ST/ESA/STAT/SER.F/28

DEPARTMENT OF INTERNATIONAL ECONOMIC AND SOCIAL AFFAIRS
STATISTICAL OFFICE

STUDIES IN METHODS Series F No. 28

# HANDBOOK OF STATISTICAL ORGANIZATION

**A study on the organization of national statistical services and related management issues**

UNITED NATIONS
New York, 1980

NOTE

Symbols of United Nations documents are composed of capital letters combined with figures. Mention of such a symbol indicates a reference to a United Nations document.

ST/ESA/STAT/SER.F/28

UNITED NATIONS PUBLICATION

Sales No. E.79.XVII.17

00800

# Preface

The present publication is volume I of a two-volume *Handbook*, which is part of the continuing work on statistical organization undertaken at the request of the United Nations Statistical Commission. It supersedes the *Handbook of Statistical Organization* issued in 1954[1] which, however, provided useful background material. Other sources utilized in the preparation of volume I were the report of the United Nations Interregional Seminar on Statistical Organization, held at Ottawa in 1973, the papers prepared for that Seminar as well as for the Seminar on the Organization of a Statistical Service, held at Munich in 1977, and a variety of other sources.

Both the organization and content of volume I of the *Handbook* are to a large extent based on a document (E/CN.3/495) prepared by the Statistical Office of the United Nations for discussion at the nineteenth session of the United Nations Statistical Commission (New Delhi, India, 1976) and subsequently published as *The Organization of National Statistical Services: A Review of Major Issues*.[2] Almost the entire publication has been incorporated into the *Handbook*, some paragraphs unchanged and some slightly modified. As was the case with the publication, the *Handbook* has been designed from the vantage point of the top management of a statistical agency. This means that the presentation is aimed at the highest level of the organizational structure of the agency and does not deal with issues specific to other levels.

Most chapters of volume I describe the major functions involved in producing statistical information with the aim of providing background for assessing the units required for the effective performance of these functions and the most appropriate location of these units in circumstances that may vary in different countries.

Most of volume I was prepared by Petter Jakob Bjerve, acting as consultant to the United Nations. Volume II contains descriptions of individual country practices in statistical organization and includes a number of organizational charts. It is envisaged that, in line with the decision of the Statistical Commission at its nineteenth session in 1976, further studies on various aspects of statistical organization and related management issues, including more detailed treatment of a number of topics included in volume I, will be undertaken. Meanwhile, the Statistical Office of the United Nations would appreciate receiving comments on the present volume so that future revisions can take into account the experience of countries in using it.

---

[1] United Nations publication, Sales No. 54.XVII.7. (Out of stock.)

[2] United Nations publication, Sales No. E.77.XVII.5.

# CONTENTS

# INTRODUCTION

## A. Preliminary considerations

"Governments and the public alike are becoming increasingly aware of the importance of having at their disposal quantitative information on a wide variety of subjects in order to permit intelligent planning, and as a basis for decisions regarding the diverse and complex economic and social problems of today. This ever-increasing need for statistics is reflected in the efforts by many Governments to develop and improve their national statistical service where none had previously existed. For others, it involves expanding the scope and improving the quality of the work of existing services. Even Governments with well-established services are experiencing new and heavier demands for statistics which, in previous years, were not considered as essential.

"Many Governments, especially those with less-developed statistical services, have not been able adequately to meet these demands in view of their limited resources and experience, and have accordingly looked to the United Nations and the specialized agencies for guidance and assistance in the development of their statistics. The function of the international agencies in assisting in the improvement of national statistics was clearly recognized by including among the assigned tasks of the Statistical Commission and the Statistical Office of the United Nations a responsibility for promoting such improvement. The work of the United Nations and the specialized agencies in this respect has included:

"(1) Standardization of definitions and methods;

"(2) Preparation of technical studies and handbooks on various statistical subjects and problems;[1]

"(3) Provision of statistical experts;

"(4) Organization and conduct of training centres;

"(5) Organization and conduct of statistical seminars and conferences; and

"(6) Training facilities for fellowships and scholarships.

"The problems of organization and operation of a national statistical service are many and interrelated, and are concerned essentially with:

"(1) The type of structure and organization which would reflect the nature of the country's economy, its stage of development, and its institutional structure;

"(2) The means of maintaining effective co-ordination and control over government statistical activities in order to avoid unnecessary duplication and waste of resources, to ensure the development of a well-balanced, integrated set of statistics, and to maintain adequate statistical standards;

"(3) The techniques for the most efficient utilization of staff and equipment; and

"(4) The provision for the training of statisticians in order to ensure a continuous flow of trained personnel into the statistical service."[2]

The paragraphs above, written in 1954, are largely valid today. However, since the 1954 *Handbook* was written, remarkable developments have taken place in many countries. For the overwhelming majority of countries, official statistics have expanded substantially in quantity and also improved significantly in quality. The computer has revolutionized statistical work in many respects and brought about radical changes of organization. To a greater or less degree this applies to all parts of the world. However, in many less developed countries the status and prestige of statistics are still fragile and statistical development is being given such a low priority that economic and social development is hampered by the lack of data for economic management and planning purposes. There is still a lack of awareness of the importance of statistics in a number of these countries. Nevertheless, practically everywhere improvements have taken place, partly due to the assistance provided by the United Nations system, which has expanded at a rapid rate and has reached a level far above that of 1954.

The United Nations Interregional Seminar on Statistical Organization, held at Ottawa in 1973, and its predecessor held at Ottawa in 1952, defined statistical organization to include certain related management aspects. The seminars covered a variety of facets, namely internal organizational structures, centralization and decentralization, co-ordination, planning and priority setting, relationships with users and suppliers of data, dissemination, data processing, legislation, recruitment, training, status, research and analysis and several others. The present *Handbook*, which is divided into four parts, will touch on these facets under the following main headings: organizational structures (part one), external capability (part two), internal capability (part three) and priority setting, integration and co-ordination and planning (part four). The need for strengthening these elements can serve as a guiding criterion in determining changes in the organization of a statistical agency.

A discussion of organization must be based on a description of the objectives to be promoted and the substantive problems to be solved. Consequently, in the *Handbook* statistical policy, methods and procedures, legal problems etc. are considered—but neither exhaustively nor in great detail. Their consideration is limited to the minimum required as a background for the study of organization. Therefore it is stressed that this is neither a manual of statistical or managerial methods nor a guide to statistical policy, although aspects of these topics are covered to the extent required for the discussion of statistical organization.

A study of the organization of a statistical agency must be based on a clear understanding of its functions, which are basically the same in all countries. However, the form of organization required to facilitate the effective and efficient performance of the functions depends to a considerable degree on circumstances, which differ between countries. Therefore, most chapters of the *Handbook* focus on major

[1] The General Assembly in its resolution 407 (V) of December 1950 recommended that the Secretary-General and the specialized agencies prepare such materials to serve as guides for Governments wishing to make use of them; specifically, the resolution mentioned "suggestions relating to the organization of adequate government machinery" for obtaining statistics.

[2] *Handbook of Statistical Organization* (United Nations publication, Sales No. 54.XVII.7), p. 1. (Out of stock.)

functions involved in producing statistical information, on the units required for effective performance and on the location of these units within the agency. The current functions of a statistical agency include the collection, production, dissemination and analysis of statistics. In addition the agency must develop and maintain an appropriate framework within which the functions can operate properly, that is, a system of planning, methods and tools of various kinds, standard concepts, definitions, classifications etc. While this framework is the main theme of parts one and four, most of parts two and three deal with current functions.

It is hoped that the review of major functions proves to be useful even though it is not carried further than necessary for the discussion of organization as defined in the *Handbook*. In particular, it is hoped that the review is helpful in an analysis of the principles on which specific organizational structural solutions should be based. The latter are dependent on a host of factors including size of the country, size of the statistical agency, degree of centralization, past practices and traditions, availability of competent managerial and technical personnel and so on. In the *Handbook*, organizational consequences of differing circumstances are at many points touched on separately as regards developing countries. The specific organizational possibilities mentioned are intended primarily for illustrative purposes and should not be regarded as recommendations.

Often, when a new head of an agency is appointed, organizational changes are made at an early date. Such changes may well be justified, but it is worth bearing in mind that one should not make changes merely for the sake of change. In any case, changes should not be made until sufficient experience has been gained and a thorough organizational analysis carried out, and only after extensive consultations with the staff and competent outside authorities.

On the other hand, there is no doubt that in any statistical agency the organization must be updated from time to time, for instance, as a consequence of technological change, expanded activities, changes in personnel etc. It is important that the organization should keep pace with major changes in the production process and serve as an instrument for furthering, and not impeding, the objectives of the statistical agency and the national statistical service. However, to the extent possible, necessary changes should be made gradually; awaiting an accumulation of many changes requiring a major reorganization always has disruptive side effects.

Some of the basic concepts and terms used in the *Handbook* are explained in section B below. The main objectives of a national statistical service and some major requirements that official statistics and the statistical service should satisfy are then described (sect. C). Finally, the contents of each part of the *Handbook* and the interrelationships between them are outlined (sects. D to G).

## B. Basic concepts and terms

The term "national statistical service", as used in the *Handbook*, refers to the totality of units of the central government engaged in statistical work. The term "statistical agency" refers to the individual units of the service. Sometimes the term "central statistical office" is used to denote the main statistical agency of a centralized statistical service.

In the most general terms, it may be said that the term "organization", as used at the interregional seminars and in the *Handbook*, deals with various ways to facilitate effectiveness ("to do the right things") and efficiency ("to do things right") in the utilization of scarce resources, especially human resources. An agency "does the right things" if its actions lead to the fulfilment of its objectives, that is, if its outputs are relevant and have the desired impact. The agency "does things right" if it makes the best possible use of the resources at its disposal, that is, if it maximizes output per unit cost (or minimizes cost per unit of output).

The term "official statistics" denotes the statistics provided by a national statistical service to others. It does not include statistics a government agency produces for its own use only and that have no interest or are not accessible to others.

The term "statistical project" is defined as the smallest package of identifiable statistical outputs for which satisfactory cost estimates can be made. This may represent statistics produced on the basis of data collected by a single questionnaire, or it may be statistics based on data collected by means of several questionnaires but linked in the data processing so that costs of component parts cannot be separated. The project concept may cover many subjects, e.g. a census of population, or be rather narrow in scope, e.g. statistics on the insemination of pigs. Furthermore, the project may consist of a further elaboration of a census or a survey, e.g. an index of industrial production or a wholesale price index. Often it is most useful to define a statistical project as including all operations involved in providing the relevant information, including dissemination. However, in some cases it may be appropriate to confine the concept mainly to the preparation of the statistics. Examples of the latter projects are a statistical abstract, a compendium of economic or social trends, a population map etc. A statistical agency may carry out analysis and methodological research which are separately budgeted and for which the term "project" is properly used. Thus, the delimitation of a project must be determined concretely in each case to make the concept as meaningful as possible for planning, implementation and evaluation of the work involved. The term "statistical programme" refers to a group of related statistical projects.

In verbal discussion and in statistical literature the term "data" is often used both for the micro-data collected from individual respondents and for the information derived from such data. Such synonymous usage is largely avoided in the *Handbook*. As a rule the term "data" refers to information on individual respondents. The term "statistics" refers to information on groups of respondents and not on the individual respondents.

Some of the micro-data collected from respondents are used for statistical purposes only and are termed "statistical data". Others are collected for administrative purposes, although they in addition may be utilized for the production of statistics. The latter, termed "administrative data", provide an important basis for official statistics in most countries. In the early history of official statistics, administrative records were practically the sole source from which official statistics could be derived.

## C. Objectives and requirements

The objectives of a national statistical service are reflected in the role statistics are designed to play. This role is highlighted in the statement quoted below which, though written over 25 years ago, is even more true today:

> "The demand for statistics of the highest quality by Governments, business, economists, social workers and others, has increased enormously. This is accounted for partly by the growing complexity of the modern world, but even more by the fact that many Governments today have embarked upon a wide variety of [economic plan-

ning, regulation and] social security measures. To function efficiently, such Governments must have a basis of sound statistical information to assist them in formulating their policies. Governments which do not have well developed statistical organizations are severely handicapped. . . . In all fields, both national and international, the work of the statistician is fundamental for comprehending the numerical aspects of the problems to be dealt with, for setting more or less isolated phenomena in their proper perspective, for indicating the significance of parts in relation to the whole and for substituting realistic data for wishful thinking, biased claims and political oratory. In short, statisticians help to shape [economic and] business policy, they furnish navigational guides for the ship of state, they help social agencies which work for the welfare of the people and they help students and the general public to have a more realistic view of the complex economic and social environment in which they live."[3]

For official statistics to play their wide-ranging role they, and the agency producing them, must satisfy certain requirements. These may be briefly summarized:

(*a*) Statistics are not end products—they are intermediate products to be used in decision-making and research and for the purpose of enlightenment in general. Hence a user orientation must pervade the statistical service;

(*b*) The same statistics serve many users, and in a variety of ways. Hence, there is a need for them to be oriented to serve many users rather than one of a few exclusively;

(*c*) Statistical series are not used in isolation—they are used jointly with other statistics. Hence an integrated and harmonized product is essential, in terms of concepts, definitions, classifications, methods;

(*d*) Time series covering some years in the past are more revealing of current and emerging events than isolated single observations. Hence there is a need for maintaining historical continuity in the data and for storing them in a systematic way as elements of data capital accumulation;

(*e*) Timeliness is essential for use in decision making. Hence there is a need for timeliness in collection and production and promptness in the release of the data;

(*f*) The statistical product is based on raw materials (data) supplied by households and private and public enterprises and institutions. Hence good public relations and the safeguarding of confidentiality of individual returns are essential for good quality;

(*g*) A condition for the acceptance of statistical results is that the statistical office is, and appears to be, impartial and objective and beyond any professional reproach;

(*h*) The production of reliable, timely statistics is an interdiciplinary—and costly—process requiring continuity in operations and management, and competent professional and administrative leadership.

The above principles are of great importance in considering various alternatives in the organization and management of statistical services. The *Handbook* aims at illuminating how organizational arrangements may contribute to satisfying them.

### D. Organizational structures

Appropriate organization of the national statistical service is necessary to achieve efficiency and effectiveness; however, it is not of course sufficient. It is often believed that problems of statistical policy can be solved by organizational rearrangements notwithstanding the fact that their solution requires other means, such as able and inspiring leadership, application of appropriate methods and techniques, qualified staff and, not the least, common sense and hard work. The needs for reorganization should be identified and satisfied; however, the contribution of such reorganization to improvements in statistics should not be overrated.

The same objectives may call for different organizational arrangements at different times and in different circumstances. For instance, a large institution has degrees of freedom not available to a small one—but large size generates complex management problems. In a small agency, with only a few professionals, wise improvisation may be much more important than any predetermined organizational arrangement. In a country in the early stages of statistical development, there may be both constraints and opportunities not present where the pattern of statistical organization is long established and deeply entrenched. The resources available—particularly qualified personnel—may influence the form of the organization.

To provide a general frame of reference, an outline of major organizational structures is given in part one of the present publication. Two aspects are dealt with. One is the organizational structure of a statistical agency that is producing statistics for several subject-matter fields (chap. I). The other is the desirable degree of centralization, i.e. whether the production of official statistics should be concentrated mainly under the control of a single statistical office or whether the national statistical service should be composed of a number of agencies, each producing a significant part of the statistical output (chap. II). As emphasized by the Statistical Commission, whatever the degree of centralization, a strong co-ordinating body is vital "to ensure a maximum of integration in the statistical process and in its outputs".[4] This body may be either a major statistical agency or a central body of another kind. In fact better co-ordination and integration should be a major objective of any reorganization of the national statistical service or of an agency within the service.

### E. External capability[5]

Close contact and co-operation with the users of the statistics are essential in order to keep abreast of their evolving needs so as to ensure that the statistics are relevant, useful and used. Similarly, since statistics come into being by the editing, adjusting, aggregating, cross-classifying and analysing of information that respondents furnish through surveys and censuses, and that administrative records provide, the production of good statistics is ultimately dependent upon the co-operation and goodwill of those who supply the basic data—individuals, enterprises, institutions, government departments and so on. The statisticians (who, incidentally, must co-operate among themselves to produce an integrated product) must strive to understand the problems of suppliers and users of the data. At the same time, they must ensure that their obligations and constraints are understood by the suppliers and users.

A statistical agency that has effective facilities for creating and maintaining such co-operation and understanding

[3] *Handbook of Statistical Organization* (United Nations publication, Sales No. 54.XVII.7), p. 55. (Out of stock.)

[4] *Official Records of the Economic and Social Council, Sixty-second Session, Supplement No. 2* (E/5910), para. 135.

[5] The first three paragraphs of the present section and the first two of section F below are based on a paper by S. A. Goldberg, "The demand for official statistics and their utilization in Canada with special reference to the role of the national accounts", *Bulletin of the International Statistical Institute* (Sydney), vol. XLII, book 2 (1967), pp. 960-963.

may be said to have an effective external capability. More precisely, the external capability relates to the set of relationships with the outside world and procedures which enable the statistical agency on the one hand to identify and assess the most urgent needs of users, to disseminate the information widely and to enhance the probability that the statistics are used; and on the other to gain the compliance of respondents and their confidence that the information requested is needed for important purposes, that constant efforts are made to reduce the burden on them to a minimum and that the confidential nature of the individual data supplied is fully safeguarded.

A major goal in structuring and managing a statistical agency is to keep its external capability strong. Thus a statistical office must endeavour to ensure that the necessary expertise is available to it in the various subject-matter fields it encompasses so that it can provide effective bridges for communicating with users of the statistics and facilitating the detection and evaluation of demands for data in the light of their feasibility and burden on respondents. Various arrangements are often made to supplement and strengthen these bridges. Formal arrangements take the form of conferences, committees and panels. Of great importance too are the more informal type of personal relationships with user organizations and suppliers of data. In other words, a network of communication channels needs to be developed.

The nature of the external relationships and the organizational means by which they can be strengthened are dealt with in part two. The special relationships to other central government agencies are dealt with in chapter III. Relationships common to all groups of users and respondents are discussed in chapters IV and V respectively. However, it appeared convenient to discuss the external committee structure, which represents an important vehicle for promotion of such a relationship, in part one even though it could have been included, perhaps more logically, in part two. The special relationships that a national statistical service has to subnational governments are dealt with in chapter VI. In chapter VII legal means of strengthening external capability are dealt with. The discussion in chapter IV of the relationships to users is confined mainly to means of dissemination and enhancement of the use of statistics. However, the identification and assessment of the needs of users and also the setting of priorities are dealt with in chapter XII, the capability to perform these functions being a part of both the external and the internal capability.

### F. Internal capability

Having identified and defined the objectives in operational terms, it should be said that it is the supreme challenge of management of a statistical agency to build up, maintain and bring up to date the internal capability needed for reaching these objectives. Clearly, user needs can only be satisfied indirectly—through the instruments comprising the internal capability. The internal capability also determines the level of external capability that the office can sustain. The limits of expectations generated and commitments made should be set by a realistic appraisal of delivery that can be supported by the internal capability. Otherwise, frustration and damage to the credibility of the agency result.

The internal capability consists of a multiplicity of elements—the range and level of human skills, infrastructures for taking surveys and censuses, including the field organization, facilities for data processing, storage, retrieval, printing and dissemination, integrating instruments including business registers and standard classification systems, facilities for collecting data and accumulating and storing them into "data banks" or "data bases" permitting flexible response to unanticipated demands, research and analysis and so on. The internal capability is much affected by the intellectual environment prevailing in the organization. It is enhanced when the agency is receptive to methodological and technological innovation, when decisions take the form of conclusions arrived at after objective evaluation of all relevant factors and when an awareness of the interdependence of the activities of individuals in various parts of the organization prevails.

Several elements of internal capability are discussed in part three; it should be emphasized, however, that an essential condition for evolving a strong internal capability is continuity in management and operations. Abrupt or frequent changes in management, such as have occurred in the past in a number of countries, tend to weaken internal capability substantially: it is extremely difficult to regain lost ground in statistics quickly. In chapter VIII recruitment and development of staff are discussed and stress is laid on the fact that an effective personnel organization is essential for the performance of all statistical functions. In chapter IX the collection of data by means of surveys and the need for a permanent field organization for implementation of surveys and censuses are emphasized. In chapter X computer organization and the systematic storage of computerized data are described. Maintenance of the necessary data bases is an activity likely to increase strongly in importance; in most countries development work will need to be focused on this function. In chapter XI there is discussion of the need for research on methods and procedures and analysis of the statistics produced.

### G. Priority setting, integration and co-ordination and planning

Priority setting, integration and co-ordination and planning are closely interrelated functions. Priorities must be set because satisfying all demands for statistics as a rule would require more human and other resources than are in fact available and because prices high enough to reduce demand would not be feasible or appropriate. However, no mechanism exists by means of which a statistical agency can objectively perform the setting of priorities in quantitative terms. The priority setting must be performed in the context of an approximation process aimed at maximizing benefits to the users of statistics within the constraints imposed.

Integration of the various statistical products is essential to satisfying the needs of users. It is therefore a major criterion for priority setting. Another criterion is co-ordination. To produce statistics efficiently that conform to user needs, the management of a statistical agency must ensure that balance prevails among its various statistical outputs and activities, that is, that they are co-ordinated.

Planning can be used as a tool for improving priority setting and for facilitating integration and co-ordination. In particular, consistency and balanced priority setting can be improved, and the communication of user needs facilitated, if at least approximate planning is carried out. An appropriate procedure for planning involves the participation of staff members and representatives of users in the priority-setting process.

Priority setting, integration and co-ordination and planning are discussed in part four. Priority setting is described in chapter XII, where the detection and evaluation of user needs are also discussed. The latter function must be distinguished from the priority-setting function, for which it is in fact a pre-condition and is therefore included in the same chapter. In chapter XIII some major tools of integration and co-ordination are described. Finally, chapter XIV discusses a system of planning for the achievement of the objectives mentioned above.

# Part One

# ORGANIZATIONAL STRUCTURES

# Chapter I

# ORGANIZATIONAL STRUCTURE OF A STATISTICAL AGENCY

## A. General considerations

"It is worth recalling . . . that organizational structures are but shells. Shells are important. They protect, attract or repel. Thus, they may be a condition for survival and growth. But they are no substitute for contents. In the last analysis, what is really decisive in the life and growth of an institution is its professional, technical and management capability—the calibre and suitability of the people that comprise it and that it can attract and retain . . . it is worth adjusting, within limits, organizational arrangements in order to accommodate outstanding and creative people."[1]

It is also worth recalling, in contemplating changes, that the new grows out of and is founded on the old; that in statistics, as in other forms of human endeavour, new developments usually have to evolve from existing institutions and the resources tied up in them. Thus time and planning are important elements in transforming purely formal changes into substantive ones. Nevertheless it is useful for the management of statistical offices to identify underlying organizational principles and the various options that changing circumstances make more or less desirable.

The head of a statistical agency must delegate many of his or her responsibilities and endow those to whom responsibilities are delegated with corresponding authority. Delegation is necessary both to keep the work-load of the top management within reasonable limits and to ensure that talents at lower levels are sufficiently utilized. It is also a condition for job satisfaction of subordinates. They, in turn, may delegate responsibility and authority to others, with the approval of the head. It is of the greatest importance that lines of reporting and communication are spelt out clearly so that all levels of management are fully aware of their responsibilities and authority. It is incumbent upon the head of the organization to ensure that lines of reporting are adhered to in a systematic, though flexible, way and that senior assistants maintain active lines of communication within their spheres of responsibility. To function well, communication in an organization must flow in two directions—from the bottom up as well as from the top down.

The need for systematic delegation in a statistical agency is greater the larger the size and complexity of its mandate; however, a degree of delegation is necessary even in small organizations. It is important to come to terms with this as a matter of deliberate, well thought-out policy; an individual can effectively look after the manifold details of his or her responsibilities when the latter are narrow in scope. As the scope broadens, he should relinquish detailed involvement even in areas where his competence and interests may excel those of his colleagues. In line with the comprehensive character of his or her responsibilities, the head of the agency should aim to preserve his time and energies for formulating policies and strategic over-all plans, strengthening bridges with the outside world and providing unifying leadership. To encourage in the staff a sense of belonging to the organization as a whole rather than just to the constituent branches, the head should retain direct control of key decisions, such as the appointment and promotion of senior personnel. Moreover, he should ensure that those who wield delegated authority feel accountable for their actions and are oriented to further the goals of the organization as a whole.

The need for delegation in a statistical agency is accentuated by the highly diverse and complex nature of the statistical production process, involving a variety of subject-matter fields (the number depending on the degree of centralization) and a diversity of functions, such as administration, finance, budgeting and personnel, training, planning, specification and evaluation of subject-matter needs, specification and design of questionnaire content, survey design (including sampling, field operations, data collection, editing and coding), construction and maintenance of central registers, electronic and manual data processing, tabulation design, evaluation of the statistics, research and analysis, integration and co-ordination, dissemination, printing and other reproduction, and external relations. Thus a division of labour and a corresponding degree of specialization are essential though the extent to which they can be carried out in practice is limited by the size of the agency and, in particular, by the number of suitable people to whom the various tasks can be delegated. In small countries and in many developing countries, one person must often carry out a number of specialized tasks, which in larger countries may be assigned to several people. It is none the less useful to identify the various elements of the statistical management and production process and to consider various alternatives that may become appropriate as the technical and professional composition of the agency changes and in order to profit from opportunities when they arise.

There are, broadly speaking, two major ways in which the needed specialization and the corresponding delegation can be viewed: one in terms of subject matter and the other in terms of function. In practice a mixed or, rather, a dual system is used. The discussion that follows is abbreviated and illustrative. It begins in section B with a brief description of a subject-matter plan of organization with little functional centralization and then, in section C, proceeds to consider an alternative arrangement with substantial functional centralization; the latter is really an example of a dual system. This is followed by a discussion of the integration function (sect. D) and three aspects related to this function, namely, internal communication in general (sect. E) and the internal and the external committee structures (sects. F and G).

## B. Organization primarily by subject matter

Historically, statistics have come into being through endeavours to satisfy specific needs in individual subject-

[1] S. A. Goldberg, "Organization by subject matter and by function" (ESA/STAT/AC.1/5), paper prepared for the United Nations Interregional Seminar on Statistical Organization, Ottawa, Canada, 1973, para. 4.

matter fields, e.g. population, agriculture, trade, manufacturing, labour. The advent of macro-economic analysis and the national accounts and, more recently, social indicators and model building (both in the economic and socio-demographic fields) has required and to some degree also facilitated comprehensive approaches to the production of official statistics but, by and large, the process of evolution of statistics still reflects a strong pull to serve detailed needs in specific fields as they arise. This is often reflected in an organizational structure primarily by subject matter, with direct assignment of as many resources as possible to subject-matter units carrying out the various functions involved in producing the statistical outputs.

The major organizational bloc, according to this plan, is a "division", which is responsible for a related set of statistics for a subject-matter field and is managed by a senior official who is knowledgeable in the subjects under his or her jurisdiction. The divisions may be subdivided into sections, comprising more or less homogeneous subject-matter areas, and the sections may be further subdivided into still more homogeneous units. Heads of sections and units are expected to have a thorough grasp of the subject matter in their domain and a very detailed knowledge of the various facets involved in the collection, compilation and publication of the statistics in that domain. In large organizations, the divisions may be assembled into several broad subject-matter branches for ease of management. In the extreme version of the subject-matter pattern of organization, all human resources would be allocated on the basis of subject matter but, in fact, even in agencies organized primarily by subject matter a significant part of the staff is engaged in computer operation and in central administrative and personnel work and field collection.

A major advantage of the subject-matter plan of organization is that it facilitates the detection of demand for specific data in specific fields.[2] It is, moreover, conducive to personnel developing a thorough knowledge of the accounting practices and reporting problems of suppliers of primary data. It facilitates the building of an esprit de corps with suppliers of data and government and private users of the data in specific fields. However, these advantages can be retained and even strengthened, under the alternative organizational form discussed below. The unique advantage of the subject-matter pattern is really that it facilitates clear-cut specification of delegated responsibility for outputs, with correspondingly visible control over the input resources required to produce them. It thus provides opportunities for unambiguous accountability for performance in specific fields. It also fits the ministerial structure in many countries.

The major disadvantage of the subject-matter organizational form is compartmentalization in statistical programming and operations with ensuing risk of duplication in the utilization of scarce resources and inconsistent practices. Problems of statistical integration and co-ordination are rendered difficult and, in view of the growing interest in across-the-board statistics, this is a serious limitation. In general, the greater the self-sufficiency of the various divisions and branches, the greater the dangers of compartmentalization and the stronger and more sustained must the efforts be to render statistical outputs coherent and statistical operations efficient, without duplication.

The question of the extent to which subject-matter divisions should have under their separate jurisdictions the resources needed to produce their outputs is particularly troublesome in regard to sampling and survey design, computer systems design and programming, and research and analysis. However, there are also difficult problems in regard to other functions, including the utilization of clerical resources. Clearly, the aim should be to retain the advantages and to minimize the disadvantages of the subject-matter plan of organization. Considerations of efficiency, and particularly the extreme shortages of specialized technical and professional personnel, lead to a consideration of functional arrangements.

### C. Organization primarily by function

Resources may be grouped on the basis of the functions or combinations of functions listed in section A above, with the heads of the groups having delegated agency-wide responsibilities and corresponding authority in their respective areas. As with the subject-matter plan, the groupings may be established as divisions, which are subdivided into sections and units and combined into branches, for convenience of management.

Thus one way of organizing an office with substantial functional centralization would be to establish, say, three branches. Branch I, which might be labelled the "administrative services branch", could have responsibility for personnel (including training), finance and general administration.

Branch II, which might be labelled the "statistical subject-matter branch", could have responsibility for identifying and evaluating subject-matter needs, specifying and designing questionnaire content, designing the tabulations and evaluating, analysing and preparing the statistics for publication. It would provide the necessary subject-matter expertise to the processing operations, which would be located in a separate branch described below. Branch II would be subdivided into divisions, each encompassing a range of subject-matter fields. Each division would maintain contact with users of statistics and evaluate their needs. It would also evaluate substantive reporting problems as they arise.

Branch III might be labelled the "supporting services and survey methodology branch". It would, in effect, provide specialized services to branch II, including, *inter alia*, maintenance and updating of central statistical registers, design of sample and other surveys, management of field operations, electronic and manual data processing, including systems design and programming, printing and other reproduction, maintenance of suitable statistical standards and perhaps dissemination of statistics. Each of these functions could be established as a division which, where appropriate, would be subdivided into sections and units on the basis of specialized subject-matter applications. For example, the division of survey design could be subdivided into one section dealing with statistics collected from households, another dealing with statistics collected from establishments and enterprises and a third dealing with institutional sources. The sections, in turn, could, if necessary, be subdivided into separate units for, say distributive trades and services, manufacturing and mining, population and

[2] It should be noted, however, that delineation of divisions or sections by subject-matter is more complex than appears on the surface. The term "subject-matter" has several connotations. One is in terms of institutional source of the information, that is, the kind of supplier of the data. Education statistics, for example, could be classified on the basis of the sources from which they are collected; all statistics coming from educational institutions, including, say, finance and investment, would be the responsibility of the education division. An organization based on institutional sources could assemble divisions into, say, three subject-matter branches—enterprises, households and Governments and institutions. An alternative arrangement is on the basis of main category of data. On this basis, elements of "subject-matter" pertaining to the same category may be grouped into distinct divisions, for example, employment and unemployment, finance, investment expenditures, prices—though the data originate from different institutional sources. In practice a mixed system is used.

labour-force statistics etc. The degree of specialization within divisions and the corresponding subdivision into sections and units would depend on the size of the staff and size and diversity of the operation. The head of this branch would be responsible for the co-ordination of functions within the branch and the main objectives would be to provide services required by the subject-matter divisions at minimum costs.

A question that arises is to what extent data collection, editing and coding should be the responsibility of a division in the supporting services and survey methodology branch (branch III) subdivided, as appropriate, by subject-matter specialization. A case can be made that these functions should be located in divisions of the subject-matter branch (branch II) to the extent that specialized subject-matter knowledge is needed to carry out these functions. However, similar considerations could be conducive to allocating some of the other functions, or portions of them, to branch II. The most practical solutions have to be determined on the basis of trade-offs among a variety of conflicting considerations as well as the size of the operations.

It should be emphasized that the pattern just described is a highly simplified one and is used here primarily to facilitate the exposition. In practice a more complex model is almost certainly needed, especially as the agency grows in size and scope. Thus in practice there may be two or more subject-matter branches. For example, the national accounts and balances and related aggregates may be located in a separate branch since they use the outputs of other divisions of the statistical agency and those of other agencies and serve the needs of over-all as against sectoral analysis. The relationships of the national accounts branch with users and suppliers of data are different from those of subject-matter divisions in specific areas, as are the skills and background of the personnel employed. Aggregative work in the social sphere may also be located in this branch. Separate subject-matter branches may also be appropriate for economic statistical areas and social statistical areas.

The case of branch III is similar. Thus it may be preferred to locate computer operations, for example, in a separate branch. In particular, because of its great importance especially in developing countries, special attention should be given to the field function; it may be preferred to establish the field function as a separate branch. Establishment of a centralized and efficient field organization for collecting data by visits to respondents, either to interview them or to secure returns they failed to supply by mail, and of a flexible multipurpose master sample, which is brought up to date periodically, is vital for building an effective statistical service. Particularly in countries where skills are scarce and illiteracy considerable, concentration of experienced field and sampling expertise through centralization to serve a variety of statistical subject-matter needs, including those in other governmental departments, seems essential. Such resources are, of course, also needed to assist in taking censuses. Whether these functions are located in branch III or in a separate branch, close collaboration with the subject-matter divisions is essential on problems involving subject-matter knowledge.

A separate branch may also be preferred for some other functions, for example, external relations and dissemination. Moreover, the location of some functions, such as research and analysis (discussed in chap. XI) do not lend themselves to simple solutions. Other functions are of such a general nature that they do not fit into any single branch. In particular, the integration function (described in sect. D below) and over-all planning (discussed in chap. XIV) cut across boundaries of all branches and should be located centrally.

While different circumstances may call for different organizational structures, an important consideration in setting up separate branches is whether sufficiently qualified personnel are available to manage them. The scarcity of such personnel is a major constraint in the number of branches that can be established efficiently. Moreover, problems of co-ordination and integration must be taken into account. Thus the head of the agency may prefer to take personal charge of some, especially across-the-board, functions, pending recruitment of suitable personnel; alternatively he or she may assign a deputy to take charge of more than one branch or major function. It should be noted too that the transfer to branch III to carry out functions, for instance editing and coding, previously located in a subject-matter division, does not necessarily mean that these functions should be completely centralized. It may be preferable that a part of the function should remain with branch II. In particular, during a period of transition to greater functional centralization, it may be advisable to transfer functions gradually from one branch or division to another to ensure a minimum of disruption.

Functional centralization, in virtue of structuring resources into specialized compartments, implies that no division or branch can carry out statistical programmes unilaterally. Consequently this organizational pattern is based on the utilization of interdivisional groups for carrying out major statistical projects (especially important developmental projects). This is discussed further in section F below.

A statistical agency needs specialists both in subject matters and in the performance of particular functions. An organization with substantial functional centralization facilitates the building up of corps of specialists in the various functional areas in which resources are very scarce, for example in sampling and survey methodology and computer systems analysis and programming. Moreover, it can provide the corps of specialists with a head who is experienced in the particular discipline and is, therefore, in a better position than a subject-matter expert to exercise effective leadership and to ensure that the methods recommended are appropriate. At the same time, it is economical, since relatively few specialists can serve the whole office. It facilitates taking advantage of the fact that the statistical survey process consists of elements which are similar from survey to survey and enables utilizing the experience of any one for the others. It also facilitates the development of specialization, which in a subject-matter division may not be recognized as such. Indeed a major weakness of organization mainly by subject matter is that functional specialization tends to be neglected. This may be, for instance, the situation as regards functions such as work on registers, sample design, interviewing, editing, coding and typing.

On the other hand, the centralization of functions may generate barriers between the units performing them. In particular, personnel in the subject-matter divisions may experience a sense of loss of control over the outputs. As methodologies and systems become complex and highly specialized, those familiar with them assume strategic positions in the statistical production process. When the functional specialists use their knowledge unwisely or thoughtlessly, serious problems arise. Coupled with this is the danger that the systems and methodologies may assume a life of their own with insufficient attention being given to the needs of the subject-matter outputs for which the methodologies and systems are merely a means. It is worth noting also, particularly in regard to computer use, that the subject-matter experts may not be sufficiently aware of the vital importance of clearly specifying their output requirements in detail. As a consequence, the computer specialists may make decisions on the basis of incomplete or faulty information, resulting in inconsistent or unusable outputs.

To minimize such problems, both functional and subject-

matter units must be made aware of their obligations towards one another. The functional units should be made fully aware that they are obliged to provide services to the subject-matter divisions (and partly to other functional units) as well as to ensure the maintenance of appropriate standards of methodology, systems development, field collection and so on. The subject-matter divisions, on the other hand, should be made fully aware that, being clients of the service units, they must specify their requirements in detail and ensure that they are understood.

One way of facilitating that the right kind of interaction takes place between functional and subject-matter units is through the application of planning and scheduling procedures (described in chap. XIV). Another way is to place the functional specialists in the same physical location as the subject-matter personnel within whose areas they concentrate. This is conducive to achieving a better rapport between the subject-matter and other specialists and a fuller appreciation of requirements and procedures. Indeed, the functional specialists should be regarded as having a dual reporting relationship—to the subject-matter head in the area for which the work is performed and, on specialized technical (and administrative) matters, to the head of the functional division or branch. Such partnership arrangements require good communication and a mutual respect by those concerned for each other's competence and responsibilities.

Yet another way of overcoming problems of functional centralization is to distinguish between various applications and to make due allowance for them.[3] To illustrate, in the case of computer systems analysis and programming, a useful distinction can be made between (*a*) development of computer systems and their documentation for production and storage of massive basic data; and (*b*) the utilization of the stored data for the purpose of index number, construction, input-output tables and similar aggregates, model building, population projections and so on. While the former, (*a*), is best carried out under centralized functional conditions (though in close collaboration with the subject-matter people), programming for the latter type of activity, (*b*), may be carried out most effectively by subject-matter specialists who should either be trained or have at their disposal programming assistants to do the work. Similarly, with the availability of generalized retrieval programmes which require little or no programming to operate, *ad hoc* demands for data can be best handled by subject-matter people who are in close contact with users.

It would appear that, on balance, a dual system with a high degree of functional centralization, though more complex to manage, is likely to be more efficient and effective than an organization structured by subject matter with little functional centralization. The major advantage of such a system is that co-ordination and integration of statistics are facilitated. This will be explained partly in section D below and partly in chapter XIII.

### D. The integration function: the horizontal dimension of statistical organization

Whether the basic organization pattern used is primarily by subject matter or whether it is one containing substantial functional centralization, the various organizational units (divisions, branches etc.) represent elements of line responsibility of a portion of the agency's activities. These elements may be viewed as comprising the vertical dimension of the organization. By contrast, the integration function as defined here relates to the across-the-board interdivisional and interbranch activities. It may be viewed as the horizontal dimension of the statistical agency. This dimension is less visible than the vertical; it does not appear on organization charts, except perhaps in an impressionistic way. But it is no less important, especially in an agency concerned with the integration of its outputs (that is, that the myriad pieces should somehow fit together) and the co-ordination of its programmes (that is, that balance is maintained among the various projects and activities).

The task of ensuring that the horizontal dimension is effective is particularly important because the subdivision of a statistical agency into separate units, which is essential for administrative purposes, usually breeds a considerable degree of parochialism. The day-to-day external pressures force concentration on getting things done within the sections and divisions—the meeting of deadlines within specified periods of time and the like. The impact of the horizontal dimension is rather more subtle—it is, or should be, reflected in the guiding philosophy of the organization; it should permeate the actions and policies in all parts of the organization. It should provide a corporate consciousness, maintain checks and balances in the face of differing pressures from the individual sections, foster multidisciplinary project planning and execution and overcome barriers, real or imagined, between the various parts of the organization. It should ensure that common concepts, definitions, classifications and methods are not only available but actually implemented in the various divisions and sections so that the statistical series represent elements of an integrated framework and are as consistent and comparable as possible.

Indeed, it is, or should be, one of the constant challenges of top management in a statistical agency, irrespective of its pattern or organization, to keep the horizontal dimension alive, visible and effective. In a small agency the head, aided by assistants, or a small steering committee may wish to carry out this function. In large agencies this may not be practical; it may be necessary to delegate the function to someone who, assisted by small staffs and committees, should be dedicated to it, undisturbed by day-to-day operational responsibilities. Ideally, this person should be the most senior deputy with very broad knowledge and experience; however, more important than seniority is the visible support provided by the head of the agency. In a decentralized national statistical service, the across-the-board horizontal activities are generally the responsibility of the central co-ordinating office. In fact, this is often the major role of such an office. In a centralized service, most if not all of this responsibility rests within the central statistical office.

The need for the horizontal dimension renders the management of a statistical agency rather more complex. Fortunately, a range of instruments is available to help render it operative and it is a constant challenge to the head of the agency, or the person to whom the integration function has been delegated, to ensure that these instruments are utilized effectively. These are discussed in some detail in chapter XIII. To render such instruments operative, special machinery must be established, including, *inter alia*, internal and external committees (described in sects. F and G below). But first some comments are provided on internal communication in general.

### E. Internal communication in general

A statistical agency cannot operate effectively and efficiently without good internal communication. Computeriza-

[3] See a paper by I. P. Fellegi, "Organization of statistical processing, storage and retrieval" (ESA/STAT/AC.1/12), prepared for the United Nations Interregional Seminar on Statistical Organization, Ottawa, Canada, 1973, pp. 27-32.

tion has made it even more evident than in the past that effective communication is the life-blood of a statistical service producing integrated statistics. Officers at all levels must ensure that their subordinates get the information they need to work efficiently. Subordinates should, of course, also communicate information to their supervisors. Regardless of how well the formal organizational structure is developed, a statistical agency cannot function effectively unless a communication policy is established and efficiently implemented. Many media of information exist but their use is not automatic.

Committees and informal meetings of various kinds are important vehicles of communication. Other vehicles are circulation of correspondence, documents, newsletters and other information bulletins, proper job and work descriptions, handbooks and periodicals, relevant newspaper clippings etc. One way of ensuring that such media are sufficiently used is for the head of the agency and all heads of branches and other units to prepare a report, perhaps once a year, on the means used to communicate information.

Ensuring an optimal flow of information is a major responsibility of the head of a statistical agency. He or she should explain to the employees how important communication is and make it clear that it is a neglect of duty to retain information which may be useful to other employees. However, the best way in which he can demonstrate the usefulness of an appropriate communication flow is by communicating well himself. This means that he should be active both in securing the right kind of information and in communicating it to all concerned. He should also make constant efforts to ensure that the communication process is organized effectively. This is not an easy task. The organizational units that can best assist in these efforts are the personnel unit and the library. If a specialized information unit exists, one of its functions should be to ensure the effective flow of information internally.

### F. Internal committee structure

Committees of various types organized to achieve particular objectives in the most effective manner are important elements of the horizontal dimension of a statistical agency. It is a major task of the head of the agency, or the person to whom the integration function has been delegated, to ensure that an appropriate committee structure is established and that it functions well. In the present section possible objectives and types of committees are described and the usefulness of one particular kind of committee is discussed in some detail, that is the multidisciplinary task force or so-called "project group".

One objective of a committee may be, as indicated in section E above, to ensure communication of information between different divisions or departments in order to promote co-ordination and integration, stimulate co-operation and induce a feeling of participation. Communication between different levels of an agency and even between different units within a division may also be formalized in this manner. A second objective may be to mobilize sufficient human resources for the accomplishment of a particular high-priority task, for instance improvement of the layout of publications, revision of a standard classification etc. In particular, tasks for which no single division is fully responsible can suitably be carried out by a committee; in fact, such tasks may not be accomplished otherwise. A third objective may be to carry out a statistical project requiring contributions by professionals with different expertise and experience, for instance in a particular subject-matter field, in sampling design, in systems analysis and programming etc. In an agency with substantial centralization of functions, such professionals would need to be brought together from different divisions. A fourth objective may be to ensure that the interests of different divisions within the statistical agency, or the interests of persons or institutions outside the agency, are taken sufficiently into account. For instance, when a standard classification needs to be developed or revised, all divisions within the agency that are likely to become prospective users of the standard should be consulted; the best way of ensuring consultation may be to establish an advisory committee on which they are represented. When a census or some other major project is to be planned, the advice of users outside the agency may be most effectively ensured through a committee on which they are properly represented. When a staff member or a group of staff members are engaged in the planning of a new and unfamiliar project, they may benefit from setting up a committee. Finally, the objective of a committee may be to provide directives for the work of individual staff members or groups of staff members or the agency as a whole or parts of it. (In this case the term "steering committee" is frequently used.)

The objectives of a committee to a large degree determine the choice of its form of work and should therefore be clarified as far as possible before the committee is established. The amount of work involved should also be carefully estimated and sufficient resources should be allocated for the task to be accomplished.

Since the objectives of different committees may vary greatly, their forms may differ correspondingly. Some committees may be composed of staff members only. Others may include representatives of other agencies also. Furthermore, committees may be permanent or temporary, they may have many or just a few members, they may meet often or seldom, or perhaps only once, they may meet at regular intervals or only when the need for a meeting arises, they may establish subcommittees or *ad hoc* working groups to solve particular problems etc. However, although they may differ in these and other respects, committees are characterized by some degree of formalization; every committee should adhere to some essential rules of procedure. A committee should (*a*) have a chairman and a secretary (the latter may also be a member of the committee); (*b*) have a clear, limited and documented mandate, formulated perhaps after consultations with the chairman and other committee members; and (*c*) be obliged to prepare a summary record of every meeting and a written report when the work is completed or whenever a part of its mandate is accomplished.

The committee structure required differs according to the size of the agency, whether it is functionally centralized or organized mainly by subject matter, whether it is responsible for most official statistics of a country or is one of a number of agencies etc. It would be impossible to deal with all the possibilities here. However, it bears emphasizing that it is usually essential to establish an executive committee, chaired by the head of the agency, to consider over-all policy and administrative matters. If possible, such a committee should meet at regular intervals. It may be organized formally as the top committee of the internal committee structure or independently of it. The branches and divisions may set up corresponding executive committees.

In what follows, one type of committee, often called a task force or project group, is considered. It is particularly suitable for planning new statistics or major changes in current routines, involving multidisciplinary inputs from various units, e.g. those concerned with the subject-matter, sample surveys, data processing, etc. To be successful, a project group must conform to certain basic rules. The project manager, who is a key member of the group, must be responsible to the division for which the project is being carried out; the group members must be released from their

regular work without diversion by other duties during the period of time assigned to the project; the date of completion must be determined in advance; regular reports must be submitted by the group to the participating divisions and the group members must be exclusively responsible to the project manager for work done on the project. The success of a project group depends greatly on the availability of a competent project manager and its proper functioning is contingent upon a clear definition of the task to be performed, on careful planning of the work to be done and on detailed scheduling and strict adherence to the schedules by all group members. In particular the project manager must be free to devote the necessary time in order to ensure adherence to objectives, allocate resources, monitor and co-ordinate implementation, ensure the participation of relevant disciplines at the appropriate time and last, but not least, ensure the necessary communication between participating disciplines and the preparation and maintenance of the required documentation by all concerned.

If the objective of a project group is to prepare the plans for a statistical project, the subject-matter division concerned should normally take over responsibility for implementation of the plans. However, it must be emphasized that to facilitate this it is necessary to describe all routines in great detail, train the production staff and perform suitable tests which demonstrate that the production staff can assume responsibility for future production.

The project-group arrangement cannot function well unless the temporary nature of the project groups is preserved. The current work of the agency may suffer if members of project groups are not returned to their own units at an agreed time. Of course, the transfer of employees from their regular work to a project group will, as a rule, involve a sacrifice for the division employing them.

Within a national statistical service with a high degree of decentralization, project groups composed of members belonging to different statistical agencies may be established to carry out time-consuming planning of statistical projects or both planning and implementation of a non-recurrent statistical survey.

The need for establishing a steering committee or an advisory committee for guidance and support of a project group depends upon the degree of authority to be delegated to the group and the nature of the project. If, for instance, the objective is to prepare a new publication for which data are needed from several subject-matter divisions (or statistical agencies), heads of these divisions may wish to control the work by way of a steering committee in which their division is represented. If a steering committee is established, the head of the division to which the project manager reports must be willing to delegate a part of his or her regular authority to the committee.

Project groups need not necessarily be multidivisional. They may be established within a large division of a statistical agency. Not only planning of new subject-matter statistics but also time-consuming planning of projects within a functional division may be organized in this manner—for instance, systems and programming work within a data processing organization.

The utilization of project groups, as described above, adds flexibility to effective utilization of resources in the statistical agency. It facilitates mobilization of resources for high-priority projects and better use of available human resources, promotes communication and co-ordination and makes it possible to delegate authority, thereby relieving superiors from some work burden and simultaneously granting more freedom to subordinates.

In developing the committee structure the benefits of each committee must be analysed against its costs and compared with the benefits and costs of other arrangements. Care should be taken not to include more members nor to arrange more meetings than necessary to achieve the objective. In particular for the purpose of communication, alternative and less expensive methods may be preferable, as indicated in section E above.

Consultative meetings may be arranged as an alternative to the establishment of a formal committee. For instance, instead of establishing an executive committee, the head of an agency or the heads of branches, divisions etc. may institute more or less regular meetings with their closest collaborators and at times even with the entire staff in order to get the advice needed and to induce the spirit of co-operation and participation that must pervade an effective and efficient statistical agency. Indeed for some purposes informal meetings may be a more flexible instrument than a committee, *inter alia* because they allow the participants to be selected according to the needs of particular situations. In any case, even if a statistical agency establishes a comprehensive internal committee structure meetings often need to be called outside this structure. However, such meetings should also adhere to certain rules which need not be further elaborated. It must be emphasized, finally, that no meeting should be held without some record being made and copies being submitted to those who may benefit from being informed. In fact, this may make it possible to keep a minimum number of participants at such meetings.

### G. External committee structure

External committees, consisting of suppliers and/or users of statistics as well as the members of the statistical service, are an integral part of the external capability discussed in part two of this publication. They are in many ways analogous to internal committees and many of the considerations outlined in section F above apply to them. Indeed, whether a committee is primarily internal or external depends on the degree of centralization of the national statistical service.

The external committee structure may be developed from the top of the hierarchy of a statistical agency in close consultation with the various subject-matter divisions to ensure that all fields requiring attention are covered. Once established, the head may leave it to the division chiefs to decide on the work the committee should do but he or she should be provided with regular progress reports. The head may also encourage division chiefs to propose the establishment of appropriate committees in their areas. Committees can be established in various areas, e.g. construction, mining, agriculture, education, health, and may include both the suppliers and users of the statistics.

Committees with members from individual departments of the government may also be established on specific subjects. Interdepartmental committees with diversified membership may be organized to consider issues on a wide range of data of interest to governmental agencies concerned with fiscal and monetary policies, industrial and trade development, social welfare etc. At the top of the interdepartmental committee structure there may be a co-ordinating committee, meeting infrequently, to review the over-all programme of economic and social statistics and to make recommendations. In countries with a federal structure, it is useful to establish federal/provincial committees in specific fields, with an over-all co-ordinating or policy committee at the apex.

Irrespective of the degree of centralization of the national statistical service a national statistical council or commission, composed of representatives of the private sector, the universities and government, may be established either at the top of the external committee structure or independently

of it. Such bodies exist in a number of countries and their role ranges from being purely advisory to having a major say in the development and implementation of statistical programmes.

A detailed discussion of the role and usefulness of a permanent council of this kind is beyond the scope of the *Handbook*. Its success obviously depends upon whether a sufficient number of outstanding and influential individuals can be persuaded to serve as members. Sufficient secretariat services are also needed. If these conditions are met, a top-level co-ordinating council may serve as a guiding and protective device, among other things strengthening the status and financial position of the national statistical service. It may also also provide useful advice—but mainly as regards the solution of problems of a general nature. Whether the benefits derived justify the cost is likely to depend, to a large degree, on national circumstances, including the political situation.

Professionals of a statistical agency should also participate in non-statistical committees, provided that their mandates are relevant for strengthening relationships with users of statistics or suppliers of data, and particularly when they are concerned with topics such as policy planning and development, the monitoring of policy, establishment of administrative systems requiring the collection of data etc. Of course, such participation costs human resources but the benefit of participation must be sufficient to justify the cost. In general, participation in committees established by the central government is likely to be most beneficial. Participation in high-ranking governmental committees may contribute substantially to an improvement in the status of the statistical agency.

The meetings and conferences of committees are extremely useful for maintaining communication with users and, where applicable, suppliers of data. Not only is light shed on past achievements, current deficiencies and future requirements but the very preparation for these conferences and meetings forces the statisticians to take stock and to become attuned to needed changes.

However, participation in external committees requires resources and should not take place unless justified by the benefits obtained, as compared with the alternatives discussed in part two. Moreover, external meetings may be arranged informally as alternatives to committee meetings. For instance, as a means of analysing user requirements a series of informal meetings with different groups of users may be preferable to formal committee meetings. Effective relationships with the suppliers of data may be better achieved by contacting the organizations to which the suppliers belong rather than just dealing with the representatives of the suppliers of data in the external committees. An advantage of the informal committee meeting is that it facilitates the selection of the group of users and suppliers that it may be most urgent to consult. The main disadvantage is that this approach may not be used sufficiently.

Finally it may be noted that of even greater beneficial and durable impact than formal or informal meetings is the cultivation of good personal relationships between the statisticians and the user and producer organizations. The telephone, the luncheon, the personal visit, the *ad hoc* working team are important tools for a meeting of minds and for developing a mutual appreciation of each other's needs, problems, knowledge and capacities. Informal personal occasions can serve, as well, to clarify issues and resolve misunderstandings. Moreover, they can provide opportunities for gaining support for the statistical programme and for establishing the fact that it is in the users' interest that the statistical office should be kept strong through the provision of the needed resources. Treasury officials are likely to be impressed when users speak up on behalf of the statistical office and its need to be equipped with adequate professional resources in order to fulfil users' expectations.

# Chapter II

# DEGREE OF CENTRALIZATION OF A NATIONAL STATISTICAL SERVICE

## A. General considerations

In contrast with the internal organizational arrangements (discussed in chap. I) wherein the head of the statistical agency may have considerable authority to carry out changes—though, usually, subject to final approval by the appropriate central government authority—amendments in the scope and range of activities of each agency within a national statistical service require specific high-level policy decision by the central government and may even involve special legislation. Such a decision is not likely to be influenced entirely by the results of an objective analysis of the alternatives. Inevitably, past practices, interdepartmental rivalries, the structure and size of government, the impact of tradition and personalities and so on come into play. Moreover, when possible changes of the organization of a national statistical service are considered, short-run disruptions in services that may be induced by the changes must be weighed against the long-run gains. Nevertheless, it is useful to analyse the merits of alternative forms of organizing the national statistical service, especially from the point of view of countries whose statistical services are in the earlier stages of evolution, where there may be opportunities for change not always present in countries with a long-established and deeply entrenched pattern of organization.

There is wide agreement that it is beneficial to a country to have a strong central statistical office which is administratively autonomous and whose head serves as the country's chief statistician. The range of fields that the central office should cover and the authority of the chief statistician over the statistical activities of other departments are subject to controversy. There appears to be a consensus that the central statistical office should be responsible for population censuses, household surveys, demographic statistics and a wide range of economic statistics involving establishment and enterprise censuses and surveys, as well as prices, international trade, the national accounts and other across-the-board activities. There seems to be less of a consensus in regard to agriculture and labour, and still less in regard to the social sphere—education, health, crime etc.—where statistics are based to a substantial degree on administrative records collected by other government departments, giving rise to special considerations discussed in chapter III. It should be noted also that even in a highly decentralized system there are centralizing influences: usually a centrally located co-ordinating agency is charged with the vitally important responsibility of integration and co-ordination of the statistical services. Moreover, a few large agencies in decentralised systems tend to be predominant, for example, the Bureau of the Census and the Bureau of Labor Statistics in the United States of America. Thus the main issues are probably best conceived as involving "degrees of centralization" rather than the two extreme poles within the broad spectrum of centralization and decentralization. Nevertheless, it is convenient to discuss the major issues under headings referring to a "centralized" or "decentralized" national statistical service, which are defined in section B below. The advantages and disadvantages of centralization (decentralization) are discussed in sections C and D respectively; in sections E and F the limits to centralization and centralization and the developing countries are dealt with.

## B. Centralized and decentralized national statistical service

A national statistical service is centralized if the management and operations of the statistical programmes are predominantly the responsibility of a single autonomous government agency, headed by the country's chief statistician. Centralization can include outposting of staff to other departments or the delegation of certain functions to geographically separate units, which, however, remain subordinate to the central authority. In other words, centralization of the statistical system is fully compatible with the physical decentralization of certain functions and personnel, departmentally or geographically. What characterizes a centralized system is that the management and operations of the predominant portion of the national statistical service are vested in an autonomous statistical office headed by a single individual or board.

A national statistical service is decentralized if the statistical programmes are managed and operated under the authority of several government departments. Under this arrangement, a particular agency is usually charged with the responsibility for co-ordinating the statistical activities of the various departments. Thus, this co-ordinating body may be responsible for the system-wide horizontal functions described in chapter I. The co-ordinating body can carry out its horizontal responsibilities more effectively if it has under its jurisdiction certain operational programmes (especially major across-the-board programmes such as the national accounts and certain central functions such as development and implementation of statistical standards, control of questionnaires and field organization and survey-taking) and/or if it can exercise control, or at least substantial influence, in the allocation of statistical resources between government departments, in setting standards for professional grades and in the recruitment of senior personnel.

## C. Advantages of centralization

Individual Governments will, of course, decide for themselves in which direction a country's statistical service should go—the centralized or decentralized way. However, the scarcity of skilled human resources and other resources provides strong incentives to take advantage of the economies of scale facilitated by centralization. It is, furthermore, convenient and efficient for users to secure statistical materials in a variety of fields from a single source; a single repository of the major portion of official statistics provides an efficient means of disseminating data to a wide range of

users. Similarly, respondents to censuses and surveys find it convenient to deal with a single office, especially if they suspect duplication.[1] In particular, a centralized statistical office is in the best position to develop and maintain a system of computerized data storage which, as explained in chapter X, can enable production of special-purpose statistics, requested by users, at short notice and reasonable cost without additional burdens of data supply. Other advantages stem from the fact that it is usually easier for an administratively autonomous, politically neutral central office, concerned only with statistics, to be free from special departmental influences and interests and to be seen by the public in this light. This is, of course, vital for the preservation of its reputation for objectivity. Thus it should be easier for a central statistical office to gain public acceptance as an agency which has a vested interest in safeguarding the secrecy of the information it collects in respect of persons, enterprises or government departments. The centralized storage of computerized data can also be better protected against unauthorized use (by means of devices described in chap. V) than storage spread over several agencies. Finally, it should be easier for such an office to maintain balance in the priorities assigned to different statistical fields, that is, to co-ordinate the entire service.

The preceding arguments favour centralization mainly on the basis of efficiency in the utilization of scarce resources and provision of services to users, respondents and the society as a whole. However, the strongest arguments for, as well as against, centralization concern the effectiveness of the system, that is, the relevance and impact of the outputs.

The distinguishing advantage of a centralized national statistical service from the point of view of statistical outputs is that it is better geared than a decentralized one to plan and implement an integrated system of statistics. Centralization makes it easier to develop and implement uniform standards, definitions and classifications and, in general, to maintain the horizontal influences and, therefore, the production of integrated statistics. In view of the growing awareness that policies and programmes of various government departments are interdependent, that both macroeconomic analysis and many kinds of socio-demographic analysis require a system of statistics in which concepts and classifications are precisely defined and standardized, with quantitative relationships established between many of the definitions, and that there is a great need for analysing the impact of any one policy action on the others in quantitative perspective, the integration of the statistical outputs is of very substantial importance.

It should be noted, however, that the mere existence of a centralized service by no means guarantees that the statistical outputs are in fact integrated. As explained above, an appropriate organizational set-up and a strong and able leadership dedicated to integration are necessary to success. Indeed a *de jure* centralized service without strong horizontal influences and effective machinery to ensure that the various instruments for integration are fully implemented by its separate divisions would really represent a *de facto* decentralized service, without the cohesive impact of a co-ordinating agency. The outputs of a decentralized service with a strong co-ordinating agency can be more integrated than those of a centralized service with weak central influences. In a strongly led decentralized service there may be great consciousness of the need for maintaining effective horizontal influences designed to harmonize the outputs of the various autonomous departments and to provide countervailing forces to tendencies of departments to go their own way. In a centralized service with a weak leadership, the existence of these may be taken for granted so that the needed dedicated resources, special and sustained efforts and machinery, and visible support by the chief statistician may in fact not be forthcoming. However, there can be no question that, given the same quality of leadership and its dedication to integration, it is much easier to ensure integration in a centralized than in a decentralized national statistical service.

### D. Disadvantages of centralization (advantages of decentralization)

The strongest argument that is usually made against the centralized service is that the statisticians may become isolated from the users of statistics. This may result in the central statistical office losing touch with the practical needs of users and so impair its capacity to be effective. It is argued that, when the statistical work is undertaken within a policy department, the statisticians are in a better position to ensure optimum use of the data, in virtue of the fact that they are in close proximity to their policy-advising colleagues. This leads to a better understanding of the uses of the statistics for policy purposes and accordingly to better and more relevant statistics being produced. It is argued, further, that there are dangers that a central statistical office, especially when it has grown large, may not be responsive enough to the changing needs of users. Moreover, the central statistical office may interpret the secrecy provisions of the Statistics Act too rigidly and suppress useful information that might otherwise be available to other departments.

The validity of these points requires examination. There are government departments that require across-the-board statistics (not just ones pertaining to a particular field), for example, departments of finance, planning, trade and industry. A centralized national statistical service should be in at least as good a position to serve them, without duplication, as a decentralized one. Even where departments deal with single fields, for example, education, labour and agriculture, the analysis of policy and action programmes requires not only statistics pertaining to these fields but a host of statistics in related fields. For example, in developing and evaluating education programmes, there is a need for statistics not only on education but also on related manpower, occupational, demographic, income and many other data, all of which are used for other programmes as well, as indeed are the education statistics. All these data must be sufficiently comparable to permit interrelated, cross-classified and diverse analyses. Definitions, classifications and methodologies should, of course, be mutually coherent not only between the various fields but, as far as possible, over time, so as to preserve continuity to facilitate analysis of change. As already indicated, to the extent that users require such integrated statistics, and a growing number do, a centralized national statistical service has major advantages. Moreover, without risking possible violation of confidentiality rules, it is more feasible to construct data bases containing data from various sources in centralized than in decentralized systems.

Furthermore, it is possible to come closer to government users of statistics in specific fields by outposting, if necessary, personnel of the central statistical office to the departments in question, when this can be done without contravening the statistical legislation. In addition, committee arrangements and the fostering of close day-to-day informal contacts are conducive to closer working arrangements with users. Furthermore, an appropriate degree of functional centralization may be conducive to an output and user orientation. Activities of research and analysis can help the central statistical office to anticipate future user needs for data

[1] It should be noted, however, that as a centralized institution grows larger, it must make sustained efforts to avoid or eliminate duplication.

and adjust its resources accordingly, possibly with greater ease than in a decentralized statistical service. To the extent that the statistical legislation has become too restrictive, in changing circumstances, or where the central office interprets its administration too rigidly, these can be modified to suit the established needs of users. Thus, it may be said that just as inadequate management may fail to profit fully from the advantages of centralization, so may good management reduce to a minimum the disadvantages of centralization.

The advantages and disadvantages of centralization have been discussed repeatedly among statisticians, in national and international forums, among users of statistics in the various countries and by special committees that some countries have established to consider the organization of the national statistical service. For example, Sir Claus Moser, after careful consideration of the various issues, came to the conclusion that, while the organization of statistics in the United Kingdom has moved in recent years in the direction of centralization, the United Kingdom does not intend to go all the way.

> "This is largely because, although there are clear advantages of centralisation if one thinks of the *production* of data, a decentralised system has many advantages for better *utilisation* of data. I believe that the GSS [Government Statistical Service] must continue to develop along the lines of greater use orientation and the increasing involvement of statisticians in analysis and interpretation of data, and for these purposes I believe a mixed system . . . to be the most effective."[2]

By contrast, after a comprehensive review of the strengths and weaknesses of centralization and decentralization, the Committee on Integration of Data Systems established by the Government of Australia came to the following conclusion in its report of April 1974 with respect to Australia:

> "The Committee agrees that some departments may on occasion suffer some difficulties under a centralized form of statistical organization. Follow-up of some evidence tendered on this point suggests, however, that a number of the claims were not substantiated. The Committee does not believe that these difficulties outweigh the multiplicity of advantages which a centralized system offers to most departments, to the Government as a whole, to non-governmental users of statistics and the reporting public" (para. 64).

The Statistical Commission, at its nineteenth session, recognized that while

> "no rigid rule could be proposed because of differences in the circumstances and traditions of various countries, there was broad agreement that for many developing and newly independent countries a high degree of centralization was desirable for rational application and optimum utilization of the scarce manpower allocated to statistics."[3]

Centralization and the developing countries are discussed in section F below.

## E. Limits of centralization

There may be a point at which the net advantages of centralization diminish and are overshadowed by the problems of managing a very large and complex central statistical office. However, it is not clear just when this point is reached, or whether it exists at all. Thus A. Yezhov, in describing the very large national statistical service of the USSR, attributes to the centralization that took place in the late 1950s "improvement of the organisation of Soviet statistics and of all statistical work in the USSR . . . ".[4] Whatever the net advantages of centralization, there would probably be wide agreement that limits may exist beyond which the process should not be carried. There are types of statistical work that should be decentralized even in a highly centralized service, for example, statistics required by only one administrative agency.

The limits of centralization are probably set, in practice, by factors other than size alone. Several of these are mentioned here. First, the external and internal capabilities of the central statistical office may fall short of users' expectations, especially those of government users. Government departments may embark on survey activities (and, if necessary, seek enabling legislation) either because the central statistical office does not have the resources to satisfy them or because its image and reputation for delivery are weak. Over and above that, special surveys may be undertaken by a department to secure urgently needed statistics to serve mainly its policy or administrative needs; or the department may need to collect statistics which require specialized technical or scientific knowledge not available in the central statistical office. In such cases, the central statistical office should have authority to exercise some control over the decision to initiate the work and, at the very least, to ensure that the concepts and classifications used facilitate statistical integration. The Australian Committee on Integration of Data Systems cautioned in its report that "if this is not done, many departments will seek to rationalise their needs as being 'exceptional' and unnecessary proliferation of official data-collecting agencies will result" (para. 73). In Canada, no government agency is permitted to undertake new surveys involving more than 10 respondents without prior consultation with the Chief Statistician of Canada. However, for such arrangements to work well, the central statistical office must be so staffed as to enable it to evaluate the proposals of other government departments judiciously and quickly.

The degree of centralization may also depend upon the qualifications of the individuals available for top management jobs. In particular in developing countries, as a rule, highly skilled managers with sufficient background either in the use or production of statistics are scarce and may not be available at all. If it is possible to find a sufficiently competent head of the entire national statistical service, this factor may well bring about a very high degree of centralization within the service. However, if a number of less qualified persons only are available, a less centralized statistical service may be chosen.

Another, and historically major, factor arises from the collection of records by government departments, that is, administrative records containing data of statistical interest. In many countries a large part of official statistics is based, in total or in part, on such records—for example, in the fields of trade, taxation, health, education, crime, vital events (births, deaths, marriages) etc. The collection of such records is naturally decentralized; incidentally, this is among the factors which explain why official statistics have been decentralized in many countries, especially in the social fields.

---

[2] Sir Claus Moser, "Organisational matters relating to the statistical services in the government hierarchy" (ESA/STAT/AC.16), paper prepared for the United Nations Interregional Seminar on Statistical Organization, Ottawa, Canada, 1973, p. 23.

[3] *Official Records of the Economic and Social Council, Sixty-second Session, Supplement No. 2* (E/5910), para. 135.

[4] A. Yezhov, *Organisation of Statistics in the USSR* (Moscow, Progress Publishers, 1967), p. 25.

With the advent of the computer, administrative records have achieved a new importance for statistical purposes. When administrative data are transferred on magnetic tape, statistical offices have added incentives to work with the departments concerned to promote improvements in content, standardization and editing of the administrative records. The central statistical office can make arrangements to receive copies of the tapes, enabling it to exploit more fully the micro-data for statistical purposes. It is important to emphasize that such arrangements, as indeed all access to administrative records by the statistical office, must be a one-way street: that is, the statistical office may have access to the departmental administrative records without the department having access to individual records collected by the statistical office.

Thus the central statistical office should endeavour to participate actively in the design of administrative records having a general statistical use and ensure that the definitions and classifications used facilitate statistical integration. In fields in which such endeavours are successful, collection of administrative data, transfer of data to machine-readable media and editing can be decentralized, that is, they can be carried out by the administrative department concerned. On the other hand, tabulation, presentation and analysis and, as necessary, assistance in editing can be carried out by the central statistical office, except in those instances where the administrative data are of use exclusively to the department concerned. Statistical utilization of administrative records is dealt with in greater detail in chapter III.

### F. Centralization and the developing countries

As recognized by the Statistical Commission (see sect. D and foot-note 3 above) the merits of centralization, on balance, seem particularly great in the case of newly independent and most developing countries. In these countries, there is a chronic, severe shortage of skilled personnel, both professional and clerical. In recruiting staff from this restricted number and retaining them, the national statistical service has to compete with government departments with which it is often at a disadvantage in respect of status and pay. Centralization provides at least some possibilities for building up a "critical mass"—a large enough work force and momentum for getting off the ground. In the absence of centralization the staff is spread thinly over a number of statistical units scattered among the various departments or among the states of the country. As Ramesh Chander of Malaysia said in an unpublished paper:

> "While the size of the country and its system of government may dictate the need for a decentralised statistical system, by way of generalisation one is led to argue strongly for a centralised system in the context of the situation prevailing in most developing countries. Even in the context of a federalised system of government a case exists for a high degree of centralisation of statistical activity."

What adds strength to this statement is that in most developing countries the external capability of the statistical agency and, in particular, the status of the chief statistician are not sufficiently strong to act as a balancing influence on departments which wish to go their own way when this is not warranted.

# Part Two

# EXTERNAL CAPABILITY

# Chapter III

# RELATIONSHIPS OF A NATIONAL STATISTICAL SERVICE TO OTHER CENTRAL GOVERNMENT BODIES

The national statistical service, regardless of its degree of centralization, comprises a secretariat providing statistical information needed by all other central government bodies as well as collecting data from these bodies. Both activities require the development of strong bridges between the national statistical service and the other bodies. Such bridges cannot be established simply by legal means or by executive orders. These kinds of formal support may facilitate but are not enough to ensure the kind of relationships desired. Of great importance is the general status of a statistical service. Such status and, to some degree, the location of the agency within the government are factors influencing the capability of the statistical service to obtain the statistical data required from persons, enterprises and other non-governmental groups and to facilitate effective communication with them in their capacity as users of the statistics. Consequently, these aspects are dealt with first, in sections A and B below. The relationships to other central government users are to a large degree similar to those with other users and are treated in chapter IV; however, there are some relationships that must be given special attention here, that is, relationships to the planning bodies (see sect. C). The data collected from other government bodies are of two kinds, namely data on activities performed by the government bodies themselves and administrative data that they collect—mainly from persons and enterprises. Both represent important statistical inputs; arrangements to ensure their supply are discussed in sections D and E.

## A. Status of the national statistical service

A distinction must be made between legal status and status in the sense of an agency's professional and administrative standing in the eyes of other government bodies and the public. It is in fact status in the latter sense that matters most for the external capability of a statistical agency or service. A high professional and administrative standing contributes to the acceptance and use of its output and facilitates the collection of administrative data from other government agencies and of statistical data from other respondents. Consequently, it is this kind of status that a national statistical service should above all attempt to develop. Status in this sense is to some degree dependent upon legal status. The higher a statistical office is ranked in the government hierarchy, the stronger is its position likely to be in dealing with administrative and other external matters. But its professional and administrative capability is even more important. Clearly, even if a statistical agency is granted the highest possible legal status, it is not likely to enjoy high professional and administrative esteem if it provides data that cannot be transformed into meaningful information, publishes the results of censuses and surveys late, prepares statistics that are inconsistent or incompatible with related data, performs the dissemination function poorly or, even worse, disseminates in favour of particular users. On the other hand, an agency that objectively and impartially provides all users with relevant, coherent, timely, easily understood and readily accessible statistics to the extent that its budget allows, is likely to enjoy high public esteem which may be conducive to also raising its legal status. Status in this wider sense is strengthened by an able leadership and by an effective public relations policy.

The external capability is also much influenced by the status of the head of the statistical service in relation to colleagues in the government hierarchy. There can be no doubt that the building of a robust statistical service is contingent on assigning top people to it. In view of the great national importance of many decisions which may be affected by statistics, it would appear to be in the national interest for the statistical service to have an equal opportunity to compete with other government departments for an outstanding individual of proven capability to be its leader and manager. Such an individual may be instrumental in enhancing its internal capability as well as its external capability. He or she should be in a position to develop rapport with policy advisers of other government departments and to negotiate various proposals on statistics with authority and insight. Clearly, his background must enable him to understand the needs of users and the problems of suppliers so as to manage effectively. He should have the same status as the top civil servant of a ministry.

At lower levels the staff of the national statistical service should also have equality in status. As noted by the Statistical Commission at its nineteenth session:

> "many developing countries have experienced severe losses of professional staff in their central statistical organizations, thus reducing their contributions to planning and policy formulation processes. Those losses and the generally severe shortages of trained statistical personnel in those countries reflected in large part the disadvantaged position of the statistical services with respect to pay scales and related working conditions".[1]

To bring about a rapid improvement in official statistics, this situation would need to be changed. In general statisticians should be ranked at the same level in the government hierarchy as the administrators with whom they are dealing. In particular, it is important that grading and pay should be at parity with those of the planning body, which is the main competitor for professional statisticians. This is a necessary prerequisite for a recruitment and personnel policy that could attract and keep good people, as discussed in chapter VIII.

## B. Location within the central government

A strong external capability is contingent on the public's

[1] *Official Records of the Economic and Social Council, Sixty-second Session, Supplement No. 2* (E/5910), para. 138.

recognition that the national statistical service is, in fact and in appearance, objective, impartial and professionally independent. The statistical service must be objective and impartial in all aspects of its operations, and in particular in the content and release time of its publications. It must be immune to special influences; the results of censuses and surveys should be published at the earliest possible time. Like the judiciary of a country, it must stand above any special-interest groups. Moreover, it must be seen to be that way. Otherwise its external capability and indeed its utility are undermined. In the maelstrom of changing economic and social events and views, it is a towering national asset to have a service that displays the facts regularly in an objective and orderly manner.

The maintenance of impartiality and professional independence is also of great importance in gaining the confidence of respondents who frequently are called upon to provide information that they consider confidential and would not wish imparted to any other government department or, more generally, to any body outside the statistical office. Not only must the information not be used against them but they must feel assured that this would not happen. Otherwise, response to questionnaires is less likely to be forthcoming and, when it is forthcoming, the likelihood of its revealing the true situation is diminished.

Objectivity, impartiality and professional independence are the main objectives to be aimed at when deciding on the location of a central statistical office or of the central co-ordinating body within a decentralized national statistical service. There may be some advantages to having the head of the statistical service report directly to the prime minister. This would be in keeping with the fact that the statistical service is designed to serve the needs of all government departments and, indeed, all users of the country. However, it would probably be the exceptional case where a prime minister would wish to give the statistical function high priority along with all the other issues of vital national importance that compete for his time and attention. Thus he may delegate the statistical function to a subordinate. Such a solution appears to be more practical in a decentralized than in a centralized national statistical service. In the former, the prime minister may more effectively than any other member of the Cabinet support the co-ordinating body in its dealings with the various ministries in which the statistical agencies are located. Other favoured locations are in the ministries of planning, finance and trade and commerce. In New Zealand the 1975 Statistics Act provides for a Minister of Statistics to whom the Chief Statistican reports. In most centrally planned economies of Europe, the head of the statistical service has, in effect, ministerial status.

In developing countries, particularly in Africa and Asia, the central statistical office is often located in the same ministry as the planning agency. This may be an advantage, at least for a time. The needs of planners are frequently comprehensive and the planners should become staunch allies in building an effective statistical service. Proximity of physical location should be conducive to mutual understanding. However, while the statistical service serves the vitally important needs of the planning agency it should not be subordinate to it; its location in the government hierarchy should reflect the fact that providing statistical information and performing social and economic planning are complementary and equally important functions. In order to carry out their functions in an efficient and national manner, it is essential not only for planners but also for other policy makers and administrators to have statistical information on the current state and past trends of situations. Moreover, an independent and co-ordinated statistical agency is better geared than one subordinate to the planners both to provide objective data for reviewing and monitoring the implementation of plans prepared by the planning agency and also to satisfy fairly the statistical needs of other users. Clearly, the statistical service should not be placed under a superior body whose performance is to be measured by means of statistics prepared by the service. Thus if the national statistical service is located within the same ministry as the planning agency, it should enjoy the same rank as the agency, both at the top and at lower levels.

Perhaps of greater importance than actual location is the interest and understanding of the minister in question and senior officials and their readiness to support the programme. Thus "the issue is not so much one of location as of the attitudes of the relevant decision-makers, political and non-political, towards the statistical function".[2] It bears emphasizing that wherever the statistical office is located, it should be seen to serve the legitimate needs of all users.

Although the head of the statistical service should have the same rank as the top civil servant of his ministry, his relations with the minister should be different. He should report to the minister, directly or indirectly, primarily on budget and administrative matters; but he should be independent of him on professional matters. This means, *inter alia*, that the head of the national statistical service should issue publications on his own responsibility without submitting them to a minister for approval. The professional independence of the national statistical service is the same as for the judiciary, i.e., no superior body can interfere in professional matters. To make this clear it may be preferable that the central statistical office (or the central co-ordinating body of a decentralized service) be physically located outside the ministerial buildings.

While on the one hand formal independence in professional matters strengthens the public confidence in the national statistical service, on the other hand the political authorities cannot entrust the statistical service with such an independence unless the service is in fact objective and impartial. Professional independence can last, formally as well as in fact, only as long as objectivity and impartiality are maintained.

Regardless of its location, a statistical agency should make strong efforts to develop good relations within its own ministry, both by providing it with a cost-effective statistical service and by preparing convincing proposals for its own budget. As regards the budgeting, the existence of a comprehensive quantitative plan for the use of resources is of great significance (see chap. XIV). Such a plan can provide a much better understanding and justification of the budget than would otherwise be possible. Moreover, it can facilitate explanation of the fact, stressed by the Statistical Commission at its nineteenth session, that "the production of adequate statistics needed by Governments for planning and evaluation of economic and social policy required a great deal of time, continuity and adequate resources".[3]

### C. Provision of statistical information to planning bodies

In several respects a national statistical service must give other central government bodies higher priority than other users of statistical information. For instance, it must give them more assistance in retrieving and using the available statistics. Special formal and informal relationships with these bodies are justified and are further discussed in chap-

[2] S. S. Heyer, "Development planning and statistical organization" (ESA/STAT/AC.1/8), paper prepared for the United Nations Interregional Seminar on Statistical Organization, Ottawa, Canada, 1973, p. 10.

[3] *Official Records of the Economic and Social Council, Sixty-second Session, Supplement No. 2* (E/5910), para. 139.

ter XII. However, some of the relationships to the planning bodies are discussed in the present chapter.

The preparation of a quantitative plan requires statistics for the years preceding the plan period and the implementation of such a plan requires monitoring on the basis of statistics for the years of the plan period. Several implications follow from this.

In the first place, the plans and the corresponding statistics must adhere to the same standards as regards concepts definitions, classifications, methods and practices. Otherwise, the planners would need to make time-consuming adjustments to the statistics, both conceptually and methodologically. For instance, to the extent that the plans include the same kind of aggregates as those of the national accounts and balances, their concepts must be defined in the same manner and the indices involved prepared according to the same methods. To ensure consistency, the statisticians and the planners must co-operate very closely. The statisticians should as far as possible endeavour to persuade the planners to apply the existing statistical standards as regards both the national accounts and balances and other kinds of statistics. If it turns out that for planning purposes existing standards are not adequate, the statisticians should be willing to make adjustments. In developing new statistics that are expected to be used by the planners, agreements should be sought on the standards involved in advance of the data processing.

In the second place, the use of statistics for planning purposes imposes special requirements with respect to timeliness. Since a plan must be linked to data for the year preceding the plan period, these data need to be estimated before the end of that year. The monitoring also requires statistics shortly after the end of the plan year for which *ex ante* plan figures are to be compared with *ex post* data. This means that in fact projections must be made as a basis for both the preparation and the monitoring of plans. Either the statisticians or the planners must make these projections; in either case, both parties should co-operate as far as necessary.

In the third place, numerical models of various kinds are increasingly being used both in preparing national plans and in making projections. For reasons explained in chapter XI, statistical agencies should take part in developing such models. In some countries, for instance France and Norway, the major role in developing and maintaining planning models is left to the central statistical office. In such cases, the central statistical office naturally also carries out the current computations for the planning bodies.

The role of the national statistical service in providing statistical information and in model building for planning bodies depends upon the degree to which the central government applies numerical plans as a basis for its policies. In the centrally planned economies of Europe, this appears to be a major role which to a large degree determines the organizational set-up of the service. In other countries where numerical plans are applied, the statistical agencies do not always play a major role. In some of them the planning bodies produce the statistics. This is not a satisfactory arrangement.

### D. Data on central government activities

The role that Governments play in a modern society generates important user demands on the national statistical service. The dominance of this role may be illustrated by the fact that in some countries the government sector collects revenue from the private sector amounting to almost one half of the gross domestic product and uses goods and services for about one quarter of GDP (somewhat less than one quarter thus being returned to the private sector). These magnitudes reflect governmental activities that are not only comprehensive but also very complex. To make possible analysis of their effects on the demand for goods and services, on the distribution of income by size, social groups and geographical regions and on the various components of social welfare such as employment, health, education etc., detailed statistics are urgently needed and these must be integrated with corresponding statistical information on the private sector. In developing countries in particular, even if the activities of government are less dominant, the design of a development policy requires comprehensive, detailed and reliable information on the governmental activities that the policy involves.

A large part of the information needed on governmental activities can be derived from the government accounts, if appropriately arranged. In addition, information on the Government's use of human resources and particular commodities in volume units and, if possible, information on the products provided by the Government in the form of various kinds of services, would be highly desirable. To produce statistics providing such information, the statistical service must collect a large amount of data from agencies within both the national and the subnational governments. The discussion in the present section is confined to the organizational arrangements required to obtain accounting and other data from agencies of the national government. Organization of the data collection from subnational governmental agencies is dealt with in chapter VI.

Traditional government budgetary and accounting procedures have generally been designed with somewhat limited purposes in view. They are largely concerned with financing and accountability—meeting the requirements for funds and ensuring that money is spent in authorized ways. Both of these raise important questions and government finance statistics must be able to provide answers. But as the complexity of government operations and their impact on the private sector increase, statistics on government operations are called upon to meet additional demands. In some countries, budgetary systems have been introduced that are designed to provide information on the purpose or programme for which the expenditure is intended and on performance in accomplishing the purpose (programme and performance budgeting—PPB). In other countries, without such formal systems, reclassification of budgetary revenue and expenditure data is nevertheless possible, with greater or less degrees of exactness. If the reclassification is done exclusively on the basis of published data, much guesswork is involved. It is preferable to collect reclassified data from each relevant government agency. This requires use of a questionnaire designed for this purpose, with appropriate instructions, and the data collection must be performed either by the ministry of finance or by a statistical agency under authority of the ministry. If the data suppliers do not modify their system of accounts so as to yield the information required, they too will need to make estimates although the guesswork involved will be less than that required in a centrally performed reclassification.

In Norway, a reform of the government accounts was implemented in 1960 and at the same time the calendar year was adopted as the accounting year. This enabled the government agencies to supply budgetary estimates according to an alternative classification in addition to *ex post* accounting estimates. In this way the Ministry of Finance was able to obtain the data needed to prepare its budget proposal in accordance with both the traditional and the national economic classification, thus enabling the Ministry to analyse the impact of the budget before making the final decision on its content. This greatly improved the data basis for budgetary policy.

## E. Administrative data

In most countries government bodies collect administrative data, which can be used for the production of statistics needed both for their own use and for incorporation in the system of official statistics. In developed countries, as a rule, a great part of demographic and social statistics is derived from such data, for instance statistics on vital events, education, health, criminality etc. Essential parts of economic statistics are also based on administrative data, for instance foreign trade statistics and data on the production or sale of commodities subject to excise taxes. In developing countries where the administrative systems are often less effective, the possibilities of providing statistics by means of administrative data are more limited and frequently statistics provided in this manner are difficult to interpret, *inter alia*, due to incomplete and changing coverage. However, even in these countries such statistics represent a considerable portion of official statistics. Some of these statistics could not be provided, or not with the same degree of detail, if the statistical agencies had to collect the data directly. Furthermore, the production of such statistics is relatively cheap and no extra burdens are imposed on the data suppliers. Thus the more administrative data can be utilized for the production of official statistics, the less the costs of statistics and the burdens of data supply are likely to be. It bears emphasizing, however, that statistics derived from administrative data may not always be as useful as desired, *inter alia*, because the units and other concepts are defined to serve administrative rather than statistical purposes, because the coverage is incomplete or changing, because the checking may not be satisfactory and so on. Nevertheless, in general administrative data represent an invaluable source of official statistics.

Hardly any country exists in which the usefulness of statistics based on administrative data cannot be improved at relatively low cost. Most likely there are also administrative data available that are not utilized for statistical purposes but that could enable a further development of the official statistics at reasonable current cost and with no substantial additional burdens of data supply. However, the development of such statistics requires a considerable initial use of resources for negotiations with the administrative agency concerned and for preparatory work.

Effective utilization of administrative data for statistical purposes is not simple. Even in countries with highly centralized statistical organizations, the scope of the authority of the statistical office seldom includes all of the potential sources of administrative-data-based statistics. In most statistical offices, it is only gradually that access is obtained to, and eventually some control is gained over, data generated outside the statistical organization. The first step may involve the right to receive copies of such data, without any control over their design, collection or processing. Often such access must be negotiated separately for each body of data: from the taxing authorities for tax data, from the ministry of education for education data etc. Achieving an impact upon the content of administrative data is more difficult and usually takes much longer.

In some cases the transfer of administrative data to a statistical agency is impeded by problems of confidentiality. The legal aspects of such a transfer are discussed in chapter VII and need not be dealt with here. However, some problems due to administrative delays and some implications of computerized administrative data systems must be discussed.

Where effective access has been obtained, either by specific negotiation for a particular body of data or through more general legislation, statistical agencies must keep close contact with government bodies supplying administrative data in order to ensure that the coverage of the data is as complete, the quality as high and the timeliness as satisfactory as possible. From time to time extra efforts should be made to achieve improvements. Frequently the forms used are not properly designed. Questions may be asked that cannot be satisfactorily answered or to which the answers cannot be or are not utilized; too little space may be provided for the answers to some questions etc. In such cases the statistical service should take the initiative and offer the expertise and other resources required for achieving the operative improvements desired. Unless this is done, setbacks, which are bound to occur from time to time, may accumulate and reduce the usefulness of the statistics.

In many developed countries the collection of administrative data tends to be computerized, mainly to facilitate the retrieval of data on individual persons or enterprises for use in handling cases regarding them. Common to most of the computerized systems is the fact that they process statistics that may be useful both for the administrative body concerned and for other users. In particular, such systems may facilitate the production of statistics that satisfy the need for detailed information, especially for small areas and for socio-demographic characteristics, which is difficult to obtain otherwise.

Computerization in many respects improves the possibilities of statistical utilization. The fact that it involves spelling out, codifying and standardizing concepts, definitions, classifications, procedures and so on means that the administrative bodies are forced to design their forms more carefully, define the concepts more clearly and improve the classifications applied. Easier retrieval stimulates efforts to improve the coverage. Computerization also enables automated checking. Since the data can be transmitted to the statistical body on machine-readable media (i.e., the original forms need not be transferred), administrative bodies need not be as reluctant as before to allow transmission. Last but not least, since the data are already in machine-readable form, the statistical body can save the costs of entering them.

As pointed out in chapter II, this is a new situation of which statistical agencies should take advantage. However, statistical utilization of administrative records may involve problems even if the administrative system has been computerized. Experience in several countries shows that technical difficulties, for instance difficulties due to the formats of machine-readable media, may exist in some cases, that coding may be of low quality, that the editing may be insufficient, that the coverage may still be incomplete and, of course, that administrative bodies tend to place priority on administrative purposes and convenience in the defining of concepts and the designing of classifications. Nevertheless, these problems can be reduced by proper co-operation between the administrative bodies and the statistical agency in the development of computerized administrative data systems. Such co-operation should also aim to establish a clear division of work as regards the statistical utilization of administrative data.

# Chapter IV

# RELATIONSHIPS TO USERS: DISSEMINATION OF STATISTICAL INFORMATION

## A. General considerations

A statistical agency has relationships to the users in the performance of several functions. It must attempt to ascertain their needs and interpret their demands, it must evaluate possible uses of statistics and, when disseminating the statistics produced, it must select media and formats that can maximize the benefit of the statistics to its users. The ascertainment and evaluation of needs and demands for statistics may be facilitated through external committees of the kind described in chapter I. Furthermore, the performance of these functions is closely related to priority setting, which is the subject of discussion in chapter XII. The present chapter is confined to an analysis of various important aspects of dissemination.

An agency's facility for dissemination of available statistical information is a vital element of its external capability. Clearly, the more a particular set of statistics is used, the greater the benefits and the smaller the cost of production per unit of output. Moreover, the wider the utilization, the better known the agency becomes. A well-known agency providing good service grows in national stature and its image benefits. The appearance as well as contents of the publications, the manner of presentation of statistics, the kind of compendiums and periodic bulletins produced, the provision on request of special tabulations, including material in machine-readable form when needed, the storage of releasable statistical information, the prevention of inadvertent violation of confidentiality and the promotion of use of statistics are all important elements of dissemination.

Although publications of various kinds represent the most important media of dissemination, other media are rapidly gaining in importance, such as computer printouts, other unpublished tables (reproduced by photography or otherwise), magnetic tapes, micro-film or micro-fiche. The form and content of publications may vary from press releases with simple descriptions to attractive monographs with complex analyses of numerical relationships. The dissemination by other media may range from dispatch of single figures by telephone or letter to release through computerized data banks, which also may enable the users to carry out analysis of the stored data. The large number of cheap tabulations that computerization makes possible has resulted in an increasing proportion of the statistics actually produced being stored rather than published. The stored data may also be regarded as a form of dissemination, although they only provide a potential for prospective use. Finally, as further explained in chapter X, by means of systematic computerized storage of clean and coded micro-data and facilities for rapid processing of such data, a statistical agency can satisfy unanticipated demands. Although the maintenance of such storage is a separate function, meeting demands in the manner described is a part of the dissemination function.

It is probably not an exaggeration to say that in most countries the statistics available, in published and other forms, are by no means fully taken advantage of by users, partly because the statistics are not well enough known and partly for other reasons. The fostering of a more extensive and intensive exploitation of the statistics by active promotion based on user studies is an integral part of the dissemination effort. The promotion should aim at better exploitation of both the currently produced statistics and the stored data. The systematic storage of computerized data, enabling utilization of both aggregated data and micro-data, greatly increases the need for informing users concerning what is available and how it can be obtained and used.

As explained in chapter X, stored computerized micro-data make possible special tabulations at relatively low costs. In this way, user needs that the available aggregated data do not satisfy can be accommodated as far as resources allow. This form of dissemination may require special efforts. The computer technique and modern statistical methods have also increased the demand for anonymous micro-data. However, the satisfaction of this kind of demand involves confidentiality and privacy problems, which call for great caution. For this reason the dissemination of such data is not discussed further here.

The scope and coverage of particular kinds of publications or other dissemination media and the choice among the various formats available cannot be discussed in the *Handbook*. A treatment of these topics would have to take into account the capability of users to handle the various media and digest their content, the variety of user groups that are likely to have special needs and other factors that may vary a great deal from country to country. The problems of avoiding delays in dissemination, unnecessary publications, possible waste in distribution etc. are not discussed. The discussion below is limited to the major problems of organization related to the dissemination function.

However, although a detailed discussion of the principles of presentation would not be appropriate, the significance of standardized presentation must be emphasized. For the users it is of great importance that all publications of official statistics be standardized and systematized. One can utilize data more effectively if time-stubs are identical; if, as far as possible, index numbers are presented with a common base period; if notes describing the source of data, the scope and coverage of data, possible breaks of continuity in time series etc. are found at the same place in all tables; if the organization of similar kinds of publications is harmonized, for instance, by describing definitions, classifications, the quality of data etc. in the same sequence; if different kinds of publications are presented in special series with a numbering system enabling easy retrieval; if the format and layout are standardized etc. These are important aspects of dissemination, to which statistical agencies often pay too little attention. One objective of the organization of the dissemination function should be to ensure the development, maintenance and implementation of such standards.

Frequently, the dissemination function has been neglected in favour of the production of statistics. Today it seems generally agreed that henceforth statistical agencies should orient themselves more towards dissemination, as regards both the allocation of resources and the organization of work. Of course, when higher priority is placed on dis-

semination, the increased resources that are required must be obtained—if necessary by reducing resources for other functions.

Major organizational vehicles that can be used to strengthen the dissemination function are a central information unit and a separate unit for regional statistics. The functions of such units are indicated below. The sections below contain discussions of the organization of the preparation and the approval of publications (sects. B and C), the organization of the dissemination by media other than publications (sect. D), the promotion of the use of statistics (sect. E) and the organization of the reproduction and distribution of statistics (sect. F).

### B. Preparation of publications

As a rule, statistical data should be prepared for publication by the responsible subject-matter unit. However, for compendia such as statistical abstracts and general bulletins of statistics, the responsibility must be centralized. Furthermore, publications presenting statistics for particular regions of the country and containing statistics from many or all subject-matter fields require central co-ordination. Surveys of economic or social trends, based on data from a number of subject-matter fields, are also illustrations of publications involving central responsibility. The organization of the preparation of such publications is not clear-cut. The arrangements may be different depending, *inter alia*, upon the kind of publication, the size of the statistical agency and the competence of the available personnel.

In a small statistical agency or in the statistical agency of a developing country, where few trained professionals are available, the head of the agency may have to take charge of such publications. In fact, only a few decades ago this was the practice in most countries as regards statistical abstracts and monthly bulletins. Even in agencies where competent professionals are available, the head may wish to take charge when a publication of this kind is prepared for the first time and leave the direction to others once the routines have been established. In such a case the staff should be centrally located or else released from one or more subject-matter units. Alternatively, a project group may be established for this purpose with a leader to whom responsibility for the work is delegated. In the longer term, preparation of current compendia and other across-the-board publications should be organized on a more permanent basis.

One objective of the permanent arrangement should be to utilize the professional knowledge of the subject-matter units concerned. Work on this kind of publication is often considered to yield high prestige and may be more interesting than the regular work in a subject-matter division or at any rate represent a desirable change from the regular work. Consequently, as much as possible of such work should be assigned to the various subject-matter divisions concerned—for instance, the preparation of tables and perhaps also descriptions. Of course, resources for this kind of work must be allocated to the subject-matter divisions concerned. However, the editorial and co-ordination functions should, if possible, be performed centrally.

The editorial functions for compendia such as the statistical abstract, the general monthly bulletin and a possible weekly bulletin can best be performed by a central information unit, working in close collaboration with the subject-matter divisions. Such a unit may also organize the issue of press releases. It may offer advice on the form of such releases; however, the subject-matter divisions must be responsible for the content of releases dealing with their statistics. Only the content of press releases of a non-statistical or general statistical nature should be the responsibility of such a unit. The preparation of publications presenting statistics from several subject-matter fields for particular areas or regions of the country may be located in a separate division. The provision of regional statistics is discussed further in chapter VI.

The development of standards for the layout of publications, the presentation of tables, the illustrations to be included, the subjects to be dealt with in the text etc. may be carried out by a committee established for this purpose, with members representing subject-matter divisions, the central information unit (or, if such a unit does not exist, individuals with special qualifications in presentation) and representatives of the top management. The implementation of such standards must have the support of top management.

The variety of publications needed to accommodate user needs is likely to multiply with the increased use of statistics and the growth of user groups. For this reason the publication policy of a statistical agency should be reconsidered at regular intervals. A committee, with a composition similar to that suggested above, may be established. Its main objective should be to strengthen dissemination by means of publications designed especially to satisfy the needs of particular user groups. It should first review the existing system, discussing the objectives of each series or kind of publications, clarifying who the main user groups are and then evaluating the form and content of the series in view of the objectives and user needs. Against this background, the committee should explore the needs for possible new series of publications and alternative forms of publications.

### C. Procedures for approval and release of publications

Firm procedures must be established for the review of manuscripts before they are released for publication. Since the publications embody the major product of a statistical agency, the top management must take great interest in them. The content and form of the publications represent the basis on which most users judge the effectiveness of the statistical agency and its leadership; administratively, of course, the head of a statistical agency is responsible for errors and any weaknesses. In an agency issuing hundreds or perhaps thousands of press releases and publications a year, the head cannot possibly evaluate them all before publication. This means that the authority of approving some of the publications, for instance, press releases and monthly or quarterly bulletins, must be delegated to subordinates. However, especially important and entirely new publications should be submitted to the head for evaluation and approval.

When a publication is submitted from a subject-matter division to the head of a statistical agency or a representative for approval, both the form and content should be of such a quality that, as a rule, approval is warranted. Nevertheless, this is an opportunity for the top management to make suggestions for improvements in the next issue and to express recognition and appreciation. A meeting may be arranged with representatives of the division concerned when formal approval of the publication takes place.

Of course, the manuscript must be carefully reviewed in advance by somebody located between the chief of the subject-matter division and the head of the agency in order to ensure that the standards of presentation are implemented and that the minimum quality requirements are satisfied. Alternatively, a publications committee may be used for this purpose. One advantage of such a committee is that the manuscripts may be discussed in a wider forum, in which

several subject-matter divisions and, if available, editorial expertise are represented. Such a committee may also make recommendations on major changes of format, on some alternative medium of dissemination or on the possible elimination of unnecessary current publications.

The procedures outlined above ensure some internal feedback to the subject-matter divisions, which may contribute to future improvements in both preparation and substance. In addition, feedback from the external users of statistics are desirable. To ensure this, procedures may be established for securing comments from external users. More active efforts to obtain feedback may also be made; this is discussed in chapter XII.

For the establishment of confidence among external users in the impartiality of a statistical agency, rules can be established as regards the time when the content of a publication is considered accessible. One way of doing this is to issue a press release shortly after approval of the manuscript and thereafter consider the content as public, i.e. users may from that time onwards request data from the publication even though they have not yet been reproduced. Of course, prior to this, no external user should have access to the content, not even the parent ministry. Furthermore, the users may at a later stage be informed of the date on which the publication is likely to be issued. Deadlines for the release of publications with current monthly or quarterly series may be established in advance and made known to the users.

In addition to publications for external use, it may also be useful to establish one or more series of publications mainly for internal use. Staff members of a statistical agency as a rule, prepare a number of memoranda of a methodological or substantive nature. Some of these may be of interest to other staff members or may even be of permanent interest. To ensure a sufficiently wide circulation of such memoranda and easy access to them in the future, a formalization of these series may be desirable.

### D. Dissemination by media other than publications

Answering telephone calls and letters from users occupies a number of staff members at all levels in many statistical agencies, from the head of the agency to the clerks in subject-matter divisions. The feedback provided by this activity for the analysis of data requirements and for priority setting may be invaluable. A statistical agency having a reputation for answering requests of this kind politely, speedily and precisely can be assured of enjoying goodwill, which may yield returns in several ways, not the least of which may be in respect of data collection. However, this activity requires human resources and can disrupt other work. A chief of division, for instance, who spends many office hours answering telephone calls or letters cannot perform other functions properly. Of course, all requests should be directed to the lowest level feasible. A directory indicating "who answers what" and made available both within the agency and to important outside users may be helpful for this purpose. To avoid excessive diversion of resources on this kind of dissemination, some centralization of the handling of external requests may be organized within the division concerned or for the entire agency. In highly developed agencies a computerized internal data bank, designed for this purpose, may facilitate a greater degree of centralization than would otherwise be feasible.

Centralization of the handling of requests, even on a modest scale, may be opposed by some of those whose duties will decrease and whose main argument is likely to be that the section or division concerned will lose valuable feedback. However, such feedback may be otherwise arranged for and in a more systematic manner. A possible strategy is to begin centralization within the divisions in which it is least resisted and in which it is likely to function best and at a later stage to centralize further, provided that less disturbance and better utilization of human resources can thus be achieved.

Whether some degree of centralization is resorted to or not, a division of work should be organized as regards the handling of requests. Inquiries on published information requiring no assistance other than guidance on what is available and where and how to get it may be handled by non-professionals. This kind of request may also be most suitable for centralized handling. Requests that require limited assistance in interpreting the statistics and in utilizing other information may be handled by general professionals while requests that require a great deal of background information must be handled by subject-matter specialists. Diversion of resources may be substantially reduced if the three kinds of requests specified above are directed to personnel that have no more qualifications than required and to a minimum number of such personnel.

In many statistical agencies large amounts of valuable unpublished statistics are stored in tabular or other summary form but are not always utilized to the extent that would be possible if their existence were better known to users and if they could be retrieved more easily. The promotion of the use of such data is discussed in section E below. The best way of tackling the retrieval problem is likely to be different in different countries and agencies; however, some observations on this issue may be warranted.

One possible solution is to store such data systematically on machine-readable media so as to enable easy retrieval and, if desired, further processing. Machine-readable media, as already mentioned, are likely to become more and more important as a means of establishing readiness for disseminating unpublished statistics on demand. For such a development much preparatory work is required in order to provide *(a)* systematic documentation of the data available, *(b)* computer programs enabling quick retrieval (and, if necessary, further processing) and *(c)* documentation of the programs to make possible easy application. This is further discussed in chapter X. At this point it may suffice to say that if the required preparatory work has been done, it will be possible to make an important choice between the delivery of available statistical information by means of publications, by printouts from machine-readable media or by the delivery of machine-readable media containing the information desired. The medium of dissemination chosen will depend upon both the costs and preferences as well as upon the absorptive capacity of users. To the extent that data are not disseminated by publications, it will also be necessary to choose between storing them on printouts and micro-film or micro-fiche which can be copied easily or on some kind of machine-readable media. However, it must be emphasized that such dissemination media require highly skilled and well-informed users.

Dissemination by media other than publications can be performed either by the relevant subject-matter division or by a functional unit. This topic is further discussed in chapter X as regards the dissemination of stored computerized data. The greater the dissemination in this form, the stronger is the case for functional centralization. The dissemination of such data requires a detailed and systematic documentation, the development of which is costly; it may not be feasible for most statistical agencies for many years.

### E. Promotion of the use of statistics

There are various ways in which an agency can promote

the utilization of its statistics. These include special programmes designed to acquaint the user community with its outputs (and their limitations), including the stationing of representatives in local communities to strengthen contact with users, the setting-up of seminars and discussion groups, the arrangement of press conferences and so on and the conduct of user surveys identifying characteristics and the difficulties users encountered in using the statistics. Well-arranged descriptive catalogues or guides to statistics are important media for facilitating access to the agency's publications. They may also facilitate access to outputs disseminated in other forms (see sect. D above) but, as explained in chapter X, special data directories and dictionaries are required for the effective dissemination and utilization of stored releasable data. Lists of publications already released or expected to be released in the near future, including short descriptions of the contents, may be distributed. The titles of publications issued and short descriptions of the kinds of publications and services offered by the statistical agency may be printed on the cover of some of the publications. Assistance in establishing libraries of official statistics may be provided to user groups such as ministries and other national or subnational government agencies, to universities and research institutes and to major educational institutions of other kinds. Advertisements and articles in newspapers and professional periodicals and programmes on radio and television may also be used, if sufficiently well formulated. Booklets and other educational materials describing how statistics could be used (and misused) can be very effective. Thus, a booklet produced by Statistics Canada some years ago under the title *How to Profit from Facts* has enjoyed remarkable distribution. The presentation of the results of the kind of analytical activities discussed in chapter XI may also promote the use of statistics.

To be effective, the promotion of the use of statistics cannot be limited to the provision of a minimum amount of information on what kind of statistics with which attributes are available and how these statistics can be acquired. Much more active promotion efforts are required. Individual groups of users must be approached and provided with information on what kind of statistics they in particular can utilize and on how to go about using them. One form of such promotion is to offer individual packages of statistics designed to fit particular user groups, or to offer a subscription service to individual users enabling them to receive a monthly, quarterly or annual package of statistics that are too detailed for general publication. Another, more active approach, is the establishment of personal contact, with the aim of educating particular groups of users and getting feedback in return. However, even in developed countries the funds and personnel needed to implement an active and robust programme of promotion are not easily obtained in the face of competition for scarce resources. Nevertheless, the importance of such a programme cannot be exaggerated since the justification for assigning resources to statistical programmes is that the statistics are not only useful but are actually used.

A programme of more active promotion may first concentrate on users within the central government sector where such a programme is, in general, simple to carry out by contacting the top level of the ministries that are most likely to be interested and then approaching the appropriate lower levels. In developing countries the most important ministries to contact are usually the ministries of planning, agriculture and industry. Arranging seminars for top civil servants and courses in the use of statistics for government employees at lower levels may be worth considering. Permanent contacts should be established with appropriate ministries for co-operation on use promotion. Naturally, the first co-operative effort should be to clarify which publications are available and what kind of statistics are used by whom in the ministry concerned. On the basis of this information, a plan should be prepared for prospective action on promotion, to be implemented in co-operation with the ministry concerned. Committees established by the central government often need statistics as a basis for their work and tend to start data collection themselves if they do not find the statistics they need. Therefore, whenever a committee is appointed that is likely to need statistics, its chairman or secretary should be informed of which data can be made available at once and of which new statistics can be produced for the committee. In some countries seminars for interested members of the legislature may promote the use of statistics for important purposes. Other groups of users for which promotion may yield considerable pay-off are universities, research institutions, local governments and organizations of various kinds. However, as regards these groups the situation in different countries varies too much to warrant making general statements on priorities and the means of promotion.

The importance of an active policy of use promotion is a strong argument for establishing a central information unit or for strengthening an existing one. The central unit should take the lead and stimulate contributions from the subject-matter units, act as a co-ordinator and concentrate its own resources on tasks for which others are not as well qualified or which relate to several or all subject-matter divisions. In particular, it should provide assistance to the subject-matter divisions in organizing user seminars, workshops and conferences. It should also assist in carrying out systematic research on the use of and need for statistics, for instance on the basis of lists of subscribers to publications and records of dissemination by media other than publications. Finally, it should analyse and evaluate the effects that various measures of use promotion have on the dissemination of statistical information. The information unit may be placed directly under the head of the agency or a deputy.

### F. Reproduction and distribution

The satisfactory performance of the dissemination function is contingent on the effective reproduction and distribution of publications. The major objectives are to ensure that all users receive the publications that they request and that the reproduction and distribution are carried out as quickly and efficiently as possible. The timeliness of the statistical information received by users can be improved by the application of proper procedures for the release of the statistics produced (see sect. C above).

Relatively cheap modern equipment for writing and offsetting may enable a statistical agency to reproduce most of its publications without having to rely on an outside printing service. Of course, such reproduction must be centralized. Moreover, most of the editing of manuscripts can be performed effectively and efficiently by a central staff trained for this job. The subject-matter divisions concerned must be responsible for the substantive editing but other editing can be carried out better by a staff especially trained for and experienced in this kind of work. Both the centralized editing and the reproduction, which may be termed composition, may be located in the same unit of the service branch (branch III); see chapter I. Alternatively it may be located in the administrative branch (branch I) but, since composition is becoming more and more computerized, location in the same branch as the systems and computer work may be preferable.

The distribution service should also be centralized. This function could be located in the administrative branch since it is mainly of an administrative and financial character.

However, wherever the location, close co-operation must be established between the distribution unit, the subject-matter divisions and the central information unit.

Different distribution methods and procedures need to be used for different kinds of published material. Thus, press releases may be distributed directly from the statistical agency while the distribution of bulletins and books may be more effectively done by assigning a part or the entire distribution service to outside agencies that specialize in such activities. A statistical agency should carefully explore the possibilities of such a delegation of the distribution service. However, the condition for such delegation is a continual monitoring of the effectiveness of delegated activities.

A considerable part of the products of a statistical agency should be disseminated to users free of charge—for instance, press releases, handling of requests that require minimal time, publications demanded by limited groups of users, such as the political authorities and administrative bodies of the central government etc. However, to avoid waste there should be a charge for the provision of most publications and of other services that cost more than minimal amounts. The administrative branch, in consultation with the subject-matter personnel concerned, should be responsible for formulating rules for free dissemination and for the pricing of both publications and services of various kinds.

In a number of countries, both the reproduction and distribution of all government publications are the responsibility of a separate department. In such cases the statistical agency should foster the closest co-operation with the department and work out arrangements to ensure effective dissemination and maximum feedback along the lines described in section D above.

# Chapter V

# RELATIONSHIPS TO SUPPLIERS OF DATA

## A. General considerations

The capability of a statistical agency to assemble the micro-data needed for the production of statistics is as important as the ability of an industrial enterprise to acquire the raw materials for the production of its commodities. If the persons, enterprises or institutions from which micro-data must be obtained are not sufficiently willing to respond or do not supply sufficiently accurate data, a statistical agency cannot provide relevant, timely and reliable statistics. The present chapter deals with problems related to the individual suppliers of statistical micro-data, mainly persons and enterprises, and with organizational means of solving such problems.

The distinction between users of statistics and suppliers of data may seem artificial to those who are both. It may even be argued that in some sense every person or establishment is both a user and a supplier. Nevertheless, the problems related to these functions are so different that a separate discussion is necessary.

The problems that data collection may impose on the suppliers are *(a)* the burdens entailed, *(b)* the risk that confidentiality may be violated, *(c)* the apparent intrusion of privacy involved and *(d)* the possible feeling that integrity is impaired if data on persons from different sources are linked without any indication of this possibility at the time of collection. The national statistical service must face these problems and as far as possible attempt to minimize them.

The problems described above are apparently more serious in developed than in developing countries. The magnitude of problem *(a)* is closely correlated with the development of official statistics in general. In some developed countries problems *(b)* to *(d)* have become major concerns in recent years and they often seem to be substantially more serious in larger cities than in less agglomerated areas. However, even in countries in which these problems are as yet non-existent or small, statistical agencies should be aware that they may arise. If the public gets the feeling that too many questions are asked or that the data may be misused or that privacy may be intruded upon, resistance to data collection may develop.

Problems *(b)* to *(d)* have increased to a considerable degree in the last decade in a number of countries, mainly due to computerization, which has immensely increased the store of retrievable data and which has also created a rather widespread and somewhat exaggerated fear that the computer is a threat to privacy.

One difficulty confronting the national statistical service when attempting to tackle these problems is that statistical and administrative uses of micro-data are frequently confused. This confusion is aggravated by the fact that administrative agencies often use their data for statistical analysis in addition to using them for handling individual cases such as in taxation, social security etc. It is not easy and not always possible to convince non-statisticians that, for a statistical agency, the information on identifiable individuals is in itself of no interest, that this information has interest only as an input required to produce statistics and that identifiable data disappear in the statistical output, which represents summary measures for groups of individuals. A salient feature of statistical information is that it always relates to a well-defined population rather than to a particular individual. Perhaps the most convincing argument is that for the statistical agency to produce good statistics, it needs a high response rate, that a high response rate is dependent on the trust of respondents, that confidentiality will not be violated and that as a consequence it is of vital importance to the statistical agency to maintain such trust, and that to violate it would be tantamount to cutting off the branch upon which the official statistician is sitting. The identification of respondents is required mainly for the checking and correction of possible errors. When the micro-data are cleaned and coded, they are rendered unidentifiable. Such unidentifiable data may be transferred to users who prefer to carry out data processing themselves.

Thus a solution to the problems of confidentiality, privacy and integrity to a large degree requires an effective public relations policy. It requires efforts to explain clearly to respondents the purposes for which the data are collected, the benefits that the resulting statistics are expected to yield and the steps that the agency has taken to protect the confidentiality of the data it collects. Such explanations are also essential to make respondents willing to accept the burden of response.

The presentation below is focused on how the burden on respondents can be minimized (sect. B), how the data received in confidence can be protected so as to avoid the violation of confidentiality (sect. C) and how the data supply can be promoted by proper communication with suppliers (sect. D). The importance of these factors for maintaining a strong external capability cannot be overemphasized. Thus the Statistical Commission at its nineteenth session emphasized that "a mechanism for continuous assessment with government and non-government users and respondents of questions relating to the respondent burden and safeguarding of privacy was useful".[1]

## B. Burdens on the data suppliers

A statistical agency cannot avoid imposing burdens on those who have to supply the data needed for statistical purposes. However, these burdens should be minimized. Moreover, the statistical agency should demonstrate visibly to the public that it is genuinely concerned with keeping the response burden to a minimum.

In other chapters of the *Handbook* methods and procedures are described which can contribute to such minimization in various ways, often also contributing to effectiveness and efficiency in the production of statistics as well as to a favourable public image. Thus, if the requirements of users are properly evaluated as described in chapter XII, it may turn out that the information needed can be obtained by

[1] *Official Records of the Economic and Social Council, Sixty-second Session, Supplement No. 2* (E/5910), para. 133.

means of available statistics or administrative data. Such evaluation may even result in withdrawal of the request for statistics because it convinces the user that it is not feasible or not worth the costs. Thus by establishing procedures for careful evaluation of requirements a statistical agency can avoid duplication and wasteful data collection and at the same time contribute to economy. If the conclusion of such an evaluation is that new statistics are needed, stored micro-data or currently collected administrative data may satisfy such needs without any further data collection or with less collection than would otherwise be required (see chaps. IV and X). Furthermore, proper performance of the data collection function may ensure that the burden of new collection is kept to a minimum, for instance by the use of multi-purpose surveys, by keeping the number of questions to a minimum, by formulating questions so as to enable the respondent to provide answers on the basis of his or her records without time-consuming adjustments, by the use of supplementary questions on established questionnaires etc. In addition, effective co-ordination of the activities within a central statistical office or between different statistical agencies in a decentralized national statistical service may minimize duplication and overlapping.

To convince the respondents that the collection of statistical data is justified is particularly difficult when other government agencies collect the same kind of data for administrative purposes. If another agency needs the data for handling individual cases, duplication of effort is unavoidable unless the statistical agency can have access to the administrative data. However, as indicated in chapter III, the coverage and concepts of the administrative data would need to be applicable or adaptable for the statistical purpose.

The responsibility for minimizing the burdens of data supply must rest mainly with the subject-matter divisions concerned. However, to the extent that the data collection function is centralized, the functional units concerned with questionnaire control, survey control etc. should be equally concerned with this problem and be involved in its solution. A central information unit may contribute to increased goodwill among data suppliers by assisting the management in implementing an effective public relations policy.

Reduction of the burdens of data supply must also be a major concern of the head of a statistical agency and senior personnel. If feasible, they should review every questionnaire issued before authorizing data collection. If this is not feasible, the head of the appropriate service branch should do so prior to seeking approval of the forms by the head of the subject-matter branch. Finally, it should be pointed out that the respondents can also contribute to a minimization of the burdens of data supply; they can adjust their own records (and related computer programs). Indeed, enterprises may realize considerable savings by arranging their accounting records appropriately. A standardization of accounting records in conformity with statistical needs may, in some countries, also be promoted by legal means, for instance by means of a general law on accounting records. This possibility is further discussed in chapter VII.

### C. Protection of confidential data

A distinction should be made between *(a)* the protection of data collected and *(b)* the protection of the respondents who have supplied the data. The subject for discussion here is *(a)*, which involves primarily ensuring that the data do not become available to persons other than those who are authorized by law to utilize them. As distinct from this, *(b)* relates to the borderline between accepted use and the misuse of information about respondents, i.e., it may apply to both authorized and non-authorized use of micro-data. Obviously *(a)* is also important for *(b)*.

The protection of confidential, identifiable data during their collection, processing and storage is a vital task of a statistical agency. To establish and maintain confidence among the data suppliers and thereby obtain a high rate of response and reliable data from respondents, it is necessary to ensure that the data assembled are not used for purposes other than those stated to the respondents. Consequently, an effective security system must be organized in order to ensure a minimal risk of confidentiality violation and to make the suppliers of data as confident as possible that this is the case. Such a security system is briefly described below.

All employees of a statistical agency should have to pledge formally, and with proper reference to their legal obligations, not to disclose any confidential information. Moreover, in order to ensure that only a few employees have access to each set of confidential data, the rules of internal office procedures should preclude access to such data for all employees not needing them in their work. Only employees needing the data to carry out work explicitly assigned to them should have such access. Furthermore, as far as possible employees should not work with data about statistical units in their geographical area.

Questionnaires with identifiable, confidential data should not be stored longer than necessary. If storage after data processing is desired, the questionnaires should be centrally stored under strict control. Removal from storage should not take place unless requested in writing by the head of the subject-matter division concerned. Removal for destruction should be authorized according to rules established by the head of the agency. Destruction must be carried out by special procedures ensuring that, on the one hand, no questionnaire is destroyed prematurely and, on the other, that no questionnaire or readable part of it goes astray.

Only a few authorized persons should have access to the files of machine-readable data. The removal of such data from the files should be strictly controlled and registered and their use for data processing should take place according to detailed instructions. All data-processing jobs should be specified in a plan for machine operations and the head of these operations should ensure that no other processing takes place without approval. Such a division of work and responsibility, together with the rules of control described above, can ensure that the unauthorized use of data is minimized.

An appropriate organization of the data files and of the machine operations can also contribute to a reduction of the risk of unauthorized use. The data-processing routines should be designed in such a manner that it would be extremely difficult for unauthorized personnel to reproduce data for individual identifiable respondents. The risk of unauthorized linkage may be reduced by the storage of data collected from different sources on different units of machine-readable media and by erasing all authorized linked data as soon as possible after their use.

The handling and sorting of confidential questionnaires in various subject-matter and service units also present a confidentiality problem. Office facilities for the protection of such data are required and instructions for the use of such facilities are needed. If storage after use is desired, the questionnaires should be moved to a central storage facility (see above).

The physical access to the buildings of a statistical agency must be controlled to protect the confidential data. Outside of office hours only authorized personnel should have access. Rooms in which confidential data are stored should be particularly protected by physical means.

To develop and maintain rules of procedure for the han-

dling of confidential data and for protecting them, a security committee should be established. The head of the administrative branch may be chairman and the heads of the other branches should be members of this important committee. The head of the agency should keep close contact with the security committee, should approve the security rules and should ensure that the public is informed of the kinds of security measures introduced.

The protection of confidential data involves ensuring that statistics in the form of aggregates are not disseminated in such a manner that information on individual respondents is inadvertently disclosed. This is a complex and difficult problem to which a national statistical service must pay great attention. A further discussion of this problem is beyond the scope of the *Handbook*.

### D. Consultation and communication

In summary, the most important ways in which goodwill among the suppliers of data can be achieved are by endeavouring as far as possible to minimize the burdens of data supply, by refraining from asking questions that are generally considered an intrusion of privacy, by providing a written explanation to the respondents of the purposes for which the data are collected and by protecting the data sufficiently to make misuse unlikely. Moreover, consultations with representatives of respondents and the use of other means of providing useful information to individual respondents are essential.

As a rule, respondents who are organized in an association for the promotion of their interests should not be asked to supply data before their association has been consulted. If the association opposes the planned data collection after receiving an explanation of the purposes, the proposal should be reconsidered. If the association is convinced of the usefulness of the investigation, an attempt should be made to get its written support to send to the respondents together with the questionnaires. If this is not possible, the association may undertake to assist in explaining the purpose of the investigation to respondents who may ask it for advice. If the statistical data asked for are identical with or similar to administrative data collected by other government bodies, the association may assist in explaining the reasons why the statistical data collection is nevertheless necessary.

A statistical agency that has established an external committee structure should take advantage of this to promote the data supply; however, as a rule such committees represent users more effectively than respondents. Therefore there should not only be discussion of data collection problems in the appropriate committee but advance contact with individual respondents, mainly to test the questionnaires. Pilot surveys, including test coding, editing and some data processing, may be particularly useful.

Mass communications media should be used as far as possible to provide information to respondents. In the case of important censuses the use of television, radio and the press may be called for. Interviews with the head of the agency or the census officials and with representatives of users may be particularly useful. For economic censuses, trade journals should also be utilized. As regards sample surveys involving only a small fraction of the population, the nation-wide mass media are not appropriate and may not even be willing to co-operate. However, local newspapers or radio stations and the relevant trade journals may be profitably utilized. If data are collected by interviewers or enumerators, the local police authorities should be informed in advance, if appropriate.

Of course, the most effective approaches are different for different groups of respondents and are different for persons and enterprises. For persons, a proper explanation of the purpose and the assurance of confidentiality is probably most important while, for enterprises, the offer of services and personal visits may yield substantial results. For all groups, clear statements on obligation and confidentiality are essential. The need for supplying the data promptly should also be emphasized. Delays in receiving data result in delays in issuing the statistics and thus damage the image of the statistical agency.

General public relations activities may facilitate all kinds of statistical data collection to the extent that the image of the agency can be improved by such means. The head of a statistical agency as well as other employees should take advantage of every opportunity provided by the mass media to explain that confidentiality is ensured and how it is accomplished. General brochures transmitted to respondents together with the questionnaires may also be helpful.

Consultations with, and the communication of appropriate information to, suppliers of data are not easy; well-qualified people must be used for this purpose. In a small statistical agency the head and other top managers, in particular the heads of the subject-matter divisions concerned, should participate in this activity. In larger agencies specialists on respondent relations located in an information unit may relieve the chief statistician to a considerable extent, but not entirely. In addition, all employees of the national statistical service should be motivated to assist in explaining to their families, friends and others the usefulness of statistics and the harmlessness of supplying data to the statistical agency.

# Chapter VI

# RELATIONSHIPS TO SUBNATIONAL GOVERNMENTS

## A. General considerations

Countries are very different in governmental structure. In some countries the national government is dominant. In others important policy issues are determined by the states, republics, provinces, departments, counties, districts, municipalities and villages. The governments of such administrative units are termed "subnational" in the *Handbook*. The governmental structure may vary according to the size of the population, the geographical conditions, the distribution of political power etc. In some countries the structure may be complex, in others, simple. At a particular time, governments at some levels may be more administratively advanced than at another. Most frequently, the governmental structure is hierarchical, but not always. Even countries with the same type of governmental structure, for instance federal, may in fact be very different in the degree of centralization for various kinds of decisions. This means that the need for, and the use of, statistics at subnational levels may differ very much among countries. Consequently, in the present chapter, relationships to subnational governments are discussed in general terms only.

Irrespective of the governmental structure, most subnational governments make some use of official statistics provided by the national statistical service, particularly those related to their own area of jurisdiction. If the official statistics do not satisfy their needs, they may produce statistics themselves. Such statistics frequently overlap and may be more or less inconsistent with the available official statistics. Thus problems of statistical integration and co-ordination arise for the national statistical service.

Subnational governments are often suppliers of data to the national statistical service. These may be administrative data that certain subnational governments collect on their own, statistical data that they collect on behalf of the national statistical service or, as indicated in chapter III, data on their own activities that they must supply to the national statistical service.

In many countries the national statistical service has its own local offices covering the entire country or parts of the country. As a rule, these offices collect micro-data and may perform some additional functions, such as coding, editing and dissemination of the statistics, while the remaining functions are left to the national statistical office. In some countries, the local offices also produce statistics for their own areas.

A local office of the national statistical service and a statistical office of a subnational government may well exist at the same place, although they may not necessarily collect statistics for the same region. They may or may not divide work between them. Their work may overlap to some extent.

In developing countries the national statistical service often has local offices; however, subnational governments do not always have statistical offices of their own. In many developed countries, particularly the larger ones, the national statistical service may not have local offices but the largest cities and some other regional subdivisions may have statistical offices of their own. In smaller countries, the national statistical service may not have local offices especially where, because of good communications, the national service can easily maintain close contact with the local areas.

In most countries national authorities have administrative units of their own located in the areas of the subnational governments. These units may supply administrative data for these areas to their higher administrative bodies. The degree to which local administrative units belong to the national or to the local authorities varies considerably among countries. In developing countries the administration of local activities is often carried out mainly by representatives of the central government, which means that administrative data for local areas are supplied mainly by them and not by the local authorities.

While the relationships of the national statistical service to subnational governments may vary considerably among countries, depending on size, system of government etc., and therefore generalizations cannot be carried too far, some observations can be made on the organization of these relationships. The provision of statistical information from the national statistical service to subnational governments is dealt with first (sect. B). Then the collection of data from subnational governments is discussed separately for administrative data and statistical data (sects. C and D). These topics are particularly relevant for the statistical service in countries where there is a growing interest in local or regional policy and, consequently, high priority is placed on statistics for local areas. Finally, the national collection of statistical data with the assistance of subnational governments is dealt with (sect. D).

## B. Provision of statistics to subnational governments

The Statistical Commission, at its nineteenth session, in considering the problems of co-ordination and organization of data collection and data use at various geographical levels of government, agreed that "concerted efforts were needed, with implications for the entire range of statistical activities, to adequately meet local and regional needs and demands for timely, detailed statistics".[1] The national statistical service may provide local and regional statistics to subnational governments partly through censuses and partly through the processing of administrative data received from the subnational governments. To some extent statistics may also be provided by means of national sample surveys. Sample surveys, as a rule, can provide statistics in some detail for the largest regions only. However, further methodological research may make possible a more detailed breakdown of sample survey statistics by region by combining data from such surveys and those covering all the units concerned.

[1] *Official Records of the Economic and Social Council, Sixty-second Session, Supplement No. 2* (E/5910), para. 137.

To be of maximum benefit, the statistics produced for each local area of a country should be compatible in order to facilitate comparisons of statistics for similar areas and the whole country. Such integrated statistics should, preferably, also be provided for small areas within administrative units at the lowest administrative level and for areas extending across the borders of administrative units. The achievement of these objectives requires a system of local and regional statistics that so far has been developed in only a few countries. Although a description of such a system is beyond the scope of the *Handbook*, it must be emphasized here that for the provision of small-area statistics needed by local governments, the objectives indicated are essential. Furthermore, to achieve the objectives at minimum cost the statistics provided by subnational governments must be integrated with the official national statistics.[2]

To ensure that official statistics are integrated, not only for the country as a whole but also for each local area and region, appropriate standards must be developed and uniformly used for the definition of the geographical areas and for other definitions and classifications. In addition, a special presentation of regional statistics is required. Traditionally, each subject-matter unit of a national statistical service produces statistics for geographical areas but subnational governments (as well as other users of statistics for particular areas) need all statistics integrated for their own area. This means that national statistics should be classified both in the traditional manner and, in addition, in such a way that for each geographical area concerned the statistics of different subject-matter fields and other categories are integrated.

Such classifications, which are greatly facilitated by computerization, increase the volume of data to be disseminated. Since subnational governments frequently need information in great detail and since the need for detail often differs among various subnational governments, dissemination by machine-readable media greatly facilitates the satisfaction of local needs.

Within a decentralized national statistical service or within a central statistical office, a separate division (or other unit) for regional statistics should perform primarily an integration and co-ordination function, leaving data development in specific fields to the subject-matter and service divisions. Externally, the regional statistics division should represent the prime point of contact with the users of local and regional statistics, both in the subnational governments and elsewhere. It should also actively promote the development of consistent and standardized data from the subnational governments (see sects. C and D below), in co-operation with local statistical offices.

If a subnational government needs statistical information on its area of jurisdiction that cannot be obtained from available official statistics, it may provide the information itself, for instance by assigning the job to its own statistical office if it has one. An alternative may be to obtain it from the national statistical service on contract. A national statistical service should be disposed in principle to accept such assignments, partly because its professional competence may be higher than that of a local statistical agency, partly because co-ordination with the official statistics can be better ensured and partly because it is conducive to good relationships with subnational governments.

[2] For a further discussion of small-area statistics, see "Draft principles and recommendations for population and housing censuses; Part one, Operational aspects of population and housing censuses" (E/CN.3/515/Add.1, paras. 82-90) as well as a forthcoming publication of the Statistical Office of the United Nations of the national small-area statistics programme.

### C. Supply of data from subnational governments

The administrative data supplied by subnational governments to governmental bodies at higher levels, or directly to the national statistical service, may relate to population, vital events (births, deaths, marriages, divorces), employment, income and taxation, education, health, crime etc. Frequently, the administrative data supplied by subnational governments at one level are first reported to one or more subnational governments at the next higher level before they are turned over to the appropriate national authority. In some cases they are supplied to the national authority in aggregated form and not as micro-data. Such an organization of data collection frequently causes delays in producing national statistics and rigidity in the use of micro-data. In particular, the aggregation may prevent proper editing and the availability of some classifications and aggregations desired. The subnational governments may get regional statistics quicker in this manner, but at the expense of national statistics. The aggregation by subnational governments may reduce the data processing costs of the national government but not the aggregate costs. Therefore the policy of the national statistical service should be to request the submission of micro-data as early as possible, preferably directly from the subnational body that first registers them. However, supplying identifiable micro-data may give rise to confidentiality problems.

Of course, only micro-data satisfying certain minimum standards of coverage, relevance and reliability should be requested. Particularly in developing countries, administrative records are frequently of too low a quality for statistical utilization and, in the short run, it may not be feasible to improve them sufficiently. However, in countries where the quality of subnational administrative data is satisfactory or where attempts to improve quality are likely to be successful, the national statistical service should make strong efforts to use the data. In co-operation with the central authority concerned, the forms used for data collection should be standardized and, if possible, the subnational government should be persuaded to adjust its system of data registration to facilitate this. The best opportunity for this is when computerization is contemplated. Particular efforts should be made to secure adoption of the standard statistical definitions and classifications for the administrative data collected. Success in these efforts depends to a large degree upon the expertise that the national statistical service can offer.

Since administrative records are generally available for small areas and since sample surveys become too expensive for detailed geographical specifications, the need for small-area data may have to be met with statistics based on administrative micro-data, whose quality has been improved as much as possible. However, often for a developing country as a whole and for major subdivisions, reliable statistics can be obtained only by sample surveys.

### D. Collection of statistical data by subnational governments

The national statistical service can obtain assistance from subnational governments in implementing its collection of statistical data. Particularly in countries where the national statistical service has few or no local offices, the subnational governments may assist in censuses, particularly as regards data collection. In some fields of statistics local governmental bodies may also assist in collecting statistical data for sample surveys. These possibilities are further discussed in chapter IX.

As already mentioned, subnational governments may col-

lect data that are inconsistent with or that duplicate the national official statistics available for the same area and, even worse, that do not satisfy the minimum quality requirements. The national statistical service should avoid being dependent on the data from such offices, unless it is permitted to play a role in improving the data and coordinating their production.

If subnational governments have succeeded in establishing sufficiently competent statistical offices, the national statistical service may assign them the task of performing one or more functions as regards the processing of particular statistical projects, provided that this can be done without violating the confidentiality rules. But the national service should attempt to provide statistical information to subnational governments to the extent it can do this efficiently. To achieve this objective the statistical requirements of these governments must be carefully analysed and their established needs included in the setting of priorities. In addition, the national statistical service should include the statistics produced for local and regional use in its dissemination programme. For dissemination purposes the assistance of both its own local offices and statistical offices of the subnational governments should be sought. The outposting of professionals in its own regional offices may be required for this purpose. In most countries this is probably the only strategy by which to avoid the local production of statistics that are either inconsistent with the official statistics or that could be more efficiently produced by the national statistical service.

In large countries, and particularly in those with a federal government and provinces or republics that are to a large degree autonomous, extensive local production of statistics will occur. In such cases the national statistical service should make strong and sustained efforts to promote the integration of the national and subnational statistics through the adoption of common practices, including classification and definitional systems such as those described in chapter XIII. To accomplish this it is necessary, among other things, to establish a federal/provincial committee structure (see chap. I).

# Chapter VII

# LEGISLATION

## A. General considerations

Much of the external capability of a national statistical service derives from the character of its legislation, often incorporated in a separate Statistics Act. In particular, as explained in chapter V, the capability of a statistical agency to collect data depends upon how well it succeeds in convincing the suppliers of the data that the burdens imposed upon them are necessary and that they do not risk being harmed by supplying the data. In the present chapter, the legal means of strengthening the capability are discussed. Clearly, one cannot legislate competence in producing statistics, tact in approaching the respondent and moderation in asking sensitive questions, all of which are essential in obtaining truthful answers. However, good statistical legislation provides a necessary framework within which to win the co-operation of respondents and of governmental bodies collecting administrative data that can be utilized for producing statistics. In fact, in most countries the data-collecting activities of the national statistical service are governed by special legislation.

The subject of statistical legislation can be reduced to two major issues: the compulsory aspect, that is, the power the Government asserts, through the statistical agency, to collect data; and the guarantee it provides for safeguarding the confidentiality of the information collected from individual respondents. What the specific legal provisions should be will differ from country to country in view of different political and social institutions, different legal traditions and last, but not least, the degree to which the data collection is centralized. Therefore the presentation below is mainly a discussion of the minimum statutory provisions required to ensure the supply of data (sect. B) and to protect the respondents against misuse of the data supplied (sect. C). Some observations are also made on the attitude of a statistical agency towards legislation for protecting the privacy of respondents (sect. D). Finally, organizational implications are indicated (sect. E).

## B. Compulsory supply of data

The main reason for making response compulsory is to ensure sufficient coverage and accurate information. Compulsion involves the sharing of the burden of response by all from whom data are needed, not just by those who are conscientious and co-operative enough to answer voluntarily. This is particularly important for business enterprises, whose supply of data involves costs that cannot be passed on to consumers unless such costs are also incurred by their competitors.

Compulsion is particularly needed in carrying out censuses involving complete coverage. Censuses of population and housing, of agricultural holdings and of non-agricultural establishments would not achieve one of their main purposes, that is, to provide statistics for small areas of the country, if data collection could not be enforced. Experience provides sufficient evidence for such a conclusion; in most countries there are some respondents who refuse to co-operate unless they have to. To prevent their number from growing, a statistical agency may even have to prosecute them. In carrying out sample surveys that require full coverage of certain groups of respondents (for instance, all enterprises above a given size), response may have to be made compulsory.

The assembly of administrative data from other central government agencies is clearly facilitated if a statistical agency can resort if necessary to independent collection on a compulsory basis. If this is the alternative, the administrative agency concerned can justify access to its data on the grounds of avoidance of duplication, which the suppliers of the data are also likely to desire. This has in fact been a major justification for the access to administrative data that statistical agencies in some countries enjoy.

In countries in which the national statistical service is decentralized, the utilization of administrative data of a ministry by a statistical agency within the same ministry presents, as a rule, no problem; however, difficulties may arise in the utilization of administrative data between ministries. In a country in which official statistics are centralized, if administrative data cannot otherwise be satisfactorily utilized the central statistical office may be provided with statutory power to obtain data on individuals, enterprises etc. from other government bodies collecting such data. The Statistics Act of Denmark includes such a provision. However, a similar provision made by executive order may be sufficient in some countries and, in others, such transfer of data may be bilaterally agreed upon within the existing legal framework.

In most countries the collection of data from enterprises is hampered by the fact that the definitions and classifications applied in their accounts differ to a considerable degree. As pointed out in chapter V, a standardization of such accounts and a harmonization of accounting practices might improve the reliability of the data supplied by enterprises and establishments, reduce delays and lessen the burden of response. In some countries general laws on accounting apply and, in others, tax laws or laws for financial institutions and stock-holding companies make some provision for the harmonization of accounting. In countries in which such provisions are lacking or are not satisfactory, the national statistical service may attempt to obtain improved legislation.

## C. Confidentiality[1]

The government powers for data collection must carry

[1] The present section is to a large degree based on a paper by Margaret E. Martin, "Statistical legislation and confidentiality issues" (ESA/STAT/AC.1/9), prepared for the United Nations Interregional Seminar on Statistical Organization, Ottawa, Canada, 1973.

with them a legal guarantee of protection of the confidentiality of individual returns or, more particularly, an "assurance of harmlessness" to the individual respondents. But as important as the secrecy provisions of the law are the administrative practices of the organization to protect confidentiality. The legal provisions have to be supplemented by critical awareness of the overriding importance of maintaining confidentiality by all concerned in the data collection, compilation and dissemination processes. Furthermore, it must be implemented with suitable procedures and continual attention to guard against inadvertent disclosures and to relate confidentiality concepts to new statistical methodologies and processes. These aspects are discussed in greater detail in chapter V.

Respondents to a statistical inquiry should be guaranteed confidential treatment of their information for their own sakes; however, such a guarantee is also fundamental to the collecting agency, because otherwise it would not get the information asked for. However, even though a statistical agency promises confidentiality, provides the best possible protection of the confidential data stored, ensures complete destruction when the questionnaires are no longer needed and takes careful precautions against inadvertent disclosure in the dissemination of the statistics, nevertheless this may not be sufficient to establish and maintain the desired confidence among the suppliers of data and to satisfy the obligations incurred towards them. The harmlessness of supplying data to a statistical agency must also be legally guaranteed; otherwise, the agency may be forced by superior bodies or by others to violate confidentiality. The statistical agency and its employees must by statute be forbidden to use the data for a purpose other than that for which they are intended, that is, the provision of statistical information. Legal provisions of penalties for breaches of confidentiality should also be made. Access to data by persons who may wish to use them for non-statistical purposes must be prohibited, as must access by other government authorities, including the judiciary. The prohibition should also cover access to copies of the statistical returns filed by the respondents. Such legal prohibitions, coupled with penalties if confidentiality is breached, may contribute to the establishment and maintenance of confidence among the suppliers of data and enable the agency to resist more effectively pressures from those who may desire access to the micro-data or the dissemination of too detailed statistics.

Since the promise of confidentiality is an important means of obtaining the co-operation of respondents, they should as far as possible be informed about the degree of confidentiality at the time when statistical data are collected. Sample surveys of individuals and households covering only a small fraction of the population are often voluntary. In many countries sample surveys of enterprises are also often based on voluntary co-operation. When a statistical agency promises confidentiality in cases of voluntary response, the respondents should be as strongly protected as if the response had been compulsory. Statutory provisions for confidentiality should apply not only when data collection is legally enforced but also when it is voluntary.

Similar legal protection is required for administrative data transferred to and stored by a statistical agency, as pointed out in chapter III. If the administrative agency collecting the data has promised confidentiality and has a legal guarantee for its promise, the statistical agency should refer those who might want access to the data to the administrative agency concerned. If the latter can and will grant access, it should take full responsibility for the transfer of such data to other users. However, administrative agencies do not always promise confidentiality or provide a legal guarantee. If they require data as a condition for providing subsidies, grants or services, they may not always promise their clients confidentiality. In such cases the statistical agency should promise confidentiality to the administrative agency in such a way that the confidentiality provisions of the statistical law become applicable.

While secrecy legislation is essential to the survival of a statistical agency, it does at times create problems with users in certain government departments or research institutes who feel that they need access to individual returns. One solution is to indicate the department's interest in receiving a copy of the returns and leaving it to the individual respondent to decide whether he or she wishes to send such a copy; at the same time an indication should be given as to what confidentiality protection, if any, is entailed. The important principle is that there should be "informed consent" by the respondent. A similar solution may be applied to a research institute of high standing needing such access for analytical purposes. Alternatively, staff members of the institute may be employed by the statistical agency and granted access with the same secrecy obligations as for the regular staff; however, in this case the research staff must also maintain confidentiality in regard to their institute, which should have access only to the final product of the statistics.

Safeguarding the confidentiality of replies may be particularly difficult in developing countries or in small developed countries where an entire industry or foreign trade is dominated by one or two large firms. Some countries have taken note of this situation in their basic statistical legislation. Sierra Leone, for example, provides that, in such cases, basic figures may be published on a restricted number of specified items.

Other problems arise from the growing interest in micro-analytical techniques, resulting in the demand by researchers for information on individual persons or enterprises. In response to this, the United States Bureau of the Census, for example, has developed sample files of data pertaining to unidentifiable persons, which are made available to legitimate users. As indicated in chapter IV the demand for such data is likely to increase. Problems also arise, particularly but by no means exclusively in a decentralized system, when the statistical production process involves matching information from one file to another; here, however, the problem is probably not one of confidentiality but rather of invasion of privacy. Finally it may be noted that this problem may to some extent be mitigated by means of legal provision for the transfer of confidential data between well-defined "statistical enclaves" within the central government.[2] While the statistical agency should endeavour to satisfy reasonable demands through legitimate devices, it must withstand all pressures conducive to disclosure not provided for in the law. In the words of the late S. S. Heyer:

> "Such pressures, motivated by short-term considerations, are inimical to the long-term goals and integrity of the statistical agency and prejudicial to the very rationale of its existence as a desirable and essential activity of government. Autonomy offers some protection against such demands".[3]

The minimum of external information that needs to be included in multipurpose central registers of the kind described in chapter XIII involves problems whose solutions might require special legislation. This information is frequently obtained with the promise of confidentiality, which means that it cannot be given to others who have not specifically been granted access to it. Under such circum-

[2] Joseph W. Duncan, "Confidentiality and the future of the U.S. statistical system", *The American Statistician*, May 1976, p. 58.

[3] "Development planning and statistical organization" (ESA/STAT/AC.1/8), paper prepared for the United Nations Interregional Seminar on Statistical Organization, Ottawa, Canada, 1973, p. 17.

stances the use of the registers as a basis for sample design, matching of information, mailing etc. may be too strictly limited. The relevant information (such as name, address, kind of activity and employment for establishments and name, address, sex, age and name of employer for persons) may be characterized as relatively harmless and a less restricted access may be desirable. In some countries such access has been ensured by special legal provisions. Legislation providing for compulsory reports on new establishments, on closure of establishments and on changes in the kind of activity previously reported by establishments might also be useful in maintaining the register.

### D. Privacy

Any collection of information from persons or households and also some data collection from small enterprises may be interpreted as an invasion of privacy. This and the burdens of data supply must be balanced against the expected benefits when deciding on the questions to be included in a statistical survey. In particular, a statistical agency should be cautious not to ask questions that are too sensitive. However, the kinds of questions that are considered sensitive differ both in space and time. They may also vary from one social or political group to another and may change as a consequence of public debate. A statistical agency should keep abreast of such changes and take them into account in its setting of priorities.

In some countries statutory provisions have been adopted and in others new legislation is being considered for the purpose of guarding against excessive invasion of privacy. The objectives of such legislation appear to be to a large degree the protection of respondents. The need for such protection arises from the interest of respondents in exerting control over information they supply, *inter alia* by being assured that discretion is exercised, that the information is correct and sufficiently complete, that its use is legitimate etc. However, this private interest must be balanced against the interest of society. If the collection of such information is considered justified, the need arises for data protection, which is discussed in detail in chapter V.

Statistical agencies should play an active role in attempting to influence possible privacy legislation. Experience indicates that such legislation may have detrimental effects on official statistics. For example, the requirement, often embodied in privacy legislation, that all individual records should be available for examination by the original respondent, who may even require that incorrect data about him or her be corrected, is totally unnecessary and harmful from the point of view of statistical micro-data files, where the accuracy of individual responses is only relevant from the point of view of the total mean square error of the resulting summary measures. The need to keep each individual record free of errors would multiply the cost of statistical collection severalfold.

### E. Organizational implications

Statistical agencies in all countries are likely to be dependent upon the existence of a legal framework that can strengthen their external capability, both in regard to the suppliers of data and the statistical analysts. Therefore in all countries the head of the national statistical service should pay great attention to this aspect of the work and should ensure competent legal assistance.

The legal problems of a statistical agency are such that outside experts, without sufficient knowledge of producing statistics, are rarely capable of providing assistance satisfactorily. Therefore the agency's own expertise is to be preferred. Even a small statistical agency needs legal advice; this should ideally be available in the administrative branch.

Among the tasks that may be assigned to a legal unit or adviser are the following: (*a*) to develop a satisfactory statistics law or, if one exists, ensure that it is amended when the need arises; (*b*) to prepare and maintain a compendium of all legal provisions on statistical data collection by other agencies and on the collection of administrative data that the agency uses in producing statistics; (*c*) to interpret statutes of the kind described above as the need arises at the management level or in the subject-matter divisions; (*d*) to represent the agency in government committees dealing with legislation on confidentiality, privacy or other legal matters of interest to the agency; (*e*) to provide advice on the legal aspects of the formulation of questionnaires for voluntary as well as for compulsory data collection; (*f*) to assist in formulating internal rules for protecting data collected and for their possible destruction; (*g*) to negotiate with administrative bodies on the use of their data and to draft agreements for such use and for the protection of their data; (*h*) to draft agreements with research institutes on the possible transfer of anonymous micro-data to be used for analytical purposes or on the possible collection of identifiable data on their behalf; and (*i*) to give legal advice whenever the need arises.

The management should consult the legal adviser before making decisions on legal matters and the various divisions of the agency should collaborate with him or her when preparing recommendations that involve legal problems.

# Part Three

# INTERNAL CAPABILITY

# Chapter VIII

# HUMAN SKILLS AND TRAINING

## A. Significance of human skills

A decisive factor in the internal capability of a statistical agency is the calibre of its staff. An agency can only function well if good people are available to make it work. Organizational arrangements may contribute to enabling good people to do their best; but it is essential to give utmost attention to building up the right kind of staff in organizing and managing a statistical agency.

Although in many countries all professional employees in a statistical agency are automatically referred to as "statisticians", it bears emphasizing that the production of official statistics is a multidisciplinary endeavour involving inputs from a variety of fields of knowledge in addition to those of mathematical statistics and the like. Advanced statistical or mathematical techniques are, of course, required in such activities as survey design, sampling and the like, and mathematical statisticians provide indispensable inputs both through direct contributions to the statistical production process and through advice and assistance to subject-matter colleagues. However, typically, in a well-established statistical agency the majority of the professional employees do not have degrees in statistics as such but rather in economics, econometrics, demography, sociology, accountancy, cartography, business administration, computer science etc. Most of them have education in subject-matter theory and on-the-job training in particular subject-matter areas and also have a bent for and interest in quantitative work. They should have sufficient grasp of the statistical theory and methodology that is needed in their work.

In order to communicate with the user effectively, to detect and identify his needs, to specify his needs in precise operational terms, to design relevant questions and to construct appropriate questionnaires, a good knowledge of the subject-matter is needed as well as a familiarity with the characteristics of respondents and their record-keeping practices. Good knowledge of the subject-matter is also essential in making adjustments to estimates on the basis of related data and, above all, in appraising whether the statistical results are consistent and sensible. When carried out by experienced subject-matter experts, such appraisals can lead to the detection of serious errors which have eluded the checking procedures previously used in preparing the estimates. Of vital importance, too, and often overlooked, is for the statistical agency to acquire specialists in operations management.

This needs emphasizing because, in the words of Tulo Montenegro, "resolutions of international conferences calling for the training of more 'statisticians' may inadvertently lead to a misleading oversimplification of the scope of the skills required in compiling basic statistics. The term 'statistician' evokes the stereotyped picture of the statistical analyst or the mathematical statistician. Nevertheless, the crucial work of gathering basic statistics involves skills which are not considered statistical in origin or even in application",[1] even though they are essential elements of the statistical operation.

To acquire the kind of skills needed, a statistical agency must have a well-planned policy and active programme of recruitment, career development, education and training. The present chapter focuses on the organizational requirements of such a policy. Major policy aspects are also dealt with, but not exhaustively.

The majority of the staff of a statistical agency has, as a rule, no more than secondary education. In some countries, mainly in the developing world, a very small proportion is university-educated. Very few national statistical services have more than one third of the staff with university education and, on average, the percentage appears to be about one tenth. This means that both the effectiveness and efficiency of the service to a considerable degree depends upon the skills of those with less education. The importance of developing their skills can hardly be overrated.

In work on official statistics, skills are to a considerable degree developed by learning on the job. The learning process may be speeded through good directives and proper supervision. A large part of the training must, of course, take place on an *ad hoc* basis as the work proceeds. However, systematic in-service training in the form of courses of various kinds may substantially enhance the possibility of developing human skills.

The systematic training in the performance of specialized functions such as interviewing and enumeration, coding, manual editing, data entry, computer programming and systems work can as a rule be best carried out in the sections or divisions concerned. Divisions responsible for such functions are particularly well suited to carrying out such training themselves. However, training within such divisions and specialized training outside the national statistical service, provided by machine suppliers and others, while extremely important, are not dealt with in the present chapter.

The chapter is confined mainly to the organization of personnel policy and agency-wide education and training. The organizational implications of personnel policy are dealt with first (sect. B). Then introductory courses for new staff members and courses for staff with some experience are described (sect. C). Courses for statisticians with university education (sect. D) and courses for other staff members (sect. E) are also discussed. It must be emphasized that to have a wide impact the training programme in a statistical agency must provide a variety of educational possibilities; this is discussed in section F. Finally, to facilitate the recruitment of personnel who are both capable and interested in receiving training and to retain those whose skills are developed, salaries and working conditions must be satisfactory; this is dealt with in section G.

[1] "Recruitment, preparation and status of statistical personnel" (ESA/STAT/AC.1/14), paper prepared for the United Nations Interregional Seminar on Statistical Organization, Ottawa, Canada, 1973, p. 24.

### B. Recruitment and career development

An effective personnel policy for a statistical agency must be geared to its particular functions. The qualifications required in recruiting staff for the various kinds of jobs should be determined on the basis of a study of the functions involved; staff development should be planned accordingly. Since new projects may require professionals not available in the country, planning, further discussed in chapter XIV, should be long-term and should include recruitment and career development by means of education and training abroad.

Recruitment should be actively carried out in the context of such planning. The supply of professionals with the skills required in a statistical agency is as a rule scarce. To get them the agency must contact them at their universities at the time of graduation describing, among other things, the jobs for which they are desired, the career that they may envisage and the possibilities available for further education. Good professionals cannot normally be recruited without active efforts. It may even be necessary to approach them before they graduate. Recruitment may be promoted by permitting professional members of the staff to teach university courses. The supply of good people with no university education is also scarce in many countries and such recruitment may also require special efforts. Of course, recruitment policy is constrained by civil service regulations. Moreover, its success is much affected by whether the statistical agency can offer competitive salaries and satisfactory working conditions (discussed in sect. G) but these alone are not sufficient. Young people can be motivated by good prospects for further education and career development; providing such motivation is an essential element of personnel policy. The top management, the personnel management and the chiefs of divisions in which new staff is needed should all participate actively in recruitment.

In addition to making efforts to augment the supply of potential talent, recruitment policy should include a careful selection process. Applicants should at some stage be interviewed by representatives of several units within the agency, at least by representatives of both the personnel unit and the unit in which they will be employed. The head of the agency and the heads of the relevant branches should take part as far as possible in the selection of professionals.

An effective career development policy requires that, after appointment, which should be on the basis of merit, the progress of every employee is followed not only by his or her superiors in the employing division and by the personnel unit but also, in the case of professionals, by the head of the agency or a deputy. This is necessary to evaluate progress, to plan the further career and to make the professionals feel that they have good prospects for the future. In large agencies personal contact between the head of the agency and all professionals is, of course, not feasible; but indirect means should be found to achieve the same results.

If good people are provided with sufficient opportunities and motivation for improving their qualifications and are given guidance on their career and promoted on the basis of merit, a strengthening of the internal capability of the agency will result. It is also important to develop pleasant working conditions, which depend not only on economic resources but also on the attitudes of the management at all levels. Of course, security of tenure is also of great importance.

The brief description above should be sufficient to demonstrate that recruitment and career development are functions that must be performed at various levels of a statistical agency. However, it also shows that this function should to a large degree be centrally controlled, partly directly by the head of the agency but mainly by the administrative branch. In fact the major functions of this branch should be, in addition to budgetary and financial matters, personnel policy and personnel management; the head of the branch should be selected with this in view. The major vehicle for personnel management within this branch should be a personnel unit, which in a large agency should have the status of a division.

The role of the administrative branch as a vehicle for personnel management is extremely important. Without an effective vehicle for the performance of this role, the head of the agency is likely to be bogged down in daily personnel problems and lack the instruments needed for planning and implementing the kind of recruitment, education, training and welfare policy referred to above. However, with an able head of the administrative branch and with sufficient staff in the personnel unit, the head of a statistical agency can delegate much of the personnel management functions to this branch and concentrate on policy matters both in this and other fields.

In addition to the personnel unit, other units of the administrative branch should be involved in carrying out the personnel policy. The acquisition and maintenance of adequate office space and equipment can contribute not only to efficiency but also to the well-being and satisfaction of the staff. Moreover, suitable accommodation, facilitating ready communication between people working in related fields, is conducive to the integration of statistics because, in a real sense, the "successful integration of statistical end-products is contingent upon the 'integration of the statisticians' ".[2]

### C. Introductory courses

Frequently, the progress made by new staff members is slow because they do not know the characteristics of the agency sufficiently well. Particularly in a statistical agency with substantial functional centralization, new employees at all levels lack knowledge of the services available, from whom they can be obtained, which technology is most appropriate, which statistical standards should be used etc. Furthermore, an understanding of the general objectives of the statistical agency, of the main lines of policy pursued and of the manner in which each employee can contribute to the implementation of this policy is necessary for appropriate orientation of new personnel. They need to understand the importance of maintaining good relationships with both the users and suppliers of data, the need for protection of the confidentiality of the data and the rules therefor, etc. Finally, knowledge of the main office rules at the earliest possible time is essential to proper discipline and conduct of work. All new employees must be briefed on these matters as soon as possible, but this is not enough. After some time, when a minimum of experience has been gained, every employee should be obliged to attend an orientation course where further explanation is provided.

If possible, experienced members of management should contribute to the introductory courses for university graduates, *inter alia*, to become acquainted with them. Officials of the personnel unit should teach the introductory course for employees at lower levels; the establishment of good personal relationships between this unit and the new employees is of great importance.

### D. Training of university graduates

In many countries the knowledge acquired in universi-

[2] S. A. Goldberg, "Organization by subject matter and by function" (ESA/STAT/AC.1/5), paper prepared for the United Nations Interregional Seminar on Statistical Organization, Ottawa, Canada, 1973, para. 35.

ties, both in subject-matter fields and in statistics, is often too general and abstract to be immediately well adapted to the needs of statistical agencies.[3] In a number of countries, there are institutes which provide more suitable training or courses arranged by the central government for all governmental agencies, which a statistical agency should take advantage of. Developing countries have access to regional institutes of statistics, sponsored by several countries, that offer tailor-made curricula for work in statistical agencies. Large statistical agencies in some countries provide systematic training for statisticians from developing countries. Whenever possible the statistical agencies, particularly in developing countries, should take advantage of such possibilities, by granting the staff a leave of absence and, if possible, by providing financial support or assistance in obtaining such support from others. In Malaysia, for example, one half of the professional staff has received training overseas. Of course, university graduates should be trained on a selective basis, i.e., only those who may be expected to improve their qualifications should receive training. Moreover, when they return the agency should ensure that they are employed in jobs in which the education acquired can be effectively utilized.

In addition, courses in statistical theory may be arranged for employees working in the subject-matter divisions and having their education mainly in substantive fields. Elementary courses in computer programming and courses designed to convey an adequate understanding of the principles of computer systems may be arranged for such personnel for the purpose of improving their capability of communicating with the professional programmers. Refresher courses in substantive theory for professionals in the subject-matter divisions and for those who are engaged in substantive analysis may also be useful. For professionals engaged in methodological research, further training in particular aspects of statistical theory may be needed. Finally, the more complex a statistical agency grows, the greater is the need for training in management. If teachers for such education and training are not available within the agency, the help of outsiders should be sought.

The internal courses may vary from single lectures or seminars to regular classes and other systematic instruction, depending upon the purpose and the nature of the subject. A statistical agency should take advantage of visiting management experts or scholars and of local experts as lecturers or seminar leaders whenever possible. The professionals should also be allowed to arrange seminars on their own initiative during working hours but should, of course, seek permission from their division chiefs and the personnel unit.

Special efforts seem to be required for a statistical agency to take sufficient advantage of the progress made in statistical theory. Special training efforts are also required in computerization to facilitate the build-up of relatively scarce skills and their blending into multidisciplinary teams. Training programmes must be organized to fill gaps in the background of the personnel, resulting from technological change. As more and more work is transferred to the computer and a greater degree of functional centralization takes place, subject-matter experts should have more time for analysis, research and evaluation of the statistics and for dealing with problems of users and suppliers, more effective planning of reliable, integrated and relevant statistical programmes and more effective exploitation of computerized administrative data bases.

[3] See *Report and Proceedings of the United Nations Interregional Seminar on Statistical Organization*, Ottawa, Canada, 1973, pp. 29-36.

### E. Training of employees with no university education

Since a large proportion of employees in a statistical agency lack university education, training programmes for them are particularly important for the efficiency and effectiveness of the agency. In addition to the introductory courses for new employees, more extensive courses for them may be useful when they have acquired enough experience in statistical work. The teaching may focus on more advanced aspects of statistical production, such as index number construction, work-sheet construction, automatic checking devices and so on. Such systematic training in important day-to-day operations cannot be overemphasized, especially in developing countries.

In addition, voluntary and more advanced courses may be arranged for employees who have demonstrated high learning capacity and who are motivated to improve their qualifications. Courses may be given in elementary theory in demography, economics, sociology, statistics and administration, coupled with exercises designed to build bridges between theory and application. Experience has shown that selected employees, after attending such courses, have been able to carry out work that previously could be assigned only to professionals with higher education. Thus the latter personnel, who play a very significant role in a statistical agency and often are scarce—particularly in developing countries, can be released for jobs requiring higher qualifications.

### F. Organization of education and training

The in-service education and training described above requires not only teaching but also quite extensive administrative efforts. Therefore permanent machinery should be established in the form of an in-service training school. In a small or medium-sized agency, a part-time head of the school may be selected from among the best qualified professionals of the agency. In a large agency, a full-time head may be needed. Such machinery is necessary to ensure the proper design of courses, recruitment of teachers, selection of students etc.

A school of this kind may be located within the administrative branch of a statistical agency since in-service training represents an important aspect of the personnel policy for which the branch is responsible. The development of the students should be carefully noted by those responsible for employee promotions. However, the head of the school should report professionally to the head of the statistical agency or a deputy. It may also be useful to support the school with an advisory council whose members may represent the top management, the divisions concerned and the staff.

The kind of courses provided, the number of students admitted and the instructors needed to a large degree depend upon the size of the agency and the possibilities available for external education and training both at home and abroad. The head of the school should play an active role in organizing both the internal and the external education and training.

### G. Salaries and working conditions

Despite the contributions of national, regional and international institutes to the trained statistical work force, critical shortages exist in developing countries. In part, this results from the fact that the demand for statistics has been

increasing faster than the available resources. In a more fundamental sense, the shortages reflect the disadvantaged position of the statistical services in many developing countries with respect to pay scales and related working conditions as well as the low or moderate status of the national statistical service within the government hierarchy. Thus the most promising young people do not enter the statistical service as a first choice and those who do are often tempted before long to consider more attractive prospects elsewhere. Some countries try to slow the outward flow of staff by contractual arrangements that ensure that the graduates of training institutes or those who were given opportunities to study abroad stay with the statistical agency for a minimum period of, say, five years. It is particularly difficult to fill posts, or to keep people for any length of time, in the computer area where competition from other government departments is compounded by even more severe competition from private sources.

In Africa, the depressed conditions of many statistical agencies compared with those of other government departments prompted the Conference of African Statisticians, at its 1973 session, to submit a draft resolution for adoption by the Conference of Ministers, urging African Governments "to establish more attractive conditions of service for statisticians, including more adequate salary scales where necessary in order to retain their services".[4] The Statistical Commission at its nineteenth session (*a*) "noted that many developing countries have experienced severe losses of professional staff in their central statistical organizations, thus reducing their contributions to planning and policy formulation processes. Those losses and the generally severe shortages of trained statistical personnel in those countries reflected in large part the disadvantaged position of the statistical services with respect to pay scales and related working conditions" and (*b*) "agreed that the Secretary-General should draw the attention of Member States to the serious disadvantages resulting from inadequate statistical investment in some countries, particularly developing countries, and the resulting inability to produce the timely, relevant statistics required by Governments".[5]

In the final analysis, the relative position or status of statistical agencies reflects the recognition given by Governments to statistical work. Despite the widely acknowledged essential role played by statistics in planning, policy-making and administration, there is still a lack of awareness of the importance of statistics in government work in a number of countries, especially developing countries. It is one of the great challenges of statisticians in those countries and their user allies to raise this awareness to the point where the statistical agencies are given an equal chance to compete for scarce human resources and the provision of reasonable working conditions.

In contrast to the situation of statistical agencies in most developing countries, the national statistical services in many developed countries enjoy a fairly high status, competitive salaries and working conditions and an allocation of budgetary resources allowing fairly satisfactory progress. In addition, in many of these countries the governments select outstanding people for the job of chief statistician. These facts suggest that, over time, prospects for a significant improvement of the situation of statistical agencies in the developing countries are promising.

[4] "Report of the eighth session of the Conference of African Statisticians" (E/CN.14/611), para. 290.

[5] *Official Records of the Economic and Social Council, Sixty-second Session, Supplement No. 2* (E/5910), paras. 138 and 142 (*f*).

# Chapter IX

# CENSUSES, SURVEY CAPABILITIES AND FIELD ORGANIZATION[1]

## A. General considerations

A balanced programme for the improvement of national statistics involves the use of censuses, sample surveys and administrative records. In the long run these three sources of statistics are complementary to a considerable extent; each has some advantages and suffers from some limitations. Therefore the full development of one source does not render the other two sources superfluous.

The potential contributions of administrative reporting systems to national statistics, along with their limitations, were discussed in chapter III. The present chapter considers the census and sample survey from the perspective of the top management of the national statistical service. Although censuses and sample surveys present the top management of the statistical agency with quite distinct managerial and technical issues, they share several common infrastructure needs. These include cartographic materials, a field organization, trained and experienced subject-matter specialists, statistical methods specialists, general statisticians and data processing equipment and staff. Thus if census and sample survey programmes in the same field are planned in relation to each other, the value of the data collected by each method can be enhanced and the burden of maintaining and improving both sources can be borne in the most cost-effective manner possible. Decisions on the location of census and survey activities should be made in the light of such considerations as well as those covered in other chapters of the *Handbook;* they will not be discussed further in the present chapter.

## B. Censuses

The term census, rigorously used, refers only to those periodic statistical operations in which, as part of a single concerted effort, all members of a class within a country are enumerated and comparable statistical information is obtained for each unit. In other words, a census is characterized by four essential features: individual enumeration of all units, universality within a defined territory, simultaneity and defined periodicity.

The three major census programmes in which countries most frequently engage are the population census (most often carried out as a combined population and housing census), the agricultural census and the industrial census. Other types of censuses include censuses of governments (in which information on local governments and/or governmental bodies is obtained), censuses of religious bodies and censuses of distributive trades.

Because censuses aim at exhaustive coverage of all the units of the population of interest (people, dwelling units, agricultural holdings, enterprises etc.), they are usually massive operations and are therefore conducted at regular, but relatively infrequent, intervals. For example, population and housing censuses are conducted usually either at 5-year or 10-year intervals, agricultural censuses at 10-year intervals and industrial censuses at 5- or 10-year intervals.

The word "census" as in terms such as "micro-census" or "sample census" has also been used in some countries, in a less rigorous sense, to refer to sample surveys that are either very large in size or broad in subject-matter coverage. For the purposes of statistical management, such sample inquiries are best considered to be sample surveys rather than censuses and are so treated in the present *Handbook*.

It should be noted, however, that the use of sampling in and of itself is not the determining factor in considering whether or not a particular statistical operation is a census. For example, a number of countries collect additional or more detailed information from a sample of units during the census enumeration or shortly thereafter. Because such an operation entails enumerating all units in the country and obtaining at least some information from each, it is a census. In contrast, in a so-called sample census, no information at all is sought from units not in the sample.

Although a census aims at enumerating all units in the country, this goal is seldom, if ever, fully achieved in practice. First, units may be accidentally or erroneously omitted from a census for various reasons. Secondly, certain well-defined categories of units may be deliberately excluded from the scope of the census because it would be impossible or prohibitively expensive to enumerate all of the units in the excluded categories. The existence of either omissions or exclusions does not mean a "census" is a "survey".[2]

It is beyond the scope of the present *Handbook* to deal in any detail with the complex managerial and technical issues that must be taken into account in planning and carrying out a successful census. With respect to population and housing censuses, guidance will be found in the following United Nations documents: "Draft principles and recommendations for population and housing censuses; Part one, Operational aspects of population and housing censuses" (E/CN.3/515/Add.1); and "Study on methods and problems of the 1970 round of African population and housing censuses" (E/CN.14/CAS.10/15). With respect to agricultural censuses, guidance will be found in the "Programme for the 1980 World Census of Agriculture"[3] and related publications of the Food and Agriculture Organization of the United Nations. With respect to industrial censuses, guidance will be found in the *Recommendations for the 1973 World Programme of Industrial Statistics*.[4]

[1] The present chapter was prepared in the United Nations Statistical Office.

[2] In some instances, the excluded categories may form such a substantial or significant portion of the total that one would want to indicate the restricted scope of the census in its title, for example "Census of large-scale industries" or "Population census of urban areas".

[3] FAO, Statistics Series, No. 1 (Rome, 1976).

[4] *Part I, General Statistical Objectives* and *Part III, Organization and Conduct of Industrial Censuses* (United Nations publications, Nos. E.71.XVII.13 and E.72.XVII.10, respectively).

Suffice it to say here that censuses, and particularly population and housing, agricultural and industrial censuses, present four major types of challenges to the top management of a national statistical agency. Each of these challenges presents, at the same time, a series of opportunities for and obstacles to the orderly and effective development of improved statistics and statistical capabilities in the country. How well these challenges are met often has an impact far beyond the specific census being undertaken.

The first of these challenges is the size and complexity of the managerial task. It is not an exaggeration to say that unless major censuses are planned and managed properly, they will run the statistical agency rather than the other way around. To quote from the "Draft principles and recommendations for population and housing censuses", a census

> "is perhaps the single most extensive, complicated and expensive statistical operation that a country undertakes, consisting of a complex series of interrelated steps. Some of these steps may be massive in scale, for example, the printing of the census questionnaires. Other steps must be carried out in a uniform manner in all parts of the country, for example, the training of the supervisory staff. And still other steps must incorporate both of these elements, for example, the actual enumeration. To ensure that the diverse operations occur in their proper sequence and in a timely manner, the entire census and its various component steps must be planned for carefully in advance. An apparently minor oversight in planning may lead to serious defects in the census results and to costly inefficiencies in the census operations. Careful planning is, therefore, critically important to a successful census, not only in countries with comparatively little statistical experience but also in countries with a well-developed system of statistics. Coupled with the need for careful planning is the need for appropriate organizational and administrative arrangements and procedures. Such arrangements and procedures are necessary to ensure that the extensive human and material resources that have been mobilized for the census are effectively and efficiently used and to ensure that the very tight time schedules and massive logistical requirements of the census are met" (E/CN.3/515/Add.1, para. 44).

A managerial undertaking of this magnitude and complexity requires a lengthy planning period and extensive and detailed preparations. For example, in the case of population and housing censuses, the preparatory work, which should be several years in duration, consists of the following 14 elements: (1) legal basis for a census, (2) budget and cost control, (3) census calendar, (4) administrative organization, (5) communications activities, including census publicity, (6) cartographic (mapping) work, (7) small-area identification, (8) living quarters and household listing, (9) tabulation programme, (10) questionnaire preparation, (11) census tests, (12) plan of enumeration, (13) plans for data processing and (14) staff recruitment and training. Similar detailed preparations are essential in the case of other types of censuses.

The second challenge arises from the fact that the value of census results largely depends upon the attention given to a host of technical considerations at each stage of census planning and operations. This, of course, considerably complicates the purely administrative and logistical aspects of census management. Again to quote from the "Draft principles and recommendations for population and housing censuses",

> "The quality and timeliness of the census data will almost certainly suffer unless sufficient weight is given throughout the census to a wide range of subject-matter and statistical requirements. It is for this reason that the management of a large statistical operation, and especially a population and housing census, cannot be considered a routine administrative assignment" (E/CN.3/515/Add.1, para. 45).

The third challenge arises from the important role that censuses play in forming the skeleton of the statistical integration within their respective fields and to a considerable extent between fields. (In some developed countries with highly developed systems of registers, this role may be less important.) In particular, the definitions, concepts and classifications used in the census often have a pervasive impact on both data users and other producers of statistics. Similarly, the lists of units and cartographic materials compiled in connexion with the census are often of major importance in shaping other data collection activities. Thus in planning for the census it is important to take these wider considerations into account if the census is to achieve its full potential for service to over-all statistical development. Chapter XIII of the present *Handbook* deals with integration in more detail.

Finally, population and housing, agricultural, and industrial censuses are perhaps the most highly visible activities in which any statistical agency engages. The prominence accorded these censuses is essential for their success and awareness of them reaches not only civil servants in other ministries but the most senior members of the Government and the general public as well. Moreover, because of its high visibility, a census is an occasion to demonstrate to the entire country the capacity of the statistical authorities to produce data needed to serve a wide variety of important purposes in a timely manner. The census may also provide the impetus for obtaining the resources needed to modernize computer or other capabilities of the statistical agency. At the same time, censuses also present a potential for highly conspicuous failures and embarrassments. One minimizes the chances of failure through careful preparations, as indicated above. For the same reason, the use of untested procedures, concepts, questionnaires or equipment in a major census should be avoided. This underscores the importance of a full programme of census tests prior to the census. In particular, while a census may be the occasion for upgrading data processing equipment, no aspect of the main census should be an experiment or test. A number of problems related to the census can be avoided or their impact lessened through a comprehensive set of census communications activities that involve (*a*) the major users of census data, (*b*) persons and institutions participating in the census operations and (*c*) the general public.

It is wise to keep in mind one additional aspect of the visibility of censuses. After the publicity and excitement of the census enumeration is over and particularly after the preliminary census results have been released, there is a natural tendency for the Government as a whole and top statistical management in particular to concern themselves with other programmes that may have been somewhat neglected in the pre-enumeration period. However, it is important that top management continue to monitor the progress in processing census results and issuing census reports and, if necessary, be prepared to intervene to ensure that processing and publication delays are avoided.

### C. Survey capabilities

An essential component of any national statistical service is the capability for carrying out a continuing programme of sample surveys covering all subject-matter fields of primary concern to the country. Such a capability permits the collection of comparable statistics on a continuing basis during the intercensal period from a scientific probability sample of

households, holdings or establishments. For developing countries, after carrying out basic censuses (for example, of agriculture or population), the establishment of such a capability is the next key step in achieving self-reliance in statistics.

Until a country establishes a continuing survey programme, data collection is limited to necessarily infrequent censuses, incomplete administrative records and one-time, *ad hoc* surveys. The latter tend to suffer from three major faults. First, they are usually oriented towards the special needs of a single user and are rarely co-ordinated with other surveys, rendering it difficult, if not impossible, to make intersurvey comparisons and carry out intersectoral analyses. Secondly, *ad hoc* surveys, by their very nature, aim at measuring conditions at one point in time; they are ill-suited to measuring change and hence evaluating action-oriented development activities. Thirdly, *ad hoc* surveys are wasteful of resources in that it is not possible to amortize the cost of the survey-taking infrastructure (for example, cartographic base, sample design, field organization, experience) over a large number of surveys or survey rounds.

Because of the importance of the household as a unit of production and consumption in most developing countries and the central role the household plays in social and population programmes, the United Nations Statistical Commission identified the household as the initial focus for developing a national survey-taking capability.[5] At the same time the Commission recognized that a household survey capability once established would facilitate the collection of data from establishments and agricultural holdings through parallel survey operations.

The establishment of permanent survey-taking capability involves the following major elements, discussed in subsections 1 and 2 below: (*a*) an over-all survey planning and management function, (*b*) a survey content function, (*c*) sample design and methods function, (*d*) a cartographic capability, (*e*) a data processing capability, (*f*) analysis and report-writing capabilities, (*g*) dissemination capabilities; and of course a field organization.

Among these elements, the most important from an administrative point of view is the field organization. To be effective and efficient, a field organization must be permanent and capable of collecting data for surveys of different kinds, i.e., its objective should be a continuing multisubject data collection. If the survey interviewers cannot be employed full time in the collection of information in the survey programme itself, they may be used to collect price data or carry out other statistical functions during the period they are not needed for interviewing or they may be employed on a part-time basis. However, the use of the same set of interviewers to collect data in a variety of different types of surveys (household, establishments, agricultural holdings) implies that training and supervision will have to be adjusted to keep the staff alert to differences in concepts and procedures in these different types of surveys. By establishing a permanent field organization, a statistical agency may strongly enhance its internal capability and also increase its external capability, in particular if the surveys are co-ordinated so as to contribute to an integrated system of official statistics, such as is discussed in chapter XIII.

In many countries, recruitment, training and supervision of the interviewers may require permanent staffs located in regional offices. Regional offices of a statistical agency may also be used for functions other than data collection, e.g. dissemination, coding, editing etc. Irrespective of the functions to be performed and the areas to be covered by a local staff, a special centrally located unit of the statistical agency must handle personnel and administrative matters and must direct the locally performed work, both of the field organization and possible regional offices.

While statistical agencies in all countries need a field organization for carrying out sample surveys based on interviewing, regional offices may not be justified in situations where the interviewers can reach all parts of the country from the central statistical agency in about a day by their usual mode of travel. It may be more economical to use a central staff to conduct sample surveys, disseminate statistics and perform other statistical functions. A decision on the establishment of regional offices must be based on an analysis of the costs and of the advantages of regional offices expected in each case.

A further consideration of these questions is beyond the scope of the present *Handbook*. Hence, the presentation below is confined to a discussion of the required functions and capabilities of a central office (subsect. 1), of a field organization for data collection (subsect. 2) and of regional offices that may also perform functions other than data collection (subsect. 3).[6]

### *1. Central office functions and capabilities*

The size and specific organizational arrangements of the central establishment needed to guide, service and utilize a permanent survey-taking capability will depend on a number of factors including the size of the country, the size of the field staff, the range of subject-matter coverage of the survey programme and the existing organizational arrangements affecting other aspects of the statistical agency. With respect to the last point, see chapter I. In view of the many factors involved, no single organizational pattern can be considered best. However, whatever the organizational arrangements, provision has to be made in the central office for the major elements listed above: (*a*) the survey planning and management function, (*b*) the survey content function, (*c*) the sample design and methods function, (*d*) a cartographic capability, (*e*) a data processing capability, (*f*) analysis and report-writing capabilities, and (*g*) dissemination capabilities—including the support services for the field organizations (see subsect. 2 below).

(*a*) Planning in statistical agencies and the related issues of priority setting and integration are discussed, in general terms, in chapters XII to XIV. Obviously, all over-all planning activities will take full account of any existing survey-taking capabilities and any needs for their further development or improvement. In addition to this general planning activity, specific and detailed plans will have to be developed for the survey programme. These detailed plans will need to cover the desired outputs in terms of major series, reliability and timeliness and therefore also the related subject-matter coverage and broad sample specifications of the survey programme as well as the resources required to carry out this programme. Such a plan, if it is to be both responsive to needs and realistic, can only be developed after consultation with appropriate users (see chap. IV) and with

[5] *Official Records of the Economic and Social Council, Sixty-second Session, Supplement No. 2* (E/5910), paras. 162-174; and Economic and Social Council resolution 2055 (LXII) of 5 May 1977.

[6] Further guidance on various aspects of survey design and execution can be found in the following: *Handbook of Household Surveys* (United Nations publication, Sales No. 64.XVII.13, in process of revision); *UNESCO-ECA Manual on Demographic Sample Surveys in Africa* (E/CN.14/CAS.7/17/Rev.2); *A Short Manual on Sampling* (United Nations publication, Sales No. E.72.XVII.5); *Recommendations for the Preparation of Sample Survey Reports* (United Nations publication, Sales No. 64.XVII.7); *Methodology of Demographic Sample Surveys* (United Nations publication, Sales No. E.71.XVII.11); selected documents of the World Fertility Survey, particularly *Survey Organization Manual, Manual on Sample Design* and *Training Manual*, Nos. 2, 3 and 4, respectively, of the Basic Documentation series, International Statistical Institute, The Hague.

the assistance of the sampling, data processing, field and relevant subject-matter staff of the statistical agency. Moreover, there may be a tendency, which needs to be actively resisted, for the planning function for an ongoing survey programme to become predominantly a mechanical exercise that fails to take sufficiently into account the altered needs for data expressed by users, the improved technologies available to the statistical agency or the changed cost structure affecting important parts of the survey programme.

Closely related to survey planning is the management of survey operations. The management or operations control function must be active in character and sufficiently broad in scope to be able to effect the full range of survey operations, if the targets expressed in the survey plan in terms of quality, timeliness and costs are to be achieved. If the survey management function is focused too narrowly and deals only with the control of field operations, serious backlogs are bound to develop in the manual editing and coding of the survey documents, in the data processing operations and in subsequent operations. As a result, substantial user dissatisfaction with the survey programme and the statistical agency is likely to occur.

No plan is perfect and, in the course of the survey programme, departures from the plan targets will occur. Those departures that are attributable to unique occurrences may have to be accepted, although careful monitoring of progress can often minimize their impact. However, if substantial departures from the plan are routine, attention should be given to dealing with the causes of these departures or to altering the plan itself. One of the great values of a continuing survey programme is the possibility it gives for the staff to improve on the basis of past experience. For this reason, it is important to keep adequate records of the survey operations and to test periodically improvements in methods and procedures within the programme.

(*b*) The survey content function is concerned with the specifications and testing of the questions to be used in the survey document, the development of training materials related to the subject-matter content of the survey programme, the specification of the substantive content of the editing and coding instructions and the specification of the substantive aspects of the basic tabulation plan. Depending on the breadth of subject-matter coverage in the survey programme, the staff engaged in this function may be drawn from the same or quite different disciplines. Co-ordination between the work of the various subject-matter specialists working on the survey is essential; more effort will have to be devoted to this task as the number of fields covered by the programme increases. It should be noted also that the same staff may be responsible for both the survey content and basic report-writing function.

(*c*) The sample design and methods function will need to be handled by statisticians who combine good training in sampling theory and mathematical statistics with practical experience in survey design and operations. This function is concerned with the methodological design of the surveys, establishment and maintenance of sample frames, selection of samples, design and specification of quality control procedures, design of evaluation studies and other methodological work on the statistical aspects of the survey programme. In all circumstances, but particularly in developing countries, it is important for those responsible for this function to be instructed to consider non-sampling errors as well as sampling errors in doing their work.

(*d*) For the sampling design and the setup of an effective field organization, satisfactory geographical frames must be available, i.e., the country must be divided into clearly identifiable enumeration areas or sample segments that can each be conveniently handled by one interviewer. In many countries this delimitation can be made on the basis of the cartographic work done in connexion with the population census. However, if such work has not already been adequately done it must be carried out when establishing a continuing survey capability. In either case, a permanent cartographic capability is needed. It would provide specialized maps for use in designing and selecting samples efficiently, for the organization and control of field operations and for the analysis and presentation of results.

(*e*), (*f*), (*g*) Data processing, analysis and dissemination capabilities are discussed, in general terms, in chapters X, XI and IV, respectively. Since it is likely that the survey programme will have to share these capabilities with other programmes, it is important to plan and manage survey operations in such a way that, to the maximum extent possible, a smooth flow of work is achieved at each stage. In this way the occurrence of time-delaying bottle-necks can be minimized. Staff with responsibility for the survey planning and management function will need to give careful and continuing attention to this aspect of their work.

### 2. *Field organization*

A statistical agency with responsibility for providing statistics for many subject-matter areas must have its own field organization. For specific purposes, such as agricultural surveys, the agency may use the field organization of another governmental body—but not for all purposes. However, the use of the field personnel of other administrative or operational agencies as survey interviewers is to be avoided, if possible. Such personnel sometimes have operational or administrative responsibilities that may conflict with unbiased data collection or respondents may perceive this to be the case. The problems inherent in the use of personnel from other agencies are usually less serious in the case of personnel who formerly performed exclusively statistical functions or teachers working as part-time or seasonal interviewers.

The collection of data by personal contact in the field, i.e., by interviewing or by persuading respondents to fill in questionnaires themselves, cannot be successfully carried out unless the field workers (interviewers, field supervisors and senior field supervisors) are qualified for this function. The fact that appropriate qualifications are required in order to perform such a function well cannot be over-emphasized. Substantive knowledge may be useful in collecting data on a particular subject, but it is not necessarily an advantage. Such knowledge may tempt an interviewer to pre-judge answers to questions or otherwise influence the respondents so that response errors are augmented. Subject-matter knowledge is more important at the planning, processing and analysis stages than in data collection. Consequently, in staffing the field organization great care should be taken to select people with the ability to establish personal rapport and obtain as complete and correct answers as possible. In general, persons who are overly shy or argumentative do not make good interviewers. Similarly, those who insist on expressing strong views on sensitive or controversial topics are not suitable for interviewer assignments. First-level supervisors should, in general, have the same qualifications as the interviewers they supervise. They should, however, have considerably more experience. The second-level supervisors usually should have at least some professional training. Persons working at this level will also need to have good judgement, a strong sense of responsibility, an ability to work well without day-to-day supervision and an ability to handle personnel matters.

Personal interviews with the applicants and some kind of job-related tests should precede appointment. For interviewers, such a test should cover attention to detail in form-

filling, the ability to follow written instructions and the ability to read maps of the type used in the field. Since some attributes of a good interviewer or supervisor cannot be identified in an interview and test, it is usually a good policy to provide some period of probationary status for all field appointments. Furthermore, those recruited should be trained both in a general course and in the field before actually starting to collect data. The initial training should be followed, as needed, by special courses in preparation for new or particularly difficult surveys and by periodic review courses of a more general kind.

Both the method of recruitment and the training scheme need to be adapted to whether the field staff will work part-time or full-time. For part-time work, a large part of those recruited in developed countries are home-makers. In many developing countries, unemployed high school graduates may be suitable. However, actual recruitment should be on the basis of merit rather than marital or employment status. For full-time work, somewhat more emphasis may be placed on previous education and, since higher monthly incomes can be ensured, it may be possible to recruit a more qualified staff. In this case, possibilities should also be opened for alternations between jobs in the field organization and in other units of the statistical agency.

Particularly in developing countries, the decision as to whether to use full-time or part-time interviewers or to give temporary or permanent contracts to the field staff can be a complex and important one affecting not only the cost of the survey programme but also the quality of the data collected. In general, staff on temporary contracts can be dismissed more easily than those on permanent contracts and so, in theory, can be supervised more closely; but on the other hand, with temporary contracts, if there are any other employment opportunities morale will probably be quite low and staff turnover may be high. From another point of view, the availability of certain types of persons for work as interviewers (for example, teachers, college or university students, home-makers) may be facilitated if they are engaged on a part-time or temporary basis.

Clearly, the field organization for data collection may require a somewhat different set-up in a large country than in a small one. For instance, in a large country supervisors may be geographically decentralized, as explained in subsection 3, while in a small country they may best be located at the centre. Similarly, recruitment and training of enumerators and their supervisors may best be regionalized in large countries but not necessarily in small ones. Moreover, special arrangements may be required to deal with travel conditions for all or part of the year, geographical barriers to easy travel or differences in languages. The size and arrangement of the field organization are also affected by the types of surveys being carried out and the general level of living in the country. In those countries where many of the surveys can be carried out by telephone or mail, relatively smaller field organizations are required, other things being equal, than in those countries where practically all respondents in most surveys must be personally visited by an interviewer.

In some large countries where the national statistical service is to a high degree decentralized, separate field organizations for data collection have been established by several statistical agencies. Even if this may not always be inefficient, it is likely to be ineffective, particularly because it makes statistical integration difficult. Statistical agencies in developing countries should try to avoid such a degree of decentralization (see chap. II).

A single unit in the central office should be given administrative responsibility for the entire field organization, including any regional offices. This unit may be considered as part of the survey planning and management function (see subsect. 1(*a*) above) or, in larger offices particularly, it may be placed in a separate location. In either case, all instructions or documents sent to the field should be routed through this single unit. The unit also has the responsibility for logging in completed questionnaires and schedules received from the field and providing or co-ordinating the full range of administrative support services required by the field staff.

Among the responsibilities of this unit is to ensure that the far-flung field staff get paid on time. If the salaries paid to statistical personnel are modest, at least all efforts should be made to ensure that interviewers and other field staff are paid on time and in a form (cash, cheque, postal money order, food and housing vouchers or some combination thereof) that, given the local circumstances in the field, is satisfactory in terms of safety and convertibility. In these circumstances, senior staff will have to devote some time to establish procedures that permit both proper fiscal control and the timely payment of earned benefits to staff. Such procedures often involve some degree of delegation to the regional offices of responsibility for salary disbursements for the field staff. Furthermore, there needs to be some sort of feed-back mechanism by which senior management is alerted when the system breaks down so that remedial action can be started promptly. In some countries, the feedback will be automatic; the interviewers will initiate it without any encouragement. In other countries, complaints about the non-payment of benefits may tend to get lost or diffused in the routine chain of command. In this situation, those responsible for the survey management function or some other designated person or unit in the office will have to monitor the payment process in such a way that arrears in payments can be identified and corrected before they begin to affect adversely the quality of the field work. It should be stressed that the failure to pay benefits in a timely and appropriate manner has been identified as a contributing cause to poor survey results in a number of countries.

### *3. Regional offices*

A national statistical service may strengthen both its external and internal capability by means of regional offices. Each office may be in charge of a particular region of the country so that together they cover the entire country. Alternatively, the central office itself may take charge of one of the regions.

One obvious function of such offices is to strengthen the survey programme and other data collection activities of the statistical agency. As already indicated, regional offices may carry out the supervision of interviewers located in the region and assist the central office in both recruitment and training of interviewers. The regional offices may also carry out similar activities in the recruitment, training and supervision of enumerators used for censuses as well as assisting with the collection of data from establishments by mail, either by visiting non-respondents or by contacting them by telephone. In this manner the data collection function of a statistical agency may be geographically decentralized. In large countries and in developing countries in which travel is difficult and the communication system is weak, data collection may not be effectively performed without the assistance of regional offices.

Another function of regional offices may be to develop and maintain personal contacts with users or with representatives of certain groups of the users of statistics and for the purpose of disseminating statistical information (see chap. IV). In addition to the dissemination activities that the central office carries out, regional offices can play an important role in the promotion of statistics for local use. In France,

for example, the central statistical office has special regional offices for dissemination in addition to regional offices for other purposes. The regional offices may also establish formal contacts with the users, for instance by providing speakers at meetings or arranging lectures, conferences and seminars. This may enable them to communicate requests for statistics to the central office and in general to assist in analysing the requirements of statistics (see chap. XI). Furthermore, they may contact local industrial and employers' organizations on matters related to the suppliers of data and, when censuses or surveys are to be carried out, they may assist the central office in preparing the ground for successful data collection programmes. Another function of regional offices is to develop and maintain effective relationships with subnational governments and in particular co-operate with the statistical units, if any, of such governments (see chap. VI).

Moreover, all or some of the regional offices may carry out the activities of coding, editing, entry of data to machine-readable media and even electronic data processing. Under special circumstances, regionalization of one or more of these functions may be effective. To be successful, however, regionalization of these functions is dependent upon staffing each regional unit with appropriate technical personnel. It also requires strong leadership by the central office to ensure that specified standards of quality, cost and timeliness are maintained.

Geographical decentralization will not be decided on the basis of statistical efficiency alone but may also be affected by policy considerations of an economic, social or cultural nature. For this reason, in some cases a major organizational task of the statistical agency may be to find a means of minimizing specific technical disadvantages associated with a particular pattern of geographical decentralization. If a central statistical agency is organized with a high degree of functional centralization, it may be less disruptive to move the performance of a function away from the location of the main office than to move a subject-matter division or section. For example, one or more of the data processing activities may well take place away from the central office, provided that it is properly planned and organized. Local performance of one or more of these functions may even be advantageous as regards censuses. It may also be advantageous for current statistical programmes if recruitment of able employees is more feasible elsewhere than where the central office is located.

In most countries, subject-matter ministries of the central government have regional offices for implementation of policy at the local level. In some of these countries, the regional subject-matter offices and their subordinate local bodies to some extent also collect data for statistical purposes, although most frequently the purpose of the data collection is primarily administrative. There is frequently a need for co-ordination of these data collection activities, which should preferably be handled in an integrated manner.

# Chapter X

# COMPUTER ORGANIZATION AND COMPUTERIZED DATA SYSTEMS

## A. General considerations

During the last decade, electronic data processing techniques have become an essential part of the statistical work in most countries; the organization of both the use of computers and the development and maintenance of computerized data systems needs continuing attention.

Current technological trends, including in particular the rapid development of mini-computers, require organizational changes in data processing; since perhaps both computer operations and programming may be less centralized in the future than today, the possibility of greater geographical decentralization has been opened up. However, the main principles of the organization described below are less likely to change.

The first utilization of computers in many countries has often been associated with the taking of population censuses. Thus, in Africa in recent years, countries have used the computer for the first time in connexion with their population censuses. The census also provides an example of how the computer can be used to enhance the internal capability of the statistical office to serve user needs in a flexible way by embarking on what may be termed a data-base approach to the organization of data storage and retrieval. Present-day technology makes possible the storage of very finely coded micro-data and the economical retrieval of small portions of the information contained in such data bases to satisfy the specific and unanticipated needs of individual users for data on small areas, detailed industrial activities etc.

In the case of the census, the data base consists of the edited and organized individual items of data. While the regular tabulations included in the publication programme of the census are traditionally considered the most important visible product of the census, the census data base itself is more and more seen as the primary product, representing a rich source of information available for a variety of purposes. With the cost of storing the data diminishing relative to other costs, it is becoming relatively inexpensive and easy to use the census data base for special tabulations and analyses. These may include detailed cross-tabulations for small enumeration areas or other subsets of the over-all data that may be of special interest for purposes of transportation planning, administration, education or health activities etc.

The major element in the data-base approach is the concept that the stock of data is the major capital asset of the statistical process and that it can be drawn upon repeatedly to satisfy a variety of user needs.[1] In earlier concepts of computerization, the micro-data files were viewed merely as an intermediate stage in the automation of various links in the chain of processes from questionnaire to publication. For the data-base approach, data have to be documented in special ways for them to provide flexible all-encompassing retrievals. In particular, each item in the file has to be identified in terms of its characteristics. Furthermore, rigorous standards have to be established for the files with respect to documentation and data editing. Moreover, where files are derived from a continuing collection programme, they must be updated and maintained to be permanently useful.

When the items included in each file are identifiable and consistent in terms of concepts, definitions, classifications and methods, it is possible to relate the individual items of each file to one another. Such a data file system would represent an integrated system of statistics, in machine-readable form, the individual items of which could be retrieved to be utilized in conjunction with each other. Such flexibility in the utilization of statistics from a variety of sources enormously enhances the internal capability of statistical offices to provide prompt and diverse services from the single investment in the data capital accumulation. Of course, the task of preserving confidentiality in such an integrated system becomes much more difficult than in the case of mutually exclusive files. A capability of this kind takes time to evolve and requires careful and sustained planning and phasing of activities.

The need for and importance of a computerized system of statistical information ready for supply to users, on request, is dealt with in chapter IV. The computerized system dealt with below is mainly confined to micro-data, which may be collected directly from the respondents or assembled from available administrative systems (manual or computerized) but systematized by the statistical agency in such a manner that they can be retrieved easily and used for processing of statistics.

There are several reasons for the data-base approach. First, only a fraction of the enormous volume of macro-data that might be produced from micro-data is in fact published or stored. Unpublished statistics are stored on the assumption that they will be needed in the future. However, a statistical agency should also be prepared to satisfy unpredictable demand, which requires a computerized system of micro-data. Secondly, if such a system is developed the capability for the future production of statistics that is thereby established may make possible a reduction of the current output of macro-data to a volume smaller than would otherwise be required. Thirdly, the data-base approach enables a combined use of accumulated micro-data (by linkage at the micro-level or by the processing of compatible macro-data), which in fact means that when new micro-data are added to those already stored, the analytical value of the latter may increase. Fourthly, the data stored can also be used for the editing of new data collected, at least as regards recurrent surveys based on samples of respondents with similar characteristics. Finally, with the present trend of increasing burdens on the suppliers of micro-data, it is particularly important that the data-base approach may minimize response burdens. However, the stor-

[1] See Svein Nordbotten, "Purposes, problems and ideas related to statistical file systems", *Bulletin of the International Statistical Institute* (Sydney), vol. XLII, book 2 (1967).

age of micro-data has major implications for processing: the data must not only be well edited, but may also require adjustment for non-response, weighted in the case of sampling and so on, and these operations must be carried out on individual records.

It should be emphasized that a computerized statistical data base must be distinguished from the computerized administrative data bases that have been developed or are being developed by government agencies to support management and control. The latter systems are discussed in detail in chapter III; but at this point a basic difference between the two kinds of data bases must be repeated, namely that the purpose of a statistical data base is to enable the processing of statistics for groups of persons or other units while the purpose of an administrative data base is the easy retrieval of information on each identifiable person or on other units. Thus the output derived from a statistical data base is characterized by the fact that it does not disclose information on an identifiable individual unit whereas such information is the essence of the output from administrative bases. A statistical data base may be confined to a sample of the population for which information is desired while an administrative system must include all units of the group administered.

In the present *Handbook*, the technical aspects of computerization can be dealt with in brief terms only (sect. B). The specific organizational questions raised by computerization are dealt with more extensively (sect. C-G). The presentation is focused on the documentation required (sect. C), the need for storing micro-data in such a manner that they can be readily used (sect. D) and the kind of computer programs required to accommodate special requests for statistics that can be produced by means of the data stored (sect. E). Education and training, which are dealt with in general in chapter VIII, are discussed specifically (sect. F) and aspects of recruitment are also mentioned. Finally, some observations are made on the special situation of developing countries (sect. G).

## B. Computer organization

The application of electronic data processing equipment for the production of statistics can be classified in the following functions: (*a*) development and maintenance of computer systems, (*b*) entry of data to machine-readable media, (*c*) machine-processing, (*d*) storage and release of machine-readable files, (*e*) data documentation, (*f*) data protection and (*g*) education and training. The organization of functions (*a*) - (*d*) is dealt with in the present section.

(*a*) The development of data processing routines generally begins with the study of specifications provided by a subject-matter unit and can be regarded as concluded when machine programs, instructions for their application and perhaps also instructions for the data entry have been tested, documented and accepted for production. (An exception to this would be some generalized systems that may be conceived in systems or methodology groups). This function is normally divided into two subfunctions, that is, systems development and machine programming. In a statistical agency, both should in general be centrally performed in one service unit, as explained below. However, application of simple programming languages and of standard programs, combined with the use of terminals, will enable the subject-matter divisions to process a part of their statistics themselves; this is further discussed in section E. The programming required for analytical work and model building can also often be best carried out by the substantive units.

There are several reasons why systems development and most of the programming should be centrally located:[2]

(i) Computer systems development is increasingly a technical speciality and there are not enough really good practitioners in the field to go around in a decentralized environment;

(ii) Individual excellence in the field of systems development, as in most other fields, is rare and centralization provides a better milieu within which the impact of outstanding individuals can be felt;

(iii) Systems development and programming may involve several technical specialities, such as basic systems design, error detection and correction, source data automation, automatic composition and confidentiality protection. The specialization required can be most effectively developed and the specialists' knowledge can be best utilized within a centralized group;

(iv) The processing of statistics can be broken down into several steps, many of which are similar in many projects. These similarities are most likely to be recognized and taken advantage of in a centralized unit. Examples of such steps for which general programs have been developed are the writing of name and address for mailing, detection and correction of errors, data retrieval and tabulation. The centralized unit needs subject-matter expertise to ensure the proper identification and specification of the necessary software tools;

(v) The development and maintenance of a computerized statistical data system that is standardized and made uniform for all subject-matter fields of the statistical agency are best achieved when the systems work and programming are to a high degree centralized—at least up to the point of establishing clean data files.

In a large system and programming unit, the work may be divided by subject matter so that the same team of systems analysts and programmers provide services to the same substantive units, as far as possible on a permanent basis. Within the centralized group, specialist teams, on such topics as data-base design, data conversion, confidentiality etc., may also be organized. However, the allocation of members to such teams needs to be changed from time to time to ensure the transfer of skills and provide a variety of challenges to the analysts and programmers. A balance needs to be struck between the conflicting goals of specialization and flexibility. An exchange of staff between the systems and programming unit and the subject-matter units may also be desirable; however, this is not easily arranged.

For a large statistical agency, it may be advantageous to develop software to meet needs not met by the general software delivered by the machine suppliers. Although smaller agencies cannot afford this, they ought to have at least one specialist able to advise on the acquisition of such software. Such specialists should work more directly with the computer than do the general programmers and analysts.

(*b*) The manual entry of data to machine-readable media should be organized in a separate unit of the computer organization. Instructions for data entry, including the arrangement of data on the machine-readable media, should be issued by the unit responsible for programming according to standards prepared jointly with the data-entry chief. A part of the data collected may be entered to machine-readable media by means of optical mark sensing or character recognition. However, so far this is economical only for entries from relatively simple questionnaires that are either

[2] The present paragraph is largely based on a paper by I. P. Fellegi, "Organization of statistical processing, storage and retrieval" (ESA/STAT/AC.1/12), prepared for the United Nations Interregional Seminar on Statistical Organization, Ottawa, Canada, 1973, pp. 28-30.

unchanged over a long period of time or are collected in a large number. Optical mark sensing is a method that substitutes manual work in the computer organization partly by work done by enumerators and partly by machine entry. By the use of terminals, the data entry may be integrated with coding and editing and may disappear as a separate function since the coding and editing can be done by the system at the time of entry and errors referred immediately back for correction. However, for most statistical agencies this is still a remote possibility.

(*c*), (*d*) The machine-processing involves the operation of the computer and other technical equipment used in conjunction with the data processing, such as optical readers, computer output on microfilm equipment etc. The work may be divided into several subfunctions, such as hardware/software planning; contact with programmers, subject-matter personnel and data-entry personnel; operative planning; maintenance of machine-oriented software; operation of the machines; "fine-tuning" of the configuration etc. In larger statistical agencies, some of these subfunctions may be organized in separate units or located in the units mentioned above. In statistical agencies with a large stock of tapes, disks, diskettes etc., the storage and release of machine-readable files should be organized in a separate unit.

The units for manual data entry, machine-processing and storage and release of tapes may be combined in one division parallel with a division for systems work and programming. Alternatively, if manual coding and editing are to a large degree centralized, the central units for these functions and the unit for manual entry of data may be combined in one division. If the work of each of these units is divided by subject matter, a part of the personnel may be trained to perform two or all three functions and shifted from one unit to another according to workload patterns. This may be appreciated by those who find such functions monotonous.

### C. Data documentation

The effective use of micro-data stored for the processing of statistics, as indicated in section A, presupposes that the data are well described. Satisfactory results of the data processing and their proper interpretation cannot be achieved unless for each project a uniform and adequate description is available on (*a*) where the data and the computer program for processing of the data are stored, (*b*) the physical characteristics of storage, (*c*) which statistical units are involved and their definitions, (*d*) what kind of standard classifications and coding systems are applied, (*e*) how good the quality of the data is, (*f*) which survey methods are used in collecting the data, (*g*) what the population coverage is etc. Many statistical agencies have learnt by bitter experience, losing valuable information because stored data could not for technical reasons be processed or finding that the processing of stored micro-data incurred costs that could have been saved if satisfactory documentation had been available. Therefore a kind of dictionary for such data is urgently needed. The documentation should be stored both in human-readable and machine-readable form.

Within a statistical agency there are three groups of employees whose use of stored micro-data is dependent upon this documentation, that is, the computer operators, the programmers and the subject-matter employees responsible for the projects. In addition to the producers of statistics, there are also users of statistics, inside or outside the agency, who may lack the technical or subject-matter knowledge of the producers but who need statistics that can be prepared by means of the micro-data or who want to carry out statistical analysis on the basis of these data.

Documentation should be elaborated as a part of the planning and implementation of each statistical project and in accordance with clear rules for the division of work. Moreover, the documentation should be designed in conformity with standards that are well described and easy to learn. Finally, the documentation must be maintained so as to be applicable at any time.

To satisfy these requirements the documentation must be elaborated and maintained by several units of a statistical agency in co-operation, namely the subject-matter divisions, the systems and programming unit, the machine-operation unit and the central units that may exist for information and promotion of the use of statistics and for printing and storage of publications and questionnaires. However, standards for the documentation should be prepared centrally.

There must be a "data administrator" (this may be a group rather than an individual) to accept responsibility for all data entered into the central data base and ensure that documentation is complete, correct and available to those who need it. This function also includes data security.

### D. Data preparedness

The data content of a computerized statistical data system and its readiness for retrieval determine the data preparedness, i.e., the capacity of the data to respond to demands for information. For stored macro-data the data preparedness determines their usefulness. The usefulness of micro-data also depends upon the preparedness for processing of the data; this is discussed in section E.

In most statistical agencies, magnetic tapes may remain much cheaper for data storage than disks, which can also be used. Diskettes are becoming relatively cheaper and in some cases provide a convenient medium of storage. Microfilm and microfiche are still cheaper media for storage but they cannot be used directly for processing the stored data. Data may be stored on disk as long as they are used frequently and they may be transferred to tapes stored in a library close to the machine when their use becomes less intensive. Tapes seldom used or perhaps not used at all may be removed from the tape library and stored at a more distant place in order to save both space and costs. To minimize the problems caused by physical damage or loss, all critical files should be copied and stored in a separate, secure and fireproof location. These considerations indicate that a data-base approach does not permit unlimited storage of micro-data and that consequently priority setting is required.

Decisions on the storage of micro-data in a data base should be based on considerations similar to those concerning new data collection. Both should be based on a careful analysis of users' requirements of statistical information and on the experience in disseminating statistics. Thus, for example, links between data elements should be based on prior analysis of which data are to be used jointly, including some estimation of anticipated demands.

This means that the subject-matter divisions and analytical units of a statistical agency should play a role in determining the data preparedness similar to that which they play when new data collection is decided on. This also applies to a possible central unit for information and for the promotion of the use of statistics. Furthermore, the development of the data preparedness must be co-ordinated in a manner similar to the co-ordination of data collection. This function should not be left to the units providing computer services but rather to those responsible for integration. If necessary, the head of the agency must resolve conflicts by determining priorities.

## E. Preparedness for data processing

As pointed out in section A, one of the major justifications for a data-base approach is that the prospective demand for statistics is not entirely predictable. In particular, the demand from single users or small groups of users is unpredictable. To accommodate such demand quickly and at reasonable cost, a statistical agency must develop flexible computer programs that can be used to produce a great variety of special-purpose statistics. In other words, both data preparedness and data processing are necessary conditions for the proper utilization of a computerized statistical data system.

Several kinds of standard programs must be developed, namely those for producing address labels, for editing and correction of data, for retrieval of data and for aggregating the micro-data. General programs for producing tables of various kinds from a number of files are also required. A fairly large number of such programs have been developed in different countries during the last decade and these should as far as possible be taken advantage of in developing preparedness for data processing. General programs for printouts of tables in such a form that they can be reproduced directly by offset or photocomposition may also enhance the preparedness for supplying the statistics requested. Finally, there exist a number of programs for the analysis of micro-data, which may satisfy demands from more sophisticated users.

The development of general programs of the kinds mentioned above requires great skill and should, as indicated in section B, be done in a central systems and programming unit. However, the use of some of these programs for producing the statistics requested may well take place in the subject-matter divisions. Such applications may not require a knowledge of programming but rather of the subject matter and the manner in which the general programs are to be used. If the subject-matter divisions are made responsible for a considerable part of the data documentation, their use of standard programs to produce statistics in their field from stored micro-data will be considerably facilitated. Such decentralization may also facilitate a reduction in the volume of general-purpose statistics to be produced for publication or for storage. Other considerations include the training of substantive staff in using generalized programs, the establishment of data dictionaries and the standardization of physical storage and documentation.

## F. Education and training[3]

Experience clearly indicates that computerized production of official statistics, investment in computerized storage of both micro- and macro-data and a systems development such as described in sections C to E above can enable a statistical agency to yield flexible and prompt services to the users. However, it cannot be repeated too often that computers do nothing without instructions prepared by people. Therefore a statistical agency should pay more attention to the human skills required than to the machines as such. Effective computerization cannot be achieved unless those taking part are sufficiently skilled.

Appropriate computer staff should take part in courses covering the objectives, procedures and problems of the statistical organization. It is very important that systems analysts and programmers, especially those who work directly with the subject-matter divisions, acquire a minimum of basic statistical knowledge so that they have the understanding and substantive background required for effective performance of their tasks. In addition, the computer staff at various levels also need more specialized education and training.

Computer suppliers as a rule provide education and training in punching (or other methods of data entry), computer operation, programming and systems work. They may also arrange seminars or conferences for users at management levels of agencies using computers. Additional training for computer staff will differ among organizations and the presentation below is confined mainly to brief descriptions of the levels of knowledge to be aimed at. It may be noted that statistical data processing does have special problems and it is important that statistical offices exchange ideas and experience. The Working Group on EDP of the Conference of European Statisticians is an excellent model in this respect.

Computer operators should know the general principles and techniques applied in the operation of modern data processing equipment. In particular, they should be instructed on the various rules and practices to be adhered to in their daily work. They should also be allowed on a selective basis to participate in basic programming courses to improve their understanding of the total system; some of them may perform so well that they can be encouraged to proceed with more advanced training and become able programmers.

Programmers should know how to prepare programs in one or more problem-oriented languages, e.g. Cobol or Fortran, to document routines and to carry out simple systems work. More advanced programmers should be thoroughly acquainted with the use of standard programs of various kinds mentioned in section E above and some of them should be able to improve or even to develop such programs. Systems analysts should be able to participate in the development of a data system for processing statistics and know how to manage and co-ordinate such work.

Operators, programmers and systems analysts must be thoroughly acquainted with the existing guidelines and rules for their work. A well-established computer organization should have written guidelines and rules, preferably in the form of a set of manuals, each designed for specific groups of staff members.

To the extent that courses offered by computer suppliers are not sufficient for providing the levels of knowledge described above, additional courses should be arranged either by the statistical agency itself or by outside experts. In some countries, such courses are arranged for the central government administration as a whole by a special unit established for this purpose.

Experience shows that some statisticians can, with appropriate training, make excellent analysts. Similarly, bright programmers with two to three years' experience may become able systems analysts if they get theoretical training in special courses for this purpose in addition to on-the-job training. They can, after special training, be assigned some work operations ordinarily performed by statisticians, the latter thus being released for other work. Tasks for which such staff members may be particularly well qualified are some operations in connexion with data collection, e.g. computer print-out of address labels and supervision of mailing; preparation of instructions for coders or alternatively design of systems for automatic editing by computer; specification of computation and tabulation; design of machine print-outs for offset copying; and filing of data on magnetic tapes for possible future use for special tabulations. Even in manual data processing, these staff members

[3] The present section is partly based on a paper by Hans-Joachim Zindler, "Possibilities of application of EDP, establishment of a statistical data bank and related fields of application", (S1-06), prepared for the Seminar on the Organization of a Statistical Service, Munich, Federal Republic of Germany, 1977.

may relieve statisticians of some work operations, for instance by formulating precise verbal instructions and performing supervisory functions. It may therefore be worth recruiting some programmers in excess of the number otherwise envisaged, thereby enabling the statisticians to concentrate more on jobs for which they are best qualified.

To make possible effective communication between the data processing staff and the staff in the subject-matter divisions, a mutual understanding of problems is necessary. Some of the agency courses mentioned in chapter VIII should include basic education in both statistics and the use of computers. Topics for inclusion may be the specification of statistical tables, the description of credibility tests and the specification of errors to be corrected, which frequently have to be done by staff members of the subject-matter divisions.

### G. Computerization and developing countries

Undoubtedly, official statistics in developing countries may benefit greatly from computerization; however, the statistical agencies should avoid the mistakes frequently made in other countries, particularly in the early days of computerization. They should not, for example: (*a*) leave control of the equipment to other agencies unless they are assured sufficiently high priority for use; (*b*) subcontract to any extent systems work and programming to outside agencies, other than certain "once-only" applications; (*c*) transfer systems analysts and programmers to new projects until they have completed a clear documentation of data and programs for the ongoing projects; (*d*) invest more in advanced systems for the dissemination of statistics than can be effectively taken advantage of by a sufficiently large number of users; (*e*) postpone development of a system of planning which includes the computerized work, such as that described in chapter XIV; (*f*) fail to organize the close co-operation needed between systems analysts and programmers and the staff members of subject-matter divisions; (*g*) neglect the appointment of a project manager for each statistical project requiring computer work or leave this task to a chief of division who already has too much to manage; and (*h*) neglect the education and training of a sufficient number of systems analysts and programmers and the user-oriented computer education of subject-matter staff and top management.

If the statistical agency in a developing country can avoid repeating mistakes of the kind mentioned above and establish a computer organization enabling a gradual development of a computerized data system such as described in sections B to E, the internal capability of the agency will be substantially enhanced. It is worth repeating that such an achievement depends mainly on the human resources that can be mobilized for this purpose. One must not attempt to achieve more than these resources allow. Finally, sophisticated technology should not be applied for prestige reasons but only if there is sufficient evidence that it is likely to be both effective and efficient.

# Chapter XI

# RESEARCH AND ANALYSIS[1]

## A. General considerations

Research and analysis, if well done, enhance the internal capability of a statistical agency and also its prestige and external capability. Moreover, they are conducive to forming closer working relationships with universities and research institutes. However, these important functions are often overlooked in organizing the national statistical service, either because of lack of resources or because of insufficient recognition of their role in producing good and timely statistics.

The question may be asked: what kind of and how much research and analysis is it appropriate for a statistical agency to do? The answer to this question may be inferred from what follows; however, it must be emphasized that unless they are in the right hands and competently done, research can be wasteful and analysis dangerous. A rule that should be insisted on is that the impartiality of the national statistical service must be maintained; published commentary must be factually based and objective, with no value judgements in regard to policy.

Since the terms "research" and "analysis" are ambiguous, it is necessary to define them. In general, research may be described as an activity aiming to bring forward new knowledge usually involving considerable study, testing and experimentation. The activity is usually undertaken in a statistical agency with a view to implementing a change for the better—in the reliability or composition of the statistical output, in the methods or procedures of producing it, in the concepts, definitions and classifications used, or in the manner and detail in which the output is stored, retrieved or presented. Although the process of testing, evaluating and generating research findings necessarily involves a degree of analysis, the word "analysis" is often applied to the statistical outputs. While the distinction between research and analysis is arbitrary, it is convenient to use the word "research" in relation to the process of producing statistical information and "analysis" in relation to the operations on the resulting data. This means that research relates primarily to the methodological work of a statistical agency. It focuses on the quality, reliability and cost-effectiveness of producing and delivering the statistical products. Analysis aims at achieving increased substantive knowledge from the statistics produced.

It will be clear from the preceding that, for methodological work, education in mathematical, statistical and methodological processing theory is essential. For analytical work, education in subject-matter theory and the substance to be analysed are of major importance. Thus the staff for these two kinds of activities may well be located in separate branches, irrespective of the degree to which the functions are centralized. In a statistical agency with substantial functional centralization, much of the methodological work could be concentrated in the methodology and supporting areas of the agency except that research strongly related to subject matter, such as seasonal adjustments and deflation, should be located in the subject-matter areas, which would also be responsible for analysis. Alternatively, both research and analysis could be placed in a single location at the centre. In an agency with little functional centralization, the location may be less clear.

Different circumstances, particularly the availability of people with the right qualifications and competence, will call for different arrangements in practice. However, an important consideration in locating activities should be to ensure that those engaged in methodological research are not isolated from the applied activities of developing, for example, survey designs for particular surveys, while those engaged in applied work should not be divorced from up-to-date theoretical developments of relevance to their work.

## B. Methodological research and its location

The process of developing and producing relevant, reliable and timely statistics involves many intellectually challenging activities which can appropriately be classified as research. Major changes in the statistical process—whether in the form of a new statistical series, of significant improvement in existing data or of the efficiency and timeliness of producing them—are not, or should not be, a matter of routine. They are often intricate and time-consuming. They involve, or should involve, much study, testing and experimentation. Thus the notion that a statistical agency is nothing more than a "figure factory" is wrong, even though a substantial amount of routine is necessarily involved.

Examples of research in a statistical agency include work leading to improved design of sample surveys and censuses; research in evaluating census and survey errors and in editing census and survey data; research in developing generalized computer processing systems; research into methods for estimating information for small regions and research into seasonal adjustment of time series. Where there are only a few people available to carry out this work, the choice of location is limited; of necessity the work will be carried out in a central unit, which may be placed either directly under the head of the agency or the deputy in charge of integration, or in the branch for survey methodology and other supporting services. Even when the number of qualified people grows larger, practical considerations may dictate that this activity should continue to stay in a central group, at least for a time. The activity needs to grow beyond a certain minimum size to surpass the "critical mass" stage and make its influence felt throughout the organization. There are considerations of career development as well as of economy which may render centralization more realistic. A

[1] The present chapter is to a large extent based on part III of a paper by S. A. Goldberg, "Organization by subject matter and by function" (ESA/STAT/AC.1/5), prepared for the United Nations Interregional Seminar on Statistical Organization, Ottawa, Canada, 1973.

further factor militating against decentralization is that pressures of day-to-day work in the divisions tend to absorb research people in the purely production activities. Location in a central unit provides a degree of protection. It bears repetition, however, that it is vitally important that such protection should not result in isolation; those engaged in methodological research must work closely with those doing applied work in the subject-matter divisions and elsewhere. Every attempt must be made to render the research relevant and purposeful.

When resources become adequate, a capability for carrying out a certain amount of methodological research within the various subject-matter and service divisions may be developed. As is true of most other activities, the point of optimum trade-off between concentration of scarce research resources at the centre and in the divisions may change as the organization grows in size and professional resources grow more plentiful. But the necessity for a strong, integrating and co-ordinating central staff increases as the research activities become more pronounced in the divisions. Methodological experts who are located in some of the subject-matter or service divisions should have close liaison with central staff members. At any rate, the development or adaptation of integrating instruments, such as standard classification systems, and across-the-board devices, such as seasonal adjustment, often involve centrally located research. Central location, or at least assistance from central staff members, is also often involved in the case of research in developing new or more efficient methods for collecting, processing, retrieving or disseminating information.

Close liaison should also be established with the academic statisticians. At present, there exists in most countries a wide gap between the official statisticians and the theoretical statisticians working at universities and colleges.[2] In general, the statistical agencies have not taken sufficient advantage of the rapid expansion and improvement of statistical theory that has taken place during the last decades; at the same time the theoreticians do not benefit sufficiently from the practical experience of the statistical agencies, nor do they take sufficiently into account in their research the practical needs of statistical agencies. Statistical agencies should take the initiative to strengthen their relationship with statistical theorists in order to take full advantage of existing theory and to stimulate further theoretical advance in fields that are of particular interest to official statistics. Functional centralization facilitates such relationships by virtue of the fact that it renders more feasible the establishment, within the statistical agency, of a group with a strong background in theoretical statistics, interested in applications to the production of statistics. There are also several other ways of strengthening such relationships—for example, temporary employment of experienced academic statisticians on the methodological staff, hiring of such statisticians as consultants, employment of promising graduate students and allowing them to write their theses on problems related to their work, permitting one's own staff to do part-time lecturing at universities etc.

### C. Analytical work and its location

A statistical agency should not only produce data but, to the extent possible, also use statistics for analysis of various kinds. Such use will enhance the capability of evaluating the quality of existing statistics and the need for new data. Thus analytical work may contribute to an improvement in both the reliability and the relevance of existing official statistics, and strengthen substantially the feasibility of satisfying the needs of users. In a centralized statistical office, where there is ready access to statistics in a number of subject-matter fields, staff members may be particularly effective in carrying out analysis requiring large masses of data, especially when there is a need for linkage of micro-data.

Analysis is involved in preparing reliable statistical data for publication, even when the results of the analysis, as such, are not published. At various stages of the statistical process, judgements must be made on whether the results up to that stage make sense; this frequently involves systematic probing of the consistency of the data. Such probing becomes particularly critical at the final stages prior to publication. This type of analysis is clearly done more effectively in the various subject-matter divisions.

In addition, there is the type of analysis which consists of distilling the highlights of the statistical results in written form. The process of producing statistics is often incomplete if it does not include this type of analysis. Numbers, even if reliable and valid, are not enough to convey information to the public. This type of analysis must be non-controversial and yet avoid blandness, which is a difficult combination to achieve. Such analysis is carried out most effectively in the subject-matter divisions of the statistical office, since it requires great familiarity with the data.

In order not to delay their dissemination, the tables from statistical surveys may be published in a separate volume with only a few comments or none at all, while a more detailed verbal description may be presented at a later stage in a separate volume. Such a volume is most interesting when results are presented for the first time but it may not be needed each time the tables of a recurrent survey are issued. Such work should, if possible, be carried out primarily in the subject-matter divisions concerned; otherwise the staff might feel deprived of interesting work for which it has competence.

A similar but more general type of interpretative analysis is illustrated by monographs or papers on special topics—e.g. income, fertility, migration, the labour force—involving a synthesis and sifting of large masses of data derived from censuses, surveys and other sources. This requires thorough familiarity with the characteristics of the data as well as competence to bring out and describe the underlying features from a massive amount of detail. Such work can be carried out either in the subject-matter divisions or in a central unit for analytical work, depending on the topic, circumstances and form of organization.

Another type of analysis is employed to explain changes in movements and relationships of data in the light of associated events, with the intent of interpreting their significance. Such analysis requires not only familiarity with the data in a variety of related fields but also a good grasp of relevant theory and the general institutional and other factors at play. It is usually carried out within the context of models, at least by implication. Examples are surveys of social or economic trends, which require an integrated presentation and explanation of events on the basis of data from a number of subject-matter fields. The more statistical data are accumulated in the statistical agency, the more important it is for the agency to carry out such analysis of the data in order to identify relationships between statistics derived from different sources and with a view to informing users on the character, limitations and potentials of the data. The process of carrying out and writing up such analysis provides a discipline and stimulus for exploring more deeply the validity and significance of the statistical results and for identifying important gaps and inconsistencies in the data. It

[2] For a more extensive consideration of this problem, see Petter Jakob Bjerve, "Two addresses on statistical co-operation" (Oslo, Statistisk Sentralbyra, 1976).

is essential that the narrative, especially if it is intended for publication, be prepared by people who have the capacity for detecting and explaining significant trends and interrelationships in the face of detailed and at times conflicting data. This sort of analysis can best be carried out at a central location.

With the growing attention to planning, there has been a growing demand on many statistical offices to carry out protections of population, labour force and school enrolment. Since projections are basically the arithmetic consequences of the assumptions underlying them, it is essential that the latter should be as realistic as possible. This involves extensive research into the individual components comprising the projection—mortality trends, fertility trends, immigration and emigration and so on. Such work may promote the consistency and relevance of these statistics. The divisions for population statistics and education statistics, for example, may well be able to construct and use numerical models comprising demographic and educational aspects respectively. However, tying together these models and possibly linking them with corresponding models in related fields requires a system of comprehensive numerical models expressing not only population behaviour but also educational behaviour, labour market behaviour etc. Such work can only be done at a central location. The highly qualified staff needed for such work is, at any rate, likely to be so scarce in most countries that the construction of even limited models can in practice be carried out only centrally.

For the planning of economic policy, there is a growing need for model building, in particular for numerical economic models comprising the entire economy; in some countries the statistical agency is given responsibility for such work. Usually, these models have to be based to a large degree on the national accounts and may therefore be developed in conjunction with the national accounting work. However, the work on economic models requires an expertise more similar to that of socio-demographic models and the development of both types of models may well be located in the same central unit. On the other hand, the construction of partial economic models for which statistics produced in only one subject-matter division are required may well be located within such a division.

Every effort should be made to develop a capability in the national statistical service to carry out analytical work competently. Among other benefits, such work has important feedback effects in that it helps to clarify difficult conceptual, methodological, numerical and presentational issues. Further, it provides practical experience by helping statistical officers to develop the kind of comprehension that evolves from actually working with the data—a comprehension not only of the surface problems but of the more complex and practical ones as well. Such comprehension strengthens the capability of a statistical agency to evaluate, with insight and authority, the practicality as well as the importance of user demands and the most effective ways of responding to them. Unfortunately, a few national statistical services in developing countries, and by no means all in the developed ones, are in a position at present to undertake this type of work. The absence of such work is a factor in the reluctance of many university graduates to join statistical agencies. They prefer work which involves using, not just producing, statistics. It should be stressed, however, that collection and dissemination of data are the primary obligation of the national statistical service and the analytical work it undertakes should in no way cause delays in making the basic statistics available to outside users.

It should be noted, finally, that the decisions on priorities made in a statistical agency have a considerable and perhaps decisive influence on the type of analysis that users will be able to make in the future. In order to carry out these decisions in a perceptive and responsible way, it is in the interest of the users as well as of the statisticians that the national statistical service should be intimately familiar with the prevailing analytical developments. This is best achieved by equipping the statistical service to carry out analysis; failing this, the statistical service should seek opportunities for being involved in analysis and model building carried out in other government agencies so that at least some of the feedback from their work is available to it. To facilitate this, it is necessary for the statistical service to have at least some analytically qualified personnel available.

### D. Research and analysis in developing countries

In many developing countries research and analysis of the kind discussed above are not done to any substantial degree by the national statistical service but rather by the planning agency and the research department of the Central Bank. University graduates who are known to have performed well in the statistical service are frequently offered better paid analytical jobs in the other agencies. This is an unfortunate tendency for the development of official statistics, which can only be arrested if the statistical service is upgraded as regards both status and salaries, as indicated in chapters III and VIII respectively.

Until a proper parity has been established between these agencies, statistical agencies in the countries concerned should make strong efforts to establish dialogues with the planning agency and the research department of the Central Bank. One way of doing this may be to establish project groups of the kind described in chapter I, when planning new statistical surveys that are of sufficient interest to the planning agency and the Central Bank for them to allow their own employees to serve as working members of the group.

# Part Four

# PRIORITY SETTING, INTEGRATION AND CO-ORDINATION AND PLANNING

# Chapter XII

# PRIORITY SETTING

## A. Process of priority setting

The setting of priorities requires detection and identification of users' needs and evaluation of benefits to users of the statistical information in the light of costs. In other words, it is necessary to know who is using what kind of statistics for which purposes, given the cost. In practice, this must be done by identifying problems and policy issues, both of government and other users, and assessing how and to what extent specified sets of statistics are relevant to the solution of the problems and to the policy decisions, and what would be the cost. In view of the acute shortage of human skills and other resources for production of statistics, especially, though not exclusively, in developing countries, it is particularly important that priority setting should be carried out in a rational way.

Ideally, priorities should be determined on the basis of analysis of the costs and benefits of various alternative ways of using the scarce resources. It is feasible to develop data on the cost of various projects although in situations of relentless pressures to meet deadlines with inadequate resources, managers may be understandably reluctant to add this chore to their work. It is, however, extremely useful, and a great tactical advantage in negotiating for more resources with treasury officers, to be able to answer questions on such subjects as the amount of human resources and money spent on this or that statistical project. The availability of output-oriented cost records, including conventions for splitting overheads among projects, is a prerequisite not only for cost-benefit analysis, which underlies balanced priority determination, but also for meaningful estimation of the future resource requirements of various projects included in the plan. When used in conjunction with information on the progress of various projects and the timeliness of reports in relation to target dates, such data also provide a means of monitoring resource utilization during the implementation cycle of the plan. However, one element of cost is usually excluded from such estimates, namely, the costs incurred by respondents included in surveys and censuses. This vital element should, however, be weighed carefully in the analysis and in the process of priority setting.

Although, with the exception noted, the cost of statistical projects can, in principle, be identified and measured, this is rarely the case with their benefits. The problem here arises from two main factors. First, statistics are intermediate products, not end products. The benefit of a statistical series is a function of its impact on policy decisions and their importance; it is generally very difficult to pin it down and attach a meaningful value to it. Secondly, the process of identifying benefits is all the more difficult both to the extent that the series are part of a system in which the diverse elements are interdependent and the value of each is enhanced by the availability of the others and also in the degree to which the same series is used by a variety of users and for a variety of purposes. What complicates this process further is that, inevitably, difficult choices must be made between subject-matter programmes, the benefits of which cannot be compared—e.g., the balance of payments and crime statistics. Choices must also be made between strengthening the infrastructure to support subject-matter programmes some years hence and more immediate improvements and extensions of surveys in various fields, between timeliness and accuracy and so on.

Thus, priority setting and allocation of resources among competing possibilities in statistics cannot be calculated precisely but must be determined by considering benefits in relation to costs, on the basis of judgements and insights based on past experience and the fullest information, particularly of user needs, in order to render priorities and related resource allocations as rational and balanced as possible. This must be done in the context of an approximation process involving *inter alia* negotiations both within the agency and between the agency and representatives of the data users and suppliers, similar to that which determines the allocation of resources for statistics by the parent ministry.

The sections below contain a description of the balancing of requirements involved in priority setting (sect. B), a discussion of the detection and evaluation of needs of the users of statistical information (sect. C) and a presentation of cost accounting methods for statistics (sect. D). The degree to which a statistical agency itself determines, or should determine, priorities is not dealt with as a separate issue. In some countries the parent ministry is deeply involved in the priority setting while in others the national statistical service has a high degree of freedom in this respect.

## B. Balancing of requirements[1]

Priority setting, in the context of over-all planning, aims to achieve broad balances between different statistical requirements. This process of balancing is a major element of the co-ordination function, which is defined in chapter I as an integral part of the integration function.

First, there is the need to maintain a balance in order to satisfy various types of users. A balance must be achieved between serving users needing detailed data in specific fields and those needing across-the-board aggregative data for macro-economic and social analysis. The needs of the central government are as a rule accorded high priority. In countries at early stages of statistical development, the planning agency usually gets priority attention. However, it is the obligation of the statistical agency to represent the interests of all users—subnational governments, business, labour and farm organizations, universities and so on—to ensure that their needs, including the increasing concern for

[1] The present section is based on an article by C. A. Moser, "Planning and integrating statistical programmes in a decentralised system", *Bulletin of the International Statistical Institute* (Washington, DC), vol. XLIV, book 1 (1971), pp. 132-135.

local statistics, are reflected adequately in the priorities. Fortunately, many of the statistics required by government and planning departments also satisfy important needs of other users.

Secondly, there is the balance between different subject-matter fields. In guiding the system of official statistics the statistical agency should strive for a judicious distribution of resources in the face of divergent pressures to concentrate on particular fields. It should also ensure that some resources are assigned (*a*) to projects that are in their early stages of development, (*b*) to strengthening weak areas and (*c*) to carrying out at least a minimum of research and analysis.

Thirdly, within each subject-matter field there is a balance between different projects both across the board and in time. The importance of covering the entire field must be balanced against the need for detailed statistics in parts of the field; the need for repeating a survey must be balanced against the need for repeating others or initiating new ones. In particular, in fields where decennial censuses are held, there is a balance between which sample surveys should be conducted in years between the censuses.

Fourthly, there is the balance between timeliness, accuracy and publication of detail. One aspect of timeliness relates to the interval between collection and release of regular statistics. Once devices for improving timeliness have been exploited, procedures for solving systematically the conflicts between timeliness, on the one hand, and accuracy and detail, on the other, need to be developed. A second aspect of timeliness relates to needs for special tabulations not anticipated in the publications. The lengthy time intervals often involved in preparing special tabulations are a source of great inconvenience to users. The solution to this problem requires, among other things, the development of general-utility computer programs and systems of storage permitting quick and flexible retrievals. A third aspect of timeliness relates to the time interval involved between (*a*) a commitment to carry out a new survey or census and (*b*) the availability of the results for use. The problem here arises at times from underestimation of the resources needed to do the job and from insufficient forethought about the logistical problems involved in preparing material for release. In its anxiety to please an important user, the statistical agency may over-extend itself in its commitments. It is of overriding importance to ensure that commitments are realistic even when they are optimistic and that full account is taken of the manifold logistical problems involved in producing the statistics. The image and status of the agency are damaged by tardiness in providing requested data and by incomplete fulfilment of commitments.

Finally, there is the balance between satisfying user needs and avoiding undue burdens on the suppliers of the primary data, that is, the individual, enterprise and government respondents included in surveys or censuses. It is an important responsibility of the statistical agency to represent the interests of the suppliers of micro-data judiciously.

The above examples clearly illustrate that a satisfactory balancing of requirements cannot be carried out *ad hoc*. Priorities mmust be set in a systematic manner in the course of an approximation procedure, such as described in chapter XIV.

### C. Detection and evaluation of needs for statistics

In a statistical agency, the daily informal contact with users is perhaps the most important means for detection and identification of needs. Letters and telephone calls from users and personal contacts with users provide vital information. Furthermore, reading governmental publications, parliamentary records, periodicals and newspapers can provide insight into the needs for statistics. It is also of great importance to participate in or have close contact with governmental committees dealing with economic and social problems requiring statistical data or making recommendations on laws and government policies affecting the demand for statistics or the supply of administrative data. Statistical agencies should place great emphasis on ensuring such participation or contact.

Another important means of communication may be provided by more formal contacts with users. As described in chapter I, one form of such contact is a structure of permanent committees for special subject-matter areas, including members representing both the statistical agency and the major groups of users. Another form is the holding of users' conferences or of seminars where both users and producers take part and where the subject for discussion may be selected according to what is of greatest interest for the statistical agency and the particular user group concerned.

In some countries attempts have been made to study systematically the demand for statistics. Data have been collected on actual use of statistics, on usefulness of statistics and on demand for new or improved data, and these data have been classified, *inter alia*, by groups of users and analysed. The data have been collected by telephone and by means of questionnaires distributed to users. Actual demand for statistics has also been analysed on the basis of mailing lists for publications. Experience with such studies is still too limited to justify generalization in regard to their usefulness. In many countries such studies have not been attempted at all. The reason may be that the subject-matter divisions of statistical agencies as a rule are so heavily engaged in the production of statistics that systematic studies of the demand have been neglected.

New laws often imply an administrative implementation that may involve new or improved statistics. Other new or expanded governmental activities may also involve new statistical requirements. As already stated, a statistical agency should at an early stage attempt to anticipate the needs for statistics likely to arise on such occasions and it should make the appropriate governmental agencies aware of such needs. Such needs should, however, be evaluated in relation to other needs and the contribution that new statistics would make to the statistical system as a whole.

Some users of statistics communicate their needs for statistics clearly and specifically. However, users are often unable to define their problems with sufficient precision and consequently need assistance from the statistical agency in specifying their needs and the type of data required for their purposes.

A statistical agency must analyse critically all requests for new or improved statistics, exploring carefully whether the needs can be satisfied with available information and whether the production of statistics of the kind asked for is feasible. Such an exploration may result in a withdrawal of the request so that no further action is required. Identified needs that survive such a test must, of course, be pursued further.

In order to judge the benefits of statistics, the producer needs to know the manner in which the statistics will be used and for what purpose. Ideally, the implicit (or, if existing, the explicit) numerical model to be used by the users should be known. Having explored the model, the producer must also evaluate the purpose; this involves not only professional but also value judgements. However, such a systematic approach can seldom be fully realized, *inter alia*, because the models frequently are not developed until the required statistics are available.

In the sphere of economic statistics, the System of Na-

tional Accounts (SNA) and the System of Balances of the National Economy (MPS) can serve as powerful instruments for identification and, to some degree, for evaluation of the needs for new or improved statistics. The SNA and the MPS provide integrated frameworks for the appraisal of available statistics and of the existing gaps, inconsistencies and other imperfections in quantitative perspective. Further, the various accounts and balances have added a major dimension in negotiating for resources with treasury officials—an additional "justification" for new or existing series in virtue of the fact that, aside from being used for specific purposes, most series can also be used either for strengthening or extending the accounts or in conjunction with them.[2]

In social statistics, where a similar over-all framework has not yet been developed, the evaluation of needs is even more difficult than in economic statistics. The progress made in designing a framework for social and demographic statistics and a set of provisional social indicators has improved the basis for evaluation; however, the over-all guidance that these frameworks can provide is so far less effective than that of the national accounts.

The evaluation of needs and the priority setting must be concerned with both the existing data and possible improved or new statistics. Special attention should be paid both to statistics recently initiated and to statistics produced in about the same form over a long period of time. Statistics of the first kind require an evaluation of the degree to which their purposes appear to have been achieved. Statistics of the second kind should be reviewed in light of the possibility that economic or social circumstances originally justifying them may have changed. If the results of such evaluations justify discontinuation of the data collection, a decision to this effect should, of course, be made. In fact, existing statistics are seldom discontinued. The reason may be that they are integrated to such a degree that for most series a discontinuation would seriously reduce the value of other series: thus the statistics currently produced are given high priority relative to new statistics. Information, like knowledge, tends to be incremental.

A re-evaluation of the frequency of collecting existing statistics may be desirable, even if a discontinuation cannot be justified. If it turns out that the economic or social relationships described by the statistics are more stable than originally expected, less frequent data collection may be warranted. If they turn out to be less stable, more frequent statistics may be desirable.

A part of the official statistics is required by all or almost all groups of users and may for that reason be given high priority. However, many series are needed by some groups but not by others. In such cases, the importance of satisfying different groups of users must be weighed. In this respect developing and developed countries seem to be in different positions. At an early stage of development, the need for statistics is in general more narrowly confined to the government than at later stages, when the needs of business enterprises and researchers tend to gain importance. In this sense the difficulties of priority setting seem to be positively correlated with the degree of development.

Priority setting involves an evaluation of current needs as compared with future needs for statistics. It also involves, *inter alia*, evaluation of current needs for new statistics against methodological research to improve quality, reduce costs and carry out analysis to render available statistics more useful. Preferences of different users of statistics will nearly always differ both as regards the choice between quantity and quality of the data and with respect to the emphasis put on different aspects of quality, such as timeliness, reliability, continuity and relevance.

Integration of statistics competes with other improvements of the data and the production of new statistics. In general, integration is likely to be given more weight in a centralized national statistical agency than in a decentralized one, although if the latter has a strong co-ordinating board, integration may be given equal weight.

One way of setting priorities is to use the price mechanism. In principle, it would be feasible to charge users for the statistics and let the forces of supply and demand determine what is done. Up to a point, selling of the statistical service for a price designed to recover costs is sensible. Thus publications and, frequently, special tabulations or analyses are charged for. Repayment systems for specific surveys or projects are also widespread. In Sweden, for example, the survey organization has been placed on a more or less "pay-as-you-go" basis.

It should be emphasized, however, that although the use of the price mechanism is practicable where one is dealing with specific projects for specific users, most statistical projects are not in this category. Some of the most important projects, such as the national accounts, the consumer price index, population and other censuses and so on, would be much too expensive to be financed by specific users; moreover, it would be impossible to divide the costs among the various users. As Sir Claus Moser pointed out:

> "There is no avoiding the conclusion that a major part of a statistical data base must be built up and financed as a central government responsibility and should not be subject to the price mechanism. Whether prices should be used for 'optional' extensions of the data base is another matter. One can argue, for instance, that detailed data for particular industries should be paid for by users, thus adding revenue to the central statistical budget. But with such a 'mixed' system, there is the danger that the part governed by the price mechanism may swamp the other, non-price part, removing crucial resources from it. Moreover, when payers withdraw financial support, the series may be in jeopardy even though it may be useful or even essential to the system as a whole. In sum, charging for statistical outputs is not a major instrument for determining priorities."[3]

The responsibility for detecting needs for statistics and analysing the requirements of users should rest with the subject-matter divisions concerned, working in close collaboration with the methodology, computer and other service groups. They should explore whether the needs of the users can be satisfied with available statistical information; if the needs cannot be so met, they should examine whether production of the statistics seems feasible and, if so, at what cost. Only if they then conclude that production is warranted should proposals be submitted to the top management of the agency, in a form such as described in chapter XIV.

### D. Cost accounting

The management of a statistical agency cannot carry out priority setting properly without making some cost estimates for the projects in question. Fortunately, these esti-

[2] However, demand for statistics that are not important for model work and for the national accounts should be accorded full recognition and evaluated on its merit. There is at times some danger of overlooking the need for such statistics even though they may be very important for other purposes.

[3] "The setting of priorities in national statistics: a review of major issues", document prepared by Sir Claus Moser acting as consultant to the United Nations (E/CN.3/522), para. 73. The entire paragraph and the one preceding it are based on this document, paras. 71-73.

mates are far less difficult to make than are judgements as to the prospective benefits of the projects. However, the costs of new as well as ongoing projects must be estimated on the basis of some form of cost accounting. Such accounting is also a prerequisite to over-all planning and the proper monitoring of plan implementation. Naturally, cost accounting requires some resources. It also imposes burdens on the staff members who must supply a part of the basic data needed. However, statisticians imposing burdens of data collection on others should possess both the professional competence to supply data and the mental attitude to accept the burdens involved.

Three categories of cost indicators are particularly relevant to planning and priority setting; these are (*a*) statistics of human resources, (*b*) statistics of machine-hours used and (*c*) estimates of direct and indirect monetary costs. A brief description of each category follows.

Current information on how many employees are working on which statistics is essential for effective management of a statistical agency, not the least as a basis for priority setting. However, many employees are working on more than one project; consequently, statistics on merely the number of employees by professional competence and by subject-matter field of statistics can provide only a rough indication of the costs of human resources. In addition, at least quarterly statistics on work-hours used in total for each project and, for each, statistics on the work-hours spent on major functions are highly desirable. A classification of these data by programme areas and by organizational units may also be useful.

Statistics on work-hours requires collection of data from most employees daily, weekly or at least monthly. It also requires supervision and some resources for data processing and presentation. However, for the management of a statistical agency, and also for the co-ordinating body of a national statistical service, such statistics may be very useful. Of course, these statistics should be presented in different degrees of detail to the top management and to lower-level managers.

The greater the extent to which statistics are processed by computer, the greater the need for statistics on machine-hours used for each statistical project. If each project is properly defined and coded, such statistics can be processed by computer at short intervals. Time spent on each kind of data processing equipment can and should be converted into a common unit and aggregated.

Statistics on human-hours and machine-hours used are relatively simple to prepare. Statistics on the former are quite costly, both in processing and in terms of the burdens of data collection; statistics on the latter cost very little. Both kinds of data generate additional managerial benefits by making cost estimates possible.

Accounting of the total monetary costs for each statistical project is more complex, partly because all cost elements need to be included (not only the cost of human resources and machinery) and partly because some cost elements require indirect distribution by project, for instance the cost of buildings, central administration etc. However, a relatively large part of the total costs can be allocated to the use of either humans or machines and can easily be estimated when statistics on human-hours and machine-hours and information on wages and machine prices are available. Other costs may be regarded as indirect and conventionally distributed by projects on the basis of cost data obtained from the financial accounts of the agency; but this may require specifications in addition to those available for budgeting and auditing purposes. Of course, cost estimates of this kind can also be used as a basis for calculation of prices for projects carried out on contract and financed outside the regular budget.

The method outlined above for the estimation of costs in monetary terms is simple and not too expensive if done annually, which is sufficient. Of course, alternative procedures can be used. It is, for instance, possible to arrange the financial accounts in such a manner that cost data can be derived; however, such an arrangement requires additional data collection that may be more burdensome than that suggested above. The cost estimates in monetary terms should include a classification by major programme areas, corresponding to those of the work-hours statistics, and also aggregations for broad groups such as "economic statistics" and "social statistics". Such data are indispensable for the management of a statistical agency desiring to set priorities in the best possible manner.

As mentioned above, the costs relevant to priority setting are not past costs but the probable prospective costs of a project. This means, *inter alia*, that choice of methods and procedures, which may influence costs, must be considered when priorities are being set. As previously pointed out, account must also be taken of the burdens imposed on the suppliers of the primary data. The respondents—individuals, enterprises and government—are invisible partners in the statistical process and it is an important responsibility of the central office to represent their interests judiciously. Efforts to minimize the burdens involve ensuring that available information is used more extensively, duplication is avoided, sampling is used where appropriate, administrative records are exploited for statistical purposes and so on. It also means ensuring good questionnaire design and clear definitions and instructions, and safeguarding the confidential nature of the returns.

# Chapter XIII

# TOOLS OF INTEGRATION AND CO-ORDINATION

## A. Pervasive character of integration and co-ordination

As indicated in chapter I, the need for integration and co-ordination is pervasive in a statistical agency, irrespective of the way it is organized. To the extent that functions are centralized in separate units, these units can contribute to the performance of the over-all integration functions as defined in chapter I. Thus, a central unit for the design of sample surveys can make a substantial contribution in this respect (chap. IX); a central computer systems and programming unit can ensure uniform practices—for instance, in editing and programming—and create micro-data files and data dictionaries that are generally accessible and that together can be used as tools to identify similar concepts in different surveys, thus facilitating the exploration of whether concepts that ought to be standardized across surveys are indeed so standardized (chap. X); a central unit for dissemination of statistics can integrate presentation and thereby promote the production of integrated statistics—for instance, in preparing a statistical abstract or other compendium (chap. IV); a unit for economic and social analysis and model building can detect inconsistencies and errors and promote integration (chap. XI). The network of internal and external committees can also be used to promote integration (chap. I), as can the proper exercise of the planning function (chap. XIV); a central unit for education and training can be instrumental in creating favourable attitudes towards integration in the entire staff (chap. VIII). Thus the head of the statistical agency or the deputy to whom the integration function is delegated, supported by appropriate staff, can utilize such units for strengthening the horizontal dimension of the organization.

In addition, four tools of integration are particularly important for rendering the horizontal dimension effective. These are (1) central multipurpose registers of basic statistical units, (2) central review and control of questionnaires, (3) standard definitions, concepts and classifications and (4) frameworks for systematizing aggregated data, such as the national accounts and balances. They are dealt with in sections B to E.

These tools can also be used for integrating statistics produced by other statistical agencies. However, such inter-agency integration of data involves special problems and is discussed separately in section F.

The tools of integration outlined above are essential for the achievement of an integrated and coherent system of official statistics; however, their mere existence in the agency is not sufficient. An active and persistent central drive is required to make integration pervade the statistical agency and the entire national statistical service, as emphasized in chapter I. Only top management can exert such a drive.

## B. Central registers of basic statistical units[1]

Any statistical survey, social or economic, depends in a fundamental way on the quality and completeness of the list of reporting units to which the survey is addressed. If the units constitute a sample, they should be drawn from a broader list that includes all potential reporting units. If the survey is addressed to households, the list should record the names and addresses of the households to which the survey is directed. And if the survey is addressed to business, the names and locations of the individual businesses should be listed.

Typically, a statistical office conducts a variety of business surveys and in many instances the survey lists are created and updated independently. Moreover, there are many cases in which a procedure has not been developed to match these individual lists in order to bring to light gaps or inconsistencies. The purpose of creating a central register of all businesses, or of all businesses that are potential respondents, is to enforce consistency at the ground level, so to say, where many if not most of the inconsistencies in the aggregates of economic statistics are generated. Thus, such a register can be used as a powerful means of integration. The present section covers briefly the principal features of registers of business units, how they can be derived, what considerations govern their maintenance etc. The usefulness of such a register as an instrument for integrating economic statistics is explained briefly. Statistical purposes alone cannot justify the establishment of comprehensive central registers of other basic statistical units, such as agricultural holdings, buildings and individuals and households. However, in countries where for administrative reasons a population register exists, it may play a role for socio-demographic statistics similar to that which a register of establishments and enterprises does for economic statistics.

Basically a central register (or simply a register) is a list of names and addresses of reporting units, to which a limited amount of standard descriptive material may be added, plus a set of rules and procedures that govern: *(a)* the rules for admission to the register, that is, the definition of the constituent unit and the conventions regarding its birth; *(b)* the rules for change of status on the list, that is, how and on the basis of what evidence do names, addresses and other descriptive material get changed; and *(c)* the rules for elimination from the register, that is, how and when and on what evidence are reporting units declared to be no longer "active" or "live".

These rules and procedures are as important to the integrity of the register as are the means of identification and description of the basic units. Naturally this is not the place for detailed accounts of how typical registers are structured. But a few highlights of the common features will help to illustrate the comments made above. A record in a register contains an identification, usually numerical, that singles out the particular unit from all others. This identification may include a location code to indicate where the business is physically located, a description of its activity—usually the code of the industrial classification that applies to its major source of revenue—and possibly some indication of the businesses (or establishments) to which it is related through common ownership or control. Other descriptive material may include the size of the business, measured in

[1] The present section, prepared in the United Nations Statistical Office, is based on an internal memorandum by Jacob Ryten of Statistics Canada.

terms of the numbers employed, last known annual sales etc. There may also be information that is necessary to the management of the register, such as when the business was last visited, how many and which surveys include it as part of their panel of respondents etc. There should of course be a name, usually the name that establishes the business as a legal entity, and one or more addresses when, for example, the physical location of the plant is not the same as that of the head office or of the business's accountant.

A register drawn up in the form described above is normally designed for computer processing. Such a register can become both a powerful and flexible tool for a wide range of statistical operations. It makes it possible to identify sets of businesses by location, size, activity etc.; it can be used for an assessment of the distribution of the response burden; and successive generations of registers can provide information on the rate at which businesses are created, change their major form of activity, merge, move and eventually die. But if the potential of such registers is enormous, so is the task of designing, instituting and—perhaps most important—maintaining them.

Two more considerations must be mentioned here. First, the definition of what is the standard reporting unit is not always straightforward. The most frequently encountered situation is one where the legal entity is coterminous with the plant, store, plantation or office. But in some cases, the legal entity may span several kinds of activity or establishments and in turn be controlled or owned by another legal entity also liable to report in the same or other economic surveys. It is difficult to draw hard and fast lines on which of these units should be considered standard. Much weight must be given to the ease with which the register is maintained; moreover, of course, the way in which it is constituted will depend partly on the source or sources for its maintenance. For example, if the main source is a periodic census of all establishments, the basic unit ought to be the establishment.

For many purposes, for example to serve as a sampling frame, the register should be comprehensive. However, scarcity of resources or the absence of satisfactory records for keeping the register up to date may make it necessary to limit the coverage, for example to manufacturing and plantation industries. Even within these industries, only establishments above a minimum size accounting for the bulk of the output within a particular industry may be covered. For many industries, establishments with fewer than five employees may be excluded; however, the appropriate level of the cut-off depends on the distribution of output within the industry—the higher the concentration in an industry, the higher the cut-off can be. However, cut-offs limit the use of the register as a sampling frame.

An automated central register is one of the most powerful tools for statistical integration. Some of its potential benefits are that it can be used to control the mail-out of a survey and, indeed, the more sophisticated registers are used to address envelopes, print personalized questionnaires etc. A register can also be used as a sampling frame. A properly constituted register should make it possible to select samples from a variety of strata into which the register can be neatly arranged. At a different stage of the processing cycle, the consistent use of a central register may be a most useful instrument for editing purposes. For example, independent surveys of output and unemployment may be used to cross-check the reasonableness of the reported data at the level of the individual reporting unit. Non-response to one survey may be dealt with by imputation based on reports to another survey etc. The inconsistencies between related aggregates derived from different surveys can be analysed in the first instance by comparing the lists of respondents to each, which is readily done if all respondents are described consistently and share a common numbering system. Such an analysis of data is a necessary prelude to the integration of related statistics. While other forms of integration take place at higher levels of aggregation, basic integration must start with comparisons at the level of the reporting unit (unless the related aggregates are derived from independently drawn samples that do not share any common reporting units).

In spite of the obvious advantages that accrue from a central register, and in particular from one that is recorded in computer-readable form, not every statistical agency will find it possible to create such an instrument. The design, implementation and maintenance of a register can be prohibitively expensive. The availability of a comprehensive list of reporting units, reasonably free of duplicates, is a prerequisite. Such a list may be generated as a result of non-statistical administrative procedures or as a result of a statistical census of businesses (or establishments). In the case of the former, while the resulting list is likely to be comprehensive, the definition of the basic unit may not be well suited to the conduct of statistical surveys. In such a case it will be up to the statistical agency to find ways and means of adapting existing administrative definitions to its own needs, for it is generally difficult to persuade other government agencies to change their routines and procedures. A registration process as a result of which all newly formed businesses acquire a unique number could serve as a basis for the creation of a central register. But it may be possible for a "business" on such a list to have more than one location and activity, in which case supplementary surveys are necessary to determine this. Such surveys may not always be feasible for budgetary reasons or considerations of response burden.

It cannot be too strongly emphasized that the setting up of a register is only worth while if it is possible to update it properly. Consequently, maintenance procedures must be developed. If sufficient information cannot be obtained from other sources, an annual collection of data on size and kind of activity may be required. Normally, the procedures for updating registers work better and faster when there are legal or regulatory reasons to report changes in the status of a particular business. However, the definition of "birth", "death" and "change in status" required for non-statistical purposes may not be the most suitable.

Even when favourable conditions for the creation and maintenance of a central register exist, its introduction into the operations of a statistical agency is seldom easy. In most cases, surveys exist before the introduction of a central register and so do lists of the respondents to which such surveys are addressed. Over time the differences in these lists will have increased. Thus, when a central register is introduced, considerations of efficiency suggest that it be located centrally and that individual surveys be tightly related—indeed controlled—by the discipline of the central register. There are, in fact, valid arguments for eliminating all existing individual lists as soon as the register is introduced. In this way gaps and duplications between different surveys are avoided. However, the orderly introduction of a central register requires, at times, acceptance of less than efficient implementation measures if the register is to be used and to gain general acceptance within the statistical agency.

In those statistical agencies in which a central register exists it does not take long to realize that the quality of the register, once created, varies with the frequency with which it is used. It is only by intensive testing in the process of conducting surveys that the contents of the register are verified and if necessary corrected. But until such time as all the survey-taking sections within a statistical office feel sufficiently confident to use the register, time and patience are

required. A very rapid introduction of the register accompanied by strict instructions for its immediate use, at a time when its efficiency has not yet been fully tested, may precipitate a loss of credibility from which it is difficult to recover. It is therefore advisable that the central register, once constituted, be at first applied to a few surveys and that this continue until the obvious advantages of using the register become well known throughout the statistical agency.

### C. Central review and control of questionnaires

Central review and control of questionnaires is essential to integration. The subject-matter divisions of a statistical agency should as a rule be responsible for the content of questionnaires and should work in co-operation with the functional units, especially those responsible for methodology, survey design and data processing, and with representatives of the users. Before a questionnaire is put to use, a central authority should ensure that certain requirements are satisfied as regards integration, efficient data processing, editing requirements and obligations towards the data suppliers.

First and foremost, it must be determined that the concepts and classifications applied conform with the standards established, so that integration is facilitated. Where applicable, the questionnaire should be suitable for computer processing. Furthermore, a set of dummy tables should be designed and discussed with interested parties. Ideally, in planning a statistical survey, dummy tables should be constructed first and then the questionnaire should be derived. In practice, it may be difficult to persuade those who design questionnaires to adhere to this discipline because they are frequently pressed for time. Not much harm is done if the two operations are performed more or less simultaneously but serious mistakes can be made if questionnaires are used before a minimum set of tables has been designed in final form. This is a particularly bad practice when the statistics are processed by computer. Finally, every effort should be made to avoid duplication. The questionnaire should impose the least possible burden upon respondents consistent with obtaining the needed information. For instance, it should provide ample space for the data to be filled in, it should fit into a typewriter and the data should be solicited no more frequently than actually required. The questionnaire should conform to the extent possible with the accounting systems and other records maintained by the respondents.

No questionnaire should be issued by a statistical agency unless approved by its head, and fulfilment of the requirements described above should be made a condition for approval. Before making a decision, the head of the agency or the deputy in charge of integration should ensure that the appropriate functional units have agreed on the questionnaire. Moreover, especially in an agency of some size, the head or a deputy will need assistance either from individual staff members on an *ad hoc* basis or from a special central unit staffed by personnel specialized in questionnaire design and control.

The advantage of having a central unit for this function is that skills can be developed that otherwise may not be available and top management can be relieved of detailed work. Such a unit should maintain a complete file of the questionnaires used by the agency and preferably also of those used by other statistical agencies. It may be useful to develop a systematic catalogue of questions with proper references to the investigations where such questions have been asked. Such a catalogue might become a useful instrument of integration if it could be developed in such a way as to provide an overview of all micro- and macro-data selected for storage by any medium. It would also be valuable as a basis for developing a data directory of the kind described in chapter X. A central unit for the review and control of questionnaires may be located within the unit for statistical standards suggested in section D; it must be sufficiently staffed to avoid unnecessary delays.

To ensure appropriate review and control of questionnaires issued by all government agencies, legal provision may be made for the submission of questionnaires to a central authority for clearance—for instance, in all cases when more than 10 respondents are involved.[2] In a country with a centralized statistical service, the authority should be the central statistical office. In countries with a decentralized service, it may be appropriate for the co-ordinating body to perform this function.

### D. Standard definitions, concepts and classifications

The establishment of standard definitions, concepts and classifications of micro-data is most important in the integration of the statistics and in the improvement of the quality of data. Unless concepts and classifications applying to several subject-matter areas of statistics are standardized within a coherent logical system, statistical data cannot be structured to meet the needs of users for aggregated data or for compatible information from various fields.

Standard definitions are needed for various items, for example urban population, illiteracy, wages received, industry, agricultural holding etc. These terms lend themselves to different interpretations and should be defined precisely to avoid inconsistencies and confusion. The general use of standard definitions is essential for compatibility of different data referring to the same subject.

The setting forth of standard classifications for such characteristics as geographical location, causes of death, commodities, industrial activities and occupations is also vitally important. The various subject-matter units processing data on population, agricultural production, school attendance, housing and the like should be in a position to publish material according to the same geographical classification of the civil divisions of the country. Clearly such compatibility permits a more adequate analysis of the various regions or divisions of the country. Similarly, if the data on wages paid, workers employed, raw materials used and finished products processed are arranged in accordance with a single industrial classification, more effective study of the various industries is possible.

Standards that are to enjoy general acceptance should be formulated in consultation with specialists in the respective fields. Technical committees are the most appropriate instruments for this work. They may be set up for the exclusive purpose of drawing up such standards and convened whenever improvements appear necessary or special problems arising from their application require solution. International sources, referred to below, should be utilized whenever possible.

The responsibility for implementation should rest with the chiefs of the subject-matter divisions; however, a separate central unit referred to below must monitor the implementation. If successfully implemented, the standards will promote the integration of statistics. To facilitate implementation, manuals should be prepared for each major standard classification system.

It is not always appreciated that the uniform implementation and updating of the various classifications, and the maintenance of coherence between them, require continu-

[2] This is the limit set in some countries having such a provision.

ous attention and negotiation with the suppliers and users of the data. This is particularly important in countries undergoing rapid changes and economic development. If possible, a full-time staff should be assigned to this function which, being one that pervades all statistical fields, is logically located at the centre under the over-all direction of the person in charge of integration. The same staff should ensure that no questionnaire or plan for a statistical project deviates from the standards, unless specifically authorized.

Through international co-operation a number of standards have been developed, particularly during the post-war period. Internationally recommended classifications exist for industrial activities, commodities, occupations, socio-economic groups, educational institutions and educational levels attained etc. Descriptions of a number of important standard concepts are also available. These classification standards and concepts can be extremely useful, even though at times further detailing or some adaptation may be required to meet the specific needs of individual countries.[3]

## E. National accounts and similar frameworks

The national accounts and balances represent a system of standard concepts and classifications applicable to the most important macro-data of economic statistics and characterized by the fact that all concepts are interrelated within a system of definitional relations. While the prime objective of these accounts is to serve as a basis for economic analysis, they can also be used as a powerful tool for integration of economic statistics. In addition, as already indicated, they represent a useful frame for developing statistics, facilitating the identification of gaps and the setting of priorities in quantitative perspective.

The comprehensive international standard systems of national accounts and balances (the System of National Accounts and the System of Balances of the National Economy) comprise production accounts, input-output tables, income accounts and capital finance accounts. Thus production statistics, income statistics and financial statistics can be integrated within these systems. Analogous in its use for integration is the international framework for socio-demographic statistics that is now in the early stages of development. This may become a valuable tool for integration of socio-demographic statistics.

The usefulness of such frameworks as tools for integration depends on the degree to which agencies preparing the primary data adapt their definitions and classifications to fit into them. Steps should be taken to motivate all producers of relevant economic and social statistics in the agency to do so.

It is a great advantage for these integrating frameworks to be developed in the central statistical office of a centralized national statistical service or in the co-ordinating body of a decentralized statistical service. However, it cannot be taken for granted that merely because these frameworks are prepared within a central statistical agency, they will automatically serve as integrating instruments. To carry forward the unifying influences of the frameworks, special machinery must be established, as indicated in chapter I. It may be added here that the units responsible for elaborating the national accounts and balances and similar integrating frameworks should be assigned a particularly important duty in regard to data improvement and integration. At regular intervals they should carry out analyses of the quality of existing data, including timeliness and the need for specific additional data, and of the improvements in quality. In addition, they should indicate to the relevant subject-matter units all inconsistencies, errors or other weaknesses detected in their use of the primary statistics.

## F. Organization of internal and interagency integration and co-ordination

Much of the material in the present section also appears elsewhere in the *Handbook* but, in view of its importance, it is summarized here.

Within a statistical agency, the responsibility for integration rests, of course, with the head. In large offices, in particular, this major function is not likely to receive the attention it requires unless it is clearly identified as a distinct function and is delegated to a deputy with appropriate experience who can devote full time to it, without being diverted by operational or other duties. Some of the tools of integration, for example business registers and the national accounts and balances, may be located in the appropriate divisions or branches but the over-all responsibility for ensuring that these tools are utilized effectively for agency-wide integration must rest at the centre.

A central staff will be required to assist with the implementation of the integration function. The size of this staff will depend on the size of the agency. It will also depend on the degree to which functions are centralized, since the functional units—for example, sample surveys, systems and programming, dissemination etc.—can be utilized for purposes of integration. In general, the less the degree of functional centralization, the more the integration must be carried out directly from the centre and the larger the staff required for this purpose.

If the agency is also responsible for the integration of the whole national statistical service, the head of the agency, or the deputy, should do the utmost to ensure that the integration function pervades the whole service. The central unit should be staffed to facilitate this. Moreover, special arrangements, including various committees, will be required.

Clearly, other things being equal, it is easier to carry out integration effectively in a centralized national statistical service than in a decentralized one. One very important reason for this is that the problems of confidentiality and access to micro-data needed to carry out effectively the integration function are much more difficult to overcome in a decentralized system, although the idea of "statistical enclaves" may provide some solutions.[4] Another reason is that a central statistical office covering a large number of subject-matter fields lends itself better to functional centralization, which in turn, can be used to promote integration.

If a national statistical system is decentralized, it is essential to establish a strong central co-ordinating body to promote the integration of statistics and co-ordination of activities.

Some of the integration tools can be located in the co-ordinating body—in particular, responsibility for central registers of statistical units, central review and control of questionnaires and statistical standards. Placing the responsibility for the national accounts and similar frameworks, the field services etc. in the co-ordinating body would further strengthen its ability to carry out integration. Alternatively, these functions may be located elsewhere but

[3] For a detailed "List of international standards, concepts, definitions and recommendations", see *Directory of International Statistics* (United Nations publication, Sales No. E.75.XVII.11), part three. Revision in preparation.

[4] Joseph W. Duncan, "Confidentiality and the future of the U.S. statistical system", *The American Statistician*, May 1976, p. 58.

under over-all control of the co-ordinating body in regard to their integration aspects. If field services are not centralized, surveys requiring such services and carried out by different agencies may be co-ordinated by instituting a survey control unit similar to the questionnaire control unit described in section C. In the United Kingdom, such an arrangement has proved to be very useful. Additional strength may be provided if the co-ordinating body controls the budgets and to some degree the priority setting of the statistical agencies, for instance by means of a system of planning that embraces all statistical agencies.

To be effective, the centralization of functions in the co-ordinating body of a decentralized statistical service requires some legal authority, provided either by executive order or by law. At any rate, to the extent that interagency access to micro-data is required for the development of coherent statistical data bases, legislation is needed to take this into account and to provide the necessary safeguards to protect confidentiality. The solution to this problem will depend upon many factors, including the constitutional and administrative structure of the government. However, although legal authority may be necessary, it is not sufficient. A formal centralization of functions alone will not lead to the effective execution of the integration function unless the co-ordinating body can provide strong leadership and secure the full co-operation of the various agencies.

The more that functions of the kind described above are assigned to the co-ordinating body and the more suitable the legal or administrative provisions are for effecting appropriate interagency access to data for statistical purposes, the more effective will integration be and the less may be the need for a separate permanent national co-ordinating council. However, interdepartmental and federal/provincial co-ordinating committees are helpful in promoting over-all integration and co-ordination for the statistical service as a whole. Co-ordinating councils or advisory commissions frequently exist in relatively decentralized systems and are designed, *inter alia*, to bring together the representatives of a number of statistical agencies located in different branches of government. Through this representation, the various agencies should feel equally responsible for integrating the system of official statistics and should therefore participate wholeheartedly in activities directed towards that objective.

Special committees with representatives from interested agencies may be required to solve problems in a particular statistical subject or technical area, for example the committees on vital and health statistics established in many countries. The formation of such committees, as in the case of the national councils of statistics, arises from the desire to bring together a group of people concerned with the same problems in order to solve them co-operatively. These committees may be permanent, created by special laws or decrees, and may act with wide powers in their field of responsibility; on the other hand, they may originate in informal agreements among the various agencies or have a temporary status to solve given problems.

The national statistical conference is another type of body that can be used for interagency co-ordination. These conferences, composed of representatives of all agencies in charge of statistics and of regional and local statistical offices, do not work on a continuous basis but meet periodically. They may be convened to discuss fundamental problems affecting the entire national statistical service, over-all programmes of official statistics, relations between the offices of the national government and those of regional and municipal governments, adoption of standard classifications for general use and training and regulation of statistical personnel. They may also be convened to solve problems in particular fields, such as vital statistics, agriculture and public finance. Generally, such conferences do not study the problems of detail met and solved in the everyday work of statistical offices, where the committee mechanism is particularly useful.

# Chapter XIV

# PLANNING

## A. Need for planning

The day-to-day pressures and periodic crises confronting top management of a statistical agency and, in particular, the obstacles it has to face in its endeavours to build up basic elements of its external and internal capability may absorb all its energies, leaving little time for planning. This is most likely to happen in the earlier stages of evolution of a statistical agency when its expansion may be "beset by all the problems of development—inadequate manpower and financial resources, lack of experience and unclear objectives"[1] but it also occurs in well-established offices. Yet it is vitally important to establish a visible over-all planning function at the earliest possible moment to ensure that appropriate planning takes place in the various sections and divisions as well as at the centre.

Planning is, of course, involved at various stages of the statistical process—at the design stage of projects to ensure that the outputs are as effective as possible, at the execution stage of projects to ensure that the various steps in the production process are carried out on time and efficiently and so on. Planning is also involved in making changes in the internal organizational structure and in the degree of centralization to ensure that the implementation of the changes takes place at a time when the statistical agency has adequate resources to carry them out effectively.

Efficient and effective utilization of new resources for strengthening the capabilities of the agency and changes in the allocation of available resources between programmes and activities involve comprehensive and sustained planning. Such product and resource planning is needed to give direction and purpose to the further development of an organization.

The over-all plan may consist of a multitude of interrelated modules covering the further development of or major changes in the various subject-matter fields encompassed by the statistical agency (population statistics, social statistics, national accounts, manufacturing, trade, prices, labour etc.), the various functions (field organization, personnel including training, dissemination, research and analysis, computerization etc.) as well as office accommodation, finance, legislation etc. Ideally, the plan should be accompanied by procedures for monitoring and evaluating progress in relation to targets; however, even when this cannot be carried out systematically and even when many targets have to be altered because of changing circumstances, the planning activity can engender a perceptive, purposeful and unifying atmosphere in the statistical agency.

Over-all planning is particularly important in statistics because of *(a)* the need to ensure that the detailed data are designed within an integrated framework so that they can be used for a large variety of aggregations and cross-classifications; *(b)* the long intervals involved in producing new data or improving substantially existing ones; *(c)* the need to ensure that outputs are timely and that balance prevails between statistical programmes; *(d)* the need to ensure that the statistics are relevant to emerging needs while at the same time maintaining continuity in them so that current issues can be seen in historical perspective; and *(e)* the far-reaching impact of the computer on the character of the operations and outputs.

Thus a general planning orientation is essential for effective and efficient management and the integration of activities and statistics. Each statistical project must be thoroughly planned. The selection of projects to be implemented must be made well in advance of implementation, within the context of a general framework, and the human and other resources required by the projects selected must be balanced against the resources available. In particular the expenditure required must not exceed the financial budget. Moreover, activities must be scheduled so as to avoid bottlenecks in the various phases of the statistical production process. Last, but not least, the dissemination of statistics must be planned to avoid delays.

The present chapter deals with planning in all these fields and with the manner in which planning may be organized. Project planning is discussed first (sect. B). Then a system of over-all planning is described, based on a long-term plan of a "strategic" nature (sect. C), a medium-term plan of a more "tactical" nature (sect. D) and a short-term "operative" plan (sect. E). The major objectives of planning are *(a)* to facilitate systematic and consistent priority setting, *(b)* to supplement the tools of integration and co-ordination and *(c)* to involve as many staff members of the statistical agency as possible in the priority setting and the integration function. Staff members should feel that the plans and their implementation are not imposed upon them from above but are part of their own regular work.

The substantive objectives of planning should reflect the concerns of the society, even though some concerns are formulated vaguely (e.g., the quality of life) and the conversion from these concerns into practical statistical programmes is often difficult; and even though the statistical implications of many concerns overlap, while some are broad enough to justify almost all statistical programmes, for example economic growth and its concomitants and the elimination of regional economic and social disparities. In countries with well-established national planning agencies, many of the national concerns are distilled in the national plans which therefore provide a framework for the statistical plan. In developing countries in particular, it is of great benefit to statistical development for the statistical plan to reflect the concerns to which the national development plan is addressed. Indeed, efforts should be made to include the statistical plan as a part of the national development plan.

## B. Project planning

To carry out a census or a statistical survey effectively and efficiently, careful planning is needed. For instance, the

[1] S. S. Heyer, "Development planning and statistical organization" (ESA/STAT/AC.1/8), paper prepared for the United Nations Interregional Seminar on Statistical Organization, Ottawa, Canada, 1973, p. 9.

planning of a population census should begin several years ahead of the data collection. Experience in many countries indicates that insufficient planning causes delays in the publication of results and in other respects makes the results less valuable; in the case of population censuses in particular insufficient planning causes serious diversions from the regular activities of the organization. Such diversions can be avoided, or at least reduced in the extent of the damage they cause, by appropriate planning. Again, analysis of the causes of delays in releasing census results often shows that much work that could have been done in advance of the data collection has in fact been carried out afterwards at the expense of timeliness and efficiency. Moreover, insufficient time allowed in advance for the survey frame, the sample design, the questionnaire, the instructions to interviewers etc. may impair both the relevance and reliability of the statistics produced. If the various operations of the statistical production are well planned, the results are likely to be more valuable and less costly than they otherwise would be.

Computerization increases significantly the need for detailed and comprehensive advance project planning in the specifications of survey design, data inputs, processing and outputs. Furthermore, the computer has introduced major economies in carrying forward the statistical production process to include various ratios, regressions and a multitude of analytical operations; these developments too should be planned in advance. The development of large projects, therefore, involves interdisciplinary participation from the outset to ensure that the right considerations are taken into account and are included in the specifications. Thus it is necessary in the appropriate phases of the statistical process to envisage, more than was done in the past, the use of the skills of the mathematician, demographer and econometrician as well as those of the subject-matter expert and computer analyst and programmer.[2]

Some preliminary project planning is required even before the selection of a project is finally approved by the top management. Priorities cannot be set without the preparation of some kind of pre-project plan, for instance in the form of a verbal project description. This means that when a subject-matter division proposes a new inquiry the division should submit a document to the management that *(a)* provides some background information for the proposal made, *(b)* specifies objectives of the inquiry proposed, *inter alia*, by indicating the users who are likely to benefit, *(c)* suggests method and procedure, *(d)* explains relationships to other statistics planned or currently produced; and *(e)* provides a rough indication of the resources and time required. Such a project description should be developed in consultation with the functional units with respect to the methodology proposed, availability of necessary capacity, assessment of reasonableness of cost estimates etc. as a basis for the discussion between the top management and representatives of the subject-matter division so that it can be decided whether the project should be rejected or approved for inclusion in the medium-term plan discussed in section D.

When data collection begins, the project plan should include, *inter alia*, a final formulation of the objectives aimed at, a detailed description of the methods and techniques to be applied, a finalized questionnaire with guidelines (and if interviewers are needed, finalized instructions to them), instructions for editing and coding, a preliminary tabulation plan enabling initiation of systems analysis and programming, a plan for publicity and public relations, a specification of the publications to be prepared, a preliminary plan for the storage of data, a time schedule for major steps to be taken in the further work and last but not least, a thorough estimate of costs. Thus while the project plan need not be complete, it must have been carried far enough so that further planning, partly by the subject-matter division itself and partly by the various functional units concerned, can be completed when required for the operations subsequent to data collection. The project plan, when completed, should describe the data collection and processing in sufficient detail.

The methods, techniques and procedures chosen should depend upon the kind of statistics to be produced, the prevailing local circumstances, the machinery and equipment available and, not least important, the size and quality of the staff available. Comprehensive literature is available on this subject, *inter alia*, a number of publications issued by the United Nations, including international standard definitions and classifications, recommendations on the development of statistics in many fields and manuals for conducting major statistical operations.

It is beyond the scope of the present *Handbook* to deal with these topics. However, it must be emphasized that the literature referred to may be of great value to project planners and that the library of a statistical agency should at least include all relevant United Nations publications and references to other relevant literature. There is also available a considerable literature on the methods of project planning—for instance, on the use of flow diagrams, network analyses, systems analysis etc. Planners of statistics may well profit from a study of such literature. However, in the last analysis, planning has to be based to a large degree on common sense and experience.

Project planning is a creative activity that so far has not been sufficiently formalized. Considerable experience in the production of statistics is the most important single kind of competence needed. Only such experience can provide much of the knowledge needed and generate the attitudes required. Perhaps the most important attitude of a project planner is the recognition that only a limited amount of relevant and reliable data can be obtained from respondents and that great care must be taken not to exceed the limit.

The project planning, particularly the design of the statistical product, should as a rule be the responsibility of the subject-matter division concerned, which should work in collaboration with functional units, the latter preparing plans for the services they are supposed to provide and being fully involved in the method of production chosen, the scheduling of activities etc.

However, the subject-matter divisions may not always have the staff to prepare sufficiently detailed plans for large projects. In such situations, assistance from outside the division may be needed. One way of satisfying such needs is to have a small centrally located staff of planners whose function would be to assist subject-matter divisions in project planning on a temporary basis, for instance as project managers or as members of project groups. If only relatively few sufficiently qualified professionals are available for project planning, placing some of them in a central unit of planners may provide greater flexibility and increase the capacity for this kind of planning. However, work that can be carried out by staff members of the divisions responsible for implementation should not to any extent be done by a centrally located staff.

[2] See also articles by W. E. Duffett and S. A. Goldberg, "Planning and co-ordination of statistical programs in a central statistical office", *Bulletin of the International Statistical Institute* (Washington, DC), vol. XLIV, book 1 (1971), pp. 119-121; and I. P. Fellegi and S. A. Goldberg, "Some aspects of the impact of the computer on official statistics", *Bulletin of the International Statistical Institute* (London), vol. XLIII, book 1 (1969), pp. 168-173. The discussion assumes that the statistical agency has administrative control over the computer but the points made are substantially applicable where this is not the case.

### C. Long-term planning

The prime objective of this kind of planning is to clarify what new statistics should be produced in the long term and what quality requirements should be aimed at both for new and ongoing projects, *inter alia*, in the light of the need for integrated statistics. A long-term plan for development of new and improved statistics may in particular be useful for co-ordination and integration of censuses and intercensal surveys in fields where both are employed. For this reason a long-term plan may extend over a 10-year period. Such a plan may also be useful as a means of accommodating users whose needs cannot be satisfied in the short or medium term but who can be informed that the statistics requested by them have been included in the long-term plan.

Preferably, a statistical agency should formulate some long-term guidelines for all aspects of its activities. They should cover not only the products of statistics but also research and analysis, dissemination of the statistical information, personnel development, education and training, office space, machinery and other equipment, and last but not least, development of the organization and the management procedures to be followed within the agency. Presumably, in most statistical agencies the management has some ideas on all of these aspects; however, they are seldom considered in context and spelled out explicitly in an over-all plan. More frequently a long-term plan is formulated for one aspect, perhaps with some reference to the others, while the long-term relationships between all relevant aspects tend to be overlooked.

Both the preparation and the existence of an over-all plan can provide perspectives that may improve decision making at all administrative levels of the statistical agency. The particular tasks of long-term planning are *(a)* to foresee circumstances that are likely to occur many years ahead but that are also important for current decision making and *(b)* to ensure that necessary provisions are made to achieve goals that are attainable only in the remote future and that cannot be realized without such provisions. Task *(a)* may, for instance, involve a projection of the supply of qualified statisticians in, say, 10 years on the assumption that the statistical agency does not actively engage in education and training. Task *(b)* may require that the agency clarify what kinds of education and training it must provide in order to obtain the desired supply of statisticians. Long-term planning may stimulate decision makers to take more relevant factors into account and, if properly organized, generate contributions from subordinates and improve work relations. The existence of long-term plan documents may improve medium- and short-term planning and thereby current decision making; such documents may provide formulations that can be utilized repeatedly for public relations purposes and for dealing with the parent ministry or other governmental bodies.

The presentation below is confined to long-term product planning. This part of an over-all plan being most important for the effectiveness of a statistical agency, it can hardly be neglected without injury to the development of statistics. At any rate, long-term planning should begin with the elaboration of a plan for the product mix, based upon an analysis of the likely development of the needs for statistics and of the technology and methods expected to be applied. However, it may be limited to the development of new statistics and to existing statistics that need to be modified or possibly discontinued.

In such a plan, numerical indications of the input requirements are not needed. It may be sufficient to give a verbal description of the new projects planned, indicating their names and the kind of statistics involved, the groups of users for which the information is intended, the benefits expected and the likely burdens of data collection. If relevant, the plan should indicate both the kind of direct benefits the statistics would yield for the users and the indirect benefits that may be expected from possible improvements in the system of statistics as a whole. For new statistics, the plan should also suggest the points of time for *(a)* the start of the project planning and *(b)* the initiation of the project implementation in accordance with the project plan, the latter not as yet perhaps entirely completed. Points of time for existing statistics to be modified or discontinued should also be indicated. Even a rough indication of such time schedules may be useful for clarifying the inputs that the production of such statistics requires or, even more important, for planning the investments that have to be made a long time ahead in order to make possible the data processing desired.

The preparation of a long-term product plan should be organized as a joint task of the top management and the management of the various subject-matter and functional divisions of the statistical agency. As a first step, the top management should formulate some broad statements on statistical policy, after discussion with all division chiefs and, if possible, also at meetings where all interested staff members can take part. Then the subject-matter divisions may be asked to indicate in a form such as that described above the most important new statistics and changes in existing statistics that they consider feasible for implementation during the period. Sufficient time should be allowed for this process so that there can be discussions with representatives of both the users and suppliers of data, and also the necessary contacts with top management, advice from the functional divisions concerned and deliberations with interested staff members elsewhere in the agency. If a permanent advisory committee is established for an area, the plan for this area should be submitted to the committee for consideration. The results of these considerations should be summarized in documents for submission to the head of the statistical agency. The top management should consider all proposals in context and emphasis should be placed on priority setting, as far as possible based on benefit judgements. Although this may lead to adjustments of the timing proposed, until cost estimates are received, only projects whose benefit obviously is too low should be rejected at this stage.

A limited product plan of this kind can normally be expected to have a long duration, while its preparation requires a great deal of time and qualified personnel. However, if after some years major changes have taken place—for instance, in the demand for statistics, in statistical methodology or technology, in feasibility of data collection or in the allocation of resources for statistics—the preparation of an entirely new long-term plan may be called for. In the meantime adjustments may be made periodically by, for example, the addition of new projects and the deletion of projects formerly included.

The extensive work involved in over-all long-term planning and the fact that additional work has to be done on the plans, described below, means that for many statistical agencies this kind of planning may for some time have to be limited to product planning. However, as soon as possible, similar efforts should be made to prepare plans for major functions. In countries in which statistics are highly decentralized, long-term planning of the organizational development is particularly important in view of the ever-increasing need for an integrated system of official statistics.

### D. Medium-term planning

A major purpose of a plan for the medium term, i.e., a

period of four to five years, is to enable more detailed and realistic priority setting to take place than is possible for a longer period ahead. Another purpose is to facilitate the co-ordination and integration of statistics. Priority setting, co-ordination and integration can be significantly improved by means of the planning procedures described below. A medium-term plan is also an effective means of communicating the policy of a statistical agency both to its own employees and to interested users. To achieve these purposes, a medium-term plan should detail all projects requiring human and other real resources; both the need for and the expected supply of resources should be indicated. This is necessary in order to consider all projects in context and to effectively control the feasibility of a plan. Preferably, such a plan should be expressed in numerical terms for both outputs and inputs and it should be based on statistics for past years that provide information on relationships between outputs and inputs. The plan must conform with these statistics so that planned outputs can subsequently be compared with realized outputs.

The outputs of a statistical agency are difficult, if not impossible, to measure. Due to the lack of market prices, output estimates in terms of money are precluded and, so far, no satisfactory solution has been found for estimation of volume indices of these products. Furthermore, the end product of statistics is the benefit of their use and, as explained in chapter XII, the possibility of making numerical estimates seems even more remote. While some kind of product measurement should be attempted, and judgement of the benefits cannot be avoided, indicators of volume such as the number of pages of the publications issued have become increasingly unsatisfactory and even misleading, as photocomposition which permits the showing of more statistics in less space is introduced. Moreover, in more developed statistical agencies there may be a trend to reduce the number of printed pages and substitute instead a high level of capacity to produce tailor-made output for particular users. Once a clean micro-data base is achieved, and given the existence of suitable generalized retrieval programmes, an almost infinite number of tables can be generated. On the other hand, the inputs into the statistical production process are much easier to measure. Human and machine inputs can roughly be accounted for in hours; cost estimates of these and other inputs can also be made.

There are, of course, many approaches to a system of numerical planning and the choice between them may depend upon circumstances in the statistical agency concerned. The approach described below is, in fact, practised by a central statistical office of medium size, characterized by a relatively high degree of functional organization and having more than a decade's experience in quantitative planning of official statistics.

One may presuppose that the agency has established quarterly *ex post* statistics on human-hours and machine-hours used for each statistical project in total, classified by major work operations or functions; preferably, the annual costs of each project should also be estimated. Furthermore, for existing projects the points of time when publications are completed should be properly recorded; in addition, although not useful as a measure of product volume, it may nevertheless be useful to keep a quarterly record for each project on the number of printed pages of the publications ready for reproduction.

The medium-term plan should specify for every project outputs and inputs in each quarter of the first year and in each year of the remaining part of the plan period. In addition, for ongoing projects, corresponding estimates for the current year and *ex post* statistics for the preceding year should be prepared in order to enable comparison with past experience.

The subject-matter divisions should, for both ongoing and new projects, prepare estimates of the human-hours and machine-hours to be used, both in the division itself and in the functional units from which services are required. The prospective input of services from functional units should be estimated by them in co-operation with the subject-matter divisions concerned. The subject-matter divisions should specify for each project requiring new project planning, the input of human-hours needed. It is very important that such "planning of the planning" be done, because otherwise sufficient resources for project planning may not become available. Furthermore, the division should indicate for each project the prospective quarter or year when a publication is expected to be completed, preferably with an indication of the number of pages aimed at. Information on publication plans is required by, among others, the functional units in charge of reproduction and dissemination.

The projected human-hours and machine-hours for the various projects as well as the data on publications should be aggregated for each division and for the agency as a whole. The input of human resources and machine capacity required should, of course, not exceed the resources expected to become available. To ensure this the likely prospective supply of human-hours and machine-hours must be separately estimated and the aggregate output and its input requirements must be adjusted accordingly. If at the outset the aggregate input requirements exceed the supply, which often occurs, some outputs must be postponed or reduced in scope. To bring about such a reduction of the outputs, a successive approximation or iteration process must take place. To facilitate this process an administrative procedure with a firm time-table for the preparation of the plan should be established and adhered to. Three major stages should be indicated in this schedule, as follows:

(1) The head of the agency, after deliberations with the staff, submits to all divisions a document containing statements on the statistical policy and objectives to be pursued, guidelines on techniques and procedure for the planning work and a preliminary indication on how many staff members each division can expect to employ in each year of the plan period;

(2) The divisions prepare proposals for plans of a kind already described, for submission to the head of the agency. Before submission, the proposals should be discussed both within the divisions and between each division and representatives of the users. The plans should be prepared in the form of standardized tables with the data mentioned above, a statement on the objectives aimed at by the division, an explanation of major assumptions made etc. The objectives stated in the medium-term plan should conform with those advocated in the long-term plan and the selection of projects for the medium-term plan should be made in the light of those included in the long-term plan, provided that the latter is relatively recent. The plans should be supplemented by a brief verbal report on its implementation during the current year;

(3) The top management examines these documents in context for the entire agency and makes decisions on the projects to be included in the final plan, but not until detailed discussions have taken place between the top management and the representatives of each division.

The procedure described provides an opportunity for the head of the statistical agency to examine in context the entire field of statistics for which he or she is responsible in co-operation with *(a)* the chiefs of the subject-matter divisions and members of their staff, *(b)* the chiefs of the functional divisions and members of their staff and *(c)* the assistant directors and, possibly, other key members of the staff. For this purpose a series of strictly scheduled meetings should be held separately with each division. The procedure

further provides an opportunity for the division chiefs to examine their entire subject-matter field of statistics in context and to carry out the deliberations and negotiations required with both superiors, subordinates and users. The division chiefs should arrange special meetings with their subordinates. All this provides an excellent basis for overall priority setting and for co-ordination, both horizontally and vertically, along time as well as across time. It also makes possible a systematic balancing of resources and evaluation of needs of the kind discussed in chapter XII and provides an opportunity for effectively utilizing the tools of integration described in chapter XIII.

In the course of this iterative process, the final plan gradually takes shape. Decisions tentatively taken at the early stages of the planning procedure may be modified as the work proceeds. It may, for instance, be decided to change more or less the original allocation of human resources by divisions in view of new information received. This information may even justify a proposal for an increased budget (or increased allocation of staff).

When, after the final iteration, the content of the medium-term plan has been determined, a document should be prepared for submission to the entire staff describing the major objectives aimed at and the basic ideas upon which the plan is based, highlighting interesting aspects both of the statistical content and of the methods and inputs to be used, and finally indicating major lines of action that must be taken in order to implement the plan. Such a document may also be used as an instrument for communication with interested users.

Once a year the medium-term plan should be rotated. This means that a new plan is prepared with revised estimates for all years covered by the current plan, with new estimates for an additional year, and with a breakdown by quarters of the revised estimates for the first year of the new plan (the second year of the current plan). In fact, this implies that the data for the first year of the rotating plan represents an annual plan with quarterly specifications and thus forms a fundamental part of the short-term plans described in section E.

Preparation and implementation of a numerical medium-term plan of the kind described above absorbs human resources at almost all levels of an agency. In particular, the head of the agency must devote a good deal of time to formulation of the policy statements and objectives, to deliberations at the last stage of planning and to formulation of the final document. He or she must also study carefully the reports on implementation and initiate corrective actions whenever required. On the other hand, he may save much time which he would otherwise have had to spend on priority setting, co-ordination and monitoring on an *ad hoc* basis. The resources absorbed are likely to be largest the first time a plan is prepared. As long as the conditions underlying the plan remain relatively unchanged, the annual rotation may be relatively simple, with main emphasis on data for and problems related to the current and one subsequent year. Many of the estimates for future years may not need to be changed at all. However, after some years the conditions are likely to change so much that a new long-term plan needs to be designed; this provides an opportunity for reconsidering carefully the estimates for all years of the medium-term plan. Whenever a new medium-term plan is being prepared—for the first time or subsequently—it is a great advantage to be able to base it on a long-term plan.

If the preparation of a numerical medium-term plan does not seem practicable, an alternative may be to formulate a written plan for the medium term. This may also improve priority setting and promote co-ordination (although not as much as a numerical plan), provided it is discussed following the general procedures outlined above. Clearly, a written plan is better than no plan at all.

In summary, a numerical medium-term plan has the following advantages:

*(a)* It can better ensure that the use of resources is planned in conformity with the expected supply and can reduce, if not eliminate, the risk of waste and delays by initiating the production of statistics for which sufficient resources are not available;

*(b)* It provides a more precise basis for priority setting, since every statistical project can be evaluated in context and in the light of the cost estimates made;

*(c)* It facilitates much better co-ordination of activities within the statistical agency and thus a substantially higher degree of statistical integration. Furthermore, since the work-load of the functional units depends on the services demanded of them, they must make estimates of this demand in terms of human resources, computer time etc. on the basis of product specifications supplied by the subject-matter divisions. A numerical plan enables them to make provisions for such resources well in advance of operations and bottlenecks and delays in the production of statistics can better be avoided or at least reduced. Capacity in excess of product requirements can be deliberately planned for in order to avoid bottlenecks, facilitate experimentation and satisfy unforeseen needs;

*(d)* It permits *ex post* monitoring and is thus a useful tool in the implementation process. The opportunity to compare numerical data on the planned use of the resources with similar data on the actual use reduces the probability for misinterpretations of the achievements and enables the management to evaluate precisely to what extent plans have been followed up so that early action can be taken if the resources needed have been underestimated, if too little has been done etc., as explained in section E. It also enables managers, particularly the top management, to delegate substantially more authority to subordinates.

Advantages *(a)* and *(b)* mean that the setting of objectives, particularly priority setting, can be better performed on the basis of a numerical plan than with qualitative information only; advantages *(c)* and *(d)* mean that the possibilities of statistical integration and co-ordination of activities can be improved. These advantages, which also apply to the short-term planning discussed below, may be more than enough to justify the efforts that the establishment and implementation of a numerical planning system require.

### E. Short-term planning

The main function of the short-term plan is to transform the long-term and the medium-term plans into action. Tools for the performance of this function are *(a)* a time schedule for activities to be performed in the various divisions of the statistical agency, *(b)* the quarterly estimates for the current year included in the medium-term plan and the corresponding *ex post* statistics and *(c)* quarterly meetings on *(a)* and *(b)*.

For each project included in the medium-term plan, a time schedule should be prepared indicating the date of initiation and the date of termination of the operations performed by each of the various units taking part in the project. Before such dates are recorded in the schedule, they should be agreed to by the parties concerned. The work flow within the subject-matter divisions, between these divisions and the functional units and between the latter should be described in the schedule in the form of specifications for the various operations to be performed.

The preparation of time schedules should be synchronized with the annual rotation of the medium-term plan as regards both new and ongoing projects. For the latter, schedules for the current year may largely be copied for the next year. For new projects, great care should be taken to indicate dates that are not only desirable but realistic.

For each project, a comparison between the plan and the actual development should be made once a quarter as soon as the *ex post* data for the quarter become available and the deviations between the plan and the actuality have been computed. The deviations, expressed in human-hours and machine-hours as regards inputs and in time units as regards outputs, should be analysed and interpreted in order to ascertain their likely causes. Particularly, attempts should be made at clarifying to what extent a deviation is due to *(a)* errors in making the plan estimates, *(b)* unforeseen circumstances, *(c)* adjustments in the plan due to re-evaluations during the course of the year or *(d)* failure of those responsible to implement the project as planned. Major deviations due to *(b)-(d)* should be reported to the head of the agency for consideration as soon as it is detected that they are likely to occur.

To ensure efficient implementation of both the medium-term plan and the time schedule, a separate meeting for each subject-matter division should be held once every quarter as soon as all relevant *ex post* data for the preceding quarter are available. The purpose of these meetings should be to solve problems causing delays, make decisions on priorities that this may require and take other actions necessary for implementation of the medium-term plan. This can be done on the basis of the information provided on deviations occurring between plans and achievements, i.e. deviations from the quarterly plan figures and deviations from the schedule. Their causes should be discussed in the light of their implications for decision making. The deviations from the schedule may require agreements on possible new dates for subsequent operations. At these follow-up meetings, the top management, the subject-matter division and the functional divisions concerned should be represented. Each subject-matter division should keep records of the conclusions arrived at and a summary report based on these records should be prepared. After all follow-up meetings the top management, including the head of the agency, should discuss the situation for the agency as a whole on the basis of the summary report and take any necessary decisions.

The functional units should report to the subject-matter divisions, and vice versa, any changes required in the schedule. At some pre-agreed date, they should submit a report regardless of whether the work is proceeding according to schedule.

By means of detailed time scheduling and a follow-up procedure such as described above, the medium-term product and resource plan is transformed into an operational plan. A review of deviations between plans and actual achievements should lead to concrete actions, as deemed desirable by those co-operating on each project.

From the point of view of a subject-matter division, some dates of the time schedule relate to its output and others to its input. The output of a subject-matter division is followed by activities such as reproduction and dissemination and is preceded by a number of service contributions made by functional units. This means that a subject-matter division is dependent at different stages of the production process upon the services of a number of functional units over which it has no direct administrative control. This problem, which was addressed in chapter I, is more serious the greater the degree of functional centralization. However, a system of planning, such as that described above, provides the subject-matter divisions with opportunities for exerting control and the functional divisions with a means of avoiding unjustified complaints.

The routines just described may enable the head of a statistical agency to control implementation of the medium-term plan with a minimum of verbal reports from the chiefs of division. Since the reports are prepared mainly in numerical form and preferably computerized, they need not be submitted more often than once a year. Monthly or quarterly reports in the form of extracts from the schedules may make possible an evaluation of the extent of adherence. For instance, for each publication the planned and achieved dates of completion may be presented, supplemented with the corresponding dates for preceding years in the case of recurrent publications. Furthermore, the expected dates of issue of new publications may be extracted and, if desired, published. Other schedules of a similar kind may be extracted and separately presented, partly to the top management and partly to the division chiefs.

Scheduling of activities may be applied as an instrument of planning even if only verbal medium-term and short-term plans are prepared. In this case the need for scheduling may even be greater. Meetings of interdivisional teams may to some degree reduce the need for over-all formal scheduling; however, such an approach is presumably more time-consuming and costly.

### F. Financial budget

As a rule, a statistical agency must submit to its parent ministry annual proposals for a financial budget for the agency and in the course of the year the agency must submit regular reports on resources spent as compared with the budget. From the Government's point of view, the purpose of this is to control the financial activities and requirements of the agency. To prevent over-spending the agency should, for major items of expenditure, compare actual with budgeted expenditure on a current basis and, at its own initiative, take corrective action if over- or underspending appears likely. Such control is fundamental for the efficient allocation of financial resources and for maintenance of good relations with the ministry. However, the present section is confined to a few remarks on the financial budget as a part of short-term planning.

As already pointed out, the budget authorities may impose constraints on the use of human and other resources not only in the current year but also for the years ahead and, if so, these constraints must be adhered to in the medium-term resource planning. If not, the latter kind of planning must be based on some assumptions on likely prospective budget accommodation. Otherwise the planning might become unrealistic.

If a statistical agency has prepared a realistic numerical medium-term plan, of a kind described in section D, this plan can be used as a basis for the financial budgeting. In fact, a large part of the financial budget can be derived from such a medium-term plan. The need for additional budgetary estimates from various divisions will be relatively modest. Thus there will be an interdependence between medium-term planning and budgeting, which ensures a high degree of conformity, implying that the annual plans and budgets will be co-ordinated and designed under a long-term perspective. This extension of the planning horizon enables the leadership of a statistical agency to obtain a greater degree of influence on its own development. In the short term, events are to a large extent determined by past decisions. However, by making provisions a long time in advance the freedom of action is increased.

## G. Organizational implications

The head of a statistical agency, utilizing the kind of planning described in sections C to E, will need assistance in developing the planning system, organizing the work, formulating the policy to be pursued and controlling its implementation. A highly qualified centrally located officer may suffice to provide a major portion of the needed assistance. Even a large statistical agency should not require many centrally located personnel for the performance of this function. As stressed above, the process of the preparation of plans should be decentralized, as far as possible, particularly in an agency where functions are centralized to a large degree.

In a large statistical agency in particular, as already indicated, the head of the agency may not wish to carry out the over-all integration function himself and may therefore assign this important task to a properly qualified deputy. In this case the planning function could also be delegated to this deputy. However, the head could not leave the performance of this function entirely to a deputy, since it involves a large part of the top decision making and the future directions of the agency.

In a centralized national statistical service the central statistical office should ensure that its plans are coherent with those of the service as a whole. In a decentralized statistical service, the co-ordination of plans prepared by each statistical agency within the service is more complex. A strong, properly staffed, central co-ordinating body with the power to apply at least a number of the tools of integration described in chapter XIII is required to ensure coherence of the plans and their implementation.

## Annex

# REFERENCE MATERIAL USED[a] IN THE PREPARATION OF THE *HANDBOOK OF STATISTICAL ORGANIZATION*


### Introduction

Report and proceedings of the United Nations Interregional Seminar on Statistical Organization. Ottawa, Canada, 3–12 October 1973.

Fellegi, I. P. Functional analysis of an "ideal" statistical system. *Statistical services in ten years' time*, Joseph W. Duncan, *ed.* Published for the United Nations by Pergamon Press, 1978. pp. 61–84.

Economic Commission for Europe, Conference of European Statisticians. An application of functional analysis; current trends in Statistics Canada (CES/382), Geneva, 1977.

### Chapter I. Organizational structure of a statistical agency

Goldberg, S. A. General notes on statistical organization; problems in organization and operation of national income statistics (Paper No. 21.1, revised). Paper prepared for the United Nations International Seminar on Statistical Organization, Ottawa, Canada, 1952.

Moser, Sir Claus. Organisational matters relating to the statistical services in the government hierarchy. (ESA/STAT/AC.1/6). Paper prepared for the United Nations Interregional Seminar on Statistical Organization, Ottawa, Canada, 1973.

### Chapter II. Degree of centralization of a national statistical service

Ripert, Jean. The organization of statistical systems: centralization or decentralization? (ESA/STAT/AC.1/4). Paper prepared for the United Nations Interregional Seminar on Statistical Organization, Ottawa, Canada, 1973.

### Chapter IV. Relationships to users: dissemination of statistical information

Image. Report of a Statistics Canada study group, June 1972. 131 p.

### Chapter VI. Relationships to subnational governments

Mathew, N. T. Organization of regional (or other local) statistical activities and the relationships between them and the central organization (ESA/STAT/AC.1/13). Paper prepared for the United Nations Interregional Seminar on Statistical Organization, Ottawa, Canada, 1973.

### Chapter VII. Legislation

McFarlane, Carmen. Legislation necessary for carrying out statistical activities including confidentiality, the limitation of legal authority and related problems (S1-(16)). Paper prepared for the Seminar on the Organization of a Statistical Service, Munich, Federal Republic of Germany, 1977.

### Chapter VIII. Human skills and training

Szameitat, Klaus. Importance, range and level of human skills in statistical offices (S1-(07)). Paper prepared for the Seminar on the Organization of a Statistical Service, Munich, Federal Republic of Germany, 1977.

### Chapter IX. Censuses, survey capabilities and field organization

Economic Commission for Africa, Conference of African Statisticians. African Household Survey Capability Programme (E/CN.14/CAS.10/18). Addis Ababa, 1977.

Booker, W. L. Establishing a continuing (household) survey and cartographic capability (S1-(09)). Paper prepared for the Seminar on the Organization of a Statistical Service, Munich, Federal Republic of Germany, 1977.

### Chapter X. Computer organization and computerized data systems

Fellegi, I. P. and S. A. Goldberg. Some aspects of the impact of the computer on official statistics. *Bulletin of the International Statistical Institute* (London) XLIII, 1, 1969.

Fellegi, I. P. and S. A. Goldberg. The computer and government statistics. *The role of the computer in economic and social research in Latin America*. Nancy D. Ruggles, *ed.*, Washington, DC, National Bureau of Economic Research, 1974. p. 1-17.

Economic Commission for Europe, Conference of European Statisticians, Working Group on Electronic Data Processing. Automatic files in statistical systems, by Svein Nordbotten (Conf.Eur.Stats/WG.9/52). Geneva, 1967.

### Chapter XI. Research and analysis

Norwood, Janet L. Should those who produce statistics analyze them? how far should analysis go? an American view. *Bulletin of the International Statistical Institute* (Warsaw) XLVI, 1: 420-432, 1975.

Szameitat, Klaus. The role and place of research and analysis in statistical operations (S1-(08)). Paper prepared for the Seminar on the Organization of a Statistical Service, Munich, Federal Republic of Germany, 1977.

### Chapter XII. Priority setting

Statistical organization: the needs of, and relationship with, different kinds of users (ESA/STAT/AC.1/7). Paper prepared by the United Nations Secretariat for the United Nations Interregional Seminar on Statistical Organization, Ottawa, Canada, 1973.

Goldberg, S. A. The demand for official statistics and their utilization in Canada with special reference to the role of the national accounts. *Bulletin of the International Statistical Institute* (Sydney), XLII, 2, 1967.

Shiskin, Julius and Edwin D. Goldfield. Objectives and priorities in statistical programs (ESA/STAT/AC.1/10). Paper prepared for the United Nations Interregional Seminar on Statistical Organization, Ottawa, Canada, 1973.

Goldberg, S. A. How D.B.S. serves the nation. *Canadian chartered accountant*, October 1957.

United States National Academy of Sciences. Setting statistical priorities. Washington, DC, 1976.

Duncan, J. W. Priority setting in the coming decade (survey linkage and integration). *Statistical services in ten years' time*, Joseph W. Duncan, *ed.* Published for the United Nations by Pergamon Press, 1978. p. 103-112.

Goudswaard, G. Some aspects of programming and budgeting statistical activities (S1-(11)). Paper prepared for the Seminar on the Organization of a Statistical Service, Munich, Federal Republic of Germany, 1977.

### Chapter XIII. Tools of integration and co-ordination

Oomens, C. A. The organization and co-ordination of statistical services. *Statistical services in ten years' time*, Joseph W. Duncan, *ed.* Published for the United Nations by Pergamon Press, 1978. p. 45-56.

### Chapter XIV. Planning

Nordbotten, Svein. Long-range planning, progress- and cost-reporting in the Central Bureau of Statistics of Norway. *Statistisk Tidskrift (Statistical Review)* (Stockholm), IV, 1: 11-17, 1966.


[a] The references included below are supplementary to those cited in the chapters themselves.

كيفية الحصول على منشورات الأمم المتحدة

يمكن الحصول على منشورات الأمم المتحدة من المكتبات ودور التوزيع في جميع أنحاء العالم . استعلم عنها من المكتبة التي تتعامل معها أو اكتب إلى : الأمم المتحدة ، قسم البيع في نيويورك أو في جنيف .

如何购取联合国出版物

联合国出版物在全世界各地的书店和经售处均有发售。请向书店询问或写信到纽约或日内瓦的联合国销售组。

HOW TO OBTAIN UNITED NATIONS PUBLICATIONS

United Nations publications may be obtained from bookstores and distributors throughout the world. Consult your bookstore or write to: United Nations, Sales Section, New York or Geneva.

COMMENT SE PROCURER LES PUBLICATIONS DES NATIONS UNIES

Les publications des Nations Unies sont en vente dans les librairies et les agences dépositaires du monde entier. Informez-vous auprès de votre libraire ou adressez-vous à : Nations Unies, Section des ventes, New York ou Genève.

КАК ПОЛУЧИТЬ ИЗДАНИЯ ОРГАНИЗАЦИИ ОБЪЕДИНЕННЫХ НАЦИЙ

Издания Организации Объединенных Наций можно купить в книжных магазинах и агентствах во всех районах мира. Наводите справки об изданиях в вашем книжном магазине или пишите по адресу: Организация Объединенных Наций, Секция по продаже изданий, Нью-Йорк или Женева.

COMO CONSEGUIR PUBLICACIONES DE LAS NACIONES UNIDAS

Las publicaciones de las Naciones Unidas están en venta en librerías y casas distribuidoras en todas partes del mundo. Consulte a su librero o diríjase a: Naciones Unidas, Sección de Ventas, Nueva York o Ginebra.

Printed in U.S.A.
36068—July 1980—3,500
Reprinted in United Nations, New York
11365—May 1990—425

00800

United Nations publication
Sales No. E.79.XVII.17
ST/ESA/STAT/SER.F/28