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| **BUSINESS CASE** | |
| **Proposed Project** | Designing and Constructing a Water Purification Plant and Sanitation Infrastructure in the Northern region of Nigeria. |
| **Date Produced** | 21st September 2024 |
| **Background** | Most of the research on Nigeria, especially the northern region, has shown that the area experiences water crises. These crises are challenging to solve because they are primarily due to pollution from industrial waste, agricultural waste, domestic sewage, and flooding. These pollutants negatively impact surface water and groundwater quality, affecting public health.  There is a high need to reduce water pollution by recycling wastewater and providing more purified water to improve the northern population's accessibility to water. |
| **Business Objective** | The business objective includes the following:   * Provide a significant amount of purified water to improve the northern population's accessibility to water in Nigeria. * Reduce water pollution by building and recycling the wastewater in the northern region of Nigeria. * To offer cost-effective and reliable solutions that benefit long-term growth in the northern region of Nigeria and reduce future expenditures. * To promote health awareness of good hygiene and sanitation practices in the northern community of Nigeria. * Increase the economic growth of the communities in the northern region by providing employment opportunities to enhance living. |
| **Current Situation and Problem/ Opportunity Statement** | **Current Situation**  There is a current water crisis in the city of Maiduguri, which has caused the state to be declared a state of emergency. As of September 10th, 2024, it was reported that flooding had destroyed numerous households, and additional support, especially water and sanitation services, is urgently required for the affected community households (Musa, 2024).  Also, the population in the northern region of Nigeria has been stated to have limited access to safe drinking water. Research reported that “96 percent of the population in Borno State lacks access to safely managed drinking water, a crisis highlighted by Phuong T. Nguyen, the UNICEF Chief of Maiduguri Field Office, during the World Water Day events” (Kareem, 2024, para. 1).  **Opportunity Statement**  There is a significant call for support from the Northern Nigerian communities, especially the incident victims in Maiduguri. Providing services and infrastructure to reduce flooding and increase water accessibility in the region is a highly required action. It would promote the growth of the northern economy in the long term. |
| **Critical Assumptions and Constraints** | |
| **Assumptions**   * Acquiring the desired land location in the Northern region, which satisfies the essential requirements for building water purification and wastewater systems. * The residents of the city where the construction would be implemented would not oppose the movement. * The city has a functional water distribution system to household and sewer systems connected from the households. * The city has access to water bodies such as dams and rivers.   **Constraints**   * The water purification and wastewater system will be built in one city in one state, in the northern region of Nigeria. * The northern region residents will be outsourced as part of the human resources for the construction phase and labour work. | |
| **Analysis of Options** | |
| **Options**   1. Design and Construct a Water purification plant & wastewater system based on Forward Osmosis Technology (FO). 2. Design and Construct a Water purification plant & wastewater system based on Reverse Osmosis Technology (RO). 3. Design and Construct a Water purification plant & wastewater system based on Ultrafiltration Technology (UF).  |  |  |  |  |  | | --- | --- | --- | --- | --- | | **Cost Analysis** | | | | | | **Factors** | **Required Standard** | **FO** | **RO** | **UF** | | **Plant Size** | 2000 square meters | $ 2,345,000 | $ 2,800,000 | $ 1,800,000 | | **Human Resource Estimate** | 170 people | | **Timeframe** | 36 months | | **Water Plant Capacity** | 75000 liters per hour | | **Purity Levels** | 6.5 - 8.5 PH |   **Benefits**   1. FO: The technology accommodates lower operational costs by consuming low energy resources and minimal chemical usage, providing high-quality water with low environmental impact. 2. RO: It provides comparatively high-quality water with high scalability but consumes more energy and runs on high operational costs. 3. UF: The technology has lower operational costs and low energy consumption but does not entirely remove all contaminants. | |
| **Recommendations** | |
| The recommended solution is to design and construct a water purification and wastewater system using state-of-the-art technology, such as Forward Osmosis Technology (FO). This will promote a long-term, cost-effective solution for the northern region of Nigeria, allowing access to more consumable water and improving the environment. | |
| **Preliminary Project Requirement** | |
| * Location of potential land for construction. * Contract Agreement with the Nigerian Government for Land Usage. * Geographic and Demographic Analysis of the State and prospective sites. | |
| **Budget Estimate and Financial Analysis** | |
| **Budget Estimate**  The estimated budget to execute this project is 2.5 million dollars, which includes all the design, construction, resources, marketing, and labour costs.  **Financial Analysis**  Estimated Budget = $ 2,500,000  Water Plant Production Capacity per hour = 75,000 litre  Water Plant Production per day = 75000 \* 24 = 1,800,000 litre  Estimated Selling rate in Nigeria per litre = $ 0.4  Revenue to the government per day = 0.4 \* 1,800,000 = $ 720,000  Breakeven point = $ 2,500,000/$ 720,000 = 3.5 days | |
| **Schedule Estimate** | |
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| **Potential Risks** | |
| * Nigerian Government not signing the land and regulatory permits in time to begin site preparation. * Vendors and suppliers increasing the prices of goods and services due to the inflation rate in Nigeria. * Potential technical glitches occurring in the internal system parts of the plant. * Limited and low-level expertise in the construction and labour workers from the community. | |

## **REFERENCES**

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