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Declaration

I declare that no part of the work referred to in this thesis had been submitted in support of an application for another degree or qualification of this or any other University or Institution.

ABSTRACT

Environmental quality is a prime concern to sustain the development of Egypt. Solid wastes generated from human settlements are of the major environmental issues that concern and challenge Egypt today. SWM is a crucial public service issue affecting both environment and health. SWM in Egypt have always been, and will continue to be one of the most pressing challenges facing the Egyptian authorities for the coming decades unless *appropriate* solutions are derived.

The intention of this search is to implement Quality Improvement Techniques in Environmental Engineering Field to analyze the Egyptian Waste Management problem and find applicable solutions according to the current situation givens. The main focus is on municipal solid waste excluding hazardous wastes from it.

SWM problem in Egypt can be summarized as the absence of a regular waste collection service; waste is dumped in open spaces, on access roads which are invaded by animals and waste pickers so, wastes are scattered and serve as breeding grounds for disease vectors and with the leachate from decomposing garbage nearby water sources and soil which results in food contamination, all this have serious environmental consequences. Alexandria, the second capital of Egypt is taken as practical case study of this search.

Summary

The field of solid waste management is as old as human beings age. Since that waste is a product that is commonly developed due to human living. This sector has been of such concern for all cultures all along the history because of its significant effects on both the human health and his surrounding environment. The effects on health appears in terms of disease spread like cholera and plague; that were really developed due to poor means of handling solid wastes at this time. While the significant effects that could affect the environment appear in terms of land degradation and soil contamination.

But a huge gap has occurred in the development and improvement of this field between developed and developing countries along time. In developing countries like Egypt, the situation is deteriorated in terms of inadequate waste collection service resulting in poor waste collection coverage efficiency that led to waste “garbage” spread on the access roads of the cities. This spread garbage is subjected to scavenging by animals and informal waste pickers with complete exposure to weathering conditions and after it is collected the most common method of disposal is controlled open dumping which led to open burning of wastes. Even those uncollected wastes remaining in their place of dumping are also open burnt by near residents due the odors they produce. If those wastes that are not open dumped most of them go to a sanitary landfill. While in developed countries the situation is completely different in terms of adequate service resulting in highly qualified waste collection coverage efficiency. The wastes in developed countries are treated as a resource for national economy not as an expenditure that costs the government money to get rid of. Wastes in those countries are considered as an industrial field, that act as an economical driver in terms of revenues to the country and employment opportunities to the people.

So when developing countries want to improve the waste collection service they always seek for the developed countries help; which is not the suitable way. This unsuitableness is due to the poor consideration of the situation from both countries. As developing countries seek for consultancy from foreign engineers from developed countries in which whose situation is far much better not taking into consideration that this gap will have negative effects on the suggested methods of improvement.

So, what actually happens is that, developing countries goes for developed countries asking for their consultation to improve their solid waste management situation; where developed countries always suggest solutions from their own points of view in terms of high technologically equipped solutions which are very expensive for the developed countries municipal budget to adequately cover. So, this situation no matter how long it lasts effective it has to end in a situation not much better than the time it started.

This gap appears in terms of several deficiencies in the system of the developing countries. Since that waste collection is meant to consider legal and managerial issues that are required to regulate the service, collection and transfer methods then the treatment processes done on the collected wastes and finally the methods of disposal either in a sanitary landfill or an open dump. These deficiencies occur in terms of legal gaps as they have already developed special waste law while we have several regulations mentioned in different laws regarding the regulations of solid waste management. Also the means of financing the service, the budget in the developing countries is limited and the revenues are always suffering from shortage. Besides is the awareness of the importance of the proper waste management by community. Most people in developing countries are not aware by the processes done on collected waste before disposal, they don't know how far the service is expensive and they don't even acquire the potential health hazards resulting from this deteriorated situation. All they know is that waste management is the collection of wastes by either the government or the waste pickers as they have always been accustomed to their handling to the service.

Taking our country as an example, when privatization started to take place in the political and economical Egyptian life; the solution was to privatize the service and seek for an international private partner as they have much more experience in the field. Though by the year 2000 Alexandria governorate was the first to obtain this system. This international private partner introduced a huge highly equipped collection fleet without considering the specific waste characteristics of the Egyptian waste and the people's culture regarding solid waste management means in the Egyptian society. So, this method was both expensive and unsuitable for technical and cultural issues.

Though this situation offered a highly qualified service but the revenues were much less than the expected. As people were not willing to pay which decreased the revenues more.

By the 2011 the international private partner broke the contract leaving the government in L.E 120 million debts to the solid waste management service.

Hence, from the searches point of view seeking for foreign advices shouldn't be from such developed countries. As they have very different circumstances in this field; so seeking for experience should be from a developing country as well but one that has managed its solid waste effectively, besides taking into consideration the unique characteristics and specifications of each country.

Besides enhancement of the local expertise consultancy in this field as they will be more aware about their own country circumstances better than anyone.

Hence, from the search's point of view is that the municipal solid waste collection service should go back to its ancient means of door to door collection with enhanced community participation in terms of encouragement of at source segregation to provide more qualified input for the processes done on wastes after collection. Also enhancement of the means of waste reduction by the producers will improve the waste hierarchy used in Egypt. Besides the closing of the legal gaps that negatively affect the service with the creation of innovative methods for the finance of the service rather than the complete dependence on the fees collection.

Nomenclature

Abbreviations

BQIP	Basic Quality Improvement Process
C&T	Collection and Transfer
CCBA	Cairo Cleansing and Beautification Authority
CN	Carbon, Nitrogen ratio
CsCM	Curbside Collection Model
EEAA	Egyptian Environmental Affairs Agency
GCBA	Giza Cleansing and Beautification Authority
HS	Hazardous Substance
HW	Hazardous Waste
HWM	Hazardous Waste Management
ICT	Information and Communication Technology
IMF	International Monetary Fund
IPP	International Private Partner
IPS	International Private Sector
L&I	Legal and Institutional
MCIT	Ministry of Communication and Information Technology
METAP	Mediterranean Environmental Technical Assistance Programme
MHP	Ministry of Public Health
MSEA	Ministry of State for Environmental Affairs
MSWM	Municipal Solid Waste Management
MUWMP	Mediterranean Urban Waste Management Program
NGO's	Non-Governmental Organizations
NSFMSWM	National Strategy For Municipal Solid Waste Management
P&D	Processing and Disposal
SMAP	Short and Medium Term Environmental Action Program
SW	Solid Waste
SWEIMA	Solid Waste Inspection and Environmental Monitoring Administration
SWM	Solid Waste Management
SWOT	Strength, Weakness, Opportunity, Threats
SWTA	Solid Waste Technical Assistance project
WB	World Bank
WTE	Waste To Energy

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