AN ANALYSIS OF THE GAP BETWEEN WASTE MANAGEMENT PRACTICES AND COMMUNITY EXPECTATION IN COLOMBO MUNICIPITY AREA IN SRI LANKA

Nelumthika J.S.D.M.S.
Department of Accounting, University of Sri Jayewardenepura

Prabodika H.W.H.
Department of Accounting, University of Sri Jayewardenepura

Kumara S.L.M.
Department of Accounting, University of Sri Jayewardenepura

Kumari P.V.K.
Department of Accounting, University of Sri Jayewardenepura

Abeysinghe A.M.K.H.
Department of Accounting, University of Sri Jayewardenepura

Abstract
This paper consists of identifying the gap between community expectation regarding the waste management and Colombo Municipal Council waste management practices. There is need to develop a correct and detailed database of waste generation, collection and treatment system in various areas in Sri Lanka. In near past, an unfortunate situation due to a gap between waste management practices and community expectation was blasted, by destroying all the environment as well as valuable human lives in Colombo area; Meethotamulla. This is another case in which know and understand the hazards, but fail to manage them. The process discusses the necessity to have a legal instrument to make arranging of solid waste at the point of beginning compulsory, such a disaster will not be happening.
Questionnaire survey, semi structured interviews, factor analysis were used by the researchers to collect and analyze data in existing articles. This study will be incorporated with both types of primary and secondary data. In order to collect primary data, it is expected to use mix approach which consists of both quantitative and qualitative methods. Semi-structured questionnaire will be distributed among participants who were affected by the disaster. Data will be analysed by using SPSS package. Field visits were conducted to collect the data and to understand the solid waste management practices of the Colombo Municipal Council, Interviews were conducted with the responsible officers of Colombo Municipality Council and residents of Colombo area. Literature reviews were used as a secondary data source which emphasized on categories of solid waste, efficiency of waste management practices, obstacles to implement the efficient waste management practices in municipalities, principals of solid waste management, benefits of efficient waste management practices and etc.

Even though there are many literatures exist in relation to foreign context, observed a lack in literatures in relation to Sri Lankan context. Through this study the gap is identified and being recommended the effective waste management practices to full fill community expectations.

**Keywords** - Municipal solid waste management, Waste disposal

1. Introduction

The Solid Waste Management problem is currently a comminatory problem for the Sri Lankan Municipalities. Due to the rises in population over the last few years, fast development of infrastructure, increasing urbanization, industrial growth, changing lifestyle, rise in living standards, and economic conditions increased the generation rate of municipal solid waste in Sri Lankan cities as well as mostly in Colombo area. Waste generation is related with our day-to-day activities and its disposal. Management of these generated wastes is a main problem for the concerned authorities all over the world. However, community expects a suitable environment to breathe in free. There is a conflict between the community expectation & practices of solid waste management in Colombo municipality area in Sri Lanka.
Most of the waste management practices in Colombo municipality are inefficient and Meethotamulla case provides best instance for that inefficiencies. Colombo is the most density area in Sri Lanka and large amount of public and private organizations are being operated in that area and huge amount of waste are raised per day due to that reasons with compared to the other municipal areas. Basically, solid waste generated through the business operation is the burden problem in that area and municipal council have to incur significance effort for collecting, controlling, discarding and get recycled outcome on solid waste. And also, the increasing solid waste generation has become an important issue in recent years due to the uncontrolled growth of the urban population and industrialization.

The Meethotamulla garbage dump, situated in Potuwilkumbura, was a small-scale dump garbage site for Mulleriyawa and Kolonnawa provincial councils. Following the flowing of Blue Mandel Garbage dump, garbage collected from the Colombo municipal council was also dumped to the Meethotamulla garbage dump. In 2009, the citizens of Meethotamulla area have filed a human rights case against the Colombo municipal council at the Supreme Court. The Supreme Court says to stop dumping garbage to this site within two years and the dump area should be limited to only two acres. There have also been number of several public protests against dumping garbage in this area in 2013. This disastrous event only shows inability to address properly a basic issue of waste management, despite the country having so many laws, regulations, authorities, academia and professionals knowledgeable in waste management. The overall goal of municipal solid waste management is to collect, treat and dispose of solid waste generated by all urban population groups in an environmentally and socially satisfactory manner using the most economical means available. Municipal councils are usually authorized to take responsibility for providing solid waste management services. To achieve a reasonable and well-functioning municipal solid waste management system, the principles of sustainable development, integrated solid waste management and the waste management hierarchy must be included and practice at all the possible levels.
As people’s lives and incomes rapidly change, traditional methods of waste disposal become increasingly inappropriate and detrimental to health and practices have been implemented by the municipal councils are not sufficient to establish proper waste management system. Therefore, people in Colombo municipal area, expect that effective and very efficient waste management practices including collect the solid and other waste timely basis, separation of waste and disposing the waste environment friendly manner without harm to others including both people and animals, would be implemented by the Colombo municipal council. But in practice there was a problem in waste discarding system in that area and as a result, lot of people live in particular area faced many damages even from their lives. Therefore, we could identify that there is a gap between waste management practices and community expectation in Colombo municipal area.

2. Literature Review

Introduction

In the carried-out studies on waste management, it was found that there are several categories of research papers within waste management area. Some papers have addressed specific problems within the waste management system where some papers have covered general problems related to waste management including the sectors such as construction, mining, electricity, water sector, gas distribution and etc. Not only that, the existing literature in waste management practices has addressed the problems related to various types of wastes including Domestic solid waste, Commercial waste, Institutional waste, Industrial waste and etc. and the most of the existing literature has based on the countries and regional areas which have been highly affected by this problem.

As a basis for a sustainable waste management system, there are research papers through which integrated frameworks for municipal wastes have been developed. Those frameworks that can be utilized to achieve sustainability, have been developed by using the integrated components of a waste management by considering the economic and environmental aspects of sustainability. Further these frameworks have useful outputs such as compost, secondary products and energy.
Where some researchers have pointed out the municipal of the country, some researchers focused the role of descriptive social norms, organizational norms and personal norms in explaining solid waste management behaviors and systems. Moreover, they have found that organizational norms and personal norms had the strongest effect on the solution to this problem and waste management behaviors.

**Efficiency of Waste Management Practices**

Some other studies have been conducted focusing on municipal solid waste management and indicated that the sectors need to be improved in order to maintain efficient solid waste management system. They find that even though urban local bodies committed to their services, it is difficult to properly manage the waste management system due to the growing magnitude of problems such as increased waste generation process of building and construction industry and hardest recycling process of those building materials. (Pappu et al. (2007) studied about the solid waste generation and their recycling potential in building materials). Authors find that the heterogeneous characteristics of the huge quantity of wastes generated lead to complexity in recycling and utilization.

Also, few other studies have been conducted focusing on measure the efficiency of waste management practices of municipalities. For example, Afonso and Fernandes (2008) measure the relative efficiency of Portuguese local municipalities in a non-parametric framework approach using data envelopment analysis. Author’s results suggest that most municipalities can achieve the same level of output using fewer resources, improving performance without necessarily increasing municipal spending. The authors had taken a wider area of municipal services into account including social services, education, cultural services, sanitation territory organization and road infra-structure. However, studies focusing exclusively on analysis of Municipal Solid Waste Management efficiencies have been rare.
Improving the performance of waste management practices

Some other studies indicate that major obstacles to implementing the efficient waste management practices in municipalities.

Insufficient regulations

The importance of complete governmental regulations for supporting waste management has been extensively investigated. The A study that has been conducted in Hong Kong has pointed out that the mandatory system in implementing the waste management plan for all construction projects would significantly affect the productivity of companies (Tam 2008).

Lack of a well-developed waste recycling market

One of the most important factors in the recycling is the availability of markets for receiving the recycled product (Mills et al., 1999). Peng et al. (1997) also stated that recycling requires an aggressive marketing effort to locate markets and sell materials at the highest possible prices.

Insufficient awareness of waste management

Although practitioners’ awareness about construction and demolition waste management is vitally important to effective waste management, waste management is perceived as a low project priority (Teo and Loosemore, 2001). Consequences caused by the weak awareness of major practitioners have been extensively investigated. Innes (2004) and Poon et al.

Inadequate economic incentive

Many industry practitioners were reluctant to join the activity of embracing waste minimization simply because it meant higher costs (Mills et al., 1999).
Poor skills of operatives

Skill is one of the main factors affecting the amounts of waste produced by operatives (Chen et al., 2002). Clearly, poor skill of the operative is a significant contributor to the large amount of waste generation.

Institutional Issues of Municipal Waste Management

Some researchers have stated issues associated with the waste management practices of municipalities including followings, (Schubeler et al., 1996; Antipolis, 2000) such as distribution of functions, responsibilities and authority between local, regional and central government institutions, organizational structure of the institutions responsible for SWM, including the coordination between SWM and other sectors and/or urban management functions, procedures and methods employed for planning and management, capacities of institutions responsible for SWM and the capabilities of their staff, private sector involvement and participation of communities and user groups.

Principals of Municipal Solid Waste Management

It is stated that six basic principles are included in the waste management system (Robinson, 1986), those are generation of waste, storage of generated waste, collection of waste, transfer or transport of waste, Processing or recycling of waste, disposal.

Even though there are six principals of waste management systems, in some cities that process have been categorized in four steps (Sharholy et al., 2007) generation, collection, transportation and disposal.
Affected Areas

Waste management system of every country or city directly affects to the all element of the environment and human health. As well as peoples’ lifestyle, economic growth, infrastructure and many other areas have been indirectly affected by the efficiency of waste management system.

Basically, the amount of waste generated and the ways of the waste are disposed highly affects to the environment damages. Uncollected wastes in the streets causes’ bad smell, drain blockage, invites scavengers, general public nuisance and become good breeding site for insects (Choe and Fraser, 1999).

3. Methodology

This research study is to explore community perception on waste management practices in Colombo municipal area in Sri Lanka. For that purpose, people in the Colombo municipal area were selected.

Data was collected from the structured questionnaire in relation to the research problem and analyzed them by using descriptive analyzing techniques in order to reach the conclusion.

Research Approach

In this study quantitative data was used in order to understand the expectations of community in Colombo Municipal Council.

Population and sample

Population of the study contained all the people in Colombo area, Sri Lanka. The reason for the selection of Colombo area for the study is due to information accessibility. The study sample of 380 people was selected by the residents in Colombo municipal council.
**Data-collection**

Both the primary and secondary data had been used for the study. But the priority will be given to the primary data sources. Primary Data had collected through in-depth interviews and through the questionnaires. Existing literature related to the research problem had reviewed through the secondary data. In order to gather data interviews with participant and structured questionnaires were distributed. Secondary data was considered to categorize prevailing challenges and barriers in municipal solid waste management.

**Strategy for Analysis**

In order to arrive at a conclusion descriptive analysis was adopted by means of frequency analysis.

**Conceptual Diagram**

![Conceptual Diagram]

- Waste Management Practices
  - Reuse
  - Recycle
  - Disposal
  - Landfill

- Community Expectation
  - Suitable environment to breathe in free
  - Sustainable environment development
  - Disposing waste in environment friendly manner
  - Minimization of disposal cost
4. Data Analysis

Introduction

The objective of this chapter is to present and analyze data gathered in this study. In order to achieve the objectives, data of three hundred eighty individuals were collected. The study constitutes from correlation and regression results in determining the relationship between waste management practices and community expectation of Colombo Municipal Council, Sri Lanka by carrying out correlation and regression model using SPSS software to find the descriptive statistics, correlation among variables and finally to ascertain the impact of the independent variables on the dependent variable. In addition to that this chapter includes the testing of hypothesis in order to check whether this study achieved the objectives.

Descriptive Test

To deliver a better understanding about the behavior of the variables, overall analysis was used in the study. Descriptive analysis was used to present how the sample comprises including gender, their monthly income and age of individuals
**Gender**

The figure 4.1 shows the total individuals in the sample comprise 59.5% of males and remaining is 40.5% of females.

![Figure 4.1](image)

**Age**

Figure 4.2 and Table 4.1 depict the total individuals in the sample based on age ranges.

![Figure 4.2](image)
Table 4.1

Income

Figure 4.3 and Table 4.2 depict the total individuals in the sample based on their income ranges.

<table>
<thead>
<tr>
<th>Income Range</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0 &lt;20</td>
<td>38</td>
<td>10.0</td>
</tr>
<tr>
<td>2.0 20-30</td>
<td>116</td>
<td>30.5</td>
</tr>
<tr>
<td>3.0 30-40</td>
<td>136</td>
<td>35.8</td>
</tr>
<tr>
<td>4.0 40-50</td>
<td>65</td>
<td>17.1</td>
</tr>
<tr>
<td>5.0 &gt;50</td>
<td>25</td>
<td>6.6</td>
</tr>
<tr>
<td>Total</td>
<td>380</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Table 4.2

<table>
<thead>
<tr>
<th>Income Range</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0 &lt;50,000</td>
<td>66</td>
<td>17.4</td>
</tr>
<tr>
<td>2.0 50,000-100,000</td>
<td>140</td>
<td>36.3</td>
</tr>
<tr>
<td>3.0 100,000-150,000</td>
<td>129</td>
<td>33.9</td>
</tr>
<tr>
<td>4.0 150,000-200,000</td>
<td>34</td>
<td>8.9</td>
</tr>
<tr>
<td>5.0 &gt;200,000</td>
<td>11</td>
<td>2.9</td>
</tr>
<tr>
<td>Total</td>
<td>380</td>
<td>100.0</td>
</tr>
</tbody>
</table>
4.1 Regression Analysis and Hypothesis Testing

The regression analysis describes the relationship of each variable with other variables including dependent variable. Therefore, the regression matrix is advantageous to the researcher to identify initially whether there is a relationship with each variable and relationship between each dependent variables and independent variables.

There are mainly four independent variables under waste management Practices such as Reuse, Recycling, Dispose, Landfilling and one dependent variable namely community expectation which comprises Sustainable Environment Development, Sustainable Environment to Breath in Free, Minimization of Disposal Cost and Disposing Waste in Environment Friendly manner.

In analyzing the obtained data, we use the Likert scale method and there are 2 to 5 questions in each variable related to waste management practice and in order to simplify the analysis, get the mean of Likert scale of all question related to each variable. Then data set was factored the using the calculated mean of each variable. Further Community Expectation is measured based on the Likert scale method comprising,

- If the existing practices fulfill the community expectation = 1
- If the existing practices does not fulfill the community expectation = 0

Multiple Linear Regressions

The regression model is based on the following formula,

\[
Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4
\]

Equation 4.1
In analyzing the relationship between waste management practices and community expectation, the linear regression model was developed using SPSS in order to fulfill the requirements of equation 4.1 formula and the resulted output represent the following Beta ($\beta$) values and the related constant of table 4.3.

### Coefficients

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>T</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>(Constant)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>.197</td>
<td>.072</td>
<td>2.726</td>
<td>.007</td>
</tr>
<tr>
<td></td>
<td>Recycling</td>
<td>.020</td>
<td>.019</td>
<td>.057</td>
</tr>
<tr>
<td></td>
<td>Reuse</td>
<td>.019</td>
<td>.012</td>
<td>.080</td>
</tr>
<tr>
<td></td>
<td>LandFill</td>
<td>-.062</td>
<td>.033</td>
<td>-.099</td>
</tr>
<tr>
<td></td>
<td>Dispose</td>
<td>.084</td>
<td>.034</td>
<td>.132</td>
</tr>
</tbody>
</table>

a. Dependent Variable: Expectation

**Table 4.3**

The equation 4.2 depicts the developed regression formula

$$Y = 0.197 + 0.020X_1 + 0.019X_2 - 0.062X_3 + 0.084X_4$$

*Equation 4.2*
In arriving the final output of the regression model, mean (X - Average response of each waste management practice) of each variable is generated using descriptive statistical analysis of SPSS and resulted mean of each practice (Dependent Variable).

Statistics

<table>
<thead>
<tr>
<th></th>
<th>Recycling</th>
<th>Reuse</th>
<th>Landfill</th>
<th>Dispose</th>
<th>Expectation</th>
</tr>
</thead>
<tbody>
<tr>
<td>N Valid</td>
<td>380</td>
<td>380</td>
<td>380</td>
<td>380</td>
<td>380</td>
</tr>
<tr>
<td>Missing</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Mean</td>
<td>2.5289</td>
<td>3.1026</td>
<td>.6084</td>
<td>.5566</td>
<td>.3158</td>
</tr>
<tr>
<td>Minimum</td>
<td>1.40</td>
<td>2.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
</tr>
<tr>
<td>Maximum</td>
<td>4.00</td>
<td>4.50</td>
<td>1.00</td>
<td>1.00</td>
<td>.75</td>
</tr>
</tbody>
</table>

Table 4.4 - Resulted mean of each practice

\[ Y = 0.31578 \]

Conclusion

Hence the output of regression model is attained by the closer to Zero (0) and based on the output it is reasonable to conclude there is a gap between waste management practice and community expectation as the satisfaction of community expectation was measured by 1 when the practices are in line with the expectation whilst zero (0) represents the existing gap between dependent and independent variable.
Hypothesis Analysis

In order to test the relationship between waste management practices and community expectation, the null hypothesis and alternative hypothesis were developed.

H0 – There is no gap between waste management practices and community expectation in Colombo Municipality area.
H1 - There is a gap between waste management practices and community expectation in Colombo Municipality area.

ANOVA

<table>
<thead>
<tr>
<th>Model</th>
<th>Sum of Squares</th>
<th>Df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Regression</td>
<td>.315</td>
<td>4</td>
<td>.079</td>
<td>4.937</td>
</tr>
<tr>
<td></td>
<td>Residual</td>
<td>5.978</td>
<td>375</td>
<td>.016</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>6.293</td>
<td>379</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a. Dependent Variable: Expectation
b. Predictors: (Constant), Dispose, Recycling, Reuse, LandFill

Table 4.5 - Significance Analysis on Hypothesis (Based on 5% Confidence Level)

Conclusion

According to table 4.5, the analysis of variance between the waste management practices and community expectation, the related significance value is 0.10% and it is less than the confidence level of 5% as described by the figure 4.4
Thus, the null hypothesis (H0 - There is no gap between waste management practices and community expectation in Colombo Municipality area) can be rejected and alternative hypothesis (H1 - There is a gap between waste management practices and community expectation in Colombo Municipality area) has to be accepted and it is reasonable to conclude that the existing waste management practices by Colombo Municipal Council are unable to fulfill the community expectation in Colombo Municipality area.

**Recommendation**

As of the information collected about the waste management practices, this study tries to recommend most suitable practice among the existing waste management practices.

<table>
<thead>
<tr>
<th>Q26</th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valid</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.0 Reuse</td>
<td>269</td>
<td>70.8</td>
<td>70.8</td>
<td>70.8</td>
</tr>
<tr>
<td>2.0 Recycling</td>
<td>91</td>
<td>23.9</td>
<td>23.9</td>
<td>94.7</td>
</tr>
<tr>
<td>3.0 Dispose</td>
<td>19</td>
<td>5.0</td>
<td>5.0</td>
<td>99.7</td>
</tr>
<tr>
<td>4.0 Landfilling</td>
<td>1</td>
<td>.3</td>
<td>.3</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>380</td>
<td>100.0</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>

Table 4.6

As per the table 4.6, the best waste management practice preferred by the individual in the Colombo Municipal area is Reuse as 70.8% of respondents confirmed this practice whilst 23.9% of respondents preferred the recycling as the best management practice. According to the study it is recommended that the reuse is most suitable way to manage the waste and fulfill the community expectation and government focus is need to be on allocating resources on enhancing the effectiveness and efficiency of reuse waste management practices.
5. Discussion

A study was conducted to analysis the gap between waste management practices and community expectation in Colombo municipality area in Sri Lanka. In near past, unfortunate situation, like Meethotamulla disaster due to the gap between waste management practices and community expectation was blasted, by destroying all the environment as well as valuable human life. The findings of this research indicate that there is a gap between the municipal solid waste management practices and the community expectation being recommended the suitable practice to fulfill the community expectation in order to reduce the gap.

A study was conducted based on the perception of the people in Colombo Municipal Council. By using questionnaire as the main data collection method, it was got the basic understanding about the existing waste management practices are being implemented by the Colombo Municipal Council and the attitudes & perception of community about the practices that would be support to maintain efficient and effective waste management system. In this study it was basically analyzed four main types of waste management practices such as reuse, recycle, landfill and disposal are implemented by the Colombo Municipal Council and community expectations are considered under Sustainable Environment Development, Sustainable Environment to Breath in Free, Minimization of Disposal Cost and Disposing Waste in Environment Friendly manner.

According to the obtained data and analysis were performed, it was found that the existing practices relating to the waste management system of Colombo Municipal Council are not fulfilled the perceived objectives of the people who are living in such area. That explains there is a gap between existing waste management practices and community expectation in Colombo Municipal Council. Therefore, authorized parties should get immediate solutions for reduce that gap and it will help to reduce the environmental waste management issues further.

Further analysis were performed highlight the waste management practice, implemented by the Colombo Municipal Council, which is highly contribute to the improve efficiency and effectiveness of existing waste management system. Based on the analyzed information reuse is the most suitable practice exercise by the CMC in order to fulfill the community expectation.
6. Conclusion, Limitations and Future Directions

This study is empirically an analysis of the gap between waste management practices and community expectation in Colombo municipality area in Sri Lanka.

This study is identified the existing waste management practices in Colombo municipal council, community expectation towards the waste management and finally find out the relationship between waste management practices and community expectations. This study recommended best practice use by the Colombo Municipal Council among other existing practices in order to reduce the identified gap between waste management practice and community expectation. This study empirically evaluates the current waste management practices against the community expectations in Colombo municipal council. Landfilling, Recycling, Reuse & disposal are the identified current waste management practices in Colombo municipal council. Sustainable environment to breath in free, sustainable environment development, minimization of disposal cost, disposing waste in environmental friendly manner are the identified community expectations in Colombo municipal council.

The growth in population is changing the scope of the municipal waste management from mainly low priority, localized issue to a huge social problem. When studying the scenario of municipal waste management practices and the expectation of the society in relevant to various cases (ex.Meethotamulla case), it revealed that a gap between the waste management practices and the people expectations. Most of the waste management practices in Sri Lanka are inefficient and inadequate. As a result of that community had to pay for it even from their lives. Therefore, this study focuses on the analysis of that gap and the recommend the most appropriate ways to improve the waste management while fulfilling community expectations.
References


