Faculty of Engineering
Public Works Department

Assessment and Application of Low Cost Technologies for Rural Sanitation in Egypt

A Thesis For
Submitted to the Faculty of Engineering, Ain Sham University for the Fulfillment of the Requirement of M.Sc. Degree
In Civil Engineering

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(SANITARY ENGINEERING)

by

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STATEMENT

This dissertation is submitted to Ain Shams University, Faculty of Engineering for the degree of M.Sc. in Civil Engineering.

The work included in this thesis was carried out by the author in the department of Public Works, Faculty of Engineering, Ain Shams University, from August 2010 to 2015.

No part of the thesis has been submitted for a degree or a qualification at any other University or Institution.

Date:-..... /...../ 2015

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DEDICATION

Deep appreciation is due to their support, encouragement and patience.

MY MOTHER

Thanks are to be extended to her support.

MY FATHER

God bless him

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ABSTRACT

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Summary :-Too many wastewater treatment plants (WWTP) systems are implemented, but most appropriate system is missing in some locations. This study aims to assess treatment technologies implemented in rural communities in both Lower and Upper Egypt. The assessment has focused on aerobic treatment, anaerobic treatment and natural treatment technologies and was based on studying plant performance; plant economic parameters including capital investment, operation and maintenance costs, total cost per m^3 of wastewater, collected fees per m^3 of wastewater; and compliance with laws and regulations. The result of the study showed that the activated sludge (AS) system is the most commonly used WWTP in Egypt (53%) including conventional (CO) and extended aeration (EX) technologies. These systems are mainly concentrated in Lower Egypt. This is followed by waste stabilization pond (15.7%) concentrated in Upper Egypt.The activated sludge (AS)**,** the rotating biological contactors (RBC), the oxidation ditch (OX), and sequencing batch reactor (SBR) technologies proved to have the highest performance for the percentage removal of BOD_5, COD and TSS. Technologies such as oxidation ditch (OX) and aerated lagoon (AL) proved to have full operation and consumables cost recovery. Technologies such as SBR, RBC, and AS exhibited high operation and consumables costs due to high energy requirements. The AL, RBC and EX plants showed the lowest total cost. From the results a matrix was formed for technical and economic data characterizing all investigated WWTP technologies. Therefore, the main parameters in selecting the most appropriate WWTP(s) technology for a village should consider its performance, and the total cost for the full life-cycle including capital and operation costs.

Key Words:
Wastewater treatment; performance analyses; economic analyses; ranking of wastewater technologies in Egypt, Total cost.

Who Are These Supervisors
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