

## **5. CHAPTER 5**

### **CONCLUSION AND RECOMMENDATIONS**

#### **5.1. CONCLUSION**

The management of solid wastes is a major challenge for the local governments, since that waste is a major health hazard that undermined people's right to a safe life [50] and also it greatly affects environment. Lack of concerted efforts to create awareness about good waste management practices and failure of the municipalities to provide this important service to the public are primarily responsible for the development of this poor solid waste management in the country. The severity of the issue has increased due to rapid urbanization coupled with population growth.

A common and fundamental deficiency in MSWM is the failure of local governments to ensure that sufficient funds are available to provide an acceptable level of the service. To the contrary, the limited funds that are available are frequently used to acquire an inadequate service due to the usage of the unsuitable collection models that its expenditure is much more than its revenue.

More over the used systems in developing countries have been recommended by overseas consultants from countries with very different economic and social conditions and completely different waste characteristics.

The absence of adequate planning and the use of unsuitable vehicles and equipment have led to serious wastage effort and expenditure in this direction.

Consequently the service provided in the majority of developing countries at best, be described as unreliable, irregular and inefficient.

Though by fulfilling the requirements of good MSWM from being cost effective, environmentally safe and suitable to people's culture, an appropriate solution can be derived after fulfilling these requirements so a sustainable service can be achieved.

Waste management is not limited to the collection of wastes; it includes proper managing to get sufficient means of collection, transportation, transferring, sorting, and processing of wastes to get best revenues and finally environmentally safe disposal.

## 5.2. RESULT FOUND FROM CURRENT SITUATION

The following are the results found after studying the current situation that has led to the high percentage of uncollected waste:

- i. Lack of effective national policies and strategies for waste management.
- ii. Unavailability of proper waste disposal standards.
- iii. Inadequate finance with low cost recovery levels.
- iv. The volume of generated solid wastes is alarmingly increasing.
- v. Poor waste collection coverage.
- vi. Insufficient MSW regulations accompanied by weak enforcement.
- vii. Vague methods of cost calculations and fees assignment.
- viii. Lack of strict quality control means on the service.
- ix. Lack of reliable data base systems for solid wastes.
- x. Undefined roles and distributed responsibilities inside the field.
- xi. Unauthorized facilities to empower law implementation.
- xii. Bureaucratic top down solutions, usually reached without community participation.
- xiii. Capital intensive approaches, that involves advanced technology and highly equipped fleet mainly adopted from developed countries.
- xiv. Ignorance of local expertise or even expertise from countries with similar conditions; but always the consultation of developed countries experts.
- xv. Neglecting of the informal sector integration; who represent a huge and experienced work force.
- xvi. Lack of innovative methods of finance and cost recovery schemes.
- xvii. Slow development in the waste hierarchy.
- xviii. The great lack of community awareness about waste management, especially the post collection processes.
- xix. The un-consideration of waste as a national resource to increase the country revenues not to be treated as expenditure.
- xx. The lack of political will towards the improvement of this field.
- xxi. The un-considered potentialities of establishment of waste industry that can turn waste management into a sustainable economy driver.

These are the main and common waste management problems not in Egypt only but in most of the developing countries as well. The derived solution in this search is supposed to overcome most of these problems, as this solution enhances the community participation and has taken into consideration our specific waste characteristics and societal habits. The solution doesn't depend on foreign approaches especially from developed countries and so it doesn't encompass the use of any expensive equipment that would result in a huge budget needed to execute the solution.

### **5.3. THE SOLUTION IN BRIEF**

The solution aims to offer a sustainable cost effective service with environmentally safe means of disposal and processing that can increase the revenue accompanied by unusual methods of finance to help in the establishment of a separate budget for the finance of solid waste management. The method suggested can be briefly mentioned as follows:

- i. Legally identified waste ownership according to collector, who collects owns the waste.
- ii. Collectors are defined according to the area class level.
- iii. Each collector is responsible for transporting his collected wastes to its means of final disposal and processing.
- iv. Primary collection storage points, are residential house holds
- v. Segregation is done at source by the generators (people)
- vi. Collection frequency, every 2 days
- vii. Collection vehicles, open trucks
- viii. Fees, according to area class level
- ix. Establishment of the “commercial utility”
  - x. Add the RDF process for the existing processes available for waste treatment.
  - xi. Increase awareness about waste management especially at schools
  - xii. Continue the improvement by the establishment of WTE processes.

According to this method the benefits from the waste management field is going to be enormous in terms of adequate service besides the huge employment opportunities that this field is going to offer.

### **5.4. THE BENEFITS**

#### **5.4.1. In the legal and institutional framework**

- i. Availability of specific waste management law.
- ii. Development of high standards for the service that guarantees a high quality service.
- iii. Effective means of monitoring for the system.
- iv. Availability of varieties in the private companies.
- v. Empowered law execution on the violators.
- vi. Development of waste regulations that are appropriate to our domestic circumstances.

- vii. Highly qualified prepared long term master plans for SWM.
- viii. Entrusted local government by the community which enhances their cooperation in system execution.
- ix. Regulated informal sector activities.
- x. Financial sustainability.
- xi. Promoted public awareness.
- xii. Collected MSW service charges.
- xiii. Decreased illegal practices.

#### **5.4.2. In the Collection and Transfer**

- i. Usage of appropriate and inexpensive vehicles.
- ii. Enhanced collection efficiency.
- iii. Avoidance of garbage spread on access roads.
- iv. Introduced means of source separation
- v. Enhanced community involvement.
- vi. Reduced operating and maintenance costs.
- vii. Decreased downtime of vehicles.
- viii. Decreased sorting efforts done at the transfer stations.
- ix. Increased productivity.

#### **5.4.3. In the Processing and Disposal**

- i. Decreased open dumping.
- ii. Decreased open burning.
- iii. Enhanced quality of inputs of different waste processes.
- iv. Introduction of new processes that add value to the waste management field.
- v. Enhancement of opportunities of WTE process to be implemented.

### **5.5. RECOMMENDATIONS**

These are the recommendations for more advanced waste management service to be achieved:

- i. Review trade agreements in order to extend the responsibility of foreign producers to manage the packaging and waste of electronic and electric equipment generated from their goods to our country.
- ii. Consider financial resources through extended producer responsibility.

- iii. Develop and implement a sustainable public awareness campaign.
- iv. Promote a Clean Week or a Clean Neighborhood with financial rewards to motivate cleansing competence criteria.
  - v. Promote the culture of waste reduction.
- vi. Raise the public awareness about the environmental consequences of inadequate waste management.
- vii. Introduce MSWM in educational programs at universities and schools.
- viii. Promote on site sorting of various waste streams.
- ix. Foster regional cooperation research and experience exchange in the field of solid waste management.
- x. Increase and enhance the focus on solid waste field as an industry that can be an economic driver in terms of new market needs that creates new job opportunities.

## **5.6. FUTURE WORK**

Solid waste management is not an exact science [51]. The waste is not homogeneous and there are daily and seasonal variations in the quantity of the generated waste and its relevant composition. But these two characteristics, the quantity and composition of waste, are the data points upon which the planning and administration waste management services depend from waste collection to transportation to facilities of processing. While waste processing needs more detailed characteristics like, moisture to dry content and the C:N ratio to develop either better revenues from available processes or continue the improvement by adopting more valuable processes.

Therefore it is necessary to develop a data information system for data storage, retrieval and analysis in terms of:

- i. Set up mechanisms for collecting information on solid waste management quantities and compositions locally.
- ii. Establish an operational and environmental monitoring program in each MSWM facility.
- iii. Increase the allocated resources for solid waste researches.
- iv. Encourage the post graduate study in the field of solid waste.
- v. Unify the practices for collecting data among the different solid waste facilities within the country.
- vi. Set up a government-run MSWM web site and upload MSW data on a regular basis.
- vii. Encourage the business of solid waste consultation and set continuous solid waste data analysis as a requisite for business continuity.

- viii. The usage of multi gas detectors that monitors O<sub>2</sub>, CO and H<sub>2</sub>S at landfills to scan different gasses and determine further improvements needed on a landfill.[52]
- ix. Establishment of agreements that offers scholarships for students or employees who are interested or involved in the MSWM for example with Sweden as in Malmo university are offering e-learning methods to provide composting courses that introduces an online plat form on organic waste management through environmental sustainability methods like the Food Wastage Footprint, Too Good To Waste and Source Separation of Organics, all courses are available in English language with Spanish, French, Japanese, Portuguese and even in Arabic subtitling to communicate these methods all over the six continents through the internet.[53]
- x. Perform studies that focus on extracting energy from sewage and sludge wastes as according to most recent studies that every 704,000 gallons of sludge can produce 1800 KW from combined heat and power energy.[53]