

CHAPTER 6

CONCLUSIONS AND RECOMMENDATIONS

The following conclusions are derived from this study.

1. The effect of various factors on solid waste generation rate in each source using multiple linear regression analysis, indicates that the important factors which affect the generation rate for residential, store, private office, hotel, restaurant and primary school in the following forms:

1.1 Residential

$$Y_r = 0.155X_{r1} + 0.242X_{r2} + 0.503$$

Where Y_r = Solid waste generation rate, kg/house/day

X_{r1} = Number of people in the house, person

X_{r2} = Income level :

$X_{r2} = 1$ if income less than 10,000
bahts/month

$X_{r2} = 2$ if income between 10,000
to 25,000 bahts/month

$X_{r2} = 3$ if income more than 25,000
bahts/month

1.2 Store

$$Y_{s1} = 4.057 \times 10^{-3} X_{s1} + 0.464$$

$$Y_{s2} = 0.077 X_{s2} + 0.361$$

where Y_s = Solid waste generation rate ,
kg/store/day

X_{s1} = Area, m²

X_{s2} = Number of employees, person

1.3 Private Office

$$Y_{p1} = 5.746 \times 10^{-3} X_{p1} + 1.406$$

$$Y_{p2} = 0.166 X_{p2} - 0.032$$

where Y_p = Solid waste generation rate ,
kg/office/day

X_{p1} = Area, m²

X_{p2} = Number of workers, person

1.4 Hotel

$$Y_{h1} = 1.866 X_{h1} + 94.871 X_{h6} - 242.679$$

$$Y_{h2} = 4.777 X_{h2} - 167.344$$

$$Y_{h3} = 1.557 X_{h4}$$

$$Y_{h4} = 1.864 \times 10^{-3} X_{h5}$$

where Y_h = Solid waste generation rate ,
kg/hotel/day

X_{h1} = Number of rooms, room

X_{h2} = Number of sold rooms per day,
room

X_{h4} = Number of employees, person

X_{h5} = Number of consumption electricity
units per month, unit

X_{h6} = Price level

where $X_{h6} = 3$ if room price per day
more than 1,000 bahts
(1st class)

$X_{h6} = 2$ if room price per day
between 500 to 1,000
bahts (medium class)

$X_{h6} = 1$ if room price per day
less than 500 bahts
(motels)

1.5 Restaurant

$$Y_{u1} = 0.094X_{u1} + 0.140X_{u2} + 2.953$$

$$Y_{u2} = 1.813X_{u3} + 0.140X_{u4} + 0.285$$

where Y_u = Solid waste generation rate ,
kg/restaurant/day

X_{u1} = Dining area, m²

X_{u2} = Number of seats, seat

X_{u3} = Number of employees, person

X_{u4} = Number of clients, person

1.6 Primary School

$$Y_{y1} = 0.015X_{y2} + 0.434X_{y3} - 3.435$$

$$Y_{y2} = 0.035X_{y4} + 27.217$$

where Y_y = Solid waste generation rate ,
kg/school/day

X_{y2} = Building area, m²

X_{y3} = Number of staff, person

X_{y4} = Number of pupils, person

1.7 Government Office

$$Y_{g1} = 2.608 \times 10^{-3} X_{g1} + 1.262$$

$$Y_{g2} = 0.050X_{g2} + 0.961$$

where Y_g = Solid waste generation rate ,
 kg/office/day
 X_{g1} = Building area, m^2
 X_{g2} = Number of staffs, person

The fit of some equations are not good, but they were adopted as the best model for the set of data. It may be mentioned that the data points were too small. A greater number of samples may give more reliable results.

2. The generation rate for Khon Kaen Municipality is estimated as 162 tons/day and 1.10 kg/capita/day. The portion of solid waste generation in waste stream of residential, commercial, institutional and municipal service are 30.81% , 55.82% , 12.59% and 0.78% respectively.

3. In waste composition analysis for the whole municipality, the higher components are garbage, plastic, paper and wood which their portion are 45.28% , 15.11% , 13.12% and 10.02% respectively.

4. The moisture content and bulk density of solid waste for the municipality are 52.87% and 233.0 kg/cu.m. respectively.

Recommendation for future study :

1. Study of waste from other sources such as religious area and stadium will present a more through information of the municipality waste.

2. The study of chemical components will present more information of the waste characteristics of the municipality.

3. Survey is need throughout the year in order to obtain the variation of quantity as well as quality over the year.

4. Study of waste from other municipalities is needed in the extension to develop models or software packages to estimate municipal solid waste generation rate for the application in Thailand.