

COURSE: BACHELOR OF APPLIED SCIENCES (GEOINFORMATICS)

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PROJECT TITLE: DESIGN OF A WEB-BASED GEO-ENABLED APPLICATION FOR REPORTING SEWER INCIDENCES IN THE INFORMAL SETTLEMENTS OF NAIROBI CITY, A CASE STUDY OF KAWANGWARE

1.1: GENERAL BACKGROUND

Even though sewer systems are one of man’s greatest inventions in waste disposal management, it has also become one of the greatest causes of pollution in urban areas. They enormously impact the health and lives of the users of the sewer systems. Sewer systems prevent diseases and unpleasant situations such as the event that occurred in the 16th century London and known as the great sink. Smart cities all over the world have majorly incorporated smart wastewater networks into their systems which use sensors, automatism and technological processes that provide substantial improvement in their sewer systems. According to Fira Barcelona, the use of sensors, data analysis and state-of-the-art infrastructure, places such as the counties Jefferson and Louisville, and the city of Cincinnati in the United States have improved their sewer systems, applying real-time control combined with a weather forecast. These combined tools predict the collapse of sewer infrastructure and can be used to prevent wastewater overflows.

In Kenya, the urban sewerage system was initially designed to maintain the clean, pollution free and hygienic environment for the urban dwellers. The sewer system is a basic amenity and is expected to provide uninterrupted services to the urban dwellers. However, the rapid increase in population growth, increased urbanization processes and rural-urban migration has created an enormous pressure on the existing services(Asoka et al., 2013). The ratio of wastewater generation has not been accompanied by an equivalent capacity to address the problem.A functional waste management system should be able to collect, transport, treat and dispose off waste, while monitoring and regulating the waste management process and waste-related laws, technologies and economic mechanisms.

However, this is not the case in Nairobi, where most of its areas lack sewage systems. In the areas that do have a system such as Kawangware, issues such as non-functional sewers, accidental and or deliberate breakages of manhole covers, sewer pipe bursts, blockages of sewer lines, sewer chokes, sewage outflows and open sewage still reign supreme. This is majorly because increased population growth in the area is not mirrored by upgrading, or maintenance of the existing sewage systems.

The authority in charge of providing and managing clean water and sewerage services in Nairobi is the Nairobi City Water and Sewerage Company(NCWSC). The role of Arthi Water Works Development Agency (AWWDA) is the development, maintenance and management of water and sewerage infrastructure in the county of Nairobi. These two bodies are responsible of maintaining of the sewer systems according to the Service Provision Agreement. A report carried out by the office of the Auditor General, 2018 proved that the sewer systems in Nairobi are lacking in maintenance practices. Further, the AWWDA has failed to provide proof that they actually perform surveillance and monitoring of the status of the sewerage system as the custodians of the infrastructure.

The NCWSC has been using conventional methods for allowing residents to air their complaints and inputs related to faulty sewer incidences, such as social media platforms like Facebook and Twitter, and through their email and telephone number. However residents claim that there has been little to no follow-ups and responsiveness to their complaints and reports.

1.2: STATEMENT OF PROBLEM

The old and poor infrastructural conditions and the lack of proper maintenance practices of the sewer systems have been the cause of sewer outbursts, overflows, chokes, bursts and other related sewer incidents along the streets and residential areas. In the event that these incidents occur, the residents do file complaints to the NCWSC and the county government for mitigation and fixing of these problems. However, it has been noticed that there is slow, little or no responsiveness of the NCWSC to reported incidences such as sewer bursts and chokes. Most of the residents also lack a proper systemic structure that enables them to report these incidences to the necessary authority and the assurance that their problems will be fixed timely.

Owing to the fact that the sewer chokes and bursts are not responded to and repaired timely, Kawangware has experienced challenges that intensify environmental degradation, pollution, poor sanitary conditions and a strain on the existing sanitary facilities such as treated water pipes. There have also been rampant cases of bad odour caused by the open sewers, breeding sites of mosquitoes, spreading of waterborne diseases, damage of infrastructure and traffic congestion, flooding, and ultimately disruption of normal life.

It is therefore prudent to develop a smart solution for this problem; which comprises of a reporting communication system in the form of a web application. This will be a platform for the residents to collect data about sewer incidents through reporting forms, and the data can be visualized through maps. This will raise awareness on areas with frequent reported incidents and enable the necessary authorities recognize areas that need urgent attention and timely repair, enabling avoidance of the incidents escalating into disasters.

1.3: OBJECTIVES

1.3.1: MAIN OBJECTIVES

The main aim of this project is to develop a web-based Geo-enabled application for reporting sewer incidences in Kawangware

1.3.2: SPECIFIC OBJECTIVES

1. To collect data and information about the system
2. To design a comprehensive conceptual model of the system
3. To develop the physical implementation of the system (Develop the system components) and Integration
4. To test and validate the system
5. To deploy and maintain the system

1.4: METHODS

1.5: SCOPE AND LIMITATIONS

1.6: JUSTIFICATION AND RELEVANCE

1.7: ORGANIZATION OF THE PROJECT