6.4 Center Staff

Preparatory work for starting and operation of the Center will be greatly affected by the quality of Center staff. Therefore, recruiting a sufficient number of staff of the required quality and raising their level through proper education and training is an issue of extreme importance.

6.4.1 Recruitment of Center staff

Prior to establishment of the Center and commencing preparations for opening, sufficient number of staff must be recruited. The work to be done during the period of preparation for commissioning, upon the establishment of the Center, is to assign, train and educate, and give preparatory experience to recruited staff. Therefore, sufficient number of staff must be assigned.

After the commissioning of the Center, no substantial changes are expected in routine operations. However, it is necessary to improve continually the quality of work throughout the year, such as through trying to get more accurate information and coverage and monitoring of long-term statistics where preparatory experience can effectively be utilized.

6.4.2 Required Number and Qualifications of Center Staff and Timing of Assignment

(1) General staff of the Center

The Center staff is defined such a person who is working regularly in the Center. For implementation of the industrial statistical survey, joint work with the staff of regional offices of the Ministry of Commerce and Industry is required in addition to the

working staff of the Center.

The staff of regional offices is deemed to be part of the Center staff insofar as the industrial statistical survey is concerned. However, regional offices are local agencies of the Ministry of Commerce and Industry and their staff is not exclusively in charge of the industrial statistical survey. Consequently, the term "Center staff" as used herein is understood to mean "working Center staff", and not include the staff of regional offices.

(2) Computer related staff

In view of the following, no staff shall be recruited for the development of software which is required for the processing of industrial statistics data. The development of the required software shall be contracted to a third party (The Computer Department within the Ministry of Commerce and Industry).

1) Omani national computer specialists are extremely scant.

2) Personnel cost for the development of application software could be extremely high.

3) The Computer Department within the Ministry of Commerce and Industry is sufficiently capable of software development and have good experience of system development.

4) Sufficient time is allowed for software development so that work schedule can be accordingly coordinated within the Computer Department.

Accordingly, computer related staffing shall be as follows.

* One computer specialist (with about 5 years experience)

* One person exclusively in charge of computer matters (to be trained by computer specialist)

* Four supporting staff (for data input, however two of them to routinely work as secretaries and others to perform computer operation as well)

(3) Enumerators

Enumerators in the Muscat capital area and at regional offices are classified as "part-time Center staff" employed for a limited period of time and will be assigned to the field survey.

Employment and qualification of enumerators is discussed in section 6.4.4 "Employment and Training of Enumerators."

(4) Number and qualifications of Center staff

The number of working Center staff including general staff and computer related staff shall be sixteen in total. The number and required qualifications of Center staff are shown in Table 6.4.1 "Number and Qualifications of Center Staff."

Table 6.4.1 Number and Qualifications of Center Staff

Job classification	Qualification	Experience	Education	No. of staff	Remarks
Center head	Knowledge of statistics	One year	University degree	1	
Planning and management	Knowledge of statistics and computing	One year	University degree	1	Note 1
Publication/PR	Knowledge of statistics	One year	University degree	1	Note 2
Training	Skill in statistics	Five years	University degree, mathematics or economics major	1	
Statistical planning	Techniques for statistics	Three years	Higher than high school degree	1	
Statistical survey	Techniques for statistics	Three years	Higher than high school degree	3	Note 3
Statistics analysis	Techniques for statistics, computer skills	Three years	Higher than high school degree	2	
Computer technician	Knowledge of computing	Five years	University degree	1	
Computer technician	Knowledge of computing and statistics	One year	University degree	1	
Computer operation	Computer skill		Higher than high school degree	2	Note 4
Secretary	Computer skill		Higher than high school degree	2	Note 5
			Total 16		

Note 1: Center head is to hold an additional post to manage and support planning and management.

Note 2: One of three planning and management, publicity/PR, and training staff members to hold an additional post in training.

Note 3: Six staff members are to cover statistical planning, statistical surveys, and statistics analyses.

Note 4: Staff members are to acquire knowledge of computing during inactive period in order to assist preparation of directory of establishments and any other statistical work.

Note 5: Staff members are to be exclusively responsible for computer operation during the busy data input period.

Note 6: General staff to have higher than high school degree for publicity/PR through statistics analysis in the Table are preferably to have a university degree. Those having a vocational college degree are preferred for computer operation and secretary.

(5) Assignment of Center staff

Additional employment of Center staff and timing of their assignments are shown in Table 6.4.2 "Timing of Center staff assignments."

Table 6.4.2 Timing of Center staff assignments

Schedule / Staff	Number of staff		Job classification	Qualification and experience	Those encircled by dotted line: Long term schedule Timing of employment/assignment and job classifications to be assigned to	
Number of staff currently assigned to Statistics Unit	7	1	Center head		1992 : Opening of the Center - Period of preparation 1993 : Implementation of pilot survey 1994 : Implementation of first formal survey	
		1	Planning and management			
		1	Publication and PR			
		1	Training			
		3	Statistics analysis			
Number of additional staff requisitioned	3	2	General staff (*1)	Higher than high school degree	as soon as possible	To be assigned to statistical survey work and trained on the job training
		1	Secretary (*2)	"	as soon as possible	To be trained for computer operation and to be in clarge of data input
Number of staff to be employed till January, 1994	6	1	Computer specialist (software engineer)	Five year experience	By the end of June 1992	To be in charge of coordination and direction of computer related development and operation. Knowledge of statistics is not required
		1	In charge of computer	University degree (any computer field)	By the end of June 1992	To be assigned to statistical survey work and trained on the job training
		1	General staff (*1)	Higher than high school degree	By the end of 1993 - Beginning of 1994	To be assigned to statistical survey work and trained on the job training
		1	Secretary (*2)	"	As soon as possible	To be trained for computer operation and to be in charge of data input
		2	Computer operator (*3)	"	By the end of 1993 - Beginning of 1994	Same as above
Total	16					

Note (*1): Vocational college degree or university degree is preferred.
(*2): Two secretaries are to be in charge of data entry and computer operation when computer operatin is busy.
(*3): Two operators are to be in charge of computer operation including of data entry.
Vocational college degree is preferred.

6.4.3 Training of Staff and Instructors in charge of Training

The objective of training staff is to satisfy the common standard essentials to carry out assigned jobs other than statistics techniques as shown in Table 6.4.1 "Job classifications and qualifications", and to qualify such staff members for appointment as instructors to provide training to enumerators and other staff members of the Center.

Staff members in regional offices who are assigned to the survey will have to be trained accordingly.

Furthermore, training activities related to the industrial statistical survey directed towards statistics users and survey targets share common elements of the enlightenment and training with Center staff members, hence due consideration should be given to that fact.

An outline of education and training courses is shown in Table 6.4.3 "Training Standards."

Table 6.4.3 Training Standards

Training course	Time required for training	Attendants	Instructors	Curriculum	Level to be reached at the end of the course
			Staff in charge of curriculum		
General regulations	One week	All the staff members in the Center	Center head Planning and management	.Moral and purpose/ contents of common and individual regulations for types of work	Attitude towards abiding by regulations is checked.
Overall actual work for statistical survey	One to three months	All the staff members in the Center Regional Office staff	Training supported by expert from overseas	.Outline of industrial statistics .Introduction to statistics .Knowledge of actual work for statistics survey	To achieve the purpose of industrial statistics, basic knowledge of actual work for statistical survey, and to be eligible to be an instructor for enumerator education
Training of enumerators	Two weeks to two months	Enumerators Regional Office staff	Statistical survey Training	.Purpose of industrial statistics .General knowledge about the actual work for statistics surveys	To be able to be engaged in survey work and examination of questionnaires as a statistics enumerator
Statistics analyses	One to two months	Staff members in charge of statistics analysis	Persons who have completed overseas training supported by expert from overseas	.Fundamentals of numerical analyses .Fundamentals of statistical analyses .Use of computers	To acquire skills in statistical analysis and computers such as the use of software packages
Computer skills	Two weeks to one month	Staff members in charge of planning and management, statistics analysis	Persons who have completed overseas training supported by expert from overseas	.Outline of processing clerical work .Use of database functions .Use of personal computers	To operate computer systems and maintain application softwares
Enlightenment of survey target (external)	One day		Statistical survey	.Outline of industrial statistics .Introduction to statistics	To understand the purposes of industrial statistics and how to clarify the data to be included in questionnaires
Enlightenment of statistics users (External)	Two days	Statistics users	Statistics analysis	* Outline of industrial statistics * Introduction to statistics * Operation of computer terminal	To understand the purposes of industrial statistics To acquire knowledge of how to use statistical tables

6.4.4 Recruitment and Training of Enumerators

Since enumerator's survey work is temporary and a relatively short survey period of three to four months a year, it is difficult to spread the volume of work evenly over one year. Therefore the enumerator recruitment system requires different properties from those shown in Table 6.4.1. "Number and Qualifications of Center staff."

(1) Employment

Not all enumerators can be employed on a full-time basis as the Center staff. Also, it is impossible to recruit all enumerators having experience in this kind of survey.

Those considered qualified to be enumerators are people who have previous survey experience, especially in this identical survey, who are familiar with the contents of the survey and the local situation, and who can be employed repeatedly.

Those to be newly hired should be questioned as to whether they wish to be repeatedly employed after the quality of their work has been confirmed. If they wish to be repeatedly employed, it is advisable to confirm whether they would be prepared to apply during the next recruitment period for preferential consideration prior to public invitation. The same applies to those who have previous experience. This system of enumerator employment is called the "Enumerator Registration System."

(2) Training

Basic training in survey activities is required for newly employed enumerators. Those who have previous

experience in working for the survey also require training before the survey begins, including understanding any differences from previous surveys. The training required for enumerators is shown in Table 6.4.3 "Education and Training Standards".

6.5 Operation of the Center

According to the plan for establishment of the Center, the Center will be commissioned for operation upon completion of various preparatory tasks. Planning and review items common to work of the Center as a whole and work of each individual operation are as follows.

6.5.1 Planning and Control

Each individual operation of the Center may be subject to deviations from its original plan due to fluctuations in data volume or change in the system of operation. It is therefore necessary to adjust and optimize the required quantities of resources, including facilities and manpower, as required for the operation of the Center from both the short-term and long-term point of view.

These fluctuating elements may be accurately predictable when operation of the Center has become more or less routine. However, prior actions are required at all times to deal with fluctuations in external elements.

Operation planning and review are indispensable in dealing with those tasks, and staged operation of the Center can be rationalized by maintaining a balance between planning and control.

(1) Planning: Resources and costs required for medium and long terms as well as yearly operation must be confirmed and budgeted. The center must be operated in accordance with the plan so confirmed and budgeted.

(2) Control: Whether operation of the Center is in accordance with the original plan must be reviewed, and corrective actions taken whenever necessary.

6.5.2 Operation Planning and Review

Actual operation of the Center shall be executed on the basis of the operation plan for the Center as a whole, as well as for each operation unit, as prepared by the Center head and planning/management staff for the particular period of time. At the end of each such period of time, any differences between the original plan and actual operations and spending must be reviewed and confirmed. The reasons for any differences must be analyzed in order to modify and reflect the results of that analysis in the next management cycle plan.

The Center's operation cycle shall consist of planning, execution, review and modification. This management cycle shall apply to the medium/long term (5 years), the single year term and the monthly term, depending upon the type of operation.

The Center head and planning/management staff shall renew the medium/long term operation plan at the

beginning of every one year term so that the renewed plan can be referred to as a guideline for the preparation of the one year term operation plan for the next year. The one year term operation plan for the next year shall be prepared at the end of the year by considering the results of review at the end of the year and coordinating with the medium/long term plan.

Staff in charge of each operation shall prepare a yearly operation plan, broken down into monthly plans. The Center head and planning/management staff shall combine those plans to prepare the yearly operation plan for the Center as a whole.

The Center head and planning/management staff, as well as the staff of each operation, must review operations at the end of each month. The review shall identify any differences between the plan and actual occurrences. Significant differences shall be analyzed in order to identify their causes so that corrective actions can be taken. In the case of differences not easily rectified, the yearly operation plan shall be modified and monthly review thereafter shall be based on the modified plan.

An outline of management items is shown in Table 6.5.1 "Outline of Yearly/Monthly Operation Planning" and in Table 6.5.2 "Outline of Yearly/Monthly Operation Review."

Table 6.5.1 Outline of Yearly/Monthly Operation Planning

Item	Contents and Timing/Method
(1) Objective	To prepare in advance the schedule, method and sequence of procedures related to maintenance and upgrading of running status after commissioning the Center, and similarly to prepare for the preparatory year term in order to ensure smooth operation.
(2) Schedule of preparation	* Before commissioning the Center: One month in advance * After commissioning the Center: The end of the year and the month
(3) Person in charge	* Before commissioning the Center: By each person expected to be in charge * After commissioning the Center: By each person in charge
(4) Contents of plan	An operation plan shall be prepared for each yearly and monthly operation term, which will be combined to prepare the plan for the Center as a whole.
(5) Method of planning	Cost planning and management targets shall be set forth on the basis of operation execution planning.

Items of each operation	Period of application	Items of management (planned value, and cost plan are common)
* Basic operation plan	Year	* Operation plan as a whole, total of cost plan
* Publication/public relations plan	Year/Month	* Contents of execution (publications etc.), schedule of execution, period of operation
* Training plan	Year/Month	* Contents of operation (courses etc.), schedule of operation, period required
* Statistics operation plan	Year	
-Survey/planning plan	Year/Month	* Schedule for setting out the system, period required
-Survey execution plan	Year/Month	* Schedule for execution of survey, period required
-Analysis and report plan	Year/Month	* Schedule for analysis and preparation of report, period required
* Computer operation plan	Year	
-Operation plan	Year/Month	* Schedule for data handling, input up to print out, period required
-Maintenance plan	Year/Month	* Schedule for maintenance/renewal, period required

Table 6.5.2 Outline of Yearly/Monthly Review

Item	Contents and Timing/Method
(1) Objective	To compare prepared operation plan with actual operation, to analyze any differences, to search for causes, to plan actions to take to adjust operation in the following period, to prepare a modification plan and to modify the original plan.
(2) Schedule of execution	End of month/year
(3) Person in charge	Each person in charge or expected to be in charge
(4) Contents of review	To analyze differences between plan and actual outcome by causes so as to take rectifying actions in the next cycle. The same applies to the preparation of the rectification plan.

Items of each operation	Period of application	Items of management (actual values etc.; actual costs are common)
* Basic operation plan	Year	* Operation plan as a whole, total of cost plan
* Publication/public relations plan	Year/Month	* Contents of execution (publications etc.), schedule of execution, period of operation
* Training plan	Year/Month	* Contents of training (courses etc.), timing, period required
* Statistics operation plan	Year	
-Survey/planning plan	Year/Month	* Schedule for setting out the system, period required
-Survey execution plan	Year/Month	* Schedule for execution of survey, period required
-Analysis and report plan	Year/Month	* Schedule for analysis and preparation of report, period required
* Computer operation plan	Year	
-Operation plan	Year/Month	* Schedule for data handling, input up to print out, period required
-Maintenance plan	Year/Month	* Schedule for maintenance/renewal, period required

6.6 Center Facilities

Facilities to be owned or utilized by the Center are classified as follows.

(1) Buildings ---------- (Offices etc.)
(2) Furnishings/fixtures ----- (Office tables etc. to be arranged in offices)
(3) Office equipment --------- (Telephones, audio-visual equipment etc.)
(4) Information communication facilities --- (Computer system)

This section shall discuss items (1) - (3) in order to confirm conditions required for operation, while item (4) information communication facilities, which is particularly important for statistics data processing, shall be discussed in section 6.7.

6.6.1 Basic Conditions

The basic conditions under which Center facilities must be provided are that economic efficiency is taken into consideration, that they are not redundant in their specification, that they are sufficient for execution of the required operations and that they are fully utilized in view of the ten items enumerated in Table 6.6.1 "Basic Conditions for Center Facilities," in order to collect, transact, store and provide statistics information on a long-term basis.

Table 6.6.1 Basic Conditions for Center Facilities

Item	Concrete Contents
Function	To provide required output information determined in advance from input information
Performance	To collect, and store all information and to provide required information whenever so required
Operability	To be operable by designated operators after short-term training
Flexibility	To be capable of corresponding in terms of functions and performance to additional requirements for output information, other than those originally planned for
Portability	To be easily transplantable into different operations at the time of facility upgrading
Compatibility	To be interchangeable with respect to input/output specifications
Reliability	To be sufficiently reliable that no stored information will be lost or updated
Safety	Not to be easily destroyed as a whole by malicious intent, misoperation, accidents or natural calamity
Comfort	Appropriate ambient room temperature, humidity and lighting, facilities free of noise and odor
Economic efficiency	Consideration given to the conservation of energy, space and manpower

6.6.2 Summary of Center Facilities

The required facilities and furnishings/fixtures are summarized in Table 6.6.2 "List of Center Facilities." Those already installed and in use or those which can be diverted are shown in brackets { }.

Table 6.6.2 List of Center Facilities (1)

Type		Description	Quantity/Specification
Building	Office	Office of Center head, General office, Information room	(Existing)
		Enumerators' room (Muscat capital area only)	(ditto) Approx. 50m² for 4 months only
	Computer room	Computer room (including 2 terminals, power supply and air conditioner)	(Approx. 15 m² of existing office) * Partition and change of door is necessary
	Data storage room	To store questionnaires and magnetic tapes	(Approx. 6 m² of existing office) * Partition and remodeling the entrance door is necessary
Computer system *Statistics data processing		< Summarized in 6.7 > Small mini-computer system	< To be shown in 6.7 >
Hardware		Main frame and terminals	Mainframe, monitor, line printer 1 set
Software		Operating system (OS: Control software)	UNIX base 1 set
		Database management system (DBMS)	Relational model 1 set
		For statistics data processing	(Note 1) 1 set
Terminals		4 in office, 2 in computer room	6
Power supply		In computer room	2 KVA 3
Air conditioner		In computer room	2
*Personal computer		In office	(4)
Office equipment and audio-visual equipment (For training)		Shredder: For information security	1
		Facsimile: For survey use	G3 standard 1
		(Copying machine)	Both sides with 25 stacker (1)
		(Telephone)	(Several)
		OHP projector/screen	1 set
		Video cassette player and TV monitor	VHS 25 inches 1 set
Safety facilities Fire fighting facilities		* Reception counter to be provided in office entrance ..... By furnishings/fixtures * Locking and security control for computer room and data storage room ..... By refurnishing (Entry of outsiders, entry into computer room and data storage room shall be regulated by procedural regulations to be enforced)	
Furnishings/ Fixtures (Furniture)		* Center head office/General office	(To utilize existing tables/chairs)
		* Reception counter (Note 2)	w1200 x d450 1 set
		* Table for computer	w1800 x d900 4
		Chairs without arm rest	7
		* Shelving rack for data storage room	h1800 x w900 x d450 4
		* Table for enumerators/	
		Conference room	(Existing 1)
		Additional table	w2400 x d100 1
		Chairs (Note 3)	(Existing 25) 13
Motor vehicle for survey		4 wheel drive car	(Note 4) (4)

(Note 1) Development shall be subcontracted to the Computer Department of the Ministry of Commerce and Industry.

(Note 2) To be installed to control entry of outsiders.

(Note 3) (1) To be expanded as a room for enumerators during the survey period.
* To accommodate approx. 40 enumerators for morning gathering and delivery of operation instructions.
* To be used by enumerators for examining questionnaires.
(2) To be of construction capable of being dismantled and stacked in a minimal storage space when not in use.

(Note 4) Two of four vehicles are available for statistical survey.

6.7 Conceptual Design of Computer System

6.7.1 Computer Operations

(1) Computer staff

The basic policy for assigning computer staffs, developing related software, operating the system and maintaining the software have already been summarized in Section 6.4 "Center Staff." The Center's computer operation staff shall consist of six members as follows.

* General computer expert (5 years experience) One (1)
* Person of general computer responsibilities (university degree) One (1)
* Data entry operators (including two to serve concurrently as secretaries and two to serve concurrently as computer operators) Four (4)

Two general computer experts shall be in charge of computer related matters (System specification design, responsibility of system development, responsibility of system operation after completion of system development) representing Industrial Statistics Unit and shall not be in charge of software development itself. Work of software development shall be contracted to the Computer Department within the Ministry of Commerce and Industry. Accordingly, division of responsibility shall be as follows.

1) The functions and responsibilities of the Center

* The Center shall be responsible for conceptual through detailed design of software during the development process.

* The Center shall be responsible for the design of specifications applicable to the software maintenance.

* The computer for industrial statistics data processing and related facilities shall be installed within the Center.

* The Center shall be responsible for operating the industrial statistics system.

* Installation costs including software development and operating costs shall be borne by the Center.

* The Center shall have the function of coordinating the progress of those activities.

2) Items with which the Computer Department is to assist and offer support

* Choice of hardware specifications and hardware configuration
* Choice of operating system (Basic control software)
* Choice of database management system
* Preparation of the installation site (Site preparation)
* Back-up system for obstruction/emergency and system upgrade
* Training of operation staff/operators
* Development of industrial statistics software in compliance with the system specification determined by the Center

(2) Medium term plan of the Computer Department

The Computer Department is in the process of establishing an in-house information medium term plan for the Ministry as follows. The division of functions mentioned above is the consequence of the Center being integrated into that medium term plan.

. Reinforcement of distributed processing and network system support.

The Computer Department shall construct a network system to interconnect individual regional offices and individual departments within the Ministry of Commerce and Industry, while providing coordination and technical support for the development of individual department's application systems. Each department shall install and operate his individual systems by himself.

The Computer Department will distribute small computers to individual regional offices in order to distribute data input and data processing of various operations as the first step. The program is currently progressing as follows towards the target of systemizing the commercial registration program. However, connection to computers installed by the Computer Department for the exchange of data through communication channels is scheduled to be adopted provided that an appropriate fee is approved at the time of commencing services. As of now, information exchange is by way of courier dispatched floppy disks.

* Sohar Regional Office - Scheduled for completion in December, 1991
* Salalah Regional Office - Scheduled for completion in January, 1992
* Other Regional Offices - Scheduled for completion in third quarter of 1992

6.7.2 Functions of the Computer System

(1) Basic functions of the computer system

The basic functions the computer system should be provided with are shown in Table 6.7.1 "Basic Functions of the Computer System."

Table 6.7.1 Basic Functions of the Computer System

Basic functions	Details of functions
1. Input/update	1.1 Input/update of information
	1.2 Check of input data
	1.3 Change/delete of data
2. Search	2.1 Search by keyword
	2.2 Search by content (data, character-string)
3. Processing	3.1 Rearrangement of data sequence
	3.2 Extraction of data
	3.3 Logical operation/arithmetic operation
4. Tabulation	4.1 Table formulation and output print font
5. Machine, Operation Control	5.1 Logging of input/update data
	5.2 Logging of change/deletion data
	5.3 Storage of data
	5.4 Access control, security management
6. Operation support	6.1 Input/output operation guide
	6.2 Operation guide for data retrieving

(2) Computer processing of statistics data

Individual functions are necessary for computer processing of statistics data, when developed in

accordance with the functions defined in section (1). Basic functions of the computer system are classified into five major processes as shown in Table 6.7.2 "Outline of Computer Processing of Statistics Data."

Table 6.7.2 Outline of Computer Processing of Statistics Data

	Functions of statistical work		Basic functions applicable	Processing
1	To clarify basic data	Update of establishment directory and codes	Input/update information, tabulation	Confirmation of objects and preparation of list/ledger corresponding to changed codes
2	Preparation of survey data	* Questionnaire input * Examination by computer * Creating database file	Data input/update Search, processing (inspection) Sort, summary	* Data entry * Check of formality error and content error * Processing of data
3	Publication of statistics data and supply of data	* Preparation of statistical table * Generation and printing of statistical table * Provision of statistical information	Processing (Tabulation) Search, Tabulation Search, Tabulation, operation support	* Including data suppression * For statistical survey report * Corresponding to ad-hoc type statistical table
4	Management of maintenability and reliability	* End user access control * Back-up of files * Safekeeping of files	Management Management Management	* Restriction of users and operators * Back-up copy * For applications including time series analysis
5	Linkage of industrial registration system	List of establishment directory	Update of industrial registration file	Supply data

(3) Estimation of approximate data volume

The approximate volume of data required for statistical survey data processing shall be estimated. The following are assumed as preconditions.

1) Input

The rate of annual increase in data volume is assumed to be 10%. Increase by a factor of 1.1^9 = 2.6 over a ten year period is assumed.

Estimation is made on the assumption that about six times the actual required memory capacity, e.g. the memory capacity required for a year and its back-up copy, the database domain, and the capacity required for the previous year (for comparison), is required.

2) Output

Estimation is made on the assumption that about eight times the actual required memory capacity, such as for about thirty statistical tables for the year (English and Arabic editions) and their back-up copies and for those of the previous year (for comparison), is required.

The approximate data volume required is summarized in Table 6.7.3 "Estimate of Approximate Data Volume."

Table 6.7.3 Estimate of Approximate Data Volume

Storage media	Industrial statistics and directory for survey objects	Remarks
Magnetic disk storage capacity Basic data	. Directory list 200 characters per record x 5,000 records x 2.6 x 6 = 15 MB .Code table (Products & materials) 200 characters per record x 2,500 records x 4 = 2 MB	One copy for back-up
Input	. Questionnaire 1,500 characters per record x 5,000 records x 2.6 x 6 = 117 MB	
Output	. Statistical tables 100 characters/line x 50 lines/page x 100 pages x 30 tables x 2 years x 2 languages x 2 = 120 MB	
OS/software etc.	. (Estimate) = 50 MB	
	Total Approx. 304 MB	1 GB memory in total would be needed.
Cartridge tape cassette (Ten years)	.Copy of questionnaire : 2 rolls x 10 years . Copy of statistical table 2 rolls x 10 years	Open reel magnetic tape device in the Computer Department shall be used for data exchange for external end users
	Total 40 rolls	

(1) Data backup file: 304MB + 304MB = 608MB. The physical memory capacity of disks capable of handling this data volume in the form of a data base is 608MB x 1.4 = 851.2MB.
(2) An additional 150MB (approx.) is required for operating system and work files, etc.
(3) Disk capacity should be 851.2 + 150 = 1,001.2MB (approx. 1 GB).

6.7.3 Factors Related to Data Input Hardware and Software

The specifications of the hardware and software required to realize the data processing functions defined in 6.7.2 "Basic Functions of the Computer System" are not yet defined in sufficient detail for final determination. It is necessary to simultaneously examine several aspects needing

further scrutiny in order to clarify variable elements before definitely determining the specification.

Elements which may affect performance of the Center are not limited to the condition of Center facilities. Human factors will have substantial impact. For example, the number of questionnaires, accuracy of filled in data, time required for the collection of questionnaires, length of time from data input until completion of summation, knowledge level of enumerators concerning the statistical survey, completeness of the application softwares, skill level of data input operators and so on may affect performance of statistical operations.

Among others, as the efficiency of questionnaire data input is directly related to the hardware system, a basic policy must be established as soon as possible. An itemized discussion follows.

(1) Small computers for regional offices

As touched upon earlier in section 6.7.1 "Form of Computer Operations," item (1), it is expected that small computers will be installed in regional offices in the near future for distributed input of commercial registration data.

Those small computers can also be used to input industrial statistics questionnaire data, which is similar to inputting industrial registration data.

(2) Data input

The type of hardware proposed for the Center, as will be discussed later in section 6.7.5 "Computer and related facilities," is identical to the small

computers proposed for installation in regional offices. No difficulty is foreseen in connection with the compatibility of software to make it technically feasible to use that hardware for questionnaire data input.

In view of the fact that each regional office is already equipped with small computers, data input is best to be made at locations which are as near as possible to where data are generated (viz., regional offices) with view to the need to question and confirm error data. However, it is recommended that data input shall be centralized at the Center at least during early stage of industrial statistical survey operation in consideration of possible modification of the system and possible occurrence of obstructions during early stage of system operation.

It is safer to progressively decentralize data input to regional offices step by step (viz., distributed data input system) only after the system has been debugged and stabilized.

(3) Design of the data input system

Establishment of a data input system using terminals must take into consideration the following in choosing the type of terminals to be used.

* The directory of establishments, name of commodity in commodity classification, and name of establishment on questionnaire must be input in the Arabic language. Because coding systems are diverse among computers, it is preferable to standardize on a type of terminal so that interchangeability of the coding system can be coordinated.

* The sooner input data is examined by computer, the sooner a clean data file can be completed. Data input unaccompanied by computerized examination is therefore not recommended unless no alternative is available.

* A system using personal computers as off-line data input terminals for data input and computerized examination would be confronted with the same problem of interchangeability of Arabic codes as data input by on-line terminals. In addition, the problem of coordination between performance and functions of each personal computer and the system configuration as a whole must be dealt with.

In conclusion, a system that locally connects several on-line terminals to a small computer installed in the Center in order to immediately computerized examine data input from those terminals and output the results of that computerized examination is considered optimal.

6.7.4 Basic Computer System Design Policy

In order to completely realize each item of Table 6.6.1 "Basic Conditions for Center Facilities," it is considered necessary, for example, to install fault tolerant equipment, to maintain a set of reserve equipment, and to duplicate the system in order to cope with possible obstructions. Some of those requirements can be met by currently available equipment and communication channels provided by the common carrier.

Currently available equipment is guaranteed to be of considerably high MTBF (Mean Time Between Failures). Several hours is considered tolerable as MTTR (Mean Time To Repair) in view of the required performance

with respect to the Center's objectives. Therefore, duplication of the system as mentioned above appears to be unnecessary.

The uninterruptible power supply, however, must be installed to protect against interruption because power outage during computer operation is directly related to failure of equipment and loss of data.

As shown in Table 6.7.4 "Basic Design Policy for Computer Facilities," as a precondition for Center computer facilities, the design policy should take into consideration a balance between levels of reliability and serviceability and cost of facilities.

Table 6.7.4 Basic Design Policy for Computer Facilities

Policies	Contents and Methods to Achieve
(1)Reliability Designs	. Computer system configuration: simplex system Reserve peripherals: one each of magnetic tape unit and magnetic disk unit . Power supply: Uninterruptible power supply unit
(2) Operation corresponding with reliability	. Facility information: To make information related facility routinely available. . Operation record: To make available reports on operation hours, volume of resources utilized . Backup data: To make copies of important data routinely . Monitoring of fault occurrence: To monitor routinely during operation. . Repair: To repair faults as soon as causes have been identified
(3) Security	. Computer room: To control entry of people by keeping entry record . Data storage: To secure a dedicated storage room Data storage room (controlled entry) Magnetic storage media room (controlled entry, controlled temperature and humidity) . Terminals: To register operators to prevent unauthorized use by third parties
(4) Standard-ization and training	. Work standards: To establish work standards as a part of rules/regulations of operation procedures and to ensure thorough observance . Fault repair training: To provide drills of fault repair . Training of operators: To let operators recognize fully the Center's mission defined as a part of rules/regulations

6.7.5 Computers and Related Facilities (Refer to Table 6.7.5)

Table 6.7.5 summarizes the configuration of equipment dictated by the specifications and premises of the industrial statistics data processing computer system and related facilities described in the foregoing sections.

Table 6.7.5 Computers and Related Facilities

	Type	Contents	Specification and quantity
1	Computer room Date storage room	Controlled temperature/ humidity, and security Controlled entry, storage safe (entrance), storage	As described partly in section 6.6"Center Facilities" See 5th column for power supply and air-conditioner.
2	Computer software	Operating system (OS) Application software Database management system (DBMS) Statistics/mathematics package Personal computer software	1 set UNIX base 1 set To be developed by Computer Department 1 set Relational model type 1 set SPSS, SAS 1 set
3	Computer hardware Terminal Personal computer	Processor (CPU) Console monitor Magnetic disk drive unit (Integral) Floppy disk drive unit Magnetic cassette tape unit Open reel magnetic tape unit Printer For statistics operation	1 32MB or more 1 English 80 x 25 2 600MB or more 1 3.5" 1 1 1600/6250 rpi [Note 1] 1 600 lpm English/Arabic 6 English/Arabic {4} with printers
4	Communication unit and terminals	MODEM, LAN equipment For Regional Offices For users (Within MCI, other ministries, external organizations)	For future connection through network with outside
5	Power supply Air conditioner	Uninterruptible power supply, distribution board	3 2 KVA each For CPU, printer, PC 2 Power supplies and air conditioners shall be procured by Computer Department.

[Note 1] Open reel magnetic tape unit is not required if conversion from floppy disks can be done by the Computer Department facilities.

[Note 2] Fig. 6.7.1 shows the Conceptual configuration of computer system

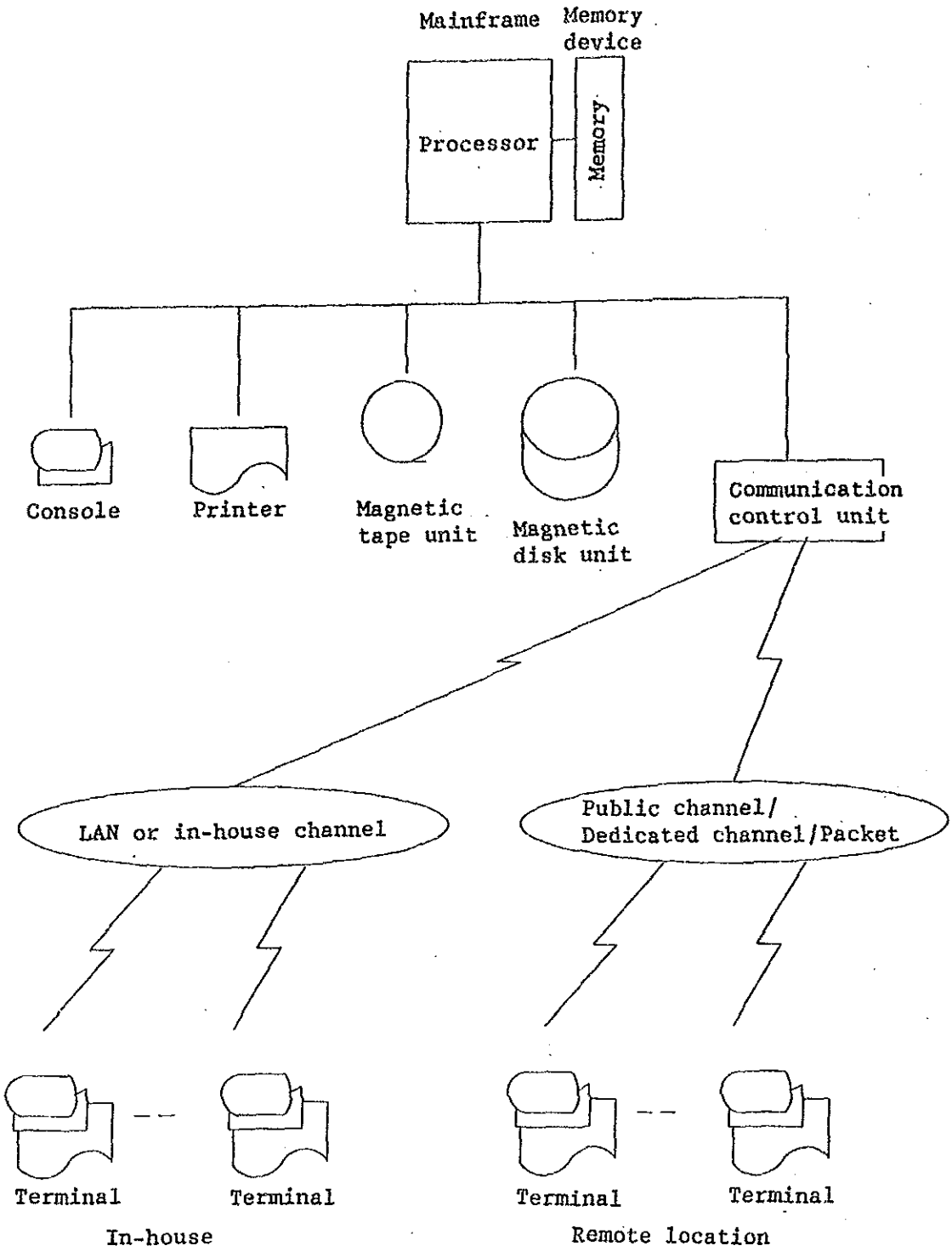


Fig. 6.7.1 Conceptual composition of computer system

6.8 Application Systems for Industrial Statistics

6.8.1 Composition of Application Systems

The application systems for industrial statistics are to be composed of the following four subsystems.

(1) Support system for preliminary work to ensure the smooth implementation of the industrial statistical survey

(2) Data processing system for collected questionnaires

1) Questionnaire data entry system
2) Data transaction/processing system

(3) Industrial statistics tabulation system

(4) System for supplying data base files and data retrieval system for end users

6.8.2 Outline of the Systems

The outline, functional purpose, objective and operation of each subsystem are as follows.

(1) Support system for preliminary work to ensure the smooth implementation of the industrial statistical survey

1) Creation and update of the directory of establishments to be surveyed for industrial statistics

a. Purpose:

This system supplies complementary information, the directory of manufacturing

establishments, to help enumerators canvas all establishments efficiently within the period they are allotted.

b. Running schedule:

Around one or two months prior to carrying out the statistical survey

c. Utilization:

A directory list shall be printed out for each enumeration area of which an enumerator is in charge. During the preliminary survey enumerators shall actually visit their areas to check the location of all manufacturing establishments with reference to the directory list and survey maps.

If a new establishment is found, its name and location shall be added to the list. If some establishment has moved to another location or stopped its manufacturing activities, its name shall be deleted from the list.

The collected information shall then be input from a CRT/workstation to update the directory file in order to prepare an accurate directory of establishments for subsequent surveys.

d. Outline of the system:

The first edition of the directory of establishments to be surveyed for industrial statistics shall be based on the industrial registration file. The file, however, is not updated regularly and accurately. Hence a

complete enumeration is required to check the current situation of each establishment and the result will be used to create a new directory of manufacturing establishments.

Furthermore, the areas designated by the area coding used in the current industrial registration file are too large geographically, and are not appropriate for use by the industrial statistical survey. Accordingly, the area coding shall be rearranged to create geographical areas appropriate for allocation to each enumerator and shall be used to create a new directory file of manufacturing establishments.

As for statistical surveys to be conducted in subsequent years, the directory shall be updated each year with information from the industrial registration system and with the results of the preliminary survey so as to be able to provide enumerators with the most accurate directory lists possible.

e. Outline of data processing (refer to Fig. 6.8.1 System Flow Chart (Directory of Industrial Establishments))

i. Program 1:

The industrial registration file shall be used for initial input to create a directory list of manufacturing establishments. It is to be used for the first preliminary survey only. Enumerators shall conduct the preliminary field survey on the basis of the list and

correct it with the survey results, such as by adding new establishments and making notes concerning those which have moved or discontinued. As the list is based on the industrial registration file, the list shall be used to coordinate the physical dimensions of the areas to be surveyed for industrial statistics.

ii. Program 2:

Results obtained from the work described in (1) above shall be input through terminals in order to create the directory file and list of establishments to be surveyed. This directory shall become the formal directory list of establishments to be surveyed.

iii. Program 3:

The directory of establishments to be surveyed shall be updated by using all transaction data which have been applied to update the industrial registration file (additions, modifications and deletions) since the time of the last directory update. The updated directory list shall be used for the preliminary survey.

iv. Program 4:

The directory of establishments to be surveyed shall be updated through terminal entry of data reflecting additions, modifictions and deletions

resulting from the above mentioned preliminary survey.

f. Directory list of establishments to be surveyed (first year, second year and each year to follow thereafter):
(Refer to Table 6.8.1 and Table 6.8.2)

2) Creation and update system for commodity classification master file, ISIC master file

a. Purpose:

These master files shall be used to check each input data item at the time of computer input of collected questionnaires and to list commodity names and ISIC classification names when they are printed out.

The commodity classification master file shall be printed as a manual on how to write the name/code of main products for filling out questionnaires, listing main product names and codes by each industry, and shall be distributed to each establishment together with the questionnaire.

b. Names and contents of master files:

ISIC master file: The file in which ISIC code, name and outline of each industrial activity are registered. Name and outline of industrial activity shall both be in English and in Arabic.

Commodity classification master file: Commodity codes and commodity names are registered. The commodity names shall be

both in English and in Arabic.

Range check master file: To check numeric values of statistical survey input data on the basis of actual values from the previous year. Master file items consist of maximum/minimum values for production, shipments, electricity consumption, and raw materials consumed. Deviation data shall be printed out on a warning list at the time of data input. (However it is not treated as erroneous data.)

c. Running schedule: At every addition to and update of master file. In general, at any time, but mainly before the implementation of the industrial statistical survey.

d. Outline of processing:

i. Program M1:

- To create a master file using ISIC master list (prepared by hand). (for initial values)

- To update the master file through terminal input when additions/updates have occurred and to generate an update list.

ii. Program M2:

- To create a master file using commodity classification code table (prepared by hand). (for initial values)

- To update the master file through terminal input when additions/updates have occurred and generate an update list.

iii. Program M3:

To input an ISIC code through a terminal and print out tabulated commodity names, commodity codes, and units of quantity of main products produced by the industry concerned. The tabulation shall be delivered to establishments together with the entry guidebook at the time of questionnaire distribution.

iv. Program M4:

The input file is all industrial statistical survey data for the year. It should be classified by ISIC four digit code and commodity code to calculate maximum, minimum and average values of production/shipments, raw materials consumed, electricity consumed etc. Output values shall be used to verify the next year's input data.

e. System flow chart: Refer to Fig. 6-8-2 System Flow Chart (Master File)

(2) Data processing system for collected questionnaires

This system constitutes the nucleus of the industrial statistics system and consists of the questionnaire input system and the statistics data processing system.

1) Questionnaire data entry system

a. Functions:

Each item of the collected questionnaires is input through terminals in on-line mode. Input items are checked using various kinds of master files (ISIC master file, directory of industrial establishments, commodity classification master file, numeric value range check master file).

The individual questionnaire items are checked and examined as follows.

i. Area code, establishment code, commodity classification code, and ISIC code are verified with reference to relevant master files.

ii. Each required item is checked as to whether it was filled in or not.

iii. Each value (code) entered into an optional blank is checked as to whether it matches the option list.

Input data found to be erroneous by this check shall be noted in an error data list.

iv. Each data item of the current year is matched with and checked against the previous year's value.

If the deviation is more than +50% or -50%, the data item shall be printed on the warning list.

v. In the case of an establishment which has no previous year's data, e.g. during the first year's survey or if the establishment was recently founded, the value range check master file shall be used. Values entered for production, shipments, electricity consumption and value of raw materials consumed are checked with reference to the value range check master file in order to confirm whether they are within the relevant upper and lower limits. Any data outside of those limits is noted in a warning list.

Also, all input data is printed in a proof list which shall be collated with the original questionnaires for check after data input.

Errors detected during data entry, which may not be corrected immediately, shall be printed on an error data list for later correction so that data entry can continue without interruption.

Input data shall be corrected within the period of rectification and when necessary. Data entry errors detected by data entry proof list/warning list and collated check with original questionnaires shall be directly corrected after having been displayed on a CRT from the input data file. A "Data Update Proof List" shall be issued to certify completion of corrections.

Each establishment's survey data shall be kept confidential. Therefore, the data entry system must be designed such that a data entry operator is not able to identify data (to recognize it as belonging to any particular establishment) during data entry. Should this requirement be met, data entry may be subcontracted to a third party.

The requirement can be met by dividing each questionnaire's data into two parts which shall automatically be rejoined after both have been input.

Example: Input data consisting of establishment identifying information such as its name, address, telephone number, industrial registration number etc. shall be separated from data concerning number of employees or other business activities (primarily accounting data).

The original questionnaires may have to be referred to later for data correction. Hence this system should be capable of specifying a safekeeping case number for each questionnaire.

Example: Name of office/name of town/ enumeration area code/Box No.

b. Input data

The final design of the input specification shall be determined during the detailed design phase of system development. Input

items which are under current consideration are summarized in Table 6.8.3. Arabic letters will be used for one or two input items. The design of two types of questionnaire is being contemplated: one to be used by large scale establishments and the other to be used by small scale establishments. As the latter would be a simplified version of the former, a system compatible with the questionnaire for large scale establishments would suffice. The questionnaires shall be prepared primarily in the English language. In order to assist establishments not conversant with English, Arabic editions of questionnaires and the guidebook for entry shall be prepared. Computer input systems for collected questionnaires shall be in English only. It will be necessary, therefore, that collected questionnaires filled out in Arabic be translated into English under the responsibility of supervisors.

c. Output

- Error Data List: List of errors in input data.

- Warning List: List of numeric values in input data exceeding permissible upper and lower limits for check and confirmation. The list may be included in "Data Entry Proof List".

- Data Entry Proof List: List of all items of input data in the form of a schedule, to be checked by collating with original data (questionnaires).

- Un-matched record list: Should questionnaire data be divided into two parts for confidential input, one complete data set can be synthesized from the divided parts. In case some records cannot be so synthesized, they should be noted on this list.

- Data Update Proof List: In case data correction is done on data which has already been input and accepted in a computer file, this list shall be issued as a certification of the amendments.

- Industrial Statistics Original Data: All questionnaire items that have been input and accepted.

d. System Flow Chart: (Refer to Fig. 6.8.3)

e. Outline of data processing:

i. Program E1:

Input data:

Questionnaire data concerning establishment identification (name of establishment, address, legal status, telephone number)

Master check:

Existence of establishment is checked using master file of establishments which was updated during preliminary survey period.

Output:

- Any entry whose essential item is incomplete is printed on the error data list.

- Data accepted as correct is written to magnetic disk output file and printed on data entry proof list.

ii. Program E2:

Input data:

Questionnaire data concerning business activities of establishments (number of employees, total cash earnings and accounting information)

Master check:

- Check for the existence of ISIC code using ISIC master code file.

- Check for the existence of item codes for shipments and raw materials using commodity classification code master file.

- Check upper and lower limits of input values using numeric value range check master file.

Output:

- Incomplete entries or invalid codes detected by existence check should be printed on error data list.

- Suspect data detected by numeric value range check is printed on warning list or so marked in the column of corresponding items of data entry proof list. It is also written to magnetic disk output file (not handled as erroneous data).

- Data processed as correct data is written to magnetic disk file and printed on data entry proof list.

iii. Program E3:

Input data:

Output files of Program E1 and Program E2 are matched and merged by key

(questionnaire number) to synthesize a single record for each establishment.

Output:

- Data that could be matched is written to a magnetic disk file containing all original statistics data, to serve as the source data file.

- Data that could not be matched is printed on the un-matched record list.

iv. Program E4:

Processing:

Data printed on the warning list and proof list by Program E1 and Program E2 shall be displayed for direct correction, if necessary. Modified data is printed on the data update proof list.

[Note]: Data printed on the error data list and the un-matched record list must be input through the respective input systems of Program E1 and Program E2 after having been re-checked and corrected.

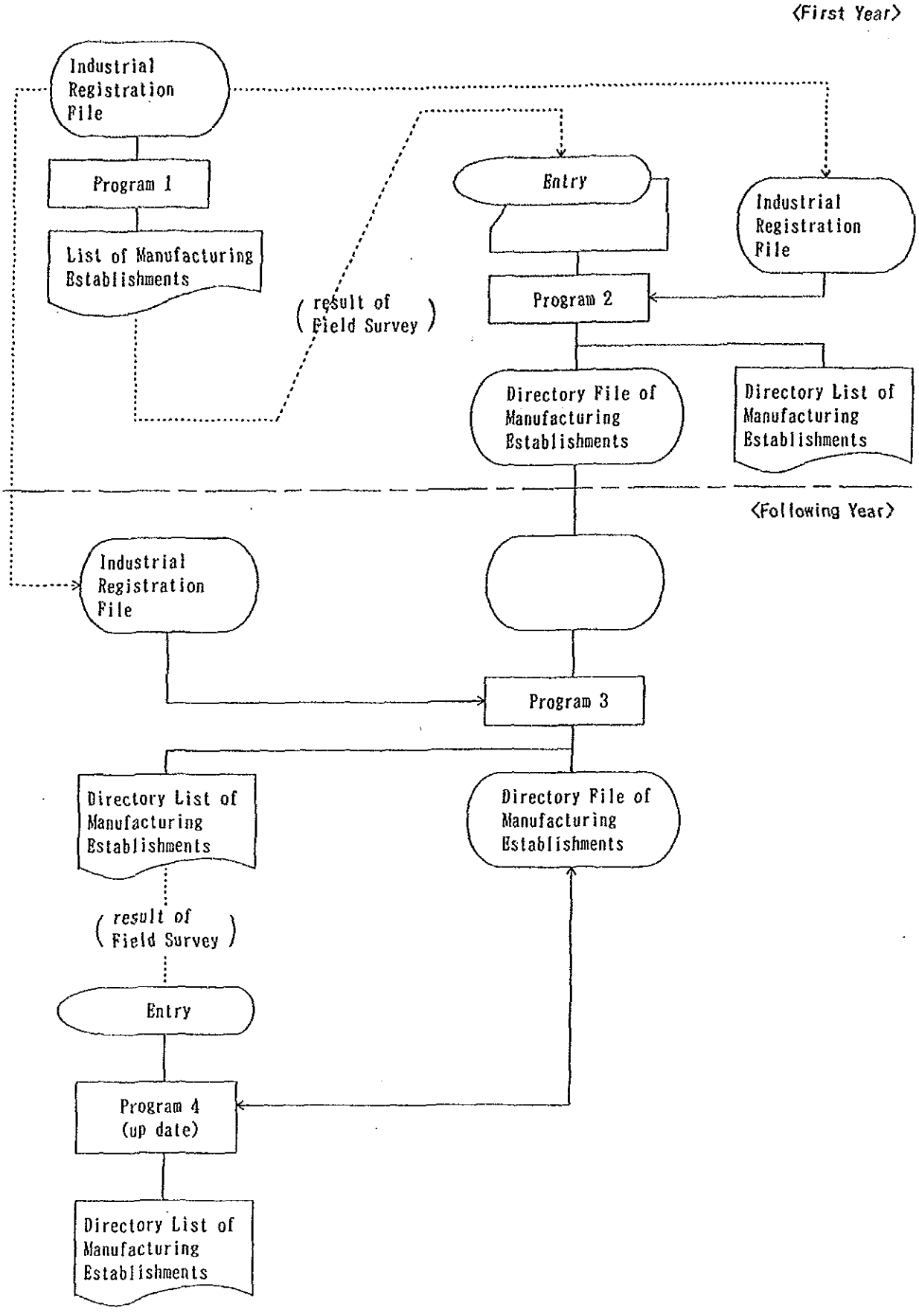


Fig. 6.8.1 System Flow Chart (List of establishments to be surveyed)

Table 6.8.1

<for First Year>

List of Manufacturing Establishments

Page ××9

Region : × ——— ×　　Location : × ——— ×　　Date : YY/MM/DD

Industrial Registration Number	Date of Registration	Name of Establishment / Kind of Activity	P.O. Box No. / Tel. No.	House No.	Mapping No.	Remarks
999999	99/99/99	×———× ×———×	× ——— × ———			

Table 6.8.2

Directory List of Manufacturing Establishments

Region : × ——— ×　　Location : × ——— ×

Page No. : ××9　　Mapping No. : ×××9　　Name of Enumerator :

No. of Qustion naire Type S. No.	Date of Deliv- ered	Name of Establishment	House No.	Tel. No.	Name of Recipient	Designated Date & Time of collection Date time	End Mark	Remarks

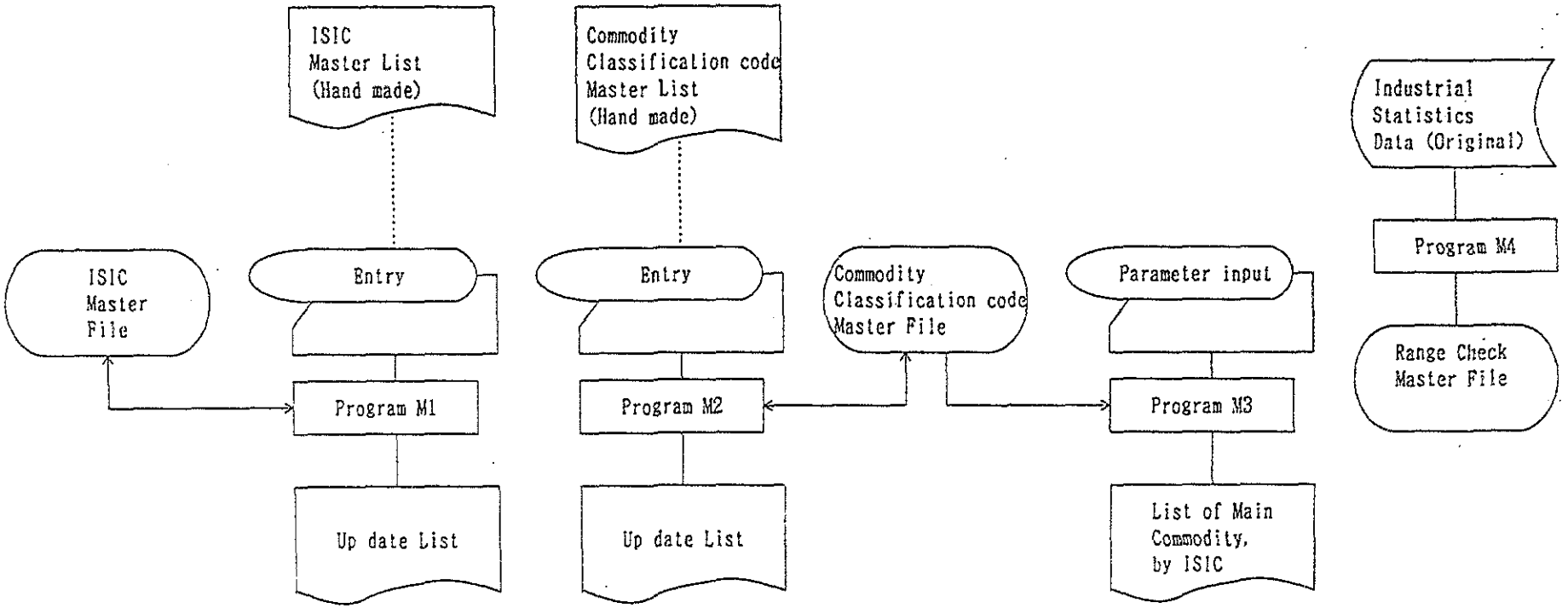


Fig. 6.8.2 System Flow Chart (Commodity classification)

Table 6.8.3

No.	Input Item	Data Attribute	
Establishment identification data (Part 1)			
1	Questionnaire No.	Alpha-Numeric	(Data retrieval/ Matching Key)
2	Establishment No.	Alpha-Numeric	(Data retrieval/ Matching Key)
3	Name of Establishment	Alphabetic	(English/Arabic)
4	Location code	Alpha-Numeric	
	- Region name	Alpha-Numeric	
	- Willayat name	Alpha-Numeric	
	- Block number	Numeric	
5	House No.	Alpha-Numeric	
6	P.O.Box No.	Alpha-Numeric	
7	Telephone No.	Numeric	
	Telex No.	Alpha-Numeric	
	Fax No.	Numeric	
8	Legal status	Numeric	
9	Paid-up capital or capital investment	Numeric	
	- Omani capital	Numeric	
	- Foreign capital	Numeric	
10	Operation period	Numeric	
11	Commercial registration		
	- Registration No.	Alpha-Numeric	
	- Date of registration	Numeric (YY/MM)	
12	Industrial Registration		
	- Registration No.	Alpha-Numeric	
	- Date of Registration	Numeric (YY/MM)	
	- Licence No.	Alpha-Numeric	
	- Date of Licence	Numeric (YY/MM)	
13	Type of economic organization		
	- Single/Plural	Alphabetic	
Business activities data (Part 2)			
14	Questionnaire No.	Alpha-Numeric	(Data retrieval/ Matching Key)
15	Establishment No.	Alpha-Numeric	(Data retrieval/ Matching Key)
16	Number of employees	Numeric	
	- Regular employee	Numeric	
	Omani national	Numeric	
	Non-Omani national	Numeric	
	- Other employee	Numeric	
	Omani national	Numeric	
	Non-Omani national	Numeric	
17	Cash earnings	Numeric	
	- Regular employee	Numeric	
	Omani national	Numeric	
	Non-Omani national	Numeric	
	- Other employee	Numeric	
	Omani national	Numeric	
	Non-Omani national	Numeric	

No.	Input Item	Data Attribute
18	Value of raw materials consumed	Numeric
	- Main raw material items (3 - 4 items)	Numeric
	- Name of raw material	Alpha-Numeric
	- Raw Material Item Code	Numeric
	Unit of quantity	Alpha-Numeric
	Quantity	Numeric
	Value	Numeric
19	Value of fuel consumption	
	- Value/ratio of fuel consumed for employee dwellings	Numeric
20	Electricity	
	- Quantity of consumption	Numeric
	- Value of consumption	Numeric
	- Quantity/Ratio of electricity consumed for employee dwellings	Numeric
	- Value/Ratio of electricity consumed for employee dwellings	Numeric
	- Private Power Generation/ Generating Capacity (KVA)	Numeric
21	Industrial Water	
	- Public water consumption (M^3)	Numeric
	- Value of public water consumption	Numeric
	- Quantity/Ratio of public water consumed for employee dwellings	Numeric
	- Value/Ratio of public water consumed for employee dwellings	Numeric
	- Well water consumption (M^3)	Numeric
22	Cost of contract and commission work done by others on your materials	Numeric
23	Total value of shipments	Numeric
	- Major products shipped (3 - 4 items)	
	Product name	Alphabetic
	Product code	Numeric
	Unit of quantity	Alpha-Numeric
	Quantity	Numeric
	Value	Numeric
24	Receipts for contract work done for other on their materials	Numeric
25	Receipts for repair and installation work done for others	Numeric
26	The value of goods shipped in the same condition as received	Numeric
27	Other revenues	Numeric
28	Total value of products	Alphabetic
29	Value of manufactured goods in stock	
	- Total value at the beginning of last year	Numeric
	- Total value at the end of last year	Numeric

No.	Input Item	Data Attribute
30	Land	
	- Total area of land at the beginning of last year	Numeric
	- Total area of land at the end of last year	Numeric
	- Total book value of land at the beginning of last year	Numeric
	- Investment in land last year	Numeric
	- Sales of land last year	Numeric
31	Buildings	
	- Total floor space of buildings at the beginning of last year	Numeric
	- Total floor space of buildings at the end of last year	Numeric
	- Total book value of buildings at the beginning of last year	Numeric
	- Total value of depreciation expenses taken last year	Numeric
	- Investment in buildings last year	Numeric
	- Sales of buildings last year	Numeric
32	Value of plant and machinery and other equipment	
	- Total book value at the beginning of last year	Numeric
	- Total value of depreciation expenses taken last year	Numeric
	- Investment costs last year	Numeric
	- Sales value last year	Numeric
33	Rental payment	
	- Space of land	Numeric
	- Value for land	Numeric
	- Space of buildings	Numeric
	- Value for buildings	Numeric

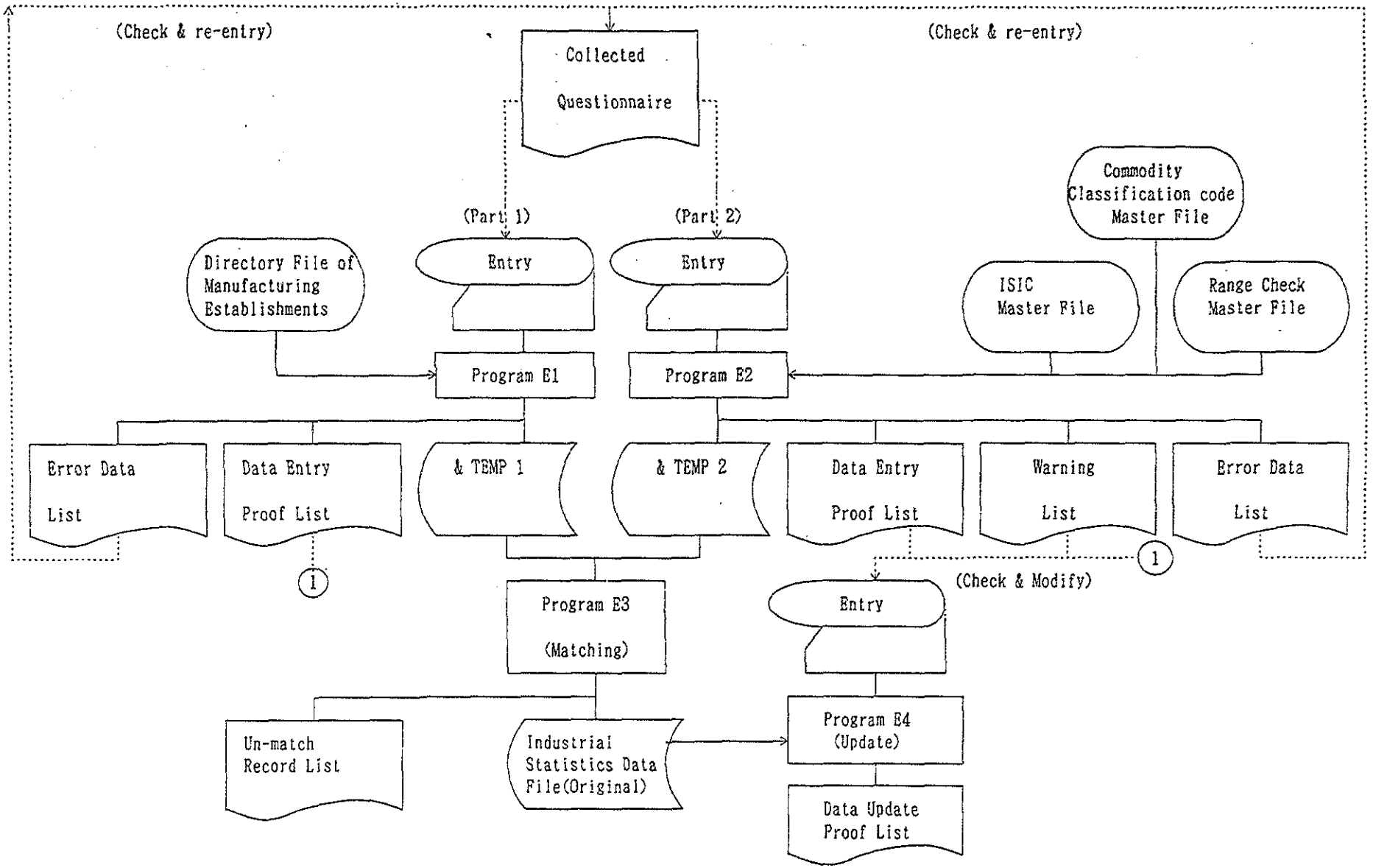


Fig. 6.8.3 System Flow (Data input)

2) Data transaction/Data processing system

a. Input data:

Statistics source data file generated as output of the questionnaire data entry system described above.

b. Required functions:

- Establishment identification data (name of establishment, address, telephone no. etc.) shall be excluded. That data is not transacted as statistics data.

- The scale of establishments shall be judged by number of employees/value of paid up capital or capital investment and assigned codes. The classification criteria (example: 1 - 4 persons, 5 - 9 persons/ RO 25,000 or less, RO 25,001 - 100,000 .....) shall be determined by the Center at the time of detailed design. Statistical tables shall be classified and summed by scale of establishment using this coding.

- Various calculation formulae:
Value added, gross value added, value of tangible fixed assets at year-end and so on shall be calculated by the following formulae. Furthermore, the total value of products filled in by each establishment shall be used to verify the accuracy of the total value of shipments and the inventory of final products. The total value of products actually used in statistical tables is calculated from the total value of shipments, value of stock in hand at the

beginning of the year and value of stock in hand at the end of year.

i) Value added
= [Total value of products] - [Value of raw materials and the like used] - [Depreciation expenses]

ii) Gross value added
= [Total value of products] - [Value of raw materials and the like consumed]

iii) Value of tangible fixed assets at the end of the year = [Total book value of tangible fixed assets at the beginning of the year] + [Total cost of tangible fixed assets acquired during last year] - [Total value of retirement during last year] - [Total value of depreciation expenses]

iv) Total value of products
= [Value of shipments and the like] + ([Inventory of final products at the end of last year] - [Inventory of final products at the beginning of last year])

In case no data is available for inventory, the total value of products is regarded as the same as the total value of shipments

(Note) [Raw materials and the like consumed]
= [Value of raw materials consumed] + [Value of fuel consumed] + [Value of electric power consumed (except private power generator)] + [Cost of contract and commission work done by others]

[Value of shipments and the like]
= [Value of shipments] + [Receipts for contract work done for others on their materials] + [Other revenues] - [Value of goods shipped in the same condition as received]

The reason why "Receipts for repair and installation work" are not included in the formula for "Value of shipments and the like" is that workshops which specialize in repair and have RO 5,000 or more worth of machinery are categorized as part of the manufacturing industry. Hence if "Receipts for repair and installation work" are included in this formula, the value is inflated and becomes inaccurate.

- Similarly, various management data items are calculated by the following formulae.

  i) [Value of shipments and the like per employee]
  = ([Value of shipments and the like]/[Yearly average of monthly number of employees]

  ii) [Value added per employee]
  = [Value added]/[Yearly average of monthly number of employees]

  iii) [Cash earnings per employee]
  = [Cash earnings]/[Yearly average of monthly number of employees]

  iv) [Proportion of value added to value of shipments and the like]
  = [Value added]/[Value of shipments

and the like]

v) [Turnover rate of tangible fixed assets against value of shipments and the like]
= [Value of shipments and the like]/ [tangible fixed assets]

vi) [Productivity of capital]
= [Value added]/[Book value of tangible fixed assets at the end of year]

- *If the number of establishments within a particular industry segment is less than or equal to 2 (a monopolistic or duopolistic condition), data on those establishments must be kept confidential. Therefore, this situation must be checked for in each of the industrial group classifications (represented by two digit, three digit, and four digit groupings of ISIC codes) as well as in combinations of classifications of upper order and classifications of lower order. An example follows. For details, refer to section 7.3.3 "Publication of Survey Results."*

Example:

ISIC 151 Three digit ISIC classification
Number of establishments
..... 11 - 12

ISIC 1511 Four digit ISIC classification
Number of establishments
..... 3 (Publishable)

ISIC 1512 Four digit ISIC classification
Number of establishments
..... 4 (Publishable)

ISIC 1513 Four digit ISIC classification
Number of establishments
..... 3 (Publishable)
ISIC 1514 Four digit ISIC classification
Number of establishments
..... 2 (Confidential)

In this example, data on the industry denoted by '1514' must be kept confidential and must be suppressed. Though the number of existing establishments sharing the first three digit of the ISIC code is 11 - 12, the total for the medium sized classification, if disclosed, would ultimately disclose confidential data, when the known four digit ISIC classification totals are subtracted. In this example however, if another industry segment other than '1514' had no more than two establishments (for example, suppose '1513' had two establishments), the three digit ISIC classification total would be publishable.

It is not publishable if the total number of concerned establishments in both segments is two (one in each four digits level of ISIC classification), but is publishable when the number of industry segments to be kept confidential (four digit ISIC classification) is three or more (in other words, the number of unpublishable establishments is three or more). The rule is applicable to all statistical tables including industry editions, area editions etc.

- Statistical data shall be saved to compare the current year's data to that

of past years. The length of the period for which data are edited for year to year comparison may differ by statistical table. Year to year comparison of each table may involve any of the following.

i) Current year only (no comparison)
ii) Two year term (current year/previous year) comparison
iii) Five year period comparison
iv) Eleven year period comparison

In the case of statistical tables published in Japan, the longest period for which past data is maintained for comparison is eleven (11) years, including the current year. As storing all data for eleven (11) years on magnetic disks would require a large volume of magnetic disk devices, and efficiency of machine operation would then deteriorate, only the data necessary for comparison shall be stored on magnetic disk, while other data shall be stored on magnetic tapes.

- Statistical tables will be printed in both English and Arabic editions. Some of the survey questionnaire entry items will be in Arabic, while all computer processed statistical data shall be maintained in English language and Arabic numerals. (It is not advisable to have both English and Arabic editions in view of the difficulty in maintaining consistent files.)

c. Output: Statistical data file

d. Timing of data processing

Immediately after completion of questionnaire data input, including checking and modification thereof, has been announced.

(3) Industrial statistical tabulation system

1) Objective:

System to prepare various industrial statistical tables to be offered to computer users and data base files for retrieval.

2) Input file:

Statistical data file output by preceding stage.

3) Outline of processing:

a. If the number of establishments in the same industry segment is less than three (3) (data to be kept confidential), each numerical item in the listing shall be marked by an "X". Corresponding records in the data base file shall be treated similarly--disclosure is not permitted. The expressions "-" and "0" shall be used in statistical tables to respectively mean "Not applicable" (or "Negative value" if it is located before a number), and "Less than one unit due to discarding of fractional value."

b. Industrial statistics will be published in two versions: one printed in English with Arabic figures, and the other printed in Arabic with Indian figures. As mentioned earlier, data files will be prepared in

English with Arabic figures only. Output in Arabic requires not only conversion of table titles into Arabic, but also conversion of Arabic figures into Indian figures.

4) Output files

a. Industrial statistical tables

Although output specification is to be finally determined at the time of detailed system design, about thirty (30) types of headers are foreseen at this point in time. Statistical tables shall be classified into:

- Industry edition (Nationwide edition, Regional edition)
- Commodity item edition
- Land, water (social infrastructure) edition

Refer to 7.3.3 "Publication of Survey Results" and Appendix 8 for the form of tabulation.

b. Data base file to provide data to end users

(4) System for supplying data base files and data retrieval system for end users

1) Objective:

The system is to provide data retrieval to end users at terminals.

2) Required functions:

- Data in public data base files must be consistent with the data published in

statistical tables. Special care must be taken in manipulating confidential data.

- In the case of specially permitted end users of common data base files who are permitted to access confidential data values, the data retrieval system must be capable of providing a means of access.

- Data access must be controlled in order to protect data security. When statistical data is to be disclosed to the private sector, use of available software providing data protection and access control functions will have to be studied.

- In the case of end users outside of the ministry utilizing the data retrieval system, a computer use accounting system will have to be introduced for fee calculation.

Whether or not to actually collect fees is subject to political decision. Nevertheless, an accounting system is needed in order to understand the pattern of use of computer systems, and parties to bear expenses.

3) Retrieval key

The key for data retrieval shall include data year, region/location code, ISIC code (2 - 4 digits), and commodity classification code (5 - 6 digits) and shall be capable of comparison by operators ($<$, $\leqq$, $=$, $\geqq$, $>$ etc.). The retrieval key shall be capable of combination by the "and" and "or" operators.

4) Types of data base file

Data base files to provide data to end users are classified into the following two types.

a. Common data base file

A common data base file is intended to provide statistical data to government agencies and to the private sector, in particular to Chamber of Commerce and Industry members. The common data base is not completely public and advance approval of the Center head is required for its use.

b. Special data base file

A special data base file is the original data file containing data from collected questionnaires and is therefore not allowed to be made public.

Data base files shall be available in English only for the time being, due to the complication of converting data in Arabic character code systems between general purpose computers and personal computers, and in consideration of the need to re-process on personal computers data downloaded from a general purpose computer.

6.8.3 Prerequisite for the Systems

(1) Preparation of guidebooks on how to use each application system and implementation of a training program for the use of the computer system by end users.

(2) Utilization of data tele-communication equipment will be indispensable when open use of the computer is made available to end users outside of the Ministry of Commerce and Industry.

(3) An easy to use data base system such as a relational data base or a Fourth Generation Language shall be made available. The overall efficiency of system operation (in particular, the ability to operate multiple terminals simultaneously) shall be taken into consideration when studying the optimal combination of a third generation procedural computer language (COBOL, PL/I, C etc.) with a fourth generation language which may be more efficient for system development but more resource-consuming, on the basis of given system resources, human resources, and term of system development.

(4) The system shall be capable of providing data security and an accounting system.

(5) It is considered necessary to consider standardization of the following items when a detailed system is designed, or program is worked out.

- Unification of file name and item names to be used in the program
- Unification of PF-Key functions (Program Function Key)
- Unification of methods of displaying multiple displays
- Provision without fail of confirmation display whenever various master files have been renewed

6.9 Details of Operations

An outline of monthly operations (excluding quarterly plan and its review) and annual operations (excluding annual plan and its review) after the commissioning of the Center, which are directly related to the main business of the Center, the industrial statistics information system, but excluding the Center head and planning and management is shown in the following tables.

Table 6.9.1 Details of Publications and Public Relations

Details		Objective	Method/Contents
Publication/ Public relations	(1) Publication of results of statistical survey	To notify survey subjects and users of information objectives and results of statistical survey	To edit, print and publish results of statistical survey in outline edition and reference information edition
	(2) Preparation of public relations materials	To let users of statistics and survey subjects understand objective and timing of industrial statistics and role of Industrial Statistics Information Center	To carry advertisement in Government publications and bulletin of Chamber of Commerce and Industry, various advertisement media
	(3) Issue of other publications	To issue as materials for enlightenment and explanation of industrial statistics	To issue pamphlets every year as materials for enlightenment and explanation of industrial statistics
	(4) Counter for consultation	Counter for consultation of questions concerning questionnaire and use of industrial statistics	Acceptance of direct consultation by telephone and direct over-the-counter consultation

Table 6.9.2 Details of Training

Activity		Objective	Details/Contents
Training	1) Training for consciousness of survey subjects	a. Targeted to survey subjects To secure understanding and cooperation for statistics survey	- Periodic seminars for Muscat area and regional offices - Training on documentation of method to use industrial statistics data
	2) Training of users of industrial statistics data	b. Targeted to users of industrial statistics. (Government agencies, enterprises) Promotion of enlightenment of significance and use of industrial statistics	
	3) Training of enumerators and guidance of training tutors	Upgrading of questionnaire accuracy through training for knowledge of enumerators and survey technique and examination procedure	Training by Center staff 1. For new recruits 2. Upgrading of those with previous experience 3. Training immediately prior to survey
	Basic training of new recruits, transferees	Quick mobilization of new recruits and transferees by study of standard operation procedures and knowledge in general	
	Training for acquiring knowledge of duties in charge of held by working Center staff	a. Supplementary study of knowledge and skill b. Assistance to self-study of knowledge c. Study of standard operation procedures, use of computer	- Training by senior Center staff - Overseas study and training

Table 6.9.3 Details of Statistical Survey

Activity			Objective	Details/Contents
Survey Planning	1	Yearly survey planning	Systematic execution, enhanced survey accuracy	Listing of execution items including budget, personnel, and preparation of execution plan
		Planning and execution management	Enhancement of consistency with objective and accuracy	
	2	Establishment of classification system	Perfection of statistics system Enhancement of consisting with related statistics	Maintenance of ISIC commodity classification, consistency with export/import statistics
		Design of statistical table	Tabulation of statistical table	Study of feasibility of items etc.
		Design of questionnaire specification	Design of questionnaire Design of manuals for entry into questionnaire	Study of possibility of data availability
Survey Plan	3	Planning of survey method	Methods compatible with local conditions	Preparation of guidance manuals for distribution, collection and examination of questionnaire
		Preparation of survey manuals	Enhancement of entry accuracy	
		Planning/plan for recruitment of enumerators	To employ sufficient numbers of enumerators	- Registration system of experienced enumerators and recruitment system of temporary enumerators - Planning of training
Statistical survey	1	Preparation for survey	Preparation for survey including listing of survey objects	- Preparation of directory of establishments to be surveyed - Preparation of maps showing locations of establishments
	2	Execution of survey	Collection of original statistical data and enhancement of their accuracy	Distribution, collection and examination of questionnaires by enumerators
Statistics analysis	1	Analysis of survey results	Explanation of statistical table	Application of statistical analysis technique
	2	Preparation of statistical survey report	Publication of statistics results	- Printing and publication as report - Provision of electronic information by terminals

Table 6.9.4 Contents of Computer Processing

Activity			Objective	Details/Contents
Computer processing	1	Software development	For computer processing of questionnaire input, examination, sum-up, statistical table	- To subcontract to Computer Department of the Ministry - Use of system development tools
	2	Data input and examination/ correction	- Enhancement of correctness of information - Speed-up and correctness of data input	Formality examination of each item of questionnaire and logic check including minus check, code check, crossfooting test
		Statistical table output computer processing	Tabulation of statistical table	- Editting for printing - Preparation of database file for retrieving through terminals
	3	Data accumulation	Preparation of time series analysis	- Storage on magnetic disk up to 10 years - Storage on magnetic tapes beyond 10 years
		Data back-up safe-keeping	Enhancement of information preservability	Program and data to be copied on magnetic tapes for outside safe-keeping
	4	Maintenance of software	Coping with system changes (questionnaire & statistical table)	To be in accordance with procedures of Computer Department of Ministry
	5	Operation management, resource management and resource planning	- Leveling of load to avoid load concentration - Preparation of basic plan of resource planning - Systematic execution of resource augmentation	To be in accordance with operation management procedures, resource management procedures of computer department of Ministry
		Safety assurance	Prevention of accidents and occurrence of obstructions and minimization of subsequent impact on equipment & data	- Establishment of procedures to deal with obstructions and to recover - Control of entry into computer room - Control of data access from terminals
		Inventory management of consumables	Management of materials including sheet, media at proper stock level	Establishment of management system

6.10 Period of Preparation and Preparation Work

6.10.1 Definition

The "period of preparation" shall be understood to mean the period required to complete all preparation work to be conducted beginning with the establishment of the Center and ending with the commencement of actual operation of the Center. "Preparation work" shall be understood to mean all of the work as a whole concerning arrangement of the operational environment to be conducted during the period of preparation.

Steps to be taken from the beginning with the establishment of the Center to the ending with its commissioning shall be in the sequence shown in Table 6.10.1 "Procedures from the Beginning with Establishment of the Center to the Ending with Commissioning of the Center."

Table 6.10.1 Procedures from the Beginning with Establishment of the Center to the Ending with Commissioning of the Center (Schedule is tentative)

Target Date	Event and milestone
1st Quarter - 2nd Quarter, 1992	.Preparation of establishment plan of the Center .Planning and partial commencement of preparation work. ---Commencement of industrial statistics system design
Beginning of 3rd Quarter, 1992	.Full-scale execution of preparation work. ---Commencement of detailed computer system design
2nd Quarter, 1993	---Implementation of pilot survey
End of 4th Quarter, 1993	.Completion of "Preparation Work"
Beginning of 1st Quarter, 1994	.Commencement of actual operation of the Center ---Implementation of first full-scale survey

6.10.2 Objective and Method of Preparation Work Plan

(1) Objective of the plan

Systematic execution of preparation is indispensable for the completion of preparation work within the preparation period.

The objective of the preparation work plan is to implement smooth preparation and to ensure timely start-up of the Center by clarifying in advance the sequence, content, timing, method and so on of preparation work to be carried out by the Center head and each responsible person, towards commissioning of the Center in line with Table 6.10.2 "5W2H."

The plan must cover the conditions required to smoothly complete preparation work as a whole by the target date by planning all preparation work (Plan), by executing preparation work (Do), by detecting differences between plan and actual events (Check), and by coordination to recover from any differences or delay so detected (Action).

Table 6.10.2 5W2H

5W2H	Contents
WHY	Reason ---------- To clarify "why".
WHAT	Objective, object--To clarify "what".
WHEN	Timing ---------- To clarify "when", "until when"
WHO	Object ---------- To clarify "user", "supplier", and "others concerned".
WHERE	Scope ---------- To clarify physical scope, logical scope.
HOW	Degree, limit ---- To clarify quantity (Much/many/frequent/etc.)
HOW TO	Method ---------- To clarify "by what method, by what technique, by what measure".

(2) Method of planning

Center head and person in charge of planning/ management shall analyze and estimate the total work load of principal processes of preparation work to be completed by the projected commissioning date of the Center. And they shall determine apportionment of the task and allocate the preparation work to each staff.

Each person in charge shall prepare a work schedule with content of period of each work item, such as procurement and installation of equipment, training of staffs and so on. Any delay in a process would result in subsequent delays to all processes to follow. It is therefore necessary to prepare a work schedule which flexibly takes into consideration some spare time for coping with critical processes and

unexpected events.

(3) Special features of preparation work and corresponding measures to be taken for their execution

The Center head and the person in charge of planning/management shall endeavor to set preparation work forward by taking care of the following items and by assisting persons in charge.

1) Special features of preparation work

All preparation work is directed towards the realization of routine operations. The work is to realize the environment necessary for the anticipated state of operations upon completion. Persons in charge ought to have sufficient creative capability and level of experience to comply with the following.

a) To anticipate the state of the completed and commissioned Center. (Conceptual design)

b) To collect information concerning elements and resources needed to materialize the anticipated state. (Detailed design)

c) To determine the required functions, to train personnel, and to test facilities and equipment. (Manufacture)

d) To foresee potential obstructions and to integrate solutions in advance. (Test to specification and manufacture)

e) To comprehend processes beginning with design and up to working operation testing and

process of working operation. (Work process management)

2) Alternative work plan and support by persons having similar experience

Preparation work in general is more difficult than routine work, because the content of preparation work has not yet been experienced by the persons in charge, and redoing of preparation work is not possible. In view of these characteristics, advance measures to prevent delay of work plan, and/or preparation of alternative work plans are indispensable and the status of such measures and work plans must be inspected from time to time. It is impossible to recruite persons having complete experience. Consequently, those having experience in work planning and management of work progress or those having experience in similar preparation work shall be assigned as the nucleus of the management organization of each process, in particular for early identification of work delays.

6.10.3 Apportionment of Preparation Work and Contents of Work

Apportionment of preparation work and contents of work are summarized in Table 6.10.3 "Contents of Preparation Work Plan".

Table 6.10.3 Contents of Preparation Work Plan

Work item	In charge of plan/work	Contents of work
1. Management of overall plan - Long-term basic plan - Preparation work plan - Management system in general - Mobilization plan - Inspection system	Center head Person in charge of planning/ management	 - Planning of operation policy and long-term policy - Clarification of elements of industrial statistics system as a whole - Stepwise expansion of operation and improvement - Overall plan schedule and method to manage progress - Identification and monitoring of critical path - Coordination of contents of work and work period/personnel/skill - Coordination of scope of external/internal operations - Plan of recruitment - Operation to be inspected, contents of inspection, rules and regulations applicable
2. Publication public relations - Public relations Advertisement - Publications etc.	Person in charge of publication and public relations	 - PR on establishment of the Center, PR on implementation of statistical survey - Enlightenment materials targeted to survey objects/statistics users
3. Training - Overall plan - Each in-house job classification - Regional office staff - Enumerators - External personnel	Person in charge of training	 - Establishment of training system - Training course corresponding to each job classification/preparation of texts - New comers' training course/preparation of texts - Regional office staff training course/ preparation off texts - Establishment of qualification criteria for instructors of enumerators - Enumerator training course/preparation of texts - Survey objects/statistics users enlightenment materials

(to be continued)

Work item	In charge of plan/work	Contents of work
4. Statistics, survey <Survey planning> - Planning, execution policy - Establishment of classification system <Survey design> - Specification design <Survey plan> - Survey method - Survey manual - Recruitment and training of enumerators <Statistics survey> - Preparation for survey <Statistics analysis> - Analysis of results - Preparation of report	Person in charge of statistics, survey	 - Systematic execution, enhancement of survey accuracy - Systematization of survey operation as a whole - Upgrading of coordination with other statistics - Design of questionnaire/statistical table - Establishment of chain of command and area assignment - Appointment of person in charge of training and establishment of contents - Determination of qualifications/timing/method - Plan of preparation for directory of establishments and enumeration map - Plan of distribution/collection/examination of questionnaires by enumerators - Explanation of statistical table Design of analysis techninique - Printing, publication/Electronic data supply system
5. Computer processing - Software development - Software maintenance - Installation, adjustment of hardware - Staff training - Overall test - Inspection/ Acceptance - Operation management system - Information management system - Full-service staff training - Support staff training	Person in charge of computer processing	 - Basic plan, coordination with computer department - Confirmation of system specification - Coordination with computer department - ditto - Training plan using the software - Overall test plan using test data - Inspection plan, determination of inspection items. - Long-term facility plan, coordination with computer department - Long-term operation plan - Training plan - ditto

6.10.4 Important Points of Progress Management

In addition to basic progress management, it is necessary to manage the progress of preparation work as a whole, as well as of individual work items, with flexibility. Periodic work progress conferences should be held frequently to identify work delays at an early stage, to study causes of any such delay, and respond with actions to recover from the delay. The need for this kind of action as a measure to deal with critical processes is often underestimated at the time of original planning.

There may be cases where additional manpower and time cannot improve the situation at all due to the lack of basic human capability. In such cases, coordination between human capability and the projected date of completion will be necessary, thus making it necessary to change work assignments or preparation work assignments.

Table 6.10.4 "Points Requiring Attention" summarizes causes of delays including the management process which might seriously affect the progress of work.

Table 6.10.4 Points Requiring Attention

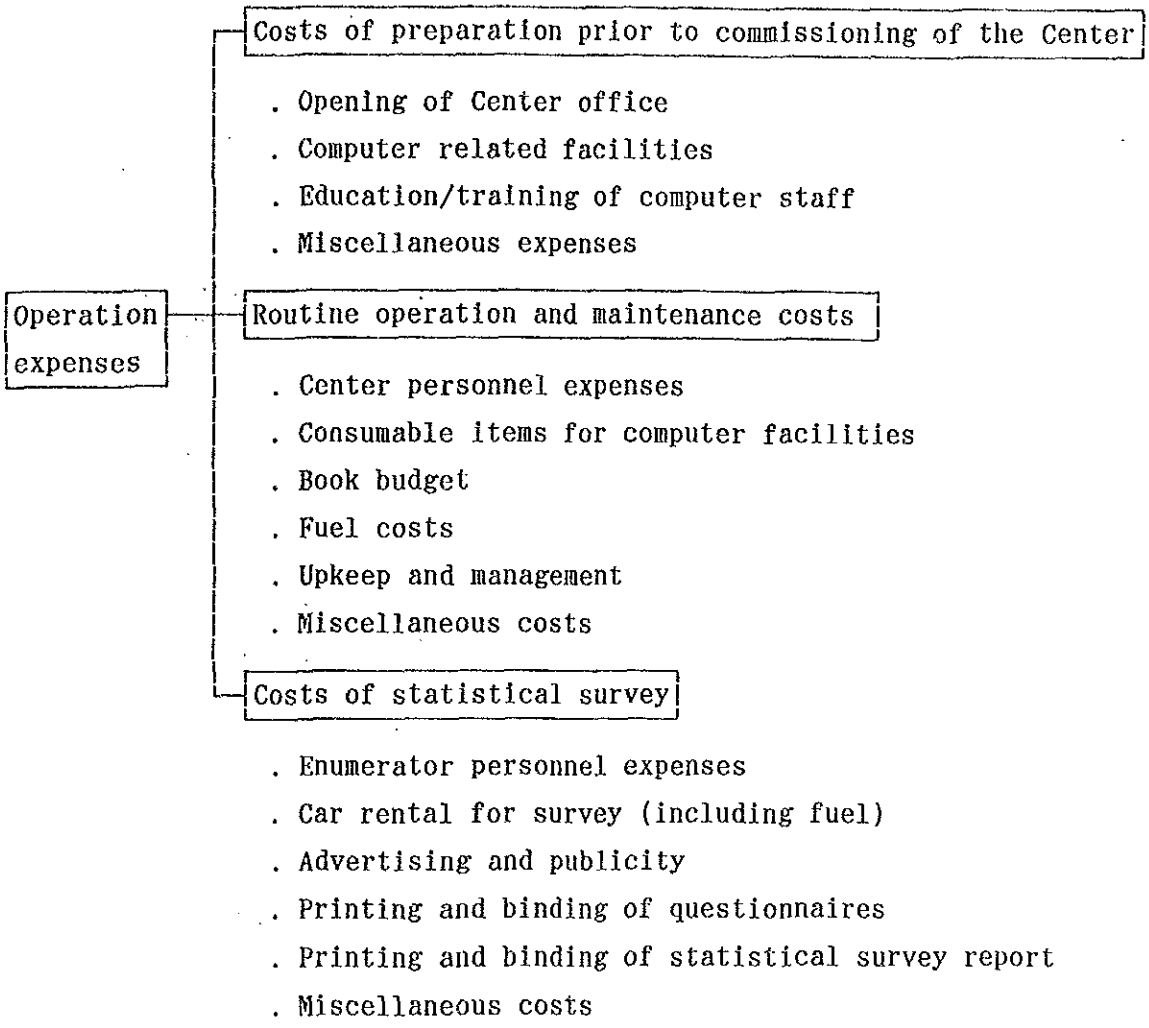
Cause	Result
(1) Delay in staff recruitment	Delay of work as a whole
(2) Inadequate plan, insufficient training, inadequate instructions	Overlapping, useless, unsatisfactory work; delay may be required to deal with overlapping, useless and unsatisfactory work
(3) Delay of decision on software application specifications	Delay in order if decision on specifications is delayed, thus causing delay of completion of software development
(4) Inadequate or insufficient inspection (method) of work progress	Work delay not identified at an early stage. The delay may be belatedly identified when recovery has become impossible, thus causing unavoidable delay.

6.11 Operating Costs

Operating costs were calculated for: (1) preparation prior to commissioning of the Center; (2) routine operation and maintenance cost; and (3) separate costs of annual statistical survey. Calculations were intended to reflect actual conditions in the Sultanate of Oman.

6.11.1 Operating Cost Estimation

Major cost components are shown as follows:



6.11.2 Status of Cost Estimation

(1) Terms - for three years beginning from 1992.

(2) Unit Price - based on prices as of November 1991.

(3) Integration relative to computer related facilities was made on the basis of section 6.6.

(4) The Center office was assumed to be a room presently used by the Industrial Statistics Unit. Existing

facilities shall be used as much as possible.

(5) The system of remuneration for Center staff and enumerators was assumed to be as follows, taking the current remuneration system into consideration.

Academic career	Remuneration (RO/Month)	Raise
Center staff		
- University (Engineering) graduate (4 year experience)	711	RO 7/year
- University graduate	506	RO 7/year
- Vocational training college graduate	445	RO 7/year
- High school graduate	310	RO 5/year
- Driver	153	-
Enumerator		
- Other staff of MCI (16:00 - 18:00)	150	
- Temporary enumerator		
. General	150	
. Teacher (one day)	200	
(16:00 - 18:00)	150	

(Source: the Personnel Department of the MCI)

Remuneration for Center staff shall include an allowance for accommodation charges, travel expenses, water and electricity fees.

(6) An outline of the Center's annual budget is shown in Table 6.11.1.

(7) The layout of the Center and remodeling work is shown in Fig. 6.11.1.

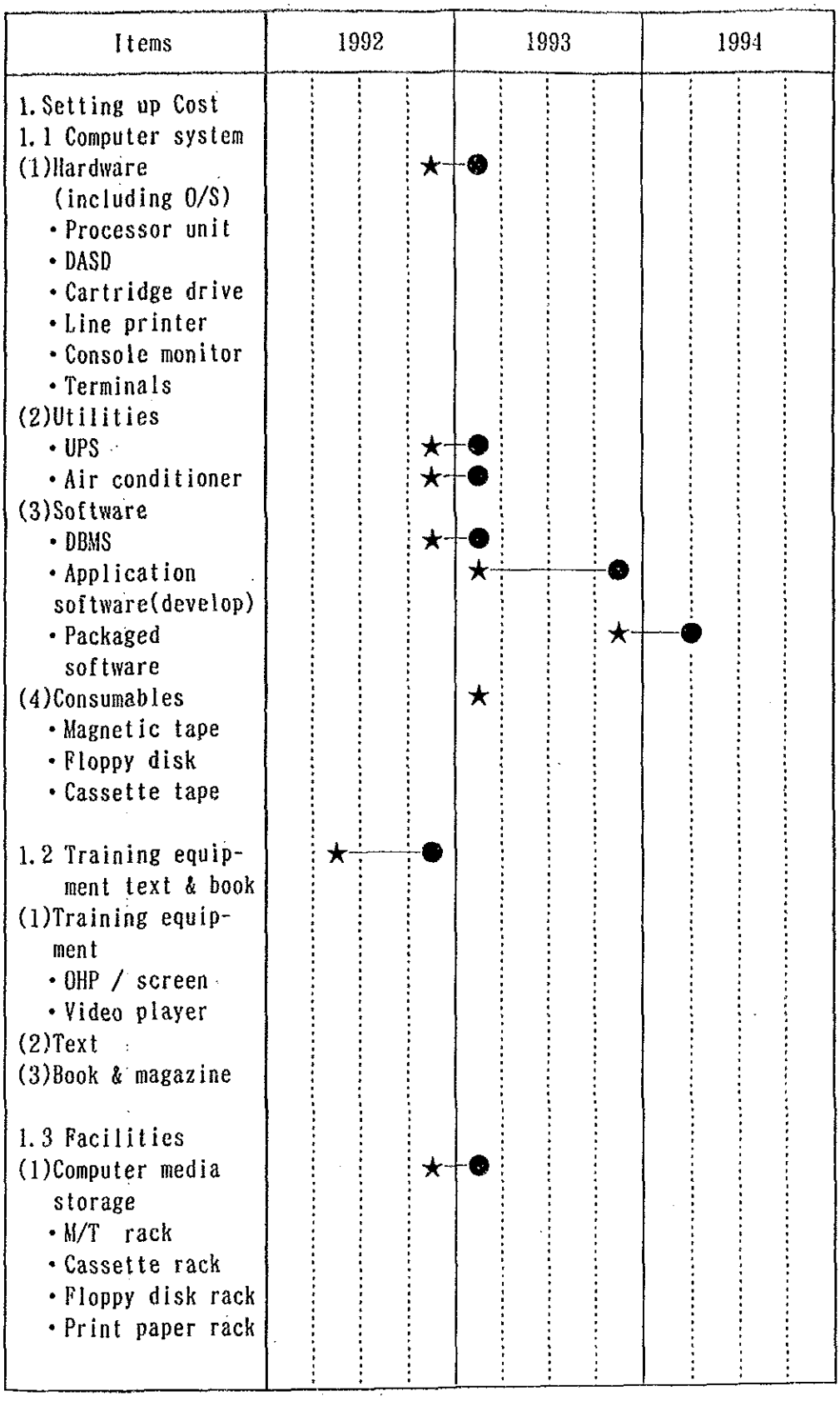
(8) Payment condition on computer related facilities:

10%: at time of order

80%: at time of installation

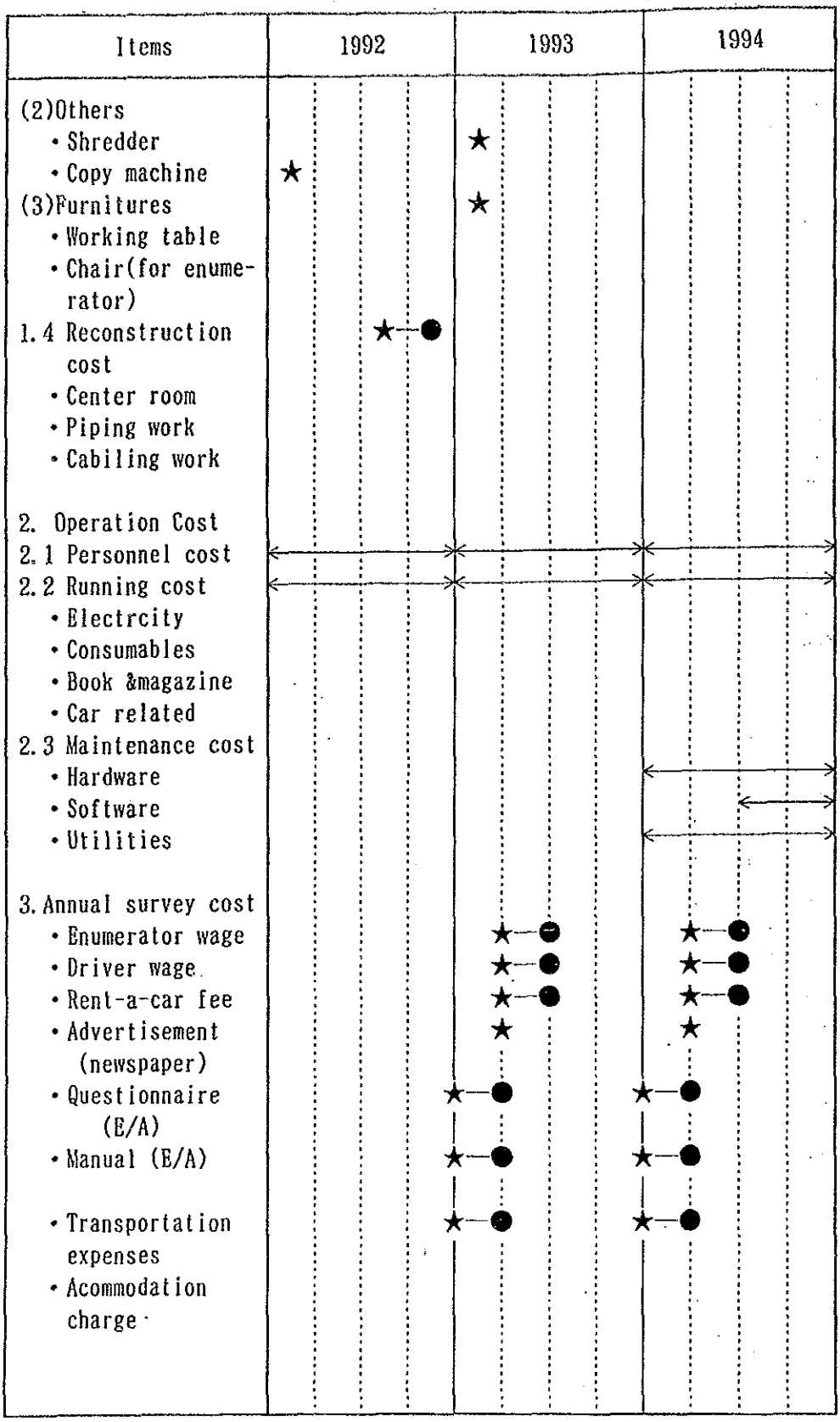
10%: after inspection

Table 6.11.1 Annual Budget Outline 1/2

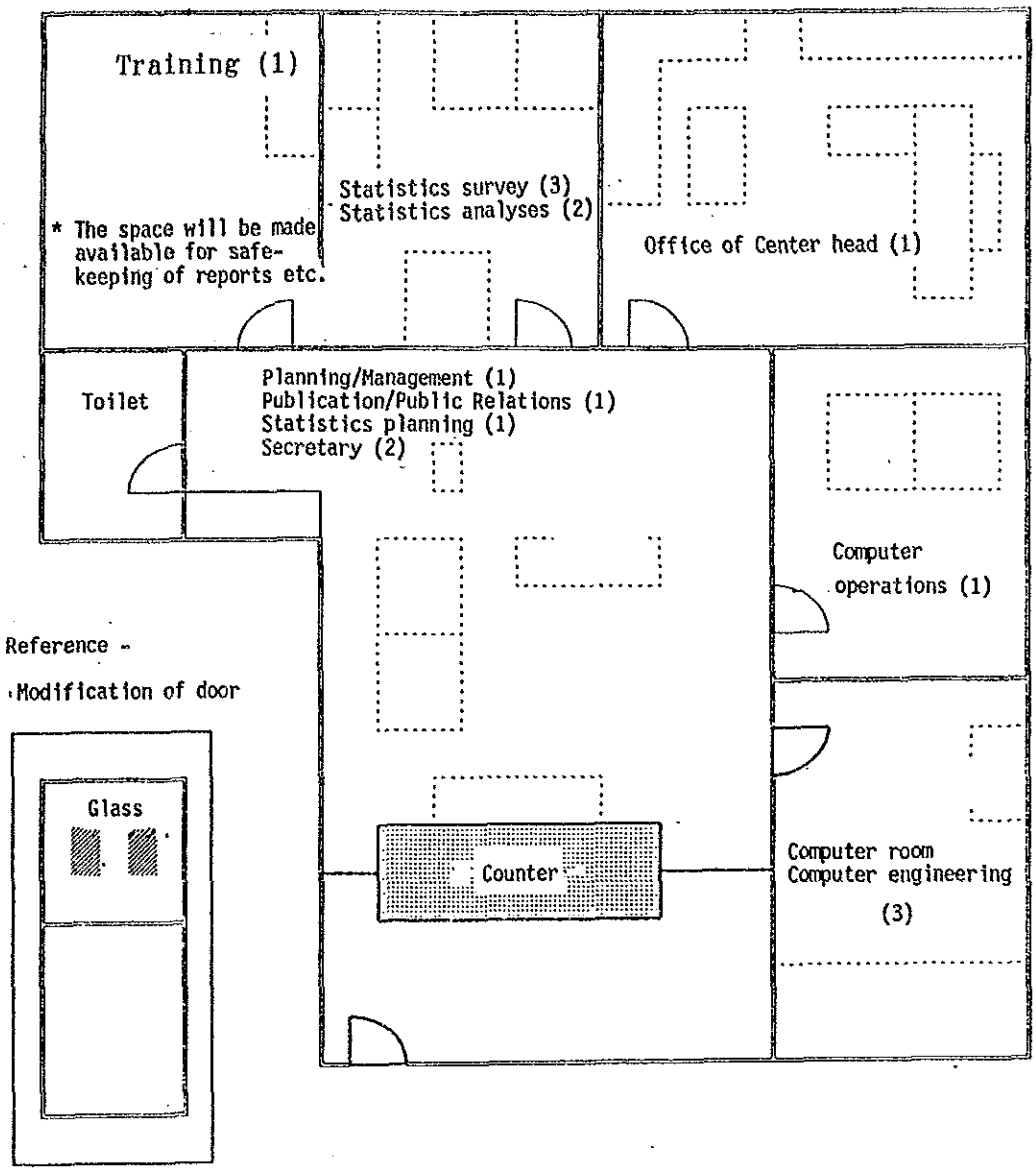


note: ★ Order ● Installation / Inspection

Table 6.11.1 Annual Budget Outline 2/2



note: ★ Order, ● Installation / Inspection, ( ) Including regional offi



Legend: —— shows reconstruction work.
Figure in brackets ( ) means number of staff members.

Note 1 : Space for training sessions for enumerators and working space for examination and arrangement of quesitonnaires shall be arranged separately.

Note 2 : A room for expert shall be arranged separately.

Fig.6.11.1 Center Layout

6.11.3 Summary of Annual Operating Costs

(1) Annual operating costs can be summarized as follows.

Unit : RO

Cost item	1992	1993	1994
1. Setup costs for the Center (Total RO 114,210)	15,500	96,020	2,690
2. Routine operation and maintenance costs	67,590	83,890	105,390
3. Cost of statistical survey	----	25,160	148,010
Total	83,090	205,070	256,090

(2) Annual operating costs can be broken down as follows.

Unit : RO

Cost item	1992	1993	1994
1. Setup costs for the Center			
(1) Center office	6,160	2,990	--
(2) Computer related (Total RO 98,540)	7,520	88,460	2,560
(3) Education/training related	1,080	--	--
(4) Miscellaneous expenses (5% of total of above)	740	4,570	130
Sub-total	15,500	96,020	2,690
2. Routine operation and maintenance costs			
(1) Personnel expenses for Center staff	60,400	75,000	83,700
(2) Consumables for computer	--	1,000	2,000
(3) Book budget	1,500	1,500	500
(4) Fuel	470	390	350
(5) Upkeep	--	--	11,820
(6) Other consumables	2,000	2,000	2,000
(7) Miscellaneous (5% of total of above)	3,220	4,000	5,020
Sub-total	67,590	83,890	105,390
3. Cost of statistical survey			
(1) Personnel expenses for enumerators	--	1,800	40,950
(2) Cost of motor vehicles	--	1,380	55,320
(3) PR and advertising	--	3,180	7,950
(4) Printing, binding of questionnaires	--	17,600	17,600
(5) Printing, binding of statistics report	--	--	19,140
(6) Miscellaneous (5% of total of above)	--	1,200	7,050
Sub-total	--	25,160	148,010
Total	83,090	205,070	256,090

Note 1: Miscellaneous costs include cost of maps to be used for the identification of establishments and travel expenses.

6.11.4 Cost Estimation

(1) Setup costs of Center office

1) Costs of office room

Item	Unit	Q'ty	Unit price	Amount	Remarks
a. Office equipment			(RO)	(RO)	
. Shredder	set	1	290	290	
. Facsimile	set	1	280	280	
. Word processor	set	3	630	1,890	360SX
Sub-total				2,460	
b. Furniture					
1992					
. Table and chair		6	250	1,500	
. Rack		3	50	150	
. Cabinet		5	50	250	
Sub-total				1,900	
1993					
. Table and chair		3	250	750	
. Chair (*1)		64	30	1,920	For enumerators
. Table for enumerators (*2)		2	160	320	Conference table
Sub-total				2,990	
c. Interior re-modeling work					
. Counter	lot	1	1,500	1,500	Fig.6.11.2
. Door		2	150	300	Fig.6.11.2
Sub-total				1,800	
Total			(1992)	6,160	
			(1993)	2,990	

(*1) To be used by enumerators.
Center --- 38-25=13 chairs (Existing : with arm rest 16
without arm rest 9
Regional offices --- 51

(*2) Conference table (for 10) shall be used by enumerators in common.
Center ---------- 1
Regional office (Sur) --- 1
Other regional offices shall use existing tables.

2) Computer related costs

Payment conditions: 10% at time of order, 80% at installation and 10% at inspection.

Item	Unit	Q'ty	Unit price	Amount	Remarks
a. Hardware			(RO)	(RO)	
. Processor (CPU)	set	1	20,600	20,600	ALTOS 5000, 32MB or more
. Disk device	set	2	2,500	5,000	600MB or more
. Line printer	set	1	5,700	5,700	600LPM
. Terminals	set	6	2,800	16,800	English/Arabic Change-over
. Personal computer	set	4	1,350	5,400	
. Others	lot	1	400	2,700	Cable, connector, floppy etc.
Sub-total				56,200	10% in 1992 90% in 1993
b. Software					
. Operating System (OS) (incl. DBMS)	lot	1	8,400	8,400	10% in 1992, 90% in 1993
. Application system	lot	1	20,500	20,500	100% in 1993
. D/B related software	lot	1	2,850	2,850	10% in 1993, 90% in 1994
Sub-total				31,750	
c. Power supply and air conditioner					
. UPS, distribution board	set	3	1,570	4,710	
. Air conditioner	set	2	2,940	5,880	
Sub-total				10,590	10% in 1992, 90% in 1993
Total				98,540	7,520 in 1992 88,460 in 1993 2,560 in 1994

3) Education/training related costs

Item	Unit	Q'ty	Unit price	Amount	Remark
a. Education/training equipment			(RO)	(RO)	
. O.H.P and screen	set	1	480	480	
. Video player and TV	set	1	600	600	
Total				1,080	

(2) Routine operation and maintenance costs

1) Personnel expenses for Center staff

Year	No. of staff member	Univ. graduate (Eng'g)	Univ. graduate	Vocational training college graduate	High school graduate	Driver	Remarks
Jan., 1992	10		4		6	2	Center to be commissioned
July, 1992	13	1	5	1	6	2	
Jan., 1993	14	1	5	1	7	2	Pilot survey
Jan., 1994	16	1	5	1	9	2	Census survey

Item	No. of staff	No. of months	Unit price	Amount
a. Personnel expenses			(RO)	(RO)
- Jan., 1992 - June, 1992 (Sub-total RO 25,200)				
Univ. graduate	4	6	506	12,144
High school graduate	6	6	310	11,160
Driver	2	6	153	1,836
- July, 1992 - Dec., 1992 (Sub-total RO 35,200)				
Univ. graduate (Eng'g)	1	6	711	4,266
Univ. graduate	5	6	506	15,180
Vocational training college graduate	1	6	445	2,670
High school graduate	6	6	310	11,160
Driver	2	6	153	1,836

- Jan., 1993 - Dec., 1993 (Sub-total RO 75,000)				
Univ. graduate (Eng'g)	1	12	718	8,616
Univ. graduate	5	12	513	30,780
Vocational training college graduate	1	12	452	5,424
High school graduate	7	12	315	26,460
Driver	2	12	153	3,672
- Jan., 1994 - Dec., 1994 (Sub-total RO 83,700)				
Univ. graduate (Eng'g)	1	12	725	8,700
Univ. graduate	5	12	520	31,200
Vocational training college graduate	1	12	459	5,508
High school graduate	9	12	320	34,560
Driver	2	12	153	3,672
Total	RO 219,100 (Sub-total is rounded up)			

Item	Unit	1992	1993	1994
		(RO)	(RO)	(RO)
2) Consumables for computer (paper etc.)			1,000	2,000
3) Book budget		1,500	1,500	500
4) Fuel cost (*)	liter	4,200	3,500	3,150
(RO 0.112/liter)		470	390	350
5) Other consumables		2,000	2,000	2,000
Total		3,970	4,890	4,850

(*) 1992 : 50km/day X 360 days X 0.7 = 12,600km/6km/lit. X 2 = 4,200 lit.
1993 : 50km/day X 300 days X 0.7 = 10,500km/6km/lit. X 2 = 3,500 lit.
1994 : 50km/day X 270 days X 0.7 = 9,450km/6km/lit. X 2 = 3,150 lit.
. 0.7 means 5 working days a week
. Fuel cost for 60 days in 1993 and for 90 days in 1994 are estimated as a cost of statistical survey.

6) Upkeep and management costs (Maintenance)

	1992	1993	1994	Remarks
(1) Computer related costs	(RO)	(RO)	(RO)	
- Hardware	—	—	6,740	12% of purchase price
- Software	—	—	3,810	- ditto -
- Power supplies and air conditioners	—	—	1,270	- ditto -
Total			11,820	

(3) Cost of statistical survey

1) Personnel expenses for survey enumerators

Assumptions of cost estimation:

a. Work to be carried out by enumerators shall be identification of establishments to be surveyed, distribution, collection and examination of questionnaires and arrangement of questionnaires.

b. Pilot survey shall be limited to the Muscat capital area where six (6) enumerators shall be assigned, and other area shall be surveyed by mail.

c. The length of the survey period shall be two (2) months for the pilot survey and three (3) months for the first census survey. Each number of months respectively includes one (1) month for training concerning the survey and data arrangement after collection of questionnaires.

d. The surveys are scheduled for 1993 (pilot survey) and 1994 (first census survey).

Item	Unit price	1992	Period	No. of enumerators	Amount	Period	No. of enumerators	Amount
	RO/Month							
Personnel expenses for enumerators	150	—	2	6	1,800	3	* 91	40,950

* Breakdown of 91 is 38 for Muscat capital area, Ministry of Commerce and Industry and 53 for regional offices.

2) Motor vehicle for survey (car rental)

Assumptions of cost estimation:

a. Car rental period shall be two month for the pilot survey and three months for the first census survey.

b. Car rental shall include drivers.

c. Car rental for regional offices shall be limited to only Salalah areas where rent-a-car is available to hire. A car of each regional office and cars which area hired from staff of regional office and enumerators shall be used in other areas.

d. Car rental fee from MCI staffs and enumerators is assumed RO 100 a car per month.

1993 (Pilot survey)

- Car rental: 60 days x 0.7 x RO 27/day = RO 1,140

- Gasoline fee:
  Rental car = 100km/day x 60 days x
  0.7/6km/lit. x 1 car x 0.112 = RO 80
  MCI cars = 100km/day x 60 days x
  10.7/6km/lit. x 2 cars x 0.112 = RO 160

1994 (First census survey)

- Car rental:
  Muscat MCI = 90 days x 0.7 x 13 cars x RO 27
  = RO 22,100
  Regional offices = 90 days x 0.7 x 3 cars x
  RO 27 = RO 5,100

- Car rental from MCI staffs and enumerators
  (86-26) Cars x 3 months x RO 100
  = RO 18,000

- Gasoline fee:
  Rental cars = 100km/day x 90 days x
  0.7/6km/lit. x 16 cars x 0.112 = RO 1,880
  MCI cars = 100km/day x 90 days x
  0.7/6km/lit. x 2 cars x 0.112 = RO 240
  Regional offices = 100km/day x 90 days x
  0.7/6km/lit. x 8 cars x 0.112 = RO 940
  Cars hired from staff of regional office and
  enumerators = 100km/day x 90 days x
  0.7/6km/lit. x 60 cars x 0.112 = RO 7,060

3) Publicity and advertising expenses

Advertisements shall be carried in newspapers to publicize objective and period of survey for pilot survey and for first census survey.

Assumptions of cost estimation:

a. Two newspaper advertisements shall be run twice for pilot survey and five times for first census survey.

b. Newspaper advertisements shall be of half page size.

c. Of the two newspapers used for advertising, one shall run an English language advertisement, and the other an Arabic advertisement.

1993 (Pilot survey)
..... RO 795 x 2 times x 2 newspapers = RO 3,180
1994 (First industrial statistical survey)
..... RO 795 x 5 times x 2 newspapers = RO 7,950

4) Printing/binding of questionnaires

Assumptions of cost estimation:

a. Questionnaire shall be in English and Arabic.

b. Number of pages is assumed to be 20 pages for questionnaire, 30 pages for manual.

c. Number of pages is assumed to be 60 pages for commodity classification code book.

1993 (Pilot survey):
- Questionnaire -- 4,000 copies x RO 0.40 x 2 = RO 3,200
- Manual -- 4,000 copies x RO 0.60 x 2 = RO 4,800

- Commodity classification code book
  -- 4,000 copies x RO 1.20 x 2 = RO 9,600

1994 (First census survey)
- Questionnaire -- 4,000 copies x RO 0.40 x 2 = RO 3,200
- Manual -- 4,000 copies x RO 0.60 x 2 = RO 4,800
- Commodity classification code book
  -- 4,000 copies x RO 1.20 x 2 = RO 9,600

5) Preparation of statistical survey report

Assumptions of cost estimation:

a. Report shall be in English and in Arabic.
b. Number of pages is assumed to be 300.
c. Number of copies is assumed to be 3,000.

1994 (First census survey)
..... 3,000 x RO 3.19 x 2 = RO 19,140

CHAPTER 7. DRAFT PLAN FOR INDUSTRIAL STATISTICAL SURVEY

Plan (Draft) of the industrial statistical survey which will be the immediate activity of the Center shall be discussed in this chapter. After pilot survey is implemented concrete action plan shall be reviewed and finalized.

7.1 Objective and Scope of Industrial Statistical Survey

7.1.1 Objective

Objective of the industrial statistical survey in Oman is to augment knowledge, in terms of both quality and quantity, of the actual status regarding currently existing manufacturing sector in Oman, and to fully comprehend profile and structure of currently existing manufacturing sector. The statistical survey will also clarify the contribution of manufacturing sector to national economy, for instance in the areas of production, shipments, employment, fixed assets formation, value added and gross value added, which will provide information indispensable for determining economic and industrial policies and will provide means to measure effectiveness of implemented national policies.

The following is the principal statistical information to be clarified by the industrial statistical survey.

(1) Employment, production, shipments, fixed capital, value added and inventory of manufacturing sector

(2) Geographical distribution of manufacturing activities, namely, pattern of distribution of manufacturing establishments in Muscat capital area

and in each region

(3) Employment structure of manufacturing sector (Ratio between Omani nationals and non-Omani nationals)

(4) Electricity and water consumption by manufacturing sector

7.1.2 Objects of Statistical Survey

The industrial statistics covers all types of manufacturing industry which current industrial registration system of the Ministry of Commerce and Industry covers. In addition, it also covers oil refining industry which does not fall under the administrative jurisdiction of The Ministry of Commerce and Industry.

Manufacturers of traditional handicraft articles are excluded for the time being, except those are operated by mechanical means. Manufacturers of fire arms should be also excluded in view of the national defense aspect.

Unit of the object of survey shall be an establishment.

7.1.3 Definition of Manufacturing Sector to Apply

Definitions of manufacturing sector to apply shall be, in principle, those currently in use in the industrial registration system. Manufacturing sector is so defined to mean activities to manufacture finished products using power driven mechanical means and by processing raw materials and semi-finished products, including mixing, assembling and packaging of products.

7.1.4 Frequency and Period of Survey

(1) Survey frequency

In general, the Omani manufacturing industry is in its infancy. Hence, enterprises start up, go out of or change their line of business quite often. Moreover, the impact of such changes in status is relatively great because of the small number of establishments in existence. It is therefore recommended that the industrial statistical survey be conducted every year in order to correctly and timely comprehend the trend of industrial activities.

(2) Reference Period

The majority of establishments operate according to a fiscal calendar year beginning on January 1st and ending on December 31st. The taxation system also utilizes this fiscal calendar year. As it is assumed this practice will continue unchanged, the reference period of the industrial statistical survey shall be the calendar year beginning on January 1st and ending on December 31st.

7.1.5 Timing of survey

The business income tax law which is expected to be enforced from fiscal 1993 onward requires each establishment to file a financial report for the previous fiscal year.

Establishments are therefore required to report on closed accounts no later than the end of March. According to the results of inquires made during the field study, the majority of establishments confirmed their readiness to close their accounts during the month of March.

Climate conditions during the summer months of June and July are too severe for the field survey, and many proprietors of establishments habitally take leaves during this period. It is therefore recommended that the industrial statistical survey should be conducted during the period beginning on April 1st and ending on May 31st of every year.

7.2 Procedures and Methods of Statistical Survey

Comprehensive procedures and principal methods are adopted as described hereunder for the implementation of industrial statistical survey, in the light of the results of survey conducted by the study team.

7.2.1 Comprehensive Procedures and Methods of Survey

Fig. 7-2-1 "Procedures of Industrial Statistical Survey" shall be referred.

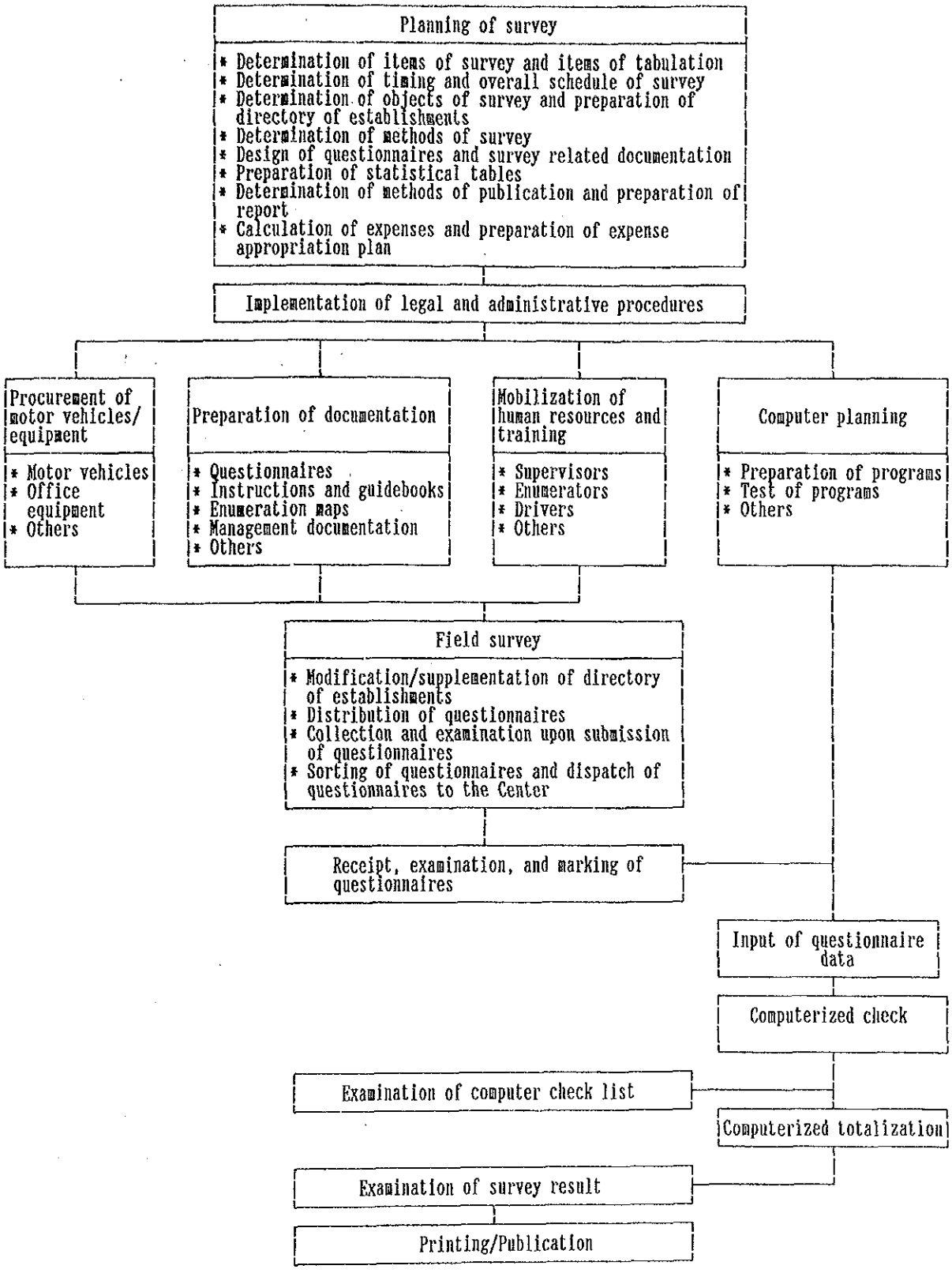


Fig. 7-2-1 Procedures of Industrial Statistical Survey

Survey shall commence with the planning of survey to be conducted by the Industrial Statistics Information Center (the Center). Implementation of legal and administrative procedures as required for the implementation of survey shall follow. Next, full scale preparation must commence with procurement of vehicles and equipment, printing of documentation, mobilization and training of human resources, and preparation of computer planning.

Those preparation works shall be, in principle, the responsibility of the Center. It is, however, desirable that procurement of vehicles and recruitment of enumerators shall be assigned for execution to Regional Offices of The Ministry of Commerce and Industry but shall be financed by the budget appropriated to the Center. Following the completion of preparation works, field survey shall be conducted. Field survey is considered best executed directly by the survey unit of the Center for Muscat capital area and by Regional Offices of The Ministry of Commerce and Industry for respective regions other than Muscat capital area under the assignment from the Center.

All questionnaires collected by field survey shall be gathered in the Center for examination/marking/ classification, being followed by data input into computers. Input data will be processed by pre-determined computerized examination and then totalized. Tabulated results will be examined and analized by the Center, being followed by printing and publication.

7.2.2 Essentials of Survey Methods

(1) Adoption of complete enumeration method

Complete enumeration system is necessary in view of the following.

1) No complete profile of manufacturing sector in Oman is yet fully comprehended.

2) The officials in charge of policy planning need sufficient data to allow them to analize the structure of manufacturing sector in order to plan and review impact of policies to encourage industrial development.

3) It is necessary to survey all manufacturing establishments in order to fully comprehend actual status by every type of industry, because the number of establishments encompassed in many types of industry is rather limited when viewed by way of industrial registrations. In other words, new entries or discontinuations of a small number of establishments may have significant impact on the status of that type of industry.

(2) Adoption of the survey by enumerators

The survey by enumerator is considered appropriate. An alternative of Mail Survey is not readily available under the current conditions in Oman because of the following.

1) No complete directory of manufacturing establishments (including mailing addresses) corresponding to complete coverage survey is available.

2) Identification data of manufacturing establishments (telephone number, address, P.O.Box etc.) partially available by way of industrial registration data are not sufficiently reliable because they are not updated since initial registrations.

3) Because mails are not delivered to each households or each establishments, problems would arise with regard to reliability of mail delivery service and time to elapse before mails are actually delivered.

4) Response rate had been extremely low for mail surveys conducted in the past. UNDP report states that the Industrial Statistics Unit of The Ministry of Commerce and Industry conducted a mail survey in May 1983, and as of December 1st of that year, no more than 38 establishments (17%) out of 225 establishments surveyed had responded effectively.

Because the industrial statistical survey this time is the first survey of entire manufacturing establishments in Oman, objective to be achieved by the survey, explanations for each survey items, and how to fill-in questionnaires need to be explained personally to respondents by enumerators in details, in addition to the issue of ministerial decrees and informing respondents in writing.

Primary check and examination of filled-in questionnaires should be conducted vis-a-vis with respondents.

In consideration of above-mentioned aspects, adoption of interview survey may be necessary. However,

adoption of interview survey would not deny possibility of adopting mail survey as an auxiliary method of survey. For example, for an industrial estate, for an instance Rusayl industrial estate, where establishments can be accurately identified by documentation and capability of establishments in responding to survey is considered sufficiently high, adoption of mail survey may be considered feasible.

(3) Adoption of self-filling system

Adoption of self-filling system - filling of questionnaires by respondents by themselves - may be more practical.

As touched upon in foregoing sections, majority of small scale establishments is not used to the practice of bookkeeping and pays no attention to the perfection of business records. Accordingly, totalization of data related to annual production/accounting is time-consuming and very burdensome for those establishments. Should statistical survey adopt filling of questionnaires by enumerators, sorting of diverse documentation/records of establishments is likely to be conducted vis-a-vis with enumerators, thus significantly increasing time to be spent by enumerators. It is therefore recommended to adopt system of self-filling by taking following steps.

1) Enumerators to deliver and explain all documents to persons to be interviewed during first visit to establishments.

2) Enumerators to allow to establishments time necessary to fill-in questionnaires and to commit themselves for follow-up visits.

3) Establishments to fill-in questionnaires

4) Enumerators to check and examine filled-in questionnaires during follow-up visits and to additionally fill-in questionnaires if and when necessary to do so, and then to collect questionnaires.

(4) Preliminary survey (preparation of directory)

Directory of establishments is the basis of industrial statistical survey (complete enumeration survey). This is prepared, based on the current registration information adding information on establishments which were confirmed partially by the study conducted by study team this time.

Enumerators shall tour through the districts they are in charge of immediately prior to the implementation of full scale survey in accordance with pertinent enumeration maps and directory lists of establishments. They shall endeavor to locate and identify establishments which are not listed in the directory list and mark them in the pertinent enumeration map, and to delete from the directory list those which have discontinued, or relocated in other areas in order to update directory lists.

Thereafter, the directory of establishment shall be controlled and maintained independently by The Industrial Statistics Information Center.

(5) Numbering of establishments

Serial number should be allocated, beginning with 1 for each enumeration district, to the establishments which are listed in directory list of establishments as described in (4) hereinabove.

The numbering so allocated to establishments shall remain unchanged for 5 years and shall be renewed thereafter in order to prevent disorder in the continuity of numbering due to founding/ discontinuation of establishments.

7.3 Questionnaires, Examination and Tabulation

7.3.1 Questionnaires

(1) Composition of questionnaires

The study team attempted to design basic composition of questionnaires considered benefiting to the industrial statistical survey in Oman in the light of previous experience of the survey of sampled establishments. (Refer to the questionnaire sample of Appendix 7)

Questionnaires are composed as follows.

I. Columns to enter identification data and attribute of establishment

II. Columns to enter employment. Volume of employment of an establishment is used as an indicator representing scale of establishment, while the same constitutes the basis to measure total volume of employment of manufacturing sector as a whole. The data can be used for the calculation of the labor productivity.

III. Column to enter value of shipment and value of other revenues which constitutes basis of the calculation of value added while the same constitutes basis to totalize overall profile of types and volume of production of principal products of manufacturing sector as a whole.

IV. Columns to enter input i.e. consumption of raw materials, consumption of utilities and any other input. The same constitutes basis for the calculation of value added as well as consumption of raw materials, consumption of water resources and energy resources by manufacturing sector as a whole.

V. Columns to enter value of inventory and fixed capital. The same provides basis for the calculation of national wealth and total capital formation. Value of inventory is used for the calculation of value added while volume of fixed capital provides basis for the calculation of productivity of fixed capital and ratio of capital equipment ratio.

(2) Use of short form survey questionnaires

In view of tasks given to the industrial statistics, questionnaires to be used for statistical survey are desired to be as detailed and as strict as possible. A typical example would be the sample questionnaires included in the "Recommendation for the 1983 World Programme of Industrial Statistics" of the United Nations. The questionnaires as described in the foregoing section "Composition of questionnaires" are more or less in line with the standard form of questionnaire, though considerably simplified to match with the current conditions of Oman.

It is to be reminded that industrial statistical survey which may result in the end collection of information in excess of what are actually needed and neglect to pay due attention to the will and capability of respondents would be at the risk of being consequently proved unsuccessful.

The questionnaires which the study team used experimentally for the survey of sampled establishments are standard form of questionnaire which was proved apparently to be excessively detailed and complex beyond the capability of small scale establishments - sole proprietorship enterprises - in Oman.

In fact, complexity of the questionnaire often discouraged respondents to respond to the survey. It is suspected that considerable data were fabricated by respondents when they were overly urged by enumerators to respond. Delays in responding were significant. As were often seen in small scale establishments located in rural areas, communication by telephone between local employees and proprietors who are living away from the locations of establishments is time-consuming and often almost impossible with regard to complex contents of questionnaires.

In conclusion, it is recommended that standard form of questionnaires should be used for initial industrial statistical survey targeted to large and medium scale establishment in Oman, while significantly short form of questionnaires should be used for the survey of small scale establishments.

Short form of questionnaire for the survey of small scale establishments should include following basic data as a minimum.

* Identity and attribute of establishment
* Employment (Composition, cost)
* Main products and raw materials and cost of raw materials
* Value of shipments

* Value of electricity and water consumption
* Fixed capital

Even small scale establishments would be capable of responding with reasonable degree of accuracy for above-mentioned items.

Provisional criteria recommended to apply to the classification of small scale establishments for which short form of questionnaire should be used would be the number of employees no greater than five. Appendix 7-3 shows short form questionnaire.

(3) Language to use in questionnaires

It is necessary that questionnaires should be prepared both in Arabic language and in English language. Though questionnaires in English language were distributed for the survey of sampled establishments, distribution of questionnaires in Arabic language was requested by many establishments. It should be remembered that proprietors of small scale establishments are often Omani nationals who are not conversant with English language, while clerks in charge of accounting/business are often expatriates not conversant with Arabic language. Though questionnaires are to be filled in Arabic and/or in English, respondents would be requested to fill-in, preferably by English language into the questionnaires prepared in English language in view of computer input for totalization.
However, the Center has to translate data into English for this purpose in case questionnaires are filled in Arabic.

(4) Instructions for respondents

Instructions for respondents were distributed in addition to questionnaires for the survey of sampled establishments in order to assist respondents to make filling-in as easy and as accurate as possible. Nevertheless, many cases were identified where respondents had apparently paid no attention to the instructions distributed. It is therefore desirable that important instructions should be included in the questionnaires immediately preceding related columns of the questionnaires. This enables respondents to have as many opportunities to refer to the instructions as may be needed by respondents for the filling-in.

7.3.2 Examination

(1) Objective of examination

Examination is conducted in order to compare contents of each stage beginning with the identification of establishments and ending with the preparation of statistical tables with the instructions (judgement criteria). Differentials from judgement criteria would have to be corrected, while resultant figures obtained from the data would have to be examined to confirm their reliability. In other words, it is difficult to conduct the survey which is completely free from errors, no matter how meticulously the survey is conducted under thorough preparation. It is to be expected that totalization could be also subject to artificial errors as well.

Examination is intended to eliminate such errors and credibility and accuracy of statistics can only be endorsed by the examination.

Results of examinations conducted during the process of statistical survey would provide valuable information including whether questionnaire design was appropriate, whether method of totalization was correct and so on. It is therefore important to record and analyze results of examination as much as possible to provide reference materials for future questionnaire design.

(2) Method of examination

Examination is classified into examination by enumerators, examination by the agencies to which survey is assigned (Directorate General of Commerce and Industry in Southern Region and Regional Offices), and examination by the Center.

1) Examination by enumerators

Enumerators shall confirm numbers of the establishments in charge, number of questionnaire sheets and questionnaire numbers.

a) Examination of questionnaires

Enumerators shall examine collected questionnaires for omission of entry and errors in entries. In case any omission or errors are identified at the time of collection of questionnaires, enumerators shall reconfirm with the establishments and shall request persons in charge of the establishments to rectify and add entries immediately and on the spot.

b) Management of distribution and collection of questionnaires

Enumerators shall have to inspect and confirm absence of omission or overlapping in distribution and collection of questionnaires.

2) Directorate General of Commerce and Industry, Southern Region, each Regional Office and the Center

a) Management of distribution and collection of questionnaires

Control record to confirm state of distribution and collection of questionnaires shall be prepared in order to supervise distribution and collection of questionnaires by enumerators.

b) Examination of questionnaires

Questionnaires collected by enumerators shall be re-examined for omission of entry, errors in entries and contents of entries into survey items.

c) Collected questionnaires shall be dispatched to the Center together with the control records.

3) Examination by the Center

a) Preparation of control record

Items of the control record shall be as follows.

- Name of establishment, telephone number
- Establishment number and questionnaire number
- Name of enumerator
- Year/Month/Day of distribution of questionnaire
- Year/Month/Day (Planned/Actual) of collection of questionnaire
- Year/Month/Day of request for submission of questionnaire

b) Confirmation of number of questionnaire sheets distributed and collected based on the control record.

c) Examination of individual questionnaire

- Check of sequence of questionnaire numbers and missing questionnaire numbers
- Check of establishment numbers
- Check of industrial classification code and commodity classification code
- Check of omission of entry and errors in entries
- Check of sum-up figures

d) Examination of tabulated data

- Confirmation of titles, headings and columns
- Confirmation of number of tables
- Verification of totalized resultant figures
- Cross-examination between tables

(3) Importance of the examination by the assigned agencies

A distinct characteristic of the statistical survey by the assigned agencies is to conduct on-the-spot examination. Any errors in entries or omission of entry can be reconfirmed and rectified immediately on the basis of facts.

On the contrary, examination by the Center with respect to the contents of entries is automatically limited to the examination by documents. The closer the survey is to actual point of time and place, the better any errors in the reported data can be timely rectified.

7.3.3 Publication

Results of industrial statistical survey shall be compiled into industrial statistical table and published.

(1) Industrial statistical table

Industrial statistical table shall be classified into three editions, viz., [Industry Edition] which is classified and tabulated by the principal manufacturing activities of establishments on the basis of ISIC Rev.3 : International Standard Industrial Classification, [Product Edition] which is classified and tabulated by products of establishments in accordance with Omani commodity classifications, and [Infrastructure (utilities) Edition] which is tabulated relating to industrial land and industrial water.

When classified by the method to display (column), it can be classified into "classification by industry",