**Chapter 1**

* 1. **Introduction**

Municipalities are responsible for ensuring the maintenance and provision of key public services like water, roads and waste disposal. In fast growing areas like Redcliff Municipality, the prompt and effective reporting and resolution infrastructure related faults are essential for sustaining operational continuity and ensuring citizen satisfaction. However traditional fault reporting mechanisms such as physical forms, phone calls and manual documentation are frequently characterized by inefficiencies, delays and a lack of systematic traceability ( Mwakalinga, 2016).

To overcome these challenges, an increasing number of local authorities are adopting web based platforms to modernize service management practices. A digital Fault Reporting System facilitates immediate access, centralized information storage and intuitive user interactions, thereby streamlining the processes of fault submission, assignment and resolution. These platforms enhance operational transparency, boost responsiveness and promote greater accountability in municipal functions (Suleiman and Karim, 2020).Furthermore, embedded citizen feedback features can strengthen public participation and boost trust in local governance structures (Fung, 2015).

This project proposes the design and development of a web based Fault Reporting System for Redcliff Municipality’s Engineering department, accessed by both residents (for reporting faults) and municipal staff (for managing and responding to reports). The system follows a structured process supported by a central relational database that stores, manages, and secures all relevant information. The database acts as the backbone of the system, enabling reliable data storage, real-time validation, and secure access control by user Verification and Authorization via Payment Records to ensure only eligible residents can report faults, the system integrates with a payment verification module. This module cross-checks the resident’s details such as Account Number against a paid rates table, a database record of all residents who have paid their municipal rates for the current month. This prevents unauthorized or prank submissions. In doing so, it aligns with the broader goal of building smart municipal systems that are responsive, data driven and community centered (Kumar et al., 2022).

This chapter also functions as an introduction to the proposed project, outlining the organization’s background, the project’s background, the problem the project will attempt to solve, its objectives, methods and instruments used, justification and conclusion.

* 1. **Background of the Study**

The effective management and upkeep of public infrastructure is a core responsibility of local government bodies. In municipalities like Redcliff, the delivery of essential services is frequently undermined by outdated, manual fault reporting methods, which contribute to inefficiencies, data inaccuracies, and a lack of accountability. Issues such as potholes, sewage overflows, burst water mains, and electricity outages are often communicated informally through phone calls or in-person visits making them difficult to trace and lacking in transparency (Munyoka & Manzira, 2019).

To tackle these inefficiencies, the global movement toward smart cities underscores the value of embedding digital tools into urban governance. A smart city utilizes information and communication technologies (ICTs) to improve the efficiency, quality, and responsiveness of public services while fostering better interaction between governments and citizens (Kitchin, 2014). Central to smart governance is the capacity to capture, analyze, and act upon real-time data—particularly in managing infrastructure faults. Web-based fault reporting systems are instrumental in this regard, providing structured, timely, and transparent mechanisms for addressing service-related issues. Several urban centers in the developing world have acknowledged this need. Cities such as Harare and Bulawayo have initiated or explored the use of digital platforms for fault reporting within their broader smart city agendas. Nevertheless, widespread adoption has faced obstacles, including limited financial resources, low levels of digital literacy, inadequate technological infrastructure, and institutional inertia (Mwaura & Ngugi, 2020; Chigwada, 2021).

These barriers point to the importance of developing solutions that are adaptable to local socio-economic conditions.

For Redcliff Municipality, implementing a web-based Fault Reporting System represents a strategic move toward smart urban governance. By transitioning to a digital platform for identifying and resolving engineering-related faults, the municipality can shorten response times, optimize resource distribution, and foster a more transparent, participatory environment. This approach would empower residents to report issues online, track progress, and hold municipal departments accountable thereby strengthening public trust and governance effectiveness.

* + 1. **Background of the organization**

The name “Redcliff” originates from the region’s distinctive natural landscape, specifically the red-soiled cliffs that surround the settlement. Before the establishment of the town in 1942, the area was locally known as Chikomo Chishava, which translates directly to “Redcliff” in English. Centrally located in Zimbabwe’s Midlands Province, Redcliff Town was formally established in 1948, strategically positioned nearly halfway between the country’s two largest cities—Bulawayo and Harare.

Redcliff’s population is estimated at around 38,000 residents. Historically, the town’s economic lifeline was the Zimbabwe Iron and Steel Company (ZISCO), previously New ZimSteel, established in 1942. At its peak, it employed approximately 6,000 individuals and was deeply interwoven with the town’s economic stability, despite operational setbacks that prevented the plant from achieving full-scale functionality.

Redcliff Municipality encompasses six suburbs: Grassland, Ridgeway Plots, Rutendo, Torwood, Simbi Park, Millennium Park, and Redcliff . The municipality also includes several commercial farms used for both crop production and livestock rearing. Governed by a council of nine elected members, each representing one of the ten municipal wards leadership within the municipality includes a Mayor, Deputy Mayor, and various Committee Chairpersons.

Granted municipal status in 1978, Redcliff covers an area of approximately 6,400 hectares. According to the 2012 national census, the town had a population of 35,924 and comprised 9,458 households. The municipality’s settlement pattern includes two low and ultra-low-density areas, one medium-density zone, and three high-density communities.

* + 1. **Organizational Structure**

According to Robbins, Coulter, and Randel (no date.), an organization’s structure refers to the official framework of task assignments and reporting lines that guides, coordinates, and encourages employees to collaborate effectively in pursuit of the organization’s objectives. Organizational structures can vary, including centralized and decentralized models. Redcliff Municipality follows a more centralized structure, where decisions and information flow primarily from the top levels of management downward. The organizational structure of Redcliff Municipality is illustrated in Figure 1.1 below. At the top of the structure is the Town Clerk, who serves as the chief executive officer of the council. The Mayor and councilors, elected from various wards, play a key role in council governance and also serve as chairpersons of the council’s standing committees. In addition, there is administrative staff responsible for managing the municipality’s daily operations



*Fig 1.1*

* + 1. **Vision**

“A City by 2030”

* + 1. **Mission Statement**

“To provide affordable, quality services and a pleasant living environment to the community through organizational excellence and strong community leadership that promotes sustainable economic development.”

* 1. **Problem definition**

The existing process is prone to delays, miscommunication, and poor coordination. Residents often struggle to find a reliable channel to report problems such as broken streetlights, blocked drainage, water pipe bursts, or potholes. Simultaneously, the engineering and public works departments face challenges in managing these complaints effectively - including tracking fault locations, assigning repairs, and monitoring response times. These delays have serious implications for service delivery and public safety. For instance, during the rainy season, delays in reporting and attending to blocked drainage systems have resulted in flooding in some neighborhoods’. In some cases, vehicles have been unable to cross flooded roads, posing risks to property and life, and further exacerbating public frustration.

This disjointed approach hampers timely maintenance and repair, affects service delivery, and reduces public satisfaction.

Therefore, there is a need to design and implement a digital Fault Reporting System that will allow residents to easily log issues via web or mobile interfaces, enable municipal staff to prioritize and track faults in real-time, and support better planning through data analytics and reporting.

* 1. **Aim**

As noted by Osayande and Ukpebor (2012), an aim refers to clearly defined objectives that are intended to be achieved. In this context, the aim is to design and a Fault Reporting System specifically for the Engineering Department of Redcliff Municipality. The system will enable the efficient logging, tracking, and management of infrastructure-related issues such as road damage, water supply failures, and sewer blockages reported by residents. By utilizing historical and real-time data, the system will improve response times, enhance accountability, and support informed decision-making for maintenance and resource planning.

* 1. **Objectives**

1. To allows authorized residents to report faults

2. Capture the details and location (address) of the person reporting.

3. Allocate a fault to a relevant section of the works department.

4. Sends status updates to residents

5. To predict faults of the town

* 1. **Instruments and methods**
     1. **Instruments**

An instrument refers to a tool or resource that supports developers throughout the different phases of the system development lifecycle, including planning, design, implementation, testing, and deployment. In this project, the developer utilized a range of instruments, as outlined in the table below.

|  |  |  |  |
| --- | --- | --- | --- |
| **Instrument** | **Description** | **Application in System** | **Reason for choosing it** |
| HTML/CSS | Markup and styling languages used to design the structure and appearance of web pages. | Used to create the front-end interface of the fault reporting system. | Widely supported, easy to use, and essential for web design |
| JavaScript | A scripting language that enables dynamic content and interactivity in web applications. | Handles form validation, dynamic page updates, and user interaction features. | Highly compatible with all browsers and essential for client-side behavior. |
| PHP | A server-side scripting language used for backend logic and database interaction. | Processes form submissions, handles requests, and communicates with the database. | Open-source, well-documented, and widely used for web development. |
| MySQL | A relational database management system used to store and retrieve data. | Stores user reports, fault data, user profiles, and system logs. | Reliable, scalable, and integrates well with PHP. |
| XAMPP | An open-source web server solution stack package that includes Apache, MySQL, PHP, and Perl. | Provides a local development environment for building and testing the system. | Easy to set up and ideal for testing PHP-MySQL applications locally. |
| Bootstrap | A front-end framework for developing responsive and mobile-first websites. | Ensures the user interface is clean, responsive, and works across devices. | Speeds up development with pre-designed components and responsiveness. |

*Table 1.1*

* + 1. **Methods**

Research methods offer an organized approach for systematically gathering, arranging, and examining data in a thorough and disciplined way.

To gain insight into the current manual system's operation, three primary data collection techniques were utilized:

1. Interviews

According to McMullan (2009), an interview involves a purposeful conversation between two or more individuals to gather targeted information aligned with specific research goals.

1. Observations

As outlined by Allan (2008), observation involves either openly or discreetly monitoring how a system functions. This method allows for first hand understanding of the system’s actual performance and highlights operational shortcomings.

1. Questionnaires

Bryant (2009) describes a questionnaire as a written set of structured questions developed by the researcher and administered to respondents to obtain key data necessary for addressing the research problem.

* 1. **Justification and Rational**

According to Eyre, Project and Statement (2021), the justification of a study lies in the practical benefits expected to emerge from the implementation of the system being developed. In the case of the web-based Fault Reporting System for Redcliff Municipality’s Engineering Department, the following benefits justify its development:

1. Reduction in workload for municipal staff

The system automates the process of fault logging, tracking, and resolution, which reduces the manual burden on engineering personnel and administrative staff.

1. Easy access to historical fault records

The system allows authorized staff to quickly retrieve records of past faults, maintenance activities, and response timelines, streamlining investigations and planning.

1. Cost savings on administrative resources

By transitioning from paper-based records to a digital platform, the municipality can reduce expenditure on stationery, printing, and physical storage.

1. Proactive infrastructure maintenance

By analysing recurring fault patterns and response times, the system can support early identification of problem areas, helping to prevent major breakdowns before they occur.

1. Fostering trust between residents and the council

By offering a transparent and accessible platform for reporting faults and tracking their resolution status, the system enhances accountability and responsiveness, thereby strengthening public trust in the municipality’s commitment to service delivery.

* 1. **Conclusion**

The aim of the Fault Reporting System is to streamline the process of identifying, reporting, and addressing engineering-related faults within Redcliff Municipality. This system leverages digital technologies to enhance transparency and responsiveness by capturing reports of infrastructure issues such as road damage, water leaks, and sewage blockages and allowing the municipality to respond in a timely and organized manner.

The core objective is to ensure that reported faults are accurately logged, tracked, and analysed for better planning and resource allocation. The system addresses limitations of the previous manual methods, which were characterized by delays, inefficiencies, and a lack of reliable records, leading to poor decision-making and reactive rather than proactive maintenance strategies.

The next phase involves the planning and analysis stage, which will include evaluating the business value of the system, identifying key stakeholders, and assessing the project’s overall feasibility. This includes reviewing four critical aspects: economic feasibility, social feasibility, technical feasibility and schedule feasibility.