Chapter 1

INTRODUCTION

1.1 Basic Definition:

A complaint management system (CMS) is an essential tool for organizations to efficiently handle customer complaints, ensuring that issues are addressed promptly and effectively. In today's fast-paced business environment, maintaining customer satisfaction is crucial for long-term success, and a CMS provides a structured approach to achieve this.

The system automates the entire complaint lifecycle, beginning with the submission of complaints through an intuitive interface. Customers can easily log their issues, which are then categorized based on their nature and urgency. This categorization helps in prioritizing complaints, enabling faster response times.

Administrators and managers can monitor the status of complaints in real-time, ensuring accountability and transparency throughout the resolution process. The system facilitates effective communication between customers and support teams, allowing for timely updates and feedback collection. By providing a systematic workflow, the CMS helps in identifying recurring issues, which can lead to proactive measures for improvement.

Ultimately, a well-implemented complaint management system not only enhances customer satisfaction by ensuring their voices are heard but also boosts organizational productivity by streamlining processes. By resolving complaints efficiently, organizations can foster customer loyalty and gain valuable insights for continuous improvement. In summary, a CMS is vital for any organization aiming to enhance customer experience and operational efficiency.

1.2 Basic Concepts:

The basic concept of a complaint management system (CMS) is to streamline the entire process of handling customer complaints, ensuring timely and effective resolutions that enhance customer satisfaction and organizational efficiency. It begins with an intuitive interface that allows customers to easily submit their complaints, which can include various channels such as web forms, emails, or mobile applications. Once a complaint is received, the system categorizes it based on type, urgency, and severity, enabling organizations to prioritize responses effectively.

The CMS also provides real-time tracking of each complaint, giving both customers and staff visibility into the status of the resolution process. This transparency fosters trust and keeps customers informed, reducing frustration. Complaints are assigned to specific team members or departments, ensuring accountability and that the right expertise is applied to each issue.

In addition to facilitating communication during the resolution process, the system allows for the documentation of interactions and outcomes, creating a comprehensive history of complaints that can be analyzed for patterns and trends. After a complaint is resolved, feedback is collected from customers to assess their satisfaction with the resolution and the overall experience. This feedback is crucial for continuous improvement, helping organizations identify areas for enhancement in their products, services, or processes.

Ultimately, a CMS not only enhances customer satisfaction by ensuring that complaints are handled efficiently and effectively but also contributes to a culture of responsiveness and improvement within the organization. By leveraging insights gained from complaint data, businesses can proactively address recurring issues, improve their offerings, and foster long-term customer loyalty.

Chapter 2

LITERATURE REVIEW

Written applications with standardized fields—such as date, subject, sender, and receiver—are commonly used for various purposes, including leave requests, misconduct appeals, and suggestions. Despite advances in technology, many organizations still rely on paper-based applications, leading to inefficiencies. This traditional approach often results in repetitive tasks, such as submitting leave requests and complaints, which can be time-consuming. Furthermore, managing paper applications presents challenges like misplacement and the need for physical storage.

To address these issues, our methodology focuses on designing a user-friendly interface (UI) in Figma, which allows for the easy export of design assets to Android Studio. In Android Studio, we implement both the UI and functionality using these assets, while integrating Firebase services for authentication, real-time database capabilities, and storage solutions. Additionally, we utilize artificial intelligence to assist in formatting the applications, enhancing usability and consistency.

After development, we conduct thorough testing to ensure the application operates smoothly and implement a plan for ongoing maintenance and updates. Our observations indicate that many institutions continue to depend on traditional application methods, highlighting a significant opportunity for improvement. We recommend that organizations transition to online application writing and management systems. Our Android app, "inQuery: An Application for Applications," exemplifies this shift, simplifying and enhancing the application process for both users and administrators.[1]

This research examines the significant shift in government operations through the implementation of e-government, largely influenced by advancements in internet technology. While there have been notable improvements in efficiency and accessibility, the challenges of ensuring security and privacy remain paramount. Key issues include user authentication, data confidentiality, and the safeguarding of personal information.

Public trust is a critical factor that can be undermined by inadequate responses to service complaints and security breaches, leading to skepticism about e-government initiatives. Utilizing

Kitchenham's framework, the study investigates the obstacles to e-government adoption and the implications of security and privacy on citizen trust. It explores various protection models that can enhance the security framework.

The findings underscore the urgent need for robust security protocols, secure communication channels, and comprehensive legislative measures to protect data. The research particularly highlights the complex challenges faced by developing countries, which often lack the resources and infrastructure to implement effective security measures. It advocates for a holistic approach that combines technology, policy, and community engagement to achieve effective privacy protection and foster public trust in e-government systems.[2]

Tracking student data and complaints is essential for monitoring academic performance and addressing student grievances effectively. This research study introduces a web portal designed using JavaScript, HTML, Python, and MySQL, enabling students to submit their concerns easily. Once a complaint is filed, the relevant department is notified, and students can access the complete history of their complaints, including statuses such as examined, investigated, forwarded, rejected, or resolved.

The proposed system emphasizes transparency; if a complaint remains unresolved for an extended period, it is automatically escalated to a higher authority. This ensures accountability and timely responses. Additionally, it is crucial for any corrective system to maintain high language quality to prevent the dissemination of misinformation or harmful stereotypes related to gender, ethnicity, or religion.

To address these concerns, advanced technologies such as deep learning and machine learning are employed to detect hate speech. The research involved training a dataset of 11,325 tweets and evaluating the results using metrics like F1 score, recall, and precision. Among the models tested—Bi-LSTM, LSTM, and Support Vector Machine (SVM)—the LSTM model demonstrated superior performance, achieving metric values of 0.884, 0.84, and 0.86, respectively. This highlights the effectiveness of LSTM in accurately identifying and mitigating harmful language in student communications.[3]

Ensuring student safety is a paramount concern, and the proposed smart school bus monitoring system addresses this need by leveraging modern technologies to assist both parents and school

administrators in managing transportation effectively. Utilizing Arduino, RFID, GPS, and GSM technologies, this system provides a comprehensive solution for tracking students during their bus rides.

Parents can monitor their child's pickup and drop-off times as well as the real-time location of the school bus through an Android application. This app receives updates from a database unit that tracks the bus's geographic coordinates. Additionally, an RFID scanner is integrated into the system to identify students as they board the bus, ensuring accurate attendance.

To enhance communication and safety, the system features two switch buttons: one for notifying parents about the bus's arrival and the other for reporting emergencies that may occur during the journey. The school unit is responsible for managing and updating student information within the Android application, ensuring that all data is current and accessible.

Overall, the implementation of this smart monitoring system significantly enhances student safety during transportation. It also keeps school management informed about any emergencies or complaints that arise, thereby fostering a secure and responsive environment for students and their families.[4]

Grievances in educational institutions are a common challenge, often leading to unresolved student issues due to factors like student reluctance to approach management or inefficient handling by authorities. This paper presents a solution through a web portal developed using Django, HTML, CSS, and SQL, which allows students to submit complaints across various categories directly to the relevant department.

Students can track their complaints in real-time, seeing updates on whether the complaint has been viewed, is in progress, has been transferred, rejected, or resolved. The system promotes transparency by automatically escalating unaddressed complaints to a higher authority if they remain unattended for several days. Special permissions are granted to the principal or head of the organization, facilitating a quicker resolution process.

Another critical aspect of any grievance redressal system is the quality of language used in complaints, as it can lead to misinformation or harmful narratives about sensitive topics such as religion, gender, and race. To address this, the system incorporates Foul/Hate Speech Detection using machine learning and deep learning techniques. The SVM, LSTM, and Bi-LSTM

models were trained on a dataset of 11,325 tweets, with the LSTM model achieving the highest performance metrics—0.884 for recall, 0.84 for precision, and 0.86 for the F1 score.

Additionally, the portal features a comprehensive page listing all complaints within the organization, along with a support feature that enables students to endorse other complaints. This collaborative approach not only empowers students but also assists authorities in identifying and addressing major issues within the institution effectively.[5]

This paper examines data from the National Open University of Nigeria's (NOUN) E-ticketing system, a vital tool for managing student complaints and inquiries in an Open and Distance Learning (ODL) environment, where students and facilitators operate from different locations. The study utilizes the Multinomial Naive Bayes algorithm, specifically focusing on "intent" classification for the chatbot system.

Since the launch of the NOUN E-ticketing system, a total of 38,263 tickets have been generated within four months, consisting of student complaints and inquiries. Of these, 30,601 tickets have been manually responded to and resolved, while 7,662 tickets remain open. The primary objective of the chatbot is to provide swift and efficient responses to student inquiries, thereby reducing the workload on the management system.

By implementing the chatbot, students will benefit from automated responses that are available 24/7, enhancing their engagement and interaction with the institution. This improvement in communication aims to create a seamless experience for both students and the ODL institution, fostering a robust and congenial relationship. Ultimately, the NOUN chatbot is expected to not only increase student satisfaction and retention rates within ODL institutions but also serve as a model for improving engagement in conventional higher education settings.[6]

Nearly 14% of American adults meet the DSM-III-R criteria for lifetime alcohol abuse or dependence. Despite estimates suggesting that around 20% of patients visiting physicians may qualify for an alcoholic diagnosis, the early signs of excessive drinking often go unrecognized in both general medical practices and hospitals. This oversight is frequently attributed to insufficient training and prevalent misconceptions about alcohol use disorders.

To tackle this issue, the American Research Corporation of Virginia (ARCOVA) is developing the Interactive Multimedia Program for Alcoholism Assessment and Counseling Training (IM-PACT). This innovative program integrates audiovisual media with interactive elements to equip physicians and nurses—both students and professionals—with essential skills for managing alcoholism. A key feature of IMPACT is a role-play activity, where user interactions are enhanced through simulated patient personalities presented via digital audio and video. These simulations respond to user inquiries, providing a realistic and engaging learning experience aimed at improving alcohol management training among healthcare providers.[7]

Natural Language Processing (NLP) is an essential area of research within artificial intelligence, yielding numerous practical applications. However, creating an online NLP service from scratch poses significant challenges for non-expert users, as it typically involves complex processes such as corpus annotation, model training, and deployment. Most existing tools primarily focus on corpus annotation and often lack support for collaborative annotation or online model training and deployment.[8]

Synchronous tracking of school buses enhances student safety and allows youth to spend more time on productive activities rather than waiting for late buses. In response to the growing need for efficient vehicle tracking systems, many educational institutions are adopting advanced solutions to ensure the safety of their students.

The effective tracking of buses is achieved by obtaining geographic coordinates through a GPS module, which transmits data to a remote server using a Wi-Fi module. This information is then made accessible to relevant stakeholders via a mobile application, which displays the bus's real-time location.

Additionally, the system includes an alert mechanism that triggers the microcontroller to send push notifications once the RFID tag of a student is scanned by an RFID reader. This feature notifies both school authorities and parents that the student has boarded the bus.

By facilitating effective bus tracking, the system helps school authorities, parents, and drivers to organize their schedules more accurately while ensuring the safety of children from boarding to disembarking. Furthermore, it allows management to stay informed about emergencies or complaints, contributing to a more responsive and secure environment for students.[9]

Customers are a vital component of any organization, and meeting their preferences and demands is essential for fostering loyalty. When customers experience delays in service or lack clear channels for filing complaints, their satisfaction can wane, leading to a negative impact on the business. Current complaint handling processes often face challenges, resulting in unresolved issues and frustrated customers.

To address these concerns, we have developed the Smart Complaint Management System (SCMS), which includes a mobile application, chatbot, and web application aimed at improving customer satisfaction. The SCMS features a complaint classification system that automatically directs issues to the appropriate department. Additionally, it incorporates a mechanism for identifying similar complaints to prevent duplicate submissions.

Testing of the SCMS has demonstrated its effectiveness in reducing the time and procedures associated with complaint handling. The system enhances the available channels for filing complaints and provides more options for progress reporting and tracking the status of complaints. By streamlining the complaint management process, the SCMS not only addresses customer dissatisfaction but also strengthens the relationship between the organization and its customers.[10]

Institutions of Higher Learning (IHLs) in Malaysia face intense competition in attracting and retaining students, given the abundance of public and private institutions in the market. Many private IHLs are experiencing financial difficulties due to a decline in student enrollment. In this context, social media has emerged as a crucial investment area for institutions, serving as a platform for fostering long-term relationships with students.

Today's students engage in multi-modal relationships with institutions, primarily through digital interactions across various social media platforms. By integrating social media data into existing Customer Relationship Management (CRM) systems, IHLs can gain valuable insights into student needs and preferences, ultimately helping to meet their best interests.

To adapt to the digital landscape, IHLs must implement strategic marketing initiatives informed by social media analytics. This paper presents a Social CRM Analytic model specifically designed for IHLs to address customer complaints and issues effectively. The model draws on

previous research and is tailored for organizations that prioritize relationship-building through social media technologies.

Preliminary results from the model highlight critical issues that require immediate attention and outline actionable steps to enhance customer satisfaction, loyalty, and the overall reputation of IHLs. By leveraging this model, institutions can proactively respond to student concerns and cultivate a more engaged and satisfied student body.[11]

The College Activity Management System is designed to streamline various college activities, including festivals, farewell events, annual celebrations, and workshops. It serves multiple functions, such as providing placement information, maintaining student attendance records, and offering details about faculty and college achievements. Additionally, the system keeps track of branch and sports information and sends notifications regarding exams and results. It also allows for the submission of complaints and manages other college-related activities.

The primary objective of this project is to develop an Android-based Mobile Campus application that enhances the institution's educational framework. This application will be accessible to students, teachers, and parents, offering a user-friendly interface to access vital information.

In previous systems, users had to refer to hard copies or navigate websites to find information, which often proved cumbersome and time-consuming. The proposed smartphone application aims to resolve these issues by providing a more efficient, secure, and error-free method of accessing information. By integrating all necessary functionalities into a single mobile platform, the system will significantly improve the efficiency and accessibility of college-related information, ultimately benefiting the entire educational community.[12]

Our challenge lies in gaining insights and understanding the implicit behaviors behind textual data. To achieve this, we utilize machine learning techniques and sentiment analysis as key tools. Text classification is essential for managing large volumes of content, allowing us to extract actionable knowledge from it.

In this study, we evaluate the performance of four established lexicons by implementing them through Naive Bayes modeling and bigram analysis. Our findings indicate that the Loughran Lexicon effectively captures predatory practices, demonstrating a notable performance in sentiment analysis. Specifically, we achieved an accuracy of 87% with the Loughran Lexicon, and cross-validation further supports the reliability of these predictions.

However, we argue that relying solely on lexicons is insufficient for developing robust AI tools. While lexicons facilitate easier feature selection for the Naive Bayes approach, they do not fully encompass the complexity of sentiment and emotion present in complaints. Our objective is to deepen our understanding of these sentiments and emotions, ultimately providing high-quality training data to enhance the automation of decision-making processes using AI tools.[13]

The parking process is a common strategy aimed at reducing road traffic by designating specific spots for vehicles to stay for a limited time. Given the growing population, traditional solutions involving large horizontal or vertical parking areas are often impractical due to the significant costs associated with acquiring land or constructing multi-story facilities. A smart parking system offers a more efficient alternative by providing real-time information on available parking spaces while facilitating quick identification and transaction processes.

Telkom University adopted this system in October 2014, utilizing physical cards equipped with RFID technology to enhance convenience and security. While this implementation simplified verification and validation, it also led to various complaints from students and staff regarding operational challenges.

The objective of this study is to explore the issues encountered with the smart parking system over the years. By identifying these challenges and proposing effective solutions, we aim to enhance the system's quality and functionality, ultimately improving the parking experience for users in the future.[14]

This survey was conducted in response to the high levels of dissatisfaction associated with the e-Aduan system, an electronic platform used for reporting complaints related to electrical, mechanical, telecommunication, civil, landscape, infrastructure, or facilities management. Managed by Universiti Teknologi Mara (UiTM), e-Aduan serves developers across seven Private Fund Institution (PFI) campuses in Malaysia, most of which have been established for about a year.

The exploratory research involved 168 respondents and revealed that 67% had never used e-Aduan. Key reasons for this lack of usage included unfamiliarity with the service, a user-unfriendly interface, and accessibility issues. Furthermore, the survey indicated that 55% of those who did use the system expressed dissatisfaction with their experience.

In light of these findings, the study recommends a restructuring of the Service Operating Procedure (SOP) for e-Aduan, along with enhancements to the system's linguistic features to make it more user-friendly. These changes aim to improve service quality and increase customer satisfaction. Future research should consider including respondents from all UiTM PFI campuses to gain a more comprehensive understanding of user experiences and needs.[15]

The Smart Waste Management (SWM) system is designed to enhance waste management by monitoring the fill levels of trash bins equipped with ultrasonic sensors, while also tracking GPS-enabled trash collection trucks. This initiative addresses significant challenges, such as overflowing bins in densely populated public areas and complaints from residents regarding the punctuality of collection services.

The project aims to develop a Smart Waste Management system using the Bootstrap platform, with a focus on designing, developing, and testing its functionality to meet specified requirements. The chosen methodological approach is the waterfall methodology, which includes four essential phases: planning and analysis, system design, system implementation, and system testing. Each phase is systematically completed before progressing to the next, ensuring a thorough development process.

The expected outcome of the SWM system is to effectively tackle issues related to overflowing trash bins and public complaints regarding trash collection. By providing operators with real-time data on which bins require immediate collection, the system enables timely dispatch of collection trucks. This approach is more efficient than traditional routine collection methods. Additionally, operators can track the dispatched trucks, enhancing overall operational efficiency and improving service delivery to the community.[16]

The Smart Waste Management (SWM) system is designed to optimize waste management by monitoring the fill levels of trash bins equipped with ultrasonic sensors, while also tracking the locations of GPS-enabled trash collection trucks. This system addresses critical issues such as overflowing bins, particularly in densely populated public areas, and the frequent complaints from residents about the timeliness of trash collection.

The project aims to develop the SWM system using the Bootstrap platform, focusing on its design, development, and functionality testing to ensure it meets project requirements. The methodology adopted for this project is the waterfall model, which consists of four key phases:

planning and analysis, system design, system implementation, and system testing. Each phase is completed in sequence, ensuring a structured approach to development.

The anticipated outcome of the SWM system is to effectively resolve the challenges of overflowing bins and public dissatisfaction with collection schedules. By providing operators with real-time data on which bins require immediate attention, the system enables prompt dispatch of collection trucks. This targeted approach is significantly more efficient than traditional routine collection methods. Additionally, operators will have the capability to track the dispatched trucks, enhancing operational efficiency and improving service quality for the community.[17]

Virtual patient simulators are essential tools in contemporary medical education, offering a safe space for learners to develop their skills. These simulators provide contextual feedback and eliminate the constraints of time and location associated with traditional face-to-face instruction. This paper introduces LiveBook, an interactive simulation system that immerses learners in the role of a clinician. In this system, users investigate patient symptoms by asking questions in natural language and receiving corresponding answers.

Upon completing a case and selecting the most plausible diagnosis, LiveBook delivers detailed feedback on the learner's performance. Currently, the first LiveBook cases are being piloted in the field of Pediatrics, with the service accessible at https://live-book.org.

Initial feedback from the pilot suggests that LiveBook can significantly enhance the curriculum for future diagnosticians. It allows learners to apply their medical knowledge and hone their diagnostic problem-solving abilities in realistic scenarios, making it a valuable addition to medical training programs.[18]

This paper focuses on the inclusiveness of resource allocation in education, identifying key actors involved in policy formulation and institutional setting. These actors include various levels of government, schools, hospitals, and development partners. Using the Institutional Analysis and Development framework proposed by Ostrom (1994), the study explores both exogenous variables that influence policy choices and institutional arrangements.

An actor mapping exercise was conducted to assess the involvement of these stakeholders in policy formulation and implementation. The research identified three primary pathways for

developing and executing education resource policies: top-down, bottom-up, and parallel co-ordination.

To gather insights, an empirical study was conducted involving the distribution of question-naires to students, teachers, and patients—those who are directly affected by educational poli-cies and initiatives. The study revealed that there are limited avenues for these stakeholders to voice their complaints and insufficient opportunities for direct engagement.

The findings highlighted significant issues, such as inadequate basic education facilities in im-poverished areas. In response, the paper offers constructive recommendations aimed at improv-ing resource allocation and addressing the challenges faced by the education system.[19]

The absence of intelligent services is a significant challenge in developing smart communities. While location-based services are essential, their effectiveness is often hindered by the low accuracy of current localization technologies. This paper introduces an innovative human lo-calization technique utilizing a 3D two-dimensional code system. In this approach, spatial units within a smart community are uniformly modeled and encoded.

The location codes are transformed into QR codes and produced as identification cards using a 3D printer. These 3D codes are then mounted on walls throughout the community. A location information server and an intelligent application server are also deployed to support the system. Users can scan the 3D code with a smartphone app to access location information. The servers integrate the location data with other heterogeneous data, and big data mining techniques can provide insights for potential intelligent services.

The location data is formatted as "zip code/institution code/building code/partition code/floor code/room code." The location information database comprises user information, a map node database, and a location characteristic database. This technique was designed and implemented for Tsinghua University, enabling students and staff to accurately locate themselves. Addition-ally, the property management department can collect complaints related to temperature or hu-midity, enhancing comfort levels and promoting energy efficiency.

This system achieves high localization accuracy at the room level through a lookup table strat-egy, offering several advantages over traditional IC card techniques.[20]

2.2 Motivation:

Enhancing Customer Satisfaction: Effective complaint management is essential for maintaining high levels of customer satisfaction. By providing a structured platform for users to voice their concerns, organizations can address issues promptly, fostering trust and loyalty among customers.

Streamlining Communication: Many customers face challenges in finding appropriate channels to submit complaints. A complaint management system simplifies this process, ensuring that users can easily communicate their issues to the relevant departments, thereby reducing frustration and confusion.

Improving Organizational Efficiency: Automating the complaint lifecycle—from submission to resolution—reduces the administrative burden on staff and improves overall efficiency. This allows organizations to allocate resources more effectively and focus on proactive solutions rather than reactive measures.

Data-Driven Insights: By systematically collecting and analyzing complaint data, organizations can identify trends, recurring issues, and areas for improvement. This data-driven approach enables informed decision-making and helps organizations enhance their products and services.

Accountability and Transparency: A well-implemented complaint management system promotes accountability within the organization. By tracking the status of complaints and providing updates to customers, the system fosters transparency, which is crucial for building a positive relationship with users.

Encouraging Continuous Improvement: A robust complaint management process allows organizations to learn from customer feedback and make necessary adjustments. This commitment to continuous improvement not only enhances service quality but also demonstrates to customers that their opinions are valued.

Supporting Regulatory Compliance: Many industries have specific regulations regarding customer complaints and feedback. A formalized complaint management system helps

organizations meet these compliance requirements, minimizing legal risks and enhancing credibility.

Building a Customer-Centric Culture: Implementing an effective complaint management system signifies an organization's dedication to customer care. It encourages a culture where customer feedback is prioritized, leading to more engaged employees and satisfied customers.

By focusing on these motivations, organizations can develop and implement a complaint management system that not only addresses current challenges but also positions them for future success in a competitive landscape.

Chapter 3

PROBLEM DEFINITION AND REQUIREMENT ANALYSIS

3.1 Problem Domain and Definition:

The Complaint Management System (CMS) operates within the domain of customer service and organizational efficiency, addressing key challenges in handling customer complaints effectively. Many customers struggle to find appropriate channels for submitting complaints,

leading to frustration and unresolved issues. Additionally, organizations often face delayed response times due to inefficient processes, resulting in customer dissatisfaction. The lack of visibility in tracking complaint statuses further compounds these issues, leaving customers uncertain about whether their concerns are being addressed. Without a centralized system, managing and analized complaint data becomes difficult, hindering the ability to identify trends and make improvements. Moreover, inconsistent handling of complaints across different departments can lead to varying customer experiences. A CMS provides a structured framework that includes intuitive complaint submission interfaces, real-time tracking, automated routing to relevant departments, and response management tools. It also incorporates data analysis and reporting features, enabling organizations to glean insights from complaint data. By integrating customer feedback into the resolution process, a CMS fosters a continuous improvement cycle, ultimately enhancing customer satisfaction and operational efficiency.

3.2 Requirement Analysis:

The Requirement Analysis for a Complaint Management System (CMS) focuses on identifying both functional and non-functional needs to ensure effective handling of customer complaints. Functional requirements include user registration and authentication, allowing users to create accounts and log in securely. The system must facilitate complaint submission through an intuitive interface, enabling users to categorize their complaints and attach relevant documents. Tracking capabilities are essential, allowing users to monitor the status of their complaints in real-time and receive notifications about updates. Automated routing should direct complaints to the appropriate departments, while response management features enable administrators to view, respond to, and document complaints efficiently. Collecting user feedback post-resolution is crucial for continuous improvement, alongside robust reporting and analytics to help administrators identify trends and measure performance.

Non-functional requirements emphasize usability, ensuring the system is intuitive and easy to navigate. Performance metrics require the system to handle high complaint volumes with minimal delays, while security measures must protect user data through encryption and secure authentication. Scalability is necessary to accommodate growth, and high availability should minimize downtime. Compatibility across various devices and browsers is also important, as is the ability to integrate with existing systems such as CRM and ERP solutions. Lastly, technical requirements specify the need for a suitable technology stack, robust database

Complaint Management System

management, and comprehensive testing to ensure the system meets all outlined specifications and user needs effectively.

3.2.1 Aim of the Project:

The Aim of the Project for the Complaint Management System (CMS) is to develop an efficient and user-friendly platform that streamlines the process of submitting, tracking, and resolving customer complaints. The project aims to enhance customer satisfaction by providing a transparent and accessible system that enables users to easily report issues and receive timely responses from the relevant departments. By automating complaint routing and management, the CMS seeks to reduce response times, improve communication between users and administrators, and facilitate better decision-making through analytics and reporting features.

Additionally, the project aims to incorporate feedback mechanisms to continuously gather insights from users, thereby enabling the organization to make data-driven improvements to its services. Ultimately, the goal is to create a comprehensive solution that not only addresses customer grievances effectively but also fosters a culture of accountability and responsiveness within the organization, leading to enhanced customer loyalty and a positive reputation.

3.2.2 Objectives to be achieved:

- **User-Friendly Interface**: Develop an intuitive and accessible interface that allows users to easily submit and track complaints without technical difficulties.

- **Efficient Complaint Handling**: Automate the routing and assignment of complaints to appropriate departments or personnel, ensuring timely responses and resolution.

- **Real-Time Tracking**: Enable users to monitor the status of their complaints in real-time, providing transparency throughout the resolution process.

- **Feedback Collection**: Implement mechanisms for users to provide feedback on the complaint resolution process, facilitating continuous improvement of services.

- **Reporting and Analytics**: Create comprehensive reporting tools that allow administrators to analyze complaint trends, measure performance metrics, and identify areas for improvement.

- **Data Security and Privacy**: Ensure robust security measures to protect user data and maintain confidentiality throughout the complaint management process.

- **Integration with Existing Systems**: Design the CMS to integrate seamlessly with other organizational systems (e.g., CRM, ERP) for better data management and operational efficiency.

- **Scalability**: Build the system to accommodate increasing user volumes and complaints as the organization grows, ensuring long-term usability.

- **Training and Support**: Provide adequate training and resources for users and administrators to effectively utilize the system and understand its features.

- **Improved Customer Satisfaction**: Ultimately, enhance overall customer satisfaction and loyalty by addressing complaints promptly and effectively, fostering a positive relationship with users.
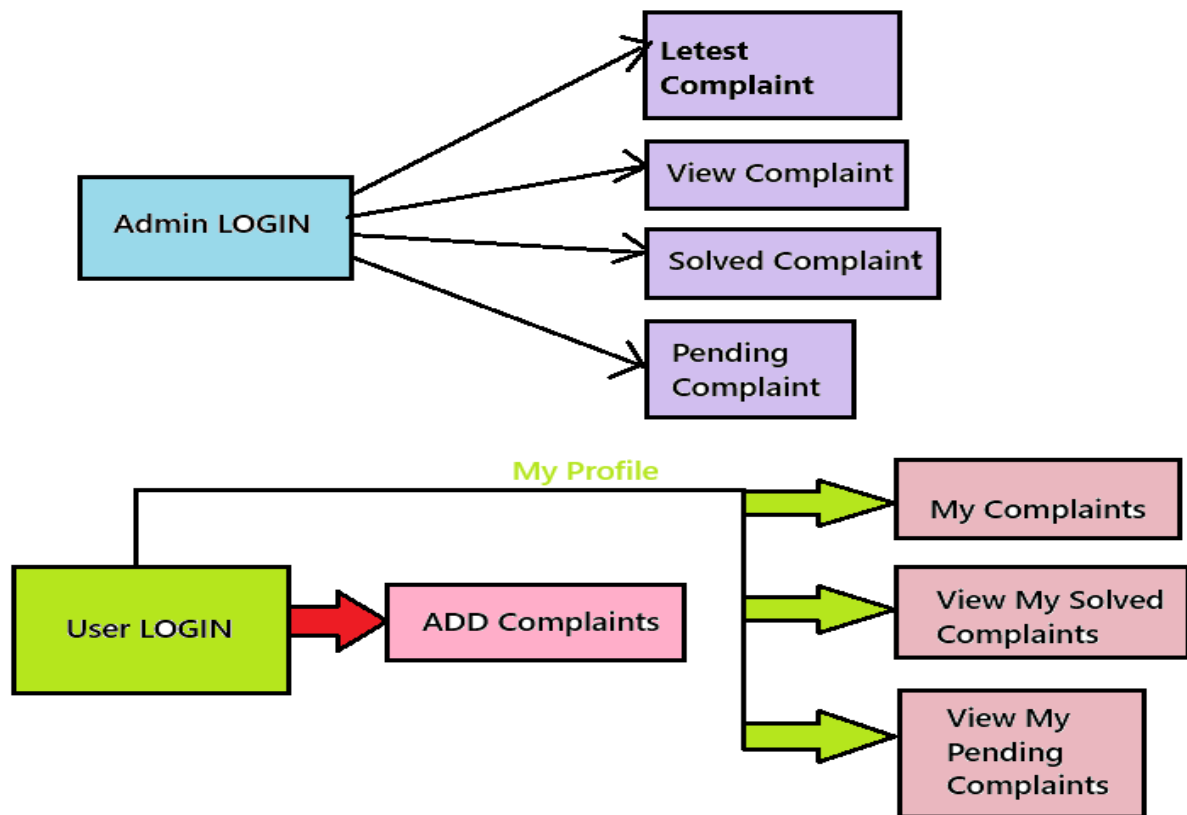
Chapter 4

PROPOSED APPROACH AND DESIGN

4.1 Proposed Approach:

The proposed approach for developing the Complaint Management System (CMS) involves a systematic and iterative methodology that begins with requirement analysis, engaging stakeholders to gather comprehensive input on essential features such as complaint submission, tracking, categorization, and reporting. Following this, a detailed system design will be created, outlining the architecture and ensuring an intuitive user interface (UI) along with a well-defined database schema for efficient data management. The technology stack will include Java for back-end development, MySQL for database management, and HTML, CSS, and JSP for front-end design. Development will proceed in a modular fashion, focusing on key components like the complaint submission module, tracking system, admin dashboard, and reporting tools. Integration with existing organizational systems will enhance data flow, followed by rigorous testing, including unit and user acceptance testing, to ensure functionality and user satisfaction. Upon successful testing, the CMS will be deployed in a controlled environment with adequate training for users. A feedback mechanism will be established to gather insights for continuous improvement, supported by a maintenance plan for regular updates and bug fixes. Additionally, performance monitoring will be implemented to evaluate the system's effectiveness in managing complaints and enhancing customer satisfaction. This structured approach aims to create an efficient, transparent, and user-centric solution that ultimately boosts customer loyalty and satisfaction.

4.1.1 Block Diagram of proposed approach:

Fig. 4.1.1 Block Diagram of Complaint Management System

4.1.2 Explanation of steps involved:

The Complaint Management System (CMS) is designed with two primary access methods: Admin Login and User Login. In the Admin Login section, administrators can access the system by entering the username "admin" and the password "admin." Upon successful login, they are directed to the Admin Dashboard, which features four key options: "Latest Complaints," "View Complaints," "Solved Complaints," and "Pending Complaints," along with a logout option for security.

For the User Login, users can register and then log in using their registered email and password. After logging in, they are directed to their User Dashboard. This page provides access to various complaint forms, including categories such as Canteen Complaints, Faculty Complaints, Library Complaints, Facility Complaints, and other general issues. Additionally,

users can submit feedback through a feedback form, which allows them to communicate directly with the admin.

On their User Dashboard, users can view the status of their complaints, including their own submitted complaints, solved complaints, and pending complaints. When an admin resolves a user's complaint, an automatic notification is sent to the user, keeping them informed of the resolution status. All these functionalities are developed using Eclipse software, with JSP pages facilitating a dynamic and interactive user experience. This structured approach ensures effective communication between users and administrators, streamlining the complaint management process.

Chapter 5

EXPERIMENTAL SETUP AND RESULTS

The experimental setup for the Complaint Management System (CMS) was designed to evaluate its functionality, user experience, and performance. The system was developed using the following technologies:

- **Java**: The primary programming language used for back-end development, facilitating business logic and server-side processing.

- **MySQL**: A relational database management system employed to store user data, complaints, and feedback securely.

- **Eclipse**: An integrated development environment (IDE) utilized for coding, debugging, and managing the project.

- **HTML/CSS**: These technologies were used for front-end development, ensuring a user-friendly interface and responsive design.

- **JSP (JavaServer Pages)**: This technology allowed for the dynamic generation of web pages, enabling seamless interaction between the user interface and back-end logic.

The CMS was implemented in a controlled environment where various test scenarios were conducted. These tests included:

1. **User Registration and Login**: Verified that new users could register successfully and log in using their credentials.

2. **Admin Functionality**: Assessed the admin dashboard features, ensuring that administrators could view, manage, and categorize complaints efficiently.

3. **Complaint Submission**: Tested the complaint forms for various categories (e.g., canteen, faculty, library) to ensure that submissions were processed correctly and stored in the database.

4. **Feedback Submission**: Evaluated the functionality of the feedback form, confirming that user feedback was recorded and sent to the admin.

5. **Notification System**: Checked the automatic notification feature, ensuring that users received updates when their complaints were resolved.

- **Results**

The results of the experimental setup demonstrated that the CMS operated smoothly and met all functional requirements. Key findings included:

- **User Satisfaction**: Users reported a positive experience with the system, appreciating the intuitive design and ease of navigation.

- **Efficient Complaint Handling**: Admins were able to track and manage complaints effectively, with a clear overview of pending and resolved issues.

- **Feedback Mechanism**: The feedback system allowed for meaningful communication between users and administrators, contributing to service improvement.

- **Notification Success Rate**: The automatic notification feature functioned without errors, ensuring users were promptly informed about their complaint statuses.

Overall, the experimental setup validated the effectiveness of the Complaint Management System, confirming its potential to enhance communication and streamline the complaint resolution process within the organization.

Chapter 6

CONCLUSION AND FUTURE SCOPE

6.1 Discussion and Conclusion:

Discussion

The development and implementation of the Complaint Management System (CMS) have underscored several pivotal factors critical to enhancing user engagement and improving operational efficiency in complaint handling. The system effectively integrates a combination of modern technologies, providing a user-friendly interface alongside robust back-end support.

One of the most significant outcomes was the system's ability to streamline the complaint submission and resolution process. By categorizing complaints into various types—such as canteen, faculty, library, and facility issues—users can easily identify where to direct their concerns. This categorization not only facilitates faster processing by administrators but also aids in generating analytics on recurring issues, enabling the institution to address systemic problems and implement proactive measures.

The feedback mechanism integrated within the CMS proved essential in fostering communication between users and administrators. By allowing users to express their concerns and suggestions directly, the system empowers them and leads to improved trust and satisfaction with management practices. Users reported feeling more valued and heard, contributing to a more positive environment.

The automated notification system played a critical role in keeping users informed about the status of their complaints, significantly reducing anxiety and uncertainty. Users appreciated receiving timely updates, which not only enhanced their experience but also minimized follow-up inquiries, allowing administrators to focus on resolution.

Furthermore, the administrative dashboard was designed to provide comprehensive oversight of complaint management processes, enabling administrators to track metrics such as resolution times and the volume of complaints. This data is invaluable for continuous

improvement efforts, allowing the institution to make informed decisions and allocate resources more effectively.

Conclusion

In conclusion, the Complaint Management System successfully addresses the challenges associated with traditional complaint handling methods by leveraging a combination of technologies, including Java, MySQL, Eclipse, HTML, CSS, and JSP. The cohesive platform meets the needs of both users and administrators, enhancing the efficiency of managing complaints while also improving user satisfaction through timely communication and feedback mechanisms.

The experimental results indicate that the CMS is a valuable tool for organizations aiming to improve their complaint resolution processes. It not only facilitates efficient handling of complaints but also fosters a culture of responsiveness and transparency. Future work could focus on incorporating advanced analytics, machine learning techniques, and user behavior analysis to predict and prioritize complaints based on historical data, further enhancing the system's capabilities.

Additionally, the implementation of a mobile-friendly version of the CMS could increase accessibility, allowing users to submit and track complaints on-the-go. Overall, the CMS stands as a promising solution for fostering a responsive, transparent, and user-centered environment in educational and organizational settings, ultimately leading to enhanced customer satisfaction and loyalty.

6.2 Future Scope

The Complaint Management System (CMS) has established a solid foundation for effectively managing user grievances, but several enhancements could further improve its functionality and user experience. One significant opportunity is the development of a dedicated mobile application, which would enhance accessibility for users, allowing them to submit complaints, track statuses, and receive notifications directly on their smartphones. Additionally, integrating artificial intelligence could enable predictive analytics to identify complaint trends and categorize issues more efficiently. An enhanced user feedback mechanism would allow users to rate their complaint resolution experience, providing valuable insights for continuous improvement.

Incorporating real-time chat support or a chatbot could facilitate immediate assistance, guiding users through the complaint submission process. Multi-language support would make the system more inclusive, ensuring that language barriers do not hinder communication. Enhanced data visualization tools in the administrative dashboard could help track key performance indicators intuitively, aiding better decision-making. Collaborative features enabling different departments to work together on resolving complaints would increase efficiency, while integrating the CMS with existing systems like learning management systems (LMS) could streamline processes further.

Exploring blockchain technology could provide an immutable record of complaints and resolutions, enhancing transparency and trust. Finally, designing the system for scalability will ensure it can handle increased user loads and larger volumes of complaints as organizations grow. By pursuing these avenues for future development, the CMS can evolve into a more comprehensive solution that not only addresses complaints effectively but also fosters a culture of continuous improvement and user satisfaction.

REFERENCES:

[1] A. Singh, Smriti, T. S. Bhat, U. Sharma and Y. Sharma, "inQuery- Online AI Application Formatting and Management System," 2024 Sixth International Conference on Computational Intelligence and Communication Technologies (CCICT), Sonepat, India, 2024, pp. 523-529, doi: 10.1109/CCICT62777.2024.00088.

[2] A. Djuric, "Challenges, Citizens' Trust and Privacy Protection Models in e-Government Systems: Security and Privacy Perspective: Student paper," 2024 23rd International Symposium INFOTEH-JAHORINA (INFOTEH), East Sarajevo, Bosnia and Herzegovina, 2024, pp. 1-6, doi: 10.1109/INFOTEH60418.2024.10495931.

[3] S. Kuhan and L. K. J. Grace, "Design and Implementation of Students Grievance and Database," 2023 2nd International Conference on Applied Artificial Intelligence and Computing (ICAAIC), Salem, India, 2023, pp. 1065-1068, doi: 10.1109/ICAAIC56838.2023.10141027.

[4] S. Banu, R. P. R, V. V, V. L and R. P. R, "Iot Based School Bus Monitoring System," 2023 7th International Conference on Design Innovation for 3 Cs Compute Communicate Control (ICDI3C), Karnataka, India, 2023, pp. 67-70, doi: 10.1109/ICDI3C61568.2023.00021.

[5] S. shah, S. Jha and P. Sonawane, "Smart Student Grievance Redressal System with Foul Language Detection," 2022 8th International Conference on Advanced Computing and Communication Systems (ICACCS), Coimbatore, India, 2022, pp. 187-192, doi: 10.1109/ICACCS54159.2022.9785119.

[6] J. N. Ndunagu, R. G. Jimoh, U. Chidiebere and G. D. Opeoluwa, "Enhanced Open and Distance Learning Using an Artificial Intelligence (AI)-Powered Chatbot: a Conceptual Framework," 2022 5th Information Technology for Education and Development (ITED), Abuja, Nigeria, 2022, pp. 1-4, doi: 10.1109/ITED56637.2022.10051575.

[7] J. W. Mullis, R. R. Avent, H. T. Mullis, A. L. Wilson and M. W. Mitchell, "IMPACT: an Interactive Multimedia Program for Alcoholism Assessment and Counseling Training," Proceedings of the International Conference on Multimedia Computing and Systems, Washington, DC, USA, 1995, pp. 318-322, doi: 10.1109/MMCS.1995.484942.

[8] X. Wu, J. Duan, J. Li and M. Li, "nPTAS: A Novel Platform for Text Annotation and Service," 2021 IEEE International Conference on Bioinformatics and Biomedicine (BIBM), Houston, TX, USA, 2021, pp. 544-549, doi: 10.1109/BIBM52615.2021.9669733.

[9] S. Malathy, P. Ambarish, S. D. Kumar and G. A. Gokul Prashanth, "Smart School Bus: To Ensure the Safety of Children," 2021 7th International Conference on Advanced Computing and Communication Systems (ICACCS), Coimbatore, India, 2021, pp. 923-927, doi: 10.1109/ICACCS51430.2021.9442044.

[10] P. Kormpho, P. Liawsomboon, N. Phongoen and S. Pongpaichet, "Smart Complaint Management System," 2018 Seventh ICT International Student Project Conference (ICT-ISPC), Nakhonpathom, Thailand, 2018, pp. 1-6, doi: 10.1109/ICT-ISPC.2018.8523949.

[11] A. Hamid et al., "Social CRM Analytics Model on Malaysian Institutes of Higher Learning (IHLs)," 2018 3rd Technology Innovation Management and Engineering Science International Conference (TIMES-iCON), Bangkok, Thailand, 2018, pp. 1-5, doi: 10.1109/TIMES-iCON.2018.8621834.

[12] M. A. Kumar, C. M. Srinivas, K. V. Vardhan Reddy and K. K. Kumar, "College Activity Management System," 2018 Second International Conference on Intelligent Computing and Control Systems (ICICCS), Madurai, India, 2018, pp. 1-4, doi: 10.1109/ICCONS.2018.8662930.

[13] P. B. Y. Jairo, R. A. Aló and D. Olson, "Comparison of Lexicon Performances on Unstructured Behavioral Data," 2019 Sixth International Conference on Social Networks Analysis, Management and Security (SNAMS), Granada, Spain, 2019, pp. 28-35, doi: 10.1109/SNAMS.2019.8931830.

[14] M. Lubis, R. Fauzi, A. R. Lubis and R. Fauzi, "Analysis of Project Integration on Smart Parking System in Telkom University," 2018 6th International Conference on Cyber and IT Service Management (CITSM), Parapat, Indonesia, 2018, pp. 1-6, doi: 10.1109/CITSM.2018.8674270.

[15] Z. B. Abu, F. Ezlina Binti Shahbudin, M. B. Mansor, N. Zahirah Binti Abd Rahim and N. Aqilah Binti Norwahi, "Improving user complaint management system and satisfaction level via reader-friendly linguistic features," 2015 International Symposium on Mathematical Sciences and Computing Research (iSMSC), Ipoh, Malaysia, 2015, pp. 269-273, doi: 10.1109/ISMSC.2015.7594064.

[16] T. P. Fei et al., "SWM: Smart waste management for green environment," 2017 6th ICT International Student Project Conference (ICT-ISPC), Johor, Malaysia, 2017, pp. 1-5, doi: 10.1109/ICT-ISPC.2017.8075303.

[17] T. P. Fei et al., "SWM: Smart waste management for green environment," 2017 6th ICT International Student Project Conference (ICT-ISPC), Johor, Malaysia, 2017, pp. 1-5, doi: 10.1109/ICT-ISPC.2017.8075303.

[18] S. Jalali, E. Stroulia, S. Foster, A. Persad, D. Shi and S. Forgie, "LiveBook: Competence Assessment with Virtual-Patient Simulations," 2017 IEEE 30th International Symposium on Computer-Based Medical Systems (CBMS), Thessaloniki, Greece, 2017, pp. 47-52, doi: 10.1109/CBMS.2017.133.

[19] B. Xiong, N. Li and W. Fan, "Research on the role of policy and institutions in achieving development in education in Yunnan province," 2016 13th International Conference on Service Systems and Service Management (ICSSSM), Kunming, China, 2016, pp. 1-9, doi: 10.1109/ICSSSM.2016.7538606.

[20] J. Zou, Q. Zhao and C. Jia, "Human localization system using 3D two-dimension code," 2017 29th Chinese Control And Decision Conference (CCDC), Chongqing, China, 2017, pp. 1819-1825, doi: 10.1109/CCDC.2017.7978812.