

## **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 1 person or more 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 were divided into 64 types of manufacturing activities (4 digits code) and 12 groups according to the number of persons as follows :

Group 1	The establishments with 1 - 5 persons.
Group 2	The establishments with 6 - 10 persons.
Group 3	The establishments with 11 - 15 persons.
Group 4	The establishments with 16 - 20 persons.
Group 5	The establishments with 21 - 25 persons.
Group 6	The establishments with 26 - 30 persons.
Group 7	The establishments with 31 - 50 persons.
Group 8	The establishments with 51 - 100 persons.
Group 9	The establishments with 101 - 200 persons.
Group 10	The establishments with 201 - 500 persons.
Group 11	The establishments with 501 - 1,000 persons.
Group 12	The establishments with more than 1,000 persons

#### **Selection of sampling unit**

The sample selection of establishments were performed separately and independently in each type of manufacturing activity (4 digits code) and group of manufacturing establishment. They were selected by using systematic sampling. The total sample establishments were 17,612 from 359,657 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	8	9	10	11	12
Bangkok	3,826	578	328	216	376	310	390	587	376	243	279	86	57
Vicinity	4,119	524	307	214	374	288	381	622	415	332	447	137	78
Central	3,431	552	236	169	304	241	207	467	353	308	371	128	95
Northern	2,138	559	197	131	240	162	157	266	179	89	94	39	25
Northeastern	2,301	674	201	123	246	172	189	274	179	113	75	30	25
Southern	1,797	559	235	155	178	107	101	190	115	71	54	21	11
<b>Whole Kingdom</b>	<b>17,612</b>	<b>3,446</b>	<b>1,504</b>	<b>1,008</b>	<b>1,718</b>	<b>1,280</b>	<b>1,425</b>	<b>2,406</b>	<b>1,617</b>	<b>1,156</b>	<b>1,320</b>	<b>441</b>	<b>291</b>

## 2.2 Method of estimation

The survey results were presented at regional level. The results were presented separately for Bangkok, Vicinity (Samut Prakan province, Nonthaburi province, Pathum Thani province, Nakhon Pathom province and Samut Sakhon province) and the remaining provinces were classified by region. Each report was divided into 6 groups according to the number of workers as follows :

1. The establishment with 1 - 15 persons.
2. The establishment with 16 - 25 persons.
3. The establishment with 26 - 30 persons.
4. The establishment with 31 - 50 persons.
5. The establishment with 51 - 200 persons.
6. The establishment with more than 200 persons.

Let  $i = 1, 2, 3, \dots, n_{hj}$  ( sample establishment )  
 $j = 1, 2, 3, \dots, 12$  ( establishment group )  
 $h = 1, 2, 3, 4, 5, 6$  ( region )  
 $l = 1, 2, 3, \dots, 64$  ( type of manufacturing activity  
with 4 digits code )  
 $m = 1, 2, 3, \dots, 23$  ( type of manufacturing activity  
with 2 digits code )



**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 :

$$\hat{X}_{hlj} = \sum_{i=1}^{n_{hlj}} w_{hlj} x_{hlji} \dots\dots\dots(1)$$

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

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

$N_{hlj}$  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 1 – 15 persons for the  $l^{th}$  type,  $h^{th}$  region was based on the formula :

$$\hat{X}'_{hl1} = \sum_{j=1}^3 \hat{X}_{hlj} \dots\dots\dots(2)$$

1.3 The estimated total number of characteristic  $X$  of establishment with 16 – 25 persons for the  $l^{th}$  type,  $h^{th}$  region was based on the formula :

$$\hat{X}'_{hl2} = \sum_{j=4}^5 \hat{X}_{hlj} \dots\dots\dots(3)$$

1.4 The estimated total number of characteristic  $X$  of establishment with 51 – 200 persons for the  $l^{th}$  type,  $h^{th}$  region was based on the formula :

$$\hat{X}'_{hl3} = \sum_{j=8}^9 \hat{X}_{hlj} \dots\dots\dots(4)$$

1.5 The estimated total number of characteristic  $X$  of establishment with more than 200 persons for the  $l^{th}$  type,  $h^{th}$  region was based on the formula :

$$\hat{X}'_{hl4} = \sum_{j=10}^{12} \hat{X}_{hlj} \dots\dots\dots(5)$$

1.6 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 :

$$\hat{X}_{lj} = \sum_{h=1}^6 \hat{X}_{hlj} \dots\dots\dots(6)$$

1.7 The estimated total number of characteristic  $X$  of establishment with 1 – 15 persons for the  $l^{th}$  type of the whole kingdom was based on the formula :

$$\hat{X}'_{l1} = \sum_{h=1}^6 \hat{X}'_{hl1} = \sum_{j=1}^3 \hat{X}_{lj} \dots\dots\dots(7)$$

1.8 The estimated total number of characteristic  $X$  of establishment with 16 – 25 persons for the  $l^{th}$  type of the whole kingdom was based on the formula :

$$\hat{X}'_{l2} = \sum_{h=1}^6 \hat{X}'_{hl2} = \sum_{j=4}^5 \hat{X}_{lj} \dots\dots\dots(8)$$

1.9 The estimated total number of characteristic  $X$  of establishment with 51 – 200 persons for the  $l^{th}$  type of the whole kingdom was based on the formula :

$$\hat{X}'_{l3} = \sum_{h=1}^6 \hat{X}'_{hl3} = \sum_{j=8}^9 \hat{X}_{lj} \dots\dots\dots(9)$$



1.10 The estimated total number of characteristic  $X$  of establishment with more than 200 persons for the  $l^{th}$  type of the whole kingdom was based on the formula :

$$\hat{X}'_{l4} = \sum_{h=1}^6 \hat{X}'_{hl4} = \sum_{j=10}^{12} \hat{X}_{lj} \dots\dots\dots(10)$$

**2. Estimate of the Total Number of Characteristic  $X$  for the type of manufacturing activities with 4 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 :

$$\hat{X}_{hmj} = \sum_{l=1}^{A_m} \hat{X}_{hlj} \dots\dots\dots(11)$$

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 1 – 15 persons for the  $m^{th}$  type,  $h^{th}$  region was based on the formula :

$$\hat{X}'_{hm1} = \sum_{j=1}^3 \hat{X}_{hmj} \dots\dots\dots(12)$$

2.3 The estimated total number of characteristic  $X$  of establishment with 16 – 25 persons for the  $m^{th}$  type,  $h^{th}$  region was based on the formula :

$$\hat{X}'_{hm2} = \sum_{j=4}^5 \hat{X}_{hmj} \dots\dots\dots(13)$$

2.4 The estimated total number of characteristic  $X$  of establishment with 51 – 200 persons for the  $m^{th}$  type,  $h^{th}$  region was based on the formula :

$$\hat{X}'_{hm3} = \sum_{j=8}^9 \hat{X}_{hmj} \dots\dots\dots(14)$$

2.5 The estimated total number of characteristic  $X$  of establishment with more than 200 persons for the  $m^{th}$  type,  $h^{th}$  region was based on the formula :

$$\hat{X}'_{hm4} = \sum_{j=10}^{12} \hat{X}_{hmj} \dots\dots\dots(15)$$

2.6 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 :

$$\hat{X}_{mj} = \sum_{h=1}^6 \hat{X}_{hmj} \dots\dots\dots(16)$$

2.7 The estimated total number of characteristic  $X$  of establishment with 1 – 15 persons for the  $m^{th}$  type of the whole kingdom was based on the formula :

$$\hat{X}'_{m1} = \sum_{h=1}^6 \hat{X}'_{hm1} = \sum_{j=1}^3 \hat{X}_{mj} \dots\dots\dots(17)$$

2.8 The estimated total number of characteristic  $X$  of establishment with 16 – 25 persons for the  $m^{th}$  type of the whole kingdom was based on the formula :

$$\hat{X}'_{m2} = \sum_{h=1}^6 \hat{X}'_{hm2} = \sum_{j=4}^5 \hat{X}_{mj} \dots\dots\dots(18)$$

2.9 The estimated total number of characteristic  $X$  of establishment with 51 – 200 persons for the  $m^{th}$  type of the whole kingdom was based on the formula :

$$\hat{X}'_{m3} = \sum_{h=1}^6 \hat{X}'_{hm3} = \sum_{j=8}^9 \hat{X}_{mj} \dots\dots\dots(19)$$

2.10 The estimated total number of characteristic  $X$  of establishment with more than 200 persons for the  $m^{th}$  type of the whole kingdom was based on the formula :

$$\hat{X}'_{m4} = \sum_{h=1}^6 \hat{X}'_{hm4} = \sum_{j=10}^{12} \hat{X}_{mj} \dots\dots\dots(20)$$



### **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 sampled manufacturing establishments during June – September 2003.

### **2.4 Errors of the data**

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

## **2.5 In Round figures**

The summation 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 division of industry (two-digit code) and by class of industry (four-digit code). In estimating the data for each group of industry, separate sets of weight were used. Consequently, the summation of detail figures may differ from the corresponding grand total.