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THE DEVELOPMENT OF A FIELD SURVEY ORGANIZATION
IN AFRICAN STATISTICAL OFFICES

(Note by the Secretariat)

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Need for a permanent field survey organization, and its main advantages

1. The first two conferences of African statisticians strongly recommended the establishment of permanent field survey organizations in African statistical offices and the need for such organizations was clearly shown by the review of field survey requirements made by the first conference. It has become a common experience of African countries when reaching independence during the last few years to find themselves lacking much of the essential information on the basic sectors of their economies, in particular the private sectors comprising both households and enterprises. Much of this information can only be collected by means of trained enumerators and it is not surprising, therefore, that emphasis is placed by African governments on intensive programmes of field surveys designed to provide the basic information required for the establishment of development plans.
2. It has not yet, however, been fully realised that the establishment of a permanent field survey organization, either as part of the central statistical service or on a decentralised basis in other government departments, is the only satisfactory means by which most African countries can implement a comprehensive survey programme, as can be best seen when considering the cost and efficiency of survey work under conditions prevailing in Africa.
3. The overhead costs of field surveys have been shown by African experience to be an important factor, even though they are often ignored in statistical text books and sometimes omitted from survey budgets. Some of the main items comprising these costs are as follows. At the planning stage of a survey it is not unusual to find that several months are spent by one or more statisticians in testing methods and questionnaires as a result of difficulties encountered in understanding a new rural environment. The training of enumerators at the next stage involves not only the salaries of new recruits for a relatively short period prior to the commencement of the survey, but also a high cost of supervision and instruction which is further increased

by the need to make provision for wastage. It is insufficiently appreciated that recording requiring considerable care and tact, such as that associated with income, expenditure and the weighing of food has to be conducted in Africa by enumerators with a low standard of education. It is not surprising, therefore, that training and supervision are very significant items in the budget of any properly conducted survey. Transport costs, in their turn, cannot simply be assessed in terms of sample size and the geographical distribution of enumerators over wide areas possessing only a thin network of rough roads, but account must also be taken of the time lost by senior staff when travelling under such conditions and the effect of transport delays and accidents. Finally the considerations concerning training, supervision and wastage apply equally to the processing staff and it may take several years to select and train a good team of African computers or machine operators. It will be noted in this connection that a good deal of data collected in past surveys has never been analysed as a result of the lack of proper processing facilities.

4. Among the points mentioned above, the principle factors which must be stressed are the scarcity of professional statisticians to design and conduct surveys and the difficulties encountered in selecting and training field enumerators. In the past, at least in tropical Africa, teams responsible for the design and execution of surveys have often included several professional statisticians. It is easy to justify the need for sharing between several persons the over-head time spent in designing and supervising field work, training enumerators, designing tabulation programmes and in selecting and training processing staff. However, in view of the present scarcity of trained statisticians in Africa, both African and expatriate, it would be unrealistic to expect that such a division of labour will be possible in the wider field programmes which will be required in the next five or ten years. It must be recognised that this will be the principal limitation which has to be kept in mind. Most tropical African countries, with populations ranging from one to three million persons, will not be in a position to assign more than one or at the most two senior statisticians to the conduct of field surveys.

5. The second factor, quality and skill of field staff, will on the other hand present less difficulty as primary education spreads in Africa. It should however be remembered that non-sampling errors, in particular the unconscious biases of enumerators, are likely to raise more significant problems in most survey programmes than sampling errors. This does not imply that the ability of African enumerators is lower than in other continents. They have on the contrary shown a remarkable facility in adapting themselves to difficult tasks, such as mapping a country to obtain a frame, handling a great number of sophisticated questionnaires etc., but it must be accepted that their low educational level adds to the burden of training and, in addition, the illiteracy of the reporting population, especially in rural areas, tends to make the task of enumerators more difficult than in many other parts of the world.

6. It follows from the above analysis that any field organization requires the following characteristics if minimum costs and maximum efficiency are to be achieved.

(a) It must draw on the minimum number of senior statisticians and in many countries should be capable of being operated by a singly professional officer.

(b) Training costs should be kept to a minimum, both for field and processing staff.

(c) Transport costs should be kept to a minimum.

7. These conditions can only be met by a permanent field organization in which a high degree of specialization can be achieved by both field and processing staff over a long period of selection and training and in which there can be considerable standardization of work at all levels in order to relieve senior staff of routine tasks.

8. Within such an organization it is also possible to minimize transport costs by the creation of branch offices to supervise the work of enumerators spread over large areas.

The initiation and development of survey operations.

9. In the foregoing paragraphs the desirability and advantages of establishing a permanent survey organization have been discussed.

It is now necessary to examine the process by which survey work is likely to be initiated and developed.

10. The development of an adequate survey organization is a considerable undertaking, irrespective of whether it functions as part of the statistical service or is decentralized in other government departments and most governments are unwilling or unable to accept the heavy additional expenditure involved in setting up such an organization until they feel an urgent need for the results which it is able to produce. Experience has shown that survey work in most countries is usually initiated in the form of ad hoc projects of limited scope whose nature is determined by government interest in particular topics. Such operations, however, make it possible to establish a nucleus of trained field staff and to obtain experience in recording and practical organization, thus providing the basis for a larger organization when its creation becomes possible.

11. In view of limited budget and manpower resources it must therefore be accepted that, in most countries, expansion of field surveys will be a gradual process. It can be said that the main problem in most African countries is at this stage the transition from a relatively small mobile staff engaged on ad hoc projects to the development of a permanent survey organization.

12. The location of field organizations within the government administrative structure is a further important point. It cannot be denied that many government departments have a close interest in the results of survey work but on the other hand it is necessary for purposes of economy and simplicity of organization to keep field operations under the control of a few agencies as far as is practicable. It is now generally accepted that a statistical field organization can be expected to handle all types of economic enquiry of a general nature which do not closely involve the technical activities of specialized government departments. Its coverage of different subjects can therefore be very wide and the most suitable organization for controlling its operations would, in most countries, appear to be the statistical office.

13. On the other hand, the achievements of agricultural departments in many African countries on the occasion of 1960 World Census of Agriculture show the great advantages of using the agricultural extension staff in many types of

agricultural surveys, including area and yield measurements for annual statistics.

Standardization of methods and procedures.

14. Standardization would, in its ultimate form, refer to the repetition over time of the same types of surveys and the same types of analysis. As has already been pointed out, this would greatly simplify the task of the senior staff of a permanent field survey organization and would result in a high degree of specialization in both field and processing activities.

15. There is no difficulty in applying such a concept to recurring types of survey such as current agricultural statistics. If, for example, an agricultural extension staff is trained in the measurement of areas and crop yields during a given year, it is desirable that the same staff should be used in carrying out the same work in subsequent years. The same can be said for other recurring tasks, such as collection of prices in rural or urban markets, registration of births and deaths, collection of data on consumers' expenditure etc.,

16. Experience shows, however, that it is no simple task for a statistical office to design a highly standardized programme of surveys over a succession of years. The first difficulty is that certain operations, such as censuses of population and establishments, are by definition of a non recurrent nature since they are meant to study existing structures rather than to measure continuous flows. Certain categories of flows, on the other hand, do not lend themselves easily to rigid enquiry methods. The best example is perhaps that of migrations, since the intensity and type of migration, either urban or rural, may differ considerably between areas and between different periods of time. More generally, it has to be accepted that the process of economic development is far from being uniform over space or over time in a given country and it therefore follows that the attention of economic planners will have a tendency to focus at certain times on certain areas, for example, in connexion with regional projects, and at other times on certain problems, such as commercial circuits or food supplies to cities.

17. From the above comments it will be seen that, for some types of enquiry, a high degree of standardization is practicable and amounts to repetition of the project at different periods of time. There are many investigations, however, which cannot be organized on a continuous and highly standardized basis. The problem is how these should be dealt with if the advantages of a standardized programme of work are to be retained.

18. In the first place, many of the investigations in the latter group form large scale ad hoc operations which do not normally come within the scope of a regular survey organization. The censuses of population and establishments mentioned above are two cases in point. These enquiries involve intensive field work over a short period and need more enumerators than can be provided from the permanent staff. They therefore require the creation of completely new field organizations on an ad hoc basis and need not necessarily affect the regular working programme of the statistical office even though the latter may have responsibility for their conduct.

19. For other operations which do come within the scope of the permanent survey organization but which require some degree of individual planning, it is still possible to utilize many standardized procedures with respect to sample selection, recording techniques, analysis and administrative arrangements, so that even though an enquiry may be of a specialized nature much of the very detailed planning is eliminated.

20. Even if a highly standardized survey programme is adopted over a succession of years, there still remains the possibility of introducing a certain degree of flexibility. This can be achieved in three possible ways.

(a) In the first place, if we take the example of current agricultural statistics, it is always possible to concentrate more on certain areas or on certain crops at particular times. This will not change the nature of the tasks of enumerators, i.e. the measurement of areas and yields, but will simply require a different geographical distribution of field staff. Even if it requires the recruitment of additional enumerators it may not entail great training delays if the number of recruits is small and if they can have in-service training in contact with teams of experienced staff.

- (b) In the same way it may often be possible, without undue delay or disturbance, to introduce a measure of change in the content of a standard questionnaire to satisfy new requirements. For example, in an annual questionnaire on manpower it is possible with a low marginal field and processing cost to introduce new questions on the origin or length of stay of workers. The important point in this connexion is that additional questions can only be incorporated in an existing enquiry if they concern factors which do not require a different sample design or recording technique. This is part of the more general question of the extent to which items can be grouped in multi-purpose surveys.
- (c) Finally it seems possible that, while the main part of the survey organization is concentrating on a routine programme of work, a relatively small part of the field strength can be diverted to special tasks of a varying nature. In this way a limited number of additional enquiries into different subjects can be carried out, but the extent to which they can be included in the programme is dependent on the availability of professional staff for planning such operations.

The need for long term planning.

21. A considerable amount of space has been devoted above to discussing the means by which survey methods and procedures, and in some cases, entire programmes can be standardized. This is because it is clear that, unless such standardization can be achieved, the shortage of professional staff in most countries will prevent any significant progress in extending the geographical scope, content and quality of survey work.

22. A further point arising from the shortage of professional staff is the need for long term planning if the continuity of field work is to be maintained. There appears to be sometimes lack of comprehension on the part of planners and economists in respect of the time lag involved in any field survey between the planning stage and the availability of results. If field work is to proceed smoothly it is necessary that there should therefore be close co-operation between the planning organization and the statistical office in order to foresee requirements well in advance. It is not possible to make radical changes in a programme at short notice once it has been established.

Application to a programme of household surveys.

23. No mention has so far been made of specific programmes of household surveys within the context of the more general type of field organization referred to above. It is important to note, however, that such surveys are appropriate for the collection of information on a number of economic flows and therefore lend themselves to the optimum utilization of a permanent field staff and a standardized survey programme.

24. If the Ghana programme is taken as an illustration it will be seen that, among the tasks of the permanent field machinery, household surveys are initially envisaged as the means of collecting information on private incomes and expenditure, to be followed later by more complete quantitative information on household production, consumption, sales and purchases. By these enquiries it will be possible to cover all private consumption, the economic aspects of almost all agricultural activity and many minor forms of enterprise, particularly trading. The general method of enquiry involves a relatively large sample of households which are all visited at intervals of approximately one week for the purpose of recording transactions under main headings and a sub-sample of households which is used to obtain a more detailed classification of household production and consumption. The less frequent visits to the large sample, in addition to providing a general budget account, are intended to show transactions such as investments which occur at irregular intervals, while the more detailed records for the sub-sample deal mainly with items which do not fluctuate so much on a seasonal basis.

25. An example of a different kind can be found in the field of agricultural statistics where an agricultural extension staff can be trained in collecting annual figures of acreages and yields in respect of a sample of households in countries where shifting cultivation prevails and where, accordingly, there is no convenient frame other than a list of households.

26. In the two preceding examples and in earlier parts of this paper it has been purposely suggested that household surveys of consumption and expenditure should be carried out by a permanent field staff attached to a central statistical office, while more specialized enquiries such as surveys of physical data relating to acreage and yield should be carried out by other organizations such as an agricultural extension staff. This is an illustration of the type of problem which has to be considered when building up a permanent programme of surveys in any country. It is not suggested that the above division of labour should apply to all African countries under all conditions, but it must be realised that this type of choice may have far reaching implications. The optimum sampling sizes and therefore the size of the field strength differs considerably for the two types of survey mentioned. Above all, the distribution of field operations over successive months in a given year may differ even more widely. For example, in a cereal producing area the harvesting of a given crop extends over a short time during which all yield surveys would have to be conducted, while the consumption of the same crop may extend over several months or perhaps the entire year. It would therefore seem that, in general, the measurement of continuous flows, such as consumption and expenditure, lends itself ideally to the full time utilization of a permanent statistical field staff, whereas surveys such as those dealing with the yield of cereals would point to the part-time utilization during the harvesting period of a permanent agricultural field staff.

27. Taking these comments into account, and using the classification of household surveys suggested under provisional item 5 of the agenda, it should be possible to suggest a tentative breakdown of household surveys into two categories: Those for inclusion in a permanent programme on the one hand and, on the other, all others, whether they come under periodic censuses or under the general heading of ad hoc surveys without any mention of periodicity.

Permanent programme.

- 1 Under the responsibility of central statistical office
- 1.1 Consumption, expenditure and income patterns in urban areas, for establishing a permanent record of consumption and expenditure aggregates, and in particular for following up fluctuations in the demand for food. This should also provide data for revision of cost of living indices and demand analysis.
- 1.2 Employment data in urban areas, in countries where acute unemployment problems require a periodic report.
- 1.3 Production of handicrafts and, more generally, home enterprises in urban areas when the production of such enterprises is significant.
- 1.4 Income, expenditure and consumption patterns of rural households. This will throw light not only on agricultural activities in countries where no other reliable source of information exists, but also on all other activities of the rural sector (handicraft production, capital formation, wages paid to hired labour, etc.).
- 1.5 Utilization of crops in rural areas. This is particularly useful in areas where the production of crops is a continuous process (vegetables, tuber crops like cassava in wet tropical areas, etc.). Records include amount harvested, sales, purchases, stocks and home consumption for important crops, for a sample of households.
- 1.6 Employment in the rural sector, in countries where the position has to be reviewed frequently.
2. Under the main responsibility of other departments.
(with possible co-operation of central statistical office).
- 2.1 Annual measurement of areas and yield of crops (in countries where the household has to be used as a sample unit).
- 2.2 Dietary surveys. This should be included in permanent programmes wherever the magnitude of nutrition problems warrants a fairly wide programme of surveys. The programme should concentrate by priority on areas or population classes affected by such problems.

3. Other Surveys

- 3.1 Cost of production surveys in the agricultural sector
- 3.2 Labour productivity in agriculture
- 3.3 Housing
- 3.4 Social characteristics of households (health, etc.)
- 3.5 Population censuses, (insofar as the household is a unit)
- 3.6 Agricultural censuses (distribution of holdings by size, equipment, etc...), insofar as the household is a unit.

Problems of sample size.

28. The problem of optimum size is only considered here for a programme of household surveys of a permanent nature under the responsibility of a central statistical office. In such a case, the problem of sample sizes for the different types of surveys included in the programme is closely related to the size of the permanent field strength. The mutual adjustment of programmes of surveys and size of field strength must be considered at two successive stages:

- (a) At the time when budgetary estimates for the survey section (size of field strength, transport costs, etc...) is prepared.
- (b) At a later stage, when preparing an annual programme on the basis of a fixed budget.

29. The solution to the first problem (mutual adjustment of field strength and a programme of surveys) is by definition dependent upon the number and the type of surveys to be included in the programme and the priorities given to these surveys. It should be noted that there will always be a measure of arbitrary judgement in assessing the size of field strength, not only because the necessary background information to compute optimum sample sizes is often lacking but also because priorities in the programme of surveys are sometimes loose.

The best approach to the problem would perhaps consist of taking the following steps:

- (a) determine the optimum sample size for the main survey (or surveys) of the programme.
- (b) derive from the sample sizes the number of enumerators required to reach these sample sizes and then adjust the programme of surveys and the size of field staff.
- (c) increase the number of enumerators by an arbitrary figure to allow for flexibility in the programme and to cover other types of survey.

30. As an illustration, let us take the case of a country with, say, 5 million inhabitants living in rural areas and where the main surveys to be included in the programme refers to household income, expenditure and consumption. The first decision to be made refers to the optimum sample size. This, as can be seen from characteristics of surveys given in paper CAS/2-ENQ/L.3, requires further definition of the main objectives of the surveys. Emphasis can be placed firstly on annual estimates of aggregate figures of income, expenditure and consumption, with a breakdown by items or groups of items. Alternatively, the main objective may be distribution of income, with a detailed breakdown of financial transfers and receipts by class of income. A further possible main objective is the collection of basic data for food demand analysis, i.e. an analysis of factors influencing consumption (location of households, income groups, size of family, etc.)

31. Supposing the first two objectives are adopted (aggregate figures and distribution of income) as a first tentative stage, then data on optimum sampling size will have to be derived from preceding enquiries. For example, it was found in Ghana that a stratified sample of some 1,100 households in the cocoa producing area gave a co-efficient of variation of 6% for the aggregate estimate of total gross household income. Figures are lacking on sampling errors relating to the frequency distribution of income derived from the same sample, but it can be guessed that the more refined the breakdown of households by income groups the larger the sample should be. Again, figures are lacking on the sampling error of the aggregate consumption figures for items or groups of items, but the more refined the classification by items the larger the sampling size should be.

32. Let us assume that, on the basis of further calculation of sampling errors, it is found that an annual sample of, say, 5,000 households would be required for obtaining adequate information on income distribution and the study of financial transfers, while accurate annual figures on income, expenditure and consumption flows would be obtained for a large group of items by means of a sample of 3,000 households. The translation of these two figures into terms of permanent enumerators is the next step required. In the case of the first survey, assuming that the same sample of families will have to be visited weekly throughout a year and with 20 households per enumerator, we find that 250 enumerators

are required. In the case of the second survey, assuming that the sample of households is renewed every month, and that a daily visit is necessary to each household throughout each month, the ratio of households per enumerator is lower than in the preceding case and is, say, 5 households per enumerator. On the other hand, each enumerator will cover $5 \times 12 = 60$ household - months for the entire year, which means that 50 permanent enumerators would be sufficient.

33. Ideally the size of field staff should then be decided on the basis of the more costly survey, i.e. the survey of income distribution. It should be noted that the second survey (consumption flows) can be conducted by the same enumerators as the first, since the sample is smaller and the timing is different (daily visits to a smaller sample). With this arrangement, however, it may be found that the figure of 250 enumerators is too high. It is here that overhead costs, e.g. number of professional staff available for the survey section and amount of supervision and training needed, can be the limiting factors. It is tentatively estimated that, after a number of years of intensive training for the staff, a single professional can handle from 200 to 300 enumerators.

The final decision, in this particular case, may well be to drop altogether the income type of the survey until such time as more professional staff are available. Alternatively, it can be decided to keep the survey in the programme, but to reduce the objectives. This can be done in two possible ways:

- (a) By simplifying the content. Thus, instead of aiming at a detailed breakdown of income by sources of earnings, only aggregates may be used. This can result in a substantial reduction in optimum sample size.
- (b) By extending the survey over a longer period. For example, it can be decided that the objective of the survey will be to give an average picture of income distribution over two successive years. This does not mean that annual results should not be published, but annual changes may not be significant for a number of items. This solution is of a fairly wide application in a number of surveys of continuous flows.

34. The next problem when a final decision has been made on the size of the field strength, is to plan the programme of surveys so as to make full use of the existing field and processing staff. This requires careful consideration of a number of factors such as seasonal factors affecting each type of survey, interval between visits to households, geographical distribution of staff, transport problems, allowances for sickness, vacations, etc.... It has been said earlier, for example, that the same staff can carry at the same time an income inquiry on a large sample and a consumption inquiry on a small sample. Allowance has also to be made for a preliminary survey in the form of a census or a sample survey of population to prepare the frame for both surveys. It is also sometimes possible to ask the staff to carry out area measurements on an ad hoc sample, since the optimum size of sample may not differ too widely from that of the budget inquiry and the same stratification of households may be efficient for both surveys. Yield measurements, on the other hand, generally require a much larger sample and do not lend themselves to utilization of the same field staff. In conclusion, there are a thousand and one ways of utilizing a permanent field staff for a series of surveys but care should always be taken to adopt an adequate sample design and adequate recording techniques for each individual survey, which is generally a severely limiting factor with respect to optimum staff utilization.

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