# CHAPTER 2
# METHODOLOGY AND PROCEDURES

## 2.1 Sample Design

The survey covered the 64 type of manufacturing activities (4 digits code) and the establishments engaged in the manufacturing with 10 persons and over at work. A Stratified Systematic Sampling was adopted for the survey. Bangkok and regions were constituted strata while type of manufacturing activities and group of manufacturing establishment were constituted sub-stratum. The sampling units were establishments.

### Stratification

Bangkok and regions were constituted strata. There were altogether 6 strata. Establishment in each stratum was divided into 64 type of manufacturing activities (4 digits code) and 7 groups according to the number of workers as follows :

Group 1    The manufacturing establishments with 10 - 19 workers.
Group 2    The manufacturing establishments with 20 - 49 workers.
Group 3    The manufacturing establishments with 50 - 99 workers.
Group 4    The manufacturing establishments with 100 - 199 workers.
Group 5    The manufacturing establishments with 200 - 499 workers.
Group 6    The manufacturing establishments with 500 - 999 workers.
Group 7    The manufacturing establishments with 1,000 workers and over.

### Selection of Sampling Unit

The sample selection of establishments were performed separately and independently in each type of manufacturing activities (4 digits code) and group of manufacturing establishment. They were selected by using systematic sampling. The total sample establishments were 9,294 from 20,783 establishments.

The total number of sample establishments  selected  for enumeration by region and group was as follows :

| Region | Total | Group | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 1. Bangkok | 2,327 | 1,085 | 532 | 256 | 205 | 138 | 63 | 48 |
| 2. Vicinity | 2,172 | 791 | 425 | 283 | 238 | 219 | 128 | 88 |
| 3. Central (excluding Bangkok and its Vicinity) | 1,729 | 618 | 328 | 206 | 191 | 201 | 107 | 78 |
| 4. Northern | 1,107 | 543 | 273 | 113 | 89 | 52 | 32 | 5 |
| 5. Northeastern | 1,030 | 498 | 276 | 110 | 63 | 49 | 14 | 20 |
| 6. Southern | 929 | 471 | 259 | 87 | 55 | 31 | 15 | 11 |
| Total | 9,294 | 4,006 | 2,093 | 1,055 | 841 | 690 | 359 | 250 |

## 2.2  Method of Estimation

The survey results were presented at regional level.  The results were presented separately for Bangkok, Vicinity (Nonthaburi province, Pathum Thani province, Samut Prakan province, Nakhon Pathom province and Samut Sakhon province) and the remaining provinces were classified by region. Each report was divided into 2 parts according to the number of workers as follows :

1.  The manufacturing establishment with 10 - 19 workers.
2.  The manufacturing establishment with 20 workers and over.

$$
\begin{aligned}
\text{Let } i &= 1, 2, 3, ..., n_{hlj} && \text{(sample manufacturing establishment)} \\
j &= 1, 2, 3, ..., 7 && \text{(manufacturing establishment group)} \\
h &= 1, 2, 3, 4, 5, 6 && \text{(region)} \\
l &= 1, 2, 3, ..., 64 && \text{(type of manufacturing activity with 4 digits code)} \\
m &= 1, 2, 3, ..., 23 && \text{(type of manufacturing activity with 2 digits code)}
\end{aligned}
$$

## 1.  Estimate of the Total Number of Characteristic X for the type of manufacturing activities with 4 digits code

1.1 The estimated total number of characteristic X of establishment for the $j^{th}$ group, $l^{th}$ type, $h^{th}$ region was based on the formula :

$$
\hat{X}_{hlj} = \sum_{i=1}^{n_{hlj}} W_{hlj} X_{hlji} \qquad\qquad .............................. (1)
$$

where   $x_{hlji}$   is the value of characteristic X for the $i^{th}$ establishment, $j^{th}$ group, $l^{th}$ type, $h^{th}$ region.

$w_{hlj}$   is the weighting factor of the establishments for the $j^{th}$ group, $l^{th}$ type, $h^{th}$ region. , where

$$
w_{hlj} = \frac{N_{hlj}}{n_{hlj}}
$$

$N_{hlj}$   is the total number of the establishments for the $j^{th}$ group, $l^{th}$ type, $h^{th}$ region.

$n_{hlj}$   is the total number of sample establishments for the $j^{th}$ group, $l^{th}$ type, $h^{th}$ region.

1.2  The estimated total number of characteristic X of establishment with 20 workers and over for the $l^{th}$ type,  $h^{th}$ region was based on the formula :

$$\hat{X}_{hl}^{'} = \sum_{j=2}^{7} \hat{X}_{hlj} \qquad ................................... (\,2\,)$$

1.3  The estimated total number of characteristic X of establishment for the $j^{th}$ group, $l^{th}$ type  of the whole kingdom was based on the formula :

$$\hat{X}_{lj} = \sum_{h=1} X_{hlj} \qquad ................................... (\,3\,)$$

1.4  The estimated total number of characteristic X of establishment with 20 workers and over for the $l^{th}$ type of the whole kingdom was based on the formula :

$$\hat{X}_{l}^{'} = \sum_{h=1}^{6} \hat{X}_{hl}^{'} = \sum_{j=2}^{7} \hat{X}_{lj} \qquad ................................... (\,4\,)$$

## 2.  Estimate of the Total Number of Characteristic X for the type of industrial activities with 2  digits code

2.1  The estimated total number of characteristic X of establishment for the $j^{th}$ group, $m^{th}$ type, $h^{th}$ region was based on the formula :

$$\hat{X}_{hmj} = \sum_{l=1}^{A_m} \hat{X}_{hlj} \qquad ................................... (\,5\,)$$

where $A_m$  is the total number of type of manufacturing activities with 4 digits code which were grouped into 2 digits code.

2.2  The estimated total number of characteristic X of establishment with 20 workers and over for the $m^{th}$ type, $h^{th}$ region was based on the formula :

$$\hat{X}_{hm}^{''} = \sum_{j=2}^{7} \hat{X}_{hmj}^{'} \qquad\qquad ................................ (6)$$

2.3   The estimated total number of characteristic X of establishment for the $j^{th}$ group, $m^{th}$ type of the whole kingdom was based on the formula :

$$\hat{X}_{mj}^{'} = \sum_{h=1}^{6} \hat{X}_{hmj}^{'} \qquad\qquad .................................. (7)$$

2.4  The estimated total number of characteristic X of establishment with 20 workers and over for the $m^{th}$ type of the whole kingdom was based on the formula :

$$\hat{X}_{m}^{''} = \sum_{h=1}^{6} \hat{X}_{hm}^{''} = \sum_{j=2}^{7} \hat{X}_{mj}^{'} \qquad\qquad ......................... (8)$$

## 2.3 Data collection

The interviewing method was employed in data collection. The enumerators who are permanent and temporary staff of the National Statistical Office were sent out to interview the owners or the entrepreneurs of the manufacturing establishments under this survey coverage during June - September 2001.

## 2.4 Errors of the data

Data presented in the report might be subject to sampling and non-sampling errors. For instance, errors from the imputation for missing values and non- respondents intentional miss reporting and errors arising at coding and data entry stages. However, the National Statistical Office tried its best to minimize such errors, thus the data should be used with appropriate cautions.

## 2.5 In round figures

The combination of each amount may not equal to the total due to rounding

## 2.6 Limitations of the Data

Data shown in the statistical tables was classified by type of activity or division of industry (2 digits code) and class of industry by (4 digits code). In estimating the data for each group of industry, separate weight was used. Consequently, the summation of detail figures may differ from the corresponding grand total.