**UPDATED CHAPTER 1 & 2 (EXCLUDING MACHINE LEARNING CONTENT, WITH RELEVANT MOBILE TECH REFERENCES)**

**UPDATED CHAPTER 1 (WITH FULL CITATIONS AND REFERENCES)**

**CHAPTER 1: INTRODUCTION**

**1.0 Background of the Study**

Mogadishu, the capital city of Somalia, has long struggled with challenges related to waste management and urban cleanliness. As the city continues to grow in population and infrastructure, the amount of waste generated has increased significantly, leading to severe environmental and public health concerns. The improper disposal of plastic waste and other non-biodegradable materials has resulted in polluted streets, clogged drainage systems, and a degraded urban environment. This situation not only impacts the city’s aesthetic appeal, but also poses risks to the health of its residents and the sustainability of its ecosystem.

Efforts to address these challenges have been hindered by a lack of organized clean-up initiatives and limited access to tools that enable community participation. While some volunteer groups and local organizations have taken steps to clean up parts of the city, their impact has often been limited due to insufficient coordination and resource allocation. Additionally, there is no centralized system that allows residents to report waste accumulation or connect with volunteers willing to assist in clean-up efforts.

The advancement of digital technologies presents a unique opportunity to tackle these issues more effectively. By leveraging mobile and web-based platforms, it is possible to create a coordinated network of volunteers and community members who can work together to clean and maintain Mogadishu’s environment.

This research explores how technology and community action can be combined to provide sustainable solutions to Mogadishu’s waste management challenges. The project aims to develop a system using mobile apps and web technologies to address littering in Mogadishu, focusing on city-wide and ocean cleanup efforts. The app provides a platform for users to report litter locations, join clean-up events, and access educational resources, enhancing awareness and collaboration (Cruz et al., 2024).

Global plastic pollution statistics highlight the urgent need for such solutions, with up to 199 million tons of plastic waste already in oceans and 33 billion pounds added annually. This pollution harms marine ecosystems and human health, as microplastics enter the food chain. The app offers real-time data, user engagement, and global collaboration, surpassing traditional cleanup methods by enabling broader data collection and reporting.

Street cleaning is a critical city service that ensures urban areas remain clean and visually appealing. It involves activities like sweeping streets (manually or with machines), picking up litter, removing illegally dumped waste, and addressing graffiti and flyposting. These efforts target pavements, road edges, and nearby green spaces (Li, Bhushan, & Gao, 2018).

Ineffective street cleaning is visibly noticeable and can negatively impact residents' quality of life, the attractiveness of neighborhoods, and even urban safety, as environmental issues are often linked to disorder and crime. Conversely, effective street cleaning contributes to better environmental quality, supports urban development, attracts tourists and investors, and reduces costs for cleaning underground water systems (Li et al., 2018).

This section emphasizes the need for improved waste management in rapidly urbanizing African cities, highlighting the environmental and health risks such as pollution and diseases. It stresses the importance of mobile applications as a solution to enhance waste collection, given the rise in mobile internet usage. The project aims to develop a mobile app to address waste management challenges, focusing on disease prevention and environmental protection (Henrys, 2021; Mavropoulos et al., 2015; Cruz et al., 2024).

**1.1 Problem Statement**

Mogadishu is grappling with a significant waste management crisis. Streets, markets, and residential areas are inundated with plastic waste and other non-biodegradable materials, posing threats to the city’s aesthetics, public health, and environmental sustainability. The lack of effective waste management systems has led to environmental degradation, contributing to the spread of diseases and negatively impacting the quality of life for its residents. The city's current waste management efforts are fragmented, resulting in inefficient resource allocation and limited long-term impact.

Moreover, there is an absence of an integrated digital platform to address these pressing issues. Residents are left without accessible channels to report waste problems, and volunteers struggle to identify areas of priority that require immediate clean-up efforts. This lack of coordination, combined with the fragmented efforts, exacerbates the crisis, preventing the city from achieving a cleaner and more sustainable environment.

**1.2 Objectives**

* Develop an integrated digital platform to coordinate community clean-up efforts, enabling residents to report waste and connect with volunteers.
* Engage the community in sustainable waste management practices by providing a user-friendly platform for participation and awareness-raising.
* Promote sustainable urban development by fostering a cleaner and healthier Mogadishu.
* Monitor and evaluate the impact of clean-up efforts to ensure continuous improvement.

**1.3 Research Questions**

1. How can digital technologies improve waste management in Mogadishu?
2. What factors influence community engagement in urban clean-up activities?

**1.4 Motivation of the Study**

The motivation behind this study is to address the pressing urban waste management challenges facing cities like Mogadishu by harnessing the power of digital technologies. In a world where urban populations are rapidly growing and waste management systems struggle to keep up, there is an urgent need for innovative solutions that go beyond traditional approaches. By creating a community-driven platform, this study aims to empower residents to actively participate in the waste reporting process, fostering a sense of shared responsibility for the cleanliness of their environment (Cruz et al., 2024).

**1.5 Significance**

The proposed mobile application represents a critical innovation for Mogadishu, aiming to bridge the existing gaps in community-driven waste management. By creating an accessible, real-time platform, the app will facilitate better communication and coordination among local residents, volunteers, and organizations engaged in environmental clean-up efforts. This system will enable faster and more organized waste reporting, which is currently lacking in the city, thus improving the efficiency of waste management operations.

Furthermore, the success of this initiative could serve as a model for other cities facing similar waste management and environmental challenges. The project aims to showcase how digital technologies can effectively address urban waste crises, creating opportunities for replication and adaptation in cities worldwide. Ultimately, the app will not only improve the quality of life for residents but also contribute to global sustainability goals by fostering cleaner, greener cities (Henrys, 2021; Cruz et al., 2024).

**1.6 Scope of the Study**

This study centers on the development of the "Mogadishu Eco-Volunteer App," a mobile application designed to address the pressing waste management challenges facing Mogadishu. The app aims to empower local communities by offering an accessible and user-friendly platform for waste reporting, organizing community clean-up events, and facilitating volunteer coordination. Through this platform, residents will have the ability to report waste issues in real-time, enabling more effective and targeted cleanup efforts (Cruz et al., 2024).

The scope of this study extends from December 2024 to August 2025, during which the app will be developed, tested, and refined to ensure its effectiveness. The focus of the study will also involve evaluating the app’s impact on community engagement, environmental cleanliness, and its potential scalability to other urban areas facing similar waste management challenges.

**1.7 Organization of the Study**

The thesis is organized into seven chapters, each serving a distinct purpose in the research process:

1. Introduction
2. Literature Review
3. Methodology
4. System Analysis and Design
5. Implementation
6. Results and Discussion
7. Conclusion and Recommendations

**References**

* Cruz, C. C., Villafuerte, H. C. R., Avila, R. B., & Derla, K. L. S. (2024). Mobile Application for Monitoring Trash Collection Schedules and Promote Efficient Solid Waste Management. *Cognizance Journal of Multidisciplinary Studies*, 4(3), 22–31. https://doi.org/10.47760/cognizance.2024.v04i03.003
* Henrys, K. (2021). Mobile application model for solid waste collection management. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.3808542
* Li, W., Bhushan, B., & Gao, J. (2018). A Multiple-Level Assessment System for Smart City Street Cleanliness. In *SEKE 2018*, 256–303. https://doi.org/10.18293/SEKE2018-101
* Mavropoulos, A., Tsakona, M., & Anthouli, A. (2015). Urban waste management and the mobile challenge. *Waste Management & Research*, 33(4), 381–387. https://doi.org/10.1177/0734242X15573819