Chapter 7

IMPLEMENTATION STRATEGY

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7. IMPLEMENTATION STRATEGY

7.1. Introduction

7.1. This is the last chapter in the sequence describing the five lines of action for achieving exhaustive estimates of GDP by better measurement of the NOE. Chapter 3 defined the NOE problem areas and illustrated how they could be examined through the use of an analytical framework. Chapter 4 summarised techniques for assessing the national accounts from the perspective of non-observed and non-measured activities. Chapter 5 described national accounts compilation methods aimed at eliminating non-measured activities. Chapter 6 showed how the basic data collection programme could be improved to reduce non-observed activities. Whereas these chapters dealt with NOE measurement from a conceptual viewpoint, this chapter is concerned with operational considerations. Its intention is to help survey statisticians and national accountants set priorities and develop action plans to deal with the NOE in their particular circumstances. It outlines the elements of a comprehensive NOE measurement strategy, through the systematic formulation of short and long term initiatives across the national statistical system.

7.2. Since the mid-1970s numerous attempts have been made to improve measurement of the NOE, both in the context of compiling exhaustive national accounts and in obtaining stand-alone estimates of specific NOE problem areas such as underground or informal sector production. Review of the vast body of literature indicates that the results of NOE measurement programmes are varied and difficult to compare, either between countries or even within the same country over time. However, there are certainly some lessons to be learned, for example those described by the Organisation for Economic co-operation and Development (1997) in relation to countries in transition. Common problems with NOE measurement programmes include the following:

- L*ack of consultation with major external users*. Major data users are not brought into the process through consultation on their concerns and priority needs with respect to NOE measurement.
- I*nadequate statement of objectives*. The aims of the programmes are unclear. For example, are they focused solely on exhaustiveness of the national accounts, or are stand-alone estimates of the NOE problem areas also an objective? Are the additional data collected going to be built into the basic data collection program or are they intended simply to adjust the national accounts? Are the measurement procedures a one-off exercise or are they going to be repeated?
- I*nadequate statement of responsibilities*. The roles of the organisational units within the statistical system are not well defined or communicated. It is not clear which responsibilities reside with national accountants and which with the survey statisticians. Regional office staff who conduct the actual data collection are often left entirely in the dark.
- N*arrow focus*. Programmes focus solely on measuring the NOE through indirect methods rather than tackling the underlying problems in the existing basic data collection program, *i.e.*, they exclude long term objectives aimed at building improvements into ongoing data collection.
- L*ack of integration*. Attempts to improve measurement are not carried out within an overall framework of short and long-term initiatives such that the development of new data collections and compilation techniques is blended into the ongoing statistical programme. The result is the production of various NOE measurements that cannot be integrated or combined with

other data compiled by the statistical office. National accounts estimates may become out of step with other macro-economic statistics. Furthermore, the absence of an overall framework makes it almost impossible to monitor progress over time or to identify and change priorities.

7.3. While the aim of this chapter is to outline the essential ingredients of an NOE implementation strategy, it must be emphasised from the outset that there is no "magic bullet" or formula for an NOE programme. Improved measurement is most likely to result from a number of incremental steps undertaken within the context of an overall framework that links them in some way. What is important is that the statistical office adopts an implementation strategy that is systematic, comprehensive, and tuned to local circumstances. The strategy should, as a minimum, contain the following elements:

- a comprehensive programme of consultation with internal and external users on their needs and priorities with respect to the measurement of the NOE;
- a set of clear, realistic, broad objectives indicating what the statistical office is trying to achieve in terms of NOE measurement and how this will address the needs of major data users;
- a well defined conceptual and analytical framework appropriate for NOE measurement;
- an assessment of the sources and outputs of the existing basic data collection programme and the national accounts compilation procedures with the aim of identifying NOE related problems and their magnitudes;
- a prioritised set of possible short and long short term initiatives for improving the statistical infrastructure and outputs of the existing basic data collection programme, and for improving the national accounts compilation processes;
- an implementation plan providing clear targets, milestones and an allocation of responsibilities and expectations for all the various players in the national statistical system;
- a data revision strategy for preventing breaks in macro-economic data outputs resulting from NOE related improvements;
- documentation procedures that ensure proper recording of: the results of the NOE assessment; estimates of the magnitude of the NOE activities by type; and the existing and planned data sources and compilation procedures;
- documentation and evaluation of the NOE measurement programme.

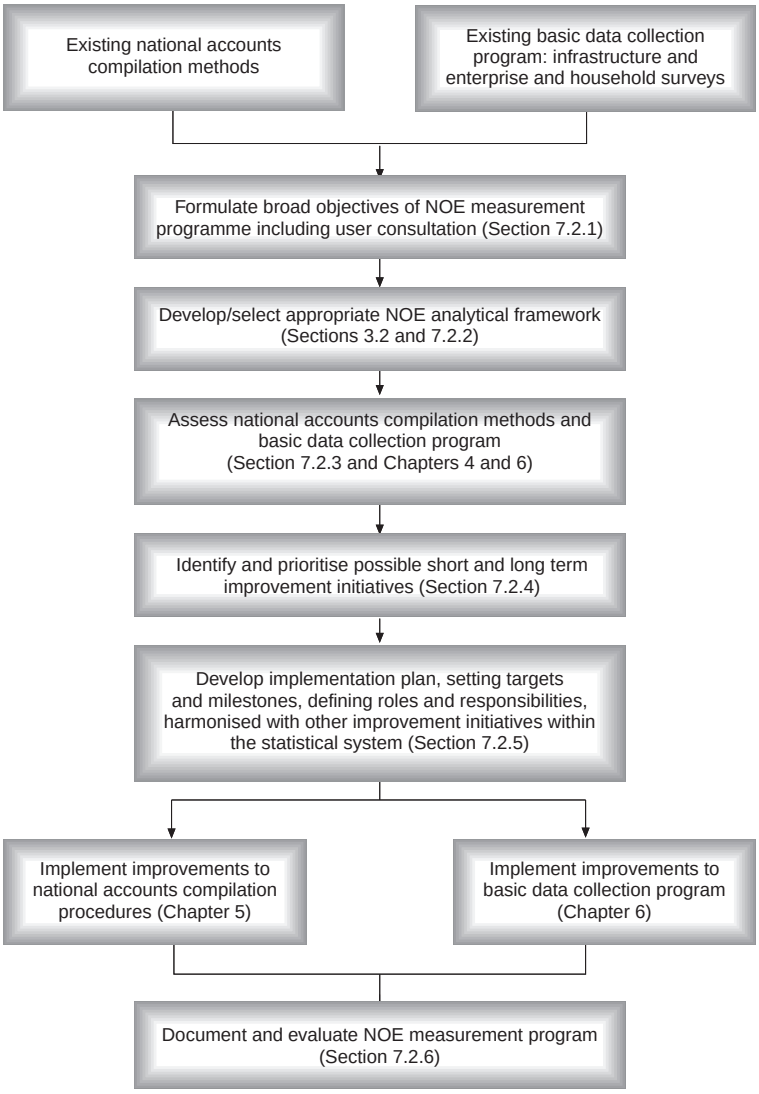
7.4. These elements and their relationships are shown in Figure 7.1 and further elaborated in Section 7.2. Figure 7.1 emphasises the fact that obtaining exhaustive measures of GDP is not a set of disparate activities. Rather it is an on-going process of co-ordinated and clearly linked procedures undertaken by staff throughout the national statistical system. It also indicates the separation of improvements into those that involve basic data collection and those that refer to compilation of the national accounts. This highlights the need for a clear definition of roles and responsibilities across the organisation to avoid duplication of effort and double counting of NOE measures by survey statisticians and national accountants.

7.2. Elements of Implementation Strategy

7.2.1. *Formulation of* Broad *Objectives and* User Consultation

7.5. The first element of the implementation strategy is development and dissemination of a clear and unambiguous understanding of what the statistical office is aiming to do with respect to NOE measurement. The primary objective is to improve the exhaustiveness of GDP estimates. Other objectives may include production of individual measures of the informal sector, or underground or illegal production. Whatever it decides to do, the statistical office must be realistic in determining what is feasible. Furthermore, the NOE measurement programme should be viewed as part – albeit a very important part – of any overall quality management strategy. The statistical office must articulate the broad objectives to staff so they have a good understanding of their roles.

Figure 7.1. **Elements of NOE measurement implementation strategy**



7.6. Formulation of objectives involves consultation with internal and external data users to determine their needs and priorities. Ideally, such consultation should be conducted at regular intervals, preferably at least once a year, with major users. The aims of user consultation include:

- obtaining advice and feedback regarding the NOE measurement strategy and implementation plan;
- educating users regarding the principal reasons for the NOE and the limitations of the measurement methods; conveying a realistic appreciation of what the problems are, what can be achieved with the resources currently available, and what could be achieved if the programme were given higher priority;
- marketing the results of improvements in NOE measurement.

7.7. The process of user consultation should be as open and transparent as possible. Mechanisms for achieving this include dissemination of the NOE measurement strategy, initially perhaps in the form of

a draft document inviting user input and suggestions, meetings with individual users and groups of users, and provision of regular feedback on progress in implementing the plan.

7.2.2. *Selection of an Analytical Framework*

7.8. A prerequisite for assessment and documentation of the NOE related problems and potential improvements is the selection and use of an analytical framework tuned to the particularities of the national statistical system. The Eurostat Tabular Framework is a possible starting point. The breakdown of non-observed activities by type may need to be elaborated, or some types combined, depending on local circumstances. The tables in which the current adjustment descriptions and magnitudes are recorded may also prove to involve too much or too little detail, depending upon the scale of the NOE measurement programme.

7.2.3. *Assessment of National Accounts and Basic Data Collection Programme*

7.9. The assessment should start with national accounts compilation methods and work backwards to the data sources and data collection infrastructure. The assessment techniques can be selected from amongst those described in Chapters 4 and 6. The objective is to identify every possible type of non-observed activity, to estimate its magnitude, and to document the adjustment (if any) that is presently made for it. For example, if the Eurostat Tabular Framework were being used for NOE analysis, the aim would be to complete every cell of the accompanying tables (shown in Annex 4.1).

7.2.4. *Identification and Prioritisation of* NOE *Improvement Initiatives*

7.10. Hand in hand with assessment of the national accounts and the basic data collection programme, possible improvements in NOE measurement can be identified based on the description of best practices in Chapters 5 and 6. Because the NOE has many facets, it is likely that many potential improvements will be identified, implementation of all of which would be beyond the resource capacity of the statistical office. Thus, they have to be prioritised and a corresponding set of short and longer-term improvement initiatives identified. The various options can be split into two basic groups – those, mostly short-term improvements that involve changes in the compilation of the national accounts and those, mostly longer-term improvements that imply modifications to the basic data collection programme.

7.11. Working from short term to long term, the improvement possibilities include:

- introduction of low cost imputation techniques and model-based adjustments to the basic data prior to their use in compilation of the national accounts;
- introduction of new or improved imputation techniques and model-based adjustments during compilation of the national accounts;
- improving the statistical infrastructure, for example, the business register;
- improving (and where appropriate abandoning) existing statistical collections;
- introducing supplementary statistical collections, either on going or on an occasional basis, to provide regular or periodic benchmark estimates of various indicators that can help in improving NOE estimates.

7.12. Improvements to national accounts compilation methods using small-scale supplementary investigations and model based adjustments provide relatively low cost, immediate solutions for dealing with non-observed production. The basic principles underlying such improvements are that there should be systematic analysis of all the problems and potential solutions; that full use should be made of all the data available; that preference should generally be given to direct estimates over model-based adjustments; and that the models actually used should be at as detailed a level as possible.

7.13. In terms of long-term strategy, the first priority is to address deficiencies in the basic data collection programme. The theme is "upstream quality control". There is no point in continuing to use

indirect compilation methods to patch up data problems that could be readily solved at the level of the basic data. Statistical co-ordination is an important aspect of the data collection programme. Consistency and utility are improved if all statistics are based on a common conceptual framework. The data collection programme is the place to deal with non-response. All missing observations should be imputed. Introduction or enhancement of a business register might increase coverage substantially. Misreporting should be addressed through editing and plausibility checks.

7.14. Furthermore, as previously noted, the macro-economic outputs generated by the basic data collection programme are not simply inputs to the national accounts but are also important indicators in their own right. They should be consistent with the national accounts. Consistency can only be achieved by reducing the activities that are non-observed through improved data collection. Published outputs of the basic programme can reflect adjustments for non-observed activities made in the national accounts along a *continuum* reflecting the amount of time and effort involved, for example by:

- acknowledging the existence of non-observed production in the methodological descriptions accompanying the published basic data, *i.e.*, explaining why the basic data differ from national accounts estimates that include adjustments for non-observed production;
- publishing tables that are supplementary to the basic data and that include NOE adjustments;
- incorporating the adjustments in the basic data, *i.e.*, reducing the volume of production that is non-observed.

7.2.5. *Implementation Plan*

7.15. The implementation plan should detail the improvement initiatives to be undertaken, the timeframe for each initiative, the outputs expected, the human, financial and systems resources involved and the allocation of responsibilities. It should be blended with, and considered part of, the strategic multi-year and quality management plans for the national statistical system.

Establishing responsibility for NOE *measurements and improvements*

7.16. It is vital to establish the roles that national accountants and survey statisticians at central and regional offices should play. Traditionally, the national accounts areas take overall responsibility for an NOE measurement programme as the compilation of the accounts requires the systematic confrontation of data obtained from many different statistical sources and the national accountants are at the focal point. However, as previously emphasised, all areas of the statistical office must be involved.

7.17. The normal process of data confrontation during compilation of the national accounts brings to light deficiencies and inconsistencies in the basic data, including those due to non-observed production. The traditional role of national accounts staff is to make adjustments to the data to compensate for inadequate coverage and errors and to allow for differences between 1993 SNA definitions and those used by enterprises and reflected in the basic data. Survey statisticians should play a crucial role in such adjustments because they are best placed to know the strengths and weaknesses of the data they produce. They can also be expected to have a good understanding of the types and scale of non-observed activities in their specific statistical subject matter area.

7.18. Problems occur if the national accountants are unaware of the efforts made by survey statisticians to improve coverage. Thus, survey staff should:

- evaluate the methodology for each data collection in order to identify the likely extent of non-observed production; they should also validate the data by examining information from other sources;
- document existing practices in the form of methodological and definitional *metadata*; the process of metadata documentation itself often reveals deficiencies in methodologies that were hitherto unnoticed. Documentation also helps users to understand the extent to which NOE activities are included in the basic data;

- participate in the development of indirect compilation methods to overcome deficiencies in the basic data.

7.19. Another reason for survey statisticians to play a prominent role in NOE measurement initiatives is that, as previously noted, the macro-economic data they produce are important indicators in their own right and should be consistent with the national accounts.

7.20. National accounts staff have a responsibility to ensure that data collection statisticians are fully aware of the 1993 SNA concepts, definitions and classifications and adopt them in collecting data to the extent possible. Such considerations are particularly important when new collections are being developed or where the methodologies of existing collections are being modified.

7.21. In countries where regional offices conduct most data collection, it is vital that regional office staff are involved as well as those in the central office. This is particularly true in the case of countries where regional office staff aggregate the data and central office statisticians work only with these regional aggregates.

Setting Priorities

7.22. The causes and sizes of the NOE and the magnitudes of existing adjustments in the national accounts provide the basis for setting priorities in the allocation of resources to NOE measurement initiatives. Areas where non-observed production is relatively small are probably not worth much additional effort. Areas where non-observed production is large or where adjustments are based on weak assumptions or data sources merit more attention. For example, if big adjustments are being made to compensate for undercoverage of enterprises that should have been included in the business register, then effort should be focused on improvement of the business register and its use as a sampling frame. On the other hand, if undercoverage is associated with enterprises that are too small to be included in the business register, then improvement initiatives should be focused on adjustments in the national accounts, perhaps involving the use of supplementary surveys or the labour input approach.

NOE *programme outputs*

7.23. The primary outputs envisaged from an NOE implementation plan might be expressed as:

- basic data that provide demonstrably better coverage of the economy, *i.e.*, the volume of production that is *non-observed* is reduced;
- improved procedures for compiling the national accounts that take into account the remaining deficiencies in the data, *i.e.*, the volume of production that is *non-measured* is reduced; and
- detailed documentation on how all the estimates and adjustments are derived.

7.2.6. *Documentation and* Evaluation

7.24. Documentation is a key element of the implementation of the NOE measurement strategy. Documentation is essential to:

- help identify priority areas in basic statistics where further improvement in coverage of NOE activities is required;
- provide staff working on the national accounts with a systematic and complete picture of all information on the NOE that can be obtained from the available data sources;
- avoid duplication of work by staff working in the various areas;
- avoid double counting of NOE estimates by the national accountants and the data collection statisticians;
- ensure that previous work undertaken in estimating the NOE is incorporated where appropriate.

7.25. Appropriate documentation also gives greater visibility to the relationship between the basic data currently produced by the survey statisticians and subsequent adjustments to these data by

national accountants aimed at compensating for non-observed activities. Documentation facilitates revision of the estimates when more reliable information is available to make the adjustments. It also assists in the identification of priorities for new statistical collections and data sources, or modifications to methodologies used in existing collections.

7.26. Two types of documentation are required. First, there must be documentation of the methods used to compile and to improve measurements of GDP, in particular to deal with the NOE. Second the data obtained from the basic data collection programme and all the subsequent NOE related adjustments must be documented. Systematic completion of all the cells in the Eurostat Tabular Framework will produce good documentation.

7.27. Documentation is a resource consuming process often left to the end of improvement initiatives and then never completed. Thus there is a need to think through a strategy for preparing documentation, making it readily available, and ensuring it is updated.

7.28. As improvement of NOE measurement is an ongoing process likely to extend over many years, it is essential that evaluation processes be built into the NOE measurement strategy itself. These may be ongoing or periodic. Their aims are to:

- match actual achievements against planned performance;
- identify reasons for non-performance, under-performance, delays;
- identify and communicate processes that worked, achieved success; and
- provide input to ensuing rounds of user consultation.

7.3. Implementation Strategy for Countries in Transition

Special features

7.29. Whilst the general approach to NOE measurement should be the same for transition countries as for others, transition economies exhibit certain features that require special attention. These include a large volume of shuttle trade, a large informal sector, extensive use of garden plots to produce food for own consumption and, in some countries, large-scale illegal activities. In addition, economic processes, institutional structures and statistical methods are all changing rapidly. The following paragraphs highlight some of the key points to consider in developing an NOE measurement strategy in these circumstances.

Setting priorities

7.30. The first priority of the programme should be improvement in the coverage of value added by kind of activity and final expenditures in the GDP, through better measurement of underground activities, informal sector activities, and food production for own consumption. The basic data required to compile the estimates and the procedures for processing these data should be comprehensively reviewed and revised as necessary.

7.31. The second priority is to integrate estimates of the NOE into the sector accounts. This implies developing specific instructions for integration and reconciliation.

7.32. The last priority is to cover any significant illegal activities. This implies developing appropriate methods for measurement and inclusion of such activities in various accounts. As noted in Chapter 3, illegal activities may be divided into two groups – those that are productive, *i.e.*, that contribute to GDP, and those that are redistributive. Users may express a strong interest in measurement and analysis of both types. However, given the inevitable resource limitations and the need to set priorities, measurement efforts should be specifically focused on productive illegal activities.

Analytical framework

7.33. As also noted in Chapter 3, the NOE problem areas do not define mutually exclusive groups of activities. However, closely related mutually exclusive groups can be derived by selecting one of the

problem areas as the first group and defining subsequent groups to exclude any activities already included in the first group. Given the characteristics of the NOE in a transition economy and the measurement tools typically available, a suitable set of mutually exclusive groups based on this approach might be:

- informal sector production;
- household production for own final use that is not included in the informal sector;
- underground production that is not informal sector or household production for own final use;
- illegal production that is not underground, informal sector or household production for own final use;
- other productive activities that are non-observed due to deficiencies in the basic data collection programme.

7.34. Incorporating such groupings in place of the original NOE problem areas would also resolve any ambiguities in the boundaries between the NOE types when using the Eurostat Tabular Framework.

Introducing sampling methods

7.35. Statisticians in transition countries are likely to be very experienced in the use of censuses and administrative sources. Administrative sources should continue to be fully exploited, and this approach should be supported by ensuring that the national statistical office has the legal right to access tax records and other administrative data sources. However, in view of the vast increases in the numbers of enterprises, traditional sources alone are not sufficient and must be supplemented or replaced by sample surveys. Not only do sample surveys provide the only practical means for ensuring coverage of enterprises that are legal entities and that have been traditionally included in estimates, they are also the only means of covering household unincorporated enterprises.

Co-operation with other government agencies

7.36. Several government agencies, including taxation, finance, social security, customs, and police, are likely to have an interest in the NOE. Given the importance of using data from all possible sources, co-operation between these agencies and the national statistical office is vital. Estimates of the NOE may also be produced by independent research institutes. Whilst the experience of staff at such institutes may be useful in shedding light on NOE causes, the measurement methods they use are often not sufficiently rigorous for estimation of GDP as they do not have access to the full range of data available to national accountants. In particular, macro-model methods depending upon simplistic assumptions, as further described in Chapter 12, are not useful.

7.4. Implementation Strategy for Countries with Large Household Sector Production

Introduction

7.37. Countries with a large household sector production often have rather weak statistical systems. In such cases, although the general principles underlying the NOE strategy are still applicable, some of the methods proposed in Chapters 5 and 6 may be too resource intensive or may depend upon data that are available. For example, the introduction of a comprehensive suite of enterprise surveys may be prohibitively expensive. Thus, the objective of this section is to outline a simplified NOE strategy making full use of all pertinent economic and social data.

7.38. Estimates of the contribution of the household sector to GDP using traditional methods tend to result in rather low estimates. In sub-Saharan Africa for example, about 75% of the non-agricultural labour force work in the informal sector, but contribute only about 25% of the total GDP (Charmes, 2000*a*). Although many analysts conclude from these figures that the informal sector has very low productivity and income generation, the position taken in the Handbook is that inadequate measurement is another explanatory factor and that new methods of estimation should be considered.

In the 1968 SNA, household production for own final use was limited to subsistence agriculture, other primary production, processing of self produced primary products, paid domestic services and imputed rents. Inclusion of other goods for own final use within the 1993 SNA production boundary implies the need to develop new methods.

7.39. Production in the corporate and government sectors is best covered through enterprise surveys, preferably based on a business register. For the household sector, there are various different types of production, as shown in Figure 7.2, and a variety of mechanisms is required. Household enterprises belonging to the formal sector are best covered by the same means as corporate enterprises. Household agriculture enterprises are best covered through agricultural surveys. Owner-occupied dwelling services can be estimated by the usual methods outlined in Section 5.3. Information on paid domestic services is often available from labour force surveys and household income-expenditure surveys. Informal sector enterprises can be handled through mixed household-enterprise surveys and/or using the labour input method, and the remaining, non-market enterprises through time use surveys. In summary, and as further elaborated in the following subsections, the priority tasks are:

- introduction of a business register containing, at a minimum, all large and medium size incorporated and quasi-corporate enterprises;
- introduction of a mixed household-enterprise survey;
- application of the labour input method; and
- time use surveys.

Figure 7.2. **Enterprises in household sector by type of production**

<table>
<tr><td colspan="6">Household sector comprising all household unincorporated enterprises</td></tr>
<tr><td colspan="3">Market (1993 SNA)
(all or most of output marketed)</td><td colspan="3">Non market (1993 SNA)</td></tr>
<tr><td colspan="3">Producing at least some goods and services for market</td><td colspan="3">Producing goods and services exclusively for own final use</td></tr>
<tr><td colspan="2">Non-Agricultural</td><td rowspan="2">Agricultural</td><td colspan="2">Producing goods</td><td>Producing services</td></tr>
<tr><td>Belonging to formal sector</td><td>Belonging to informal sector (ex agriculture)</td><td>Agriculture forestry fishing</td><td>Other kind of activities</td><td>Paid domestic services</td><td>Owner occupied dwelling services</td></tr>
</table>

Business register and enterprise surveys

7.40. A core part of the strategy for improvement of data collection is the introduction and use of a business register to provide the frames for enterprise surveys, at least for the large enterprises. In many countries with a large informal sector, the business register, if it exists at all, contains enterprises accounting for only a relatively small proportion of total production. In such cases, introducing and strengthening the business register is a priority.

7.41. Ideally the business register should be based on data from an administrative register or registers, as outlined in Chapter 6. In the absence of a suitable administrative source, it can be constructed on the basis of an economic census, *i.e.*, door to door enumeration of all enterprises in the country. In this case it is essential that the census covers not only readily visible enterprises but also those that are conducting their activities within the owner's domestic premises or without fixed location.

7.42. Small enterprises have a high rate of turnover. They are readily created, they frequently change activity and they often go out of business. Annual turnover rates of 20% can be considered quite normal. Thus, a business register based on an economic census is effective as a sampling frame only immediately after the census. Subsequently it can be used as the starting point for developing an area

frame for micro-enterprise surveys, as described by Charmes (1999) in connection with a survey of micro-enterprises in Benin.

7.43. In summary, even though it is impossible to maintain a comprehensive register of all enterprises, there should be a business register containing, at the minimum, all large and medium size incorporated and quasi-corporate enterprises. It can be based on administrative data arising, for example, from the registration process for incorporated enterprises, or from social security systems. The register should be designed to contain all enterprises that are above a given size threshold and/or that are registered by the administrative source(s). The economic production of these enterprises should be measured by enterprise surveys, using the business register to provide the survey frames. The economic production of the market enterprises not covered by the enterprise surveys should be measured through mixed household-enterprise surveys or using the labour input method, as described in the following subsections.

Mixed household-enterprise surveys for informal sector

7.44. The ideal approach for measuring productive activities in the informal sector is to use a comprehensive, area frame based, mixed household-enterprise survey. Hussmanns (2000) notes that more than 20 countries with large informal sectors have already started to use this method. It is fully described in Chapter 10, together with other informal sector measurement methods.

7.45. There are unlikely to be the resources to conduct such a survey on an annual basis. However, provided the survey can be repeated, say five yearly, then data for intermediate years can be indirectly estimated. In particular, if there is an annual labour force survey then labour input data for the informal sector can be collected and used to extrapolate other informal sector characteristics such as output and value added for the intermediate years, as outlined in the following paragraphs.

Labour input method

7.46. According to Charmes (1999 and 2000*a*) a simplified form of the labour input method described in Chapter 5 has been applied in 15 countries with large informal sectors to provide informal sector estimates. The main features of the method are outlined in the following paragraphs.

7.47. Data on the supply of labour are obtained from a population census or labour force survey, or as a supplement to an income and expenditure, living standard, or other household survey. The survey must collect information that enables the enterprise for which a person works to be classified according to whether or not it belongs to the informal sector. For example, questions may be asked about the legal status of the enterprise (incorporated or not) and its size. The aim is to construct a table of employed persons cross-classified by informal/other sector, by kind of activity, by employment status (employers, own-account workers, family workers, and employees), by sex, and if possible by urban/rural area. It may be necessary to use data classified by occupation and to assume a fixed correspondence between occupation and kind of activity. From this table, agriculture should be extracted and treated separately. It is usually excluded from the informal sector.

7.48. Data on the use of labour may come from an economic census or survey, or from administrative sources, in particular from social security records. If the data are obtained from an economic census or survey, the first step is to check whether the information on the legal status of the enterprise has been collected. Where possible, outworkers (usually identified by questions about their place of work) should be treated as a separate category because they may require specific adjustments in the labour input matrix. In this context, it is useful to classify separately construction, transport, and domestic workers.

7.49. The next step is comparison of the numbers of employees and employers in the various categories on the supply side with those on the use side in order to arrive at a labour input matrix. If the employment associated with incorporated or quasi-incorporated firms can be eliminated from both sides, then the comparison can focus on the informal sector. Depending on the data available, the

comparison can be broken down by sex and urban/rural area. Such a division is useful as output and value added per labour unit ratios may differ by sex and by urban/rural location.

7.50. Once the labour input matrix has been constructed, output and value added per labour unit ratios are applied to arrive at output and value added totals. Ideally, these ratios are obtained from a comprehensive mixed household-enterprise survey, as noted above.

7.51. There are likely to be a number of difficulties to overcome.

- There may not be a full set of data for the reference year. In this case it is necessary to use data spanning a number of years and to adjust as well as possible for differences in the reference periods.
- The supply side data may be available only for the main urban centres and require adjustment to include the whole country.
- The use side data may be incomplete and may have to be augmented to include, for example, public enterprises.
- In the absence of a comprehensive mixed household-enterprise survey, the output and value added per unit of labour input ratios may be based on a relatively small survey.
- Hours worked may have to be imputed from employment status and knowledge of whether the person was permanent, part-time or seasonal, or a multiple jobholder.
- Special attention should be given to multiple jobs of agricultural workers, seasonal or not, because according to Charmes (1989 and 1996), this is a major reason why production by women is underestimated in many countries.

Thus the accuracy of estimates obtained through the labour input method depends upon the quality and degree of harmonisation of the data sources used.

Time use surveys

7.52. The extension of the production boundary in the 1993 SNA makes it easier to address gender bias in the measurement of production. Reasons why production by women, and therefore GDP, tend to be underestimated include:

- Women are frequently involved in multiple activities which tend to be overlooked;
- Production of women is concentrated in activities, particularly agriculture and trade, for which national accountants usually impute low output and income levels; and
- women not belonging to the household are often engaged in domestic activities from a young age but are only reimbursed by income in kind, in the form of food and lodging.

7.53. These are some of the reasons for considering implementation of time-use surveys in countries with large household production for own final use. They may also provide information that is useful in evaluating the quality of labour force and informal sector survey data. Until recently, such surveys have been limited to developed countries. Among the findings from such surveys Charmes (2000*b*) notes that inclusion of non-market household production of goods for own use brings the hours worked by women to the same level as for men, and the share of women in the labour force to the same value as their share in the population.

7.54. These results suggest that an adequate estimate of household production for own final use, at least of non-agricultural production, cannot be made without resort to time use surveys. They can be associated with other household surveys and thus incorporated in ongoing data collection programmes.

7.5. Introducing Changes in the Estimates

7.55. For many users a vital aspect of the national accounts and other major macro-economic data is the availability of extensive time series, allowing comparisons over time and analyses of growth rates. This feature is often as important, if not more important, than the accuracy of the level estimates. Evidently, improvements in measurement of the NOE by a statistical office will result in changes in the

data outputs. It is vital that these changes are not attributed by users to the economic phenomena being measured. This is a requirement associated with any changes to measurement or compilation methodology and not just those associated with the NOE programme. For example, changing GDP estimates as a result of more exhaustive coverage without taking proper measures to present these changes destroys the national accounts time series. Worse still, this may happen several years in a row, with each year bringing changes in estimates due to methods of measurement rather than actual movements in the economy. A revision strategy is needed that allows changes to be made to the national accounts and other macro-economic data without impairing their comparability over time.

7.56. There are three options for introducing methodological improvements:

- The first option is to apply the new methodology to previous years. This is sometimes referred to as *backcasting* and is undoubtedly the preferred option. However, it is likely to be expensive, and the cost increases with the number of years for which the new methodology is projected backwards. The number of years is a matter of judgement. Costs can be reduced by fully applying the new methodology only for those parts of the accounts where the changes are greatest and for other parts of the accounts to make simple ratio adjustments based on a single year overlap between estimates using the old and new methodologies.
- The second option is to suppress the effects of the new methodology in the estimates until a sufficient number of years have elapsed, and then to introduce all the accumulated changes at once. What constitutes a sufficient number of years is again a matter of judgement.
- A third option, which is a compromise between the other two, is to continue publishing the level estimates according to the old methodology but to compute growth rates according to the new methodology.

7.57. Whatever option is adopted, transparency is an important aspect of the revision strategy. Changes should be well documented and this documentation should be made available to the general public. To avoid any suspicion that political motives are determining the timing for the introduction of new estimates, forthcoming revisions should be announced well in advance.