaint to the wrong department and increase resolution time.
- **Data Privacy:** Complaint data may contain names, phone numbers, addresses, transaction information, and other private details.
- **Model Explainability:** Organizations need to understand why an AI system classified a complaint as high priority or assigned it to a particular department.
- **Multilingual Complaints:** Customers may communicate using multiple languages within the same complaint, creating additional NLP challenges.
- **Human Intervention:** Complex complaints often require human judgment, empathy, negotiation, or managerial intervention.

VI. MOTIVATION

Organizations receive thousands of complaints through multiple channels every day. Manual processing requires significant time and human resources and can lead to inconsistent categorization and delayed responses.

The motivation for developing an intelligent customer complaint tracking system is to automate repetitive complaint-management tasks while maintaining human control over complex cases. NLP can understand complaint text, machine learning can classify the complaint, sentiment analysis can determine emotional intensity, and automated routing can assign the complaint to the appropriate department.

A centralized tracking system can also provide customers with complaint IDs, status updates, expected resolution dates, and notifications. For organizations, dashboards can provide information about complaint volume, frequently reported problems, department performance, unresolved cases, and customer satisfaction. The primary motivation for developing the Customer Complaint Tracking System is the need for an organized and efficient method of handling increasing numbers of customer complaints. Manual complaint processing can consume significant time and may result in inconsistent records and delayed responses.

A centralized system provides customers with a convenient method for submitting complaints and tracking their progress. For organizations, it provides a structured method for assigning, monitoring, resolving, and recording complaints.

The system can also provide administrators with information about complaint volumes, frequently reported problems, unresolved cases, and customer feedback. Such information can help organizations understand recurring problems and improve their service processes.

VII. SCOPE OF THE STUDY

The scope of this study is to develop a Smart Customer Complaint Tracking and Resolution System using Natural Language Processing (NLP) and Machine Intelligence (MI). The proposed system focuses on automating the collection, analysis, classification, prioritization, routing, tracking, and resolution of customer complaints. NLP techniques are used to process complaint text and extract meaningful information, while machine learning methods are applied for complaint classification, sentiment analysis, priority prediction, and duplicate complaint detection.



The system provides a customer interface through which users can submit complaints, receive a unique complaint ID, track complaint status, and provide feedback after resolution. For administrators and service personnel, the system supports automatic department assignment, complaint status management, escalation of unresolved complaints, and resolution tracking. An administrator dashboard can provide analytical information such as complaint categories, pending and resolved complaints, department-wise performance, priority distribution, and complaint trends.

The study also considers the applicability of the proposed system across different service sectors, including banking, telecommunications, e-commerce, healthcare, education, transportation, hospitality, insurance, government services, and utilities. The system aims to improve complaint-handling efficiency, reduce manual processing, support faster routing and resolution, and provide better visibility into recurring customer issues. Future extensions may include multilingual complaint processing, explainable AI, integration with CRM and help-desk platforms, advanced resolution-time prediction, and stronger privacy and security mechanisms.

VIII. APPLICATIONS OF CUSTOMER COMPLAINT TRACKING SYSTEM

Banking and Finance – Handles complaints related to transactions, payments, accounts, loans, and online banking.

- Telecommunications – Tracks complaints regarding network problems, billing, connectivity, and service interruptions.
- E-Commerce – Manages complaints related to product quality, delivery delays, returns, refunds, and payments.
- Healthcare and Education – Supports complaints about appointments, services, facilities, academic activities, examinations, and administration.
- Transportation and Hospitality – Tracks issues related to ticketing, delays, bookings, hotels, restaurants, and customer services.
- Insurance and Government Services – Manages insurance claims, policy-related complaints, citizen grievances, and public-service requests.
- Utility Services – Handles complaints related to electricity, water supply, internet services, and other essential utilities.
- AI-Based Complaint Management – Uses NLP and machine intelligence for complaint classification, sentiment analysis, priority prediction, duplicate detection, automatic routing, escalation, and resolution tracking.

IX. CONCLUSION

Customer complaint management is an important component of customer relationship management because complaints provide direct information about customer dissatisfaction and service problems. Traditional manual complaint handling becomes inefficient when organizations receive large volumes of complaints from multiple communication channels.

Recent research demonstrates that NLP and machine learning can automate important complaint-management activities such as classification, topic discovery, sentiment analysis, prioritization, and routing. Transformer-based models such as BERT have further improved contextual understanding, while topic-modelling techniques can identify recurring problems. Recent AI-enabled systems are also moving toward automated triage, routing, escalation, and complete complaint-process management.

However, a complete customer complaint tracking system should not focus only on prediction accuracy. It should also provide real-time tracking, explainability, privacy, multilingual support, human intervention, and integration with existing business systems. Human-AI collaboration is particularly important for complex or emotionally sensitive complaints.

Therefore, an intelligent customer complaint tracking system integrating **NLP + machine learning + sentiment analysis + priority prediction + automatic routing + escalation + dashboard-based tracking** can provide a practical solution for improving complaint resolution and customer service.

X. FUTURE RESEARCH DIRECTIONS

- Multilingual NLP: Future research can extend the system to support regional and multilingual complaints, including Tamil and other Indian languages.



- Advanced AI Models: Transformer-based models such as BERT and other large language models can be explored to improve complaint classification, sentiment analysis, and priority prediction.
- Explainable AI: Explainable AI techniques can be incorporated to provide understandable reasons for complaint classification, priority assignment, and routing decisions.
- Resolution Prediction: Future systems can predict the expected resolution time and recommend suitable resolution strategies based on historical complaint data.
- Improved Duplicate Detection: Advanced semantic similarity techniques can be developed to identify duplicate or closely related complaints and group them automatically.
- Human-AI Collaboration: Future research can develop human-in-the-loop mechanisms where complex, sensitive, or high-priority complaints are automatically referred to human administrators.
- Privacy and Security: Stronger privacy-preserving techniques, data anonymization, encryption, and secure access mechanisms can be incorporated to protect sensitive customer information.
- Business System Integration: The system can be integrated with CRM, help-desk, email, database, SMS, and notification platforms for seamless complaint management.
- Real-Time Analytics: Future work can introduce real-time dashboards and predictive analytics to identify emerging complaint trends and recurring service problems.
- Machine-learning models can be designed to continuously learn from newly resolved complaints and customer feedback, improving system performance over time. The primary motivation for developing the Customer Complaint Tracking System is the need for an organized and efficient method of handling increasing numbers of customer complaints. Manual complaint processing can consume significant time and may result in inconsistent records and delayed responses.
- A centralized system provides customers with a convenient method for submitting complaints and tracking their progress. For organizations, it provides a structured method for assigning, monitoring, resolving, and recording complaints.

XI. CONCLUSION

The Customer Complaint Tracking System provides a structured approach for managing customer complaints from initial submission to final resolution. Traditional manual methods can become difficult to manage when organizations receive large numbers of complaints through multiple communication channels. A centralized digital system can simplify complaint registration, tracking, assignment, status management, resolution, and feedback.

The proposed system provides customers with a convenient platform for submitting complaints and monitoring their progress. At the same time, administrators and customer-service personnel can manage complaints more systematically and maintain complete complaint records.

A well-designed complaint tracking system can therefore improve transparency, reduce manual work, organize complaint information, and support better customer service. Future extensions involving multilingual processing, advanced analytics, external system integration, stronger security, and intelligent complaint analysis can further expand the capabilities of the platform. This direction is consistent with the future research areas already identified in your journal.

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