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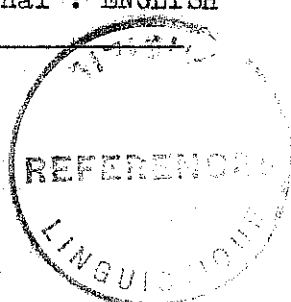
Distr.
LIMITED

E/CN.14/NAC/23
28 September 1966

Original : ENGLISH

ECONOMIC COMMISSION FOR AFRICA
Working Group on National Accounts
at Constant Prices
Addis Ababa, 21-28 November 1966

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NATIONAL ACCOUNTING PRACTICES AT CONSTANT PRICES IN AFRICA
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NATIONAL ACCOUNTING PRACTICES AT CONSTANT PRICES IN AFRICA

INTRODUCTION

1. The purpose of the present paper is to describe in a matter-of-fact way the current country practices in national accounting at constant prices in Africa insofar as information available to the ECA Secretariat would permit, while problems concerning principles, concepts and methods, as well as the techniques of estimation and data sources on the same subject are dealt with elsewhere in separate papers.

2. This paper is intended to cover the whole continent of Africa. It begins with a brief summary of the present status of national accounts statistics at constant prices in the African region, followed by a rather detailed description of current country practices, itemised with respect to the major components of two tables, viz., the gross domestic product (GDP) by industrial origin and expenditure on GDP, and ends with a short section on "Concluding remarks", which urges the Working Group on National Accounts at Constant Prices to make specific recommendations on this subject for adoption and implementation by countries of the region.

3. Among the sources used in the preparation of the paper may be listed the country statistical publications, official and unofficial reports and documents^{1/}, contributions by individuals to professional journals, and correspondence between the countries and the ECA. The paper cannot claim nor hope to provide complete coverage of the subject or contain up-to-date information in every respect; gaps in information on the subject would have to be filled at a later stage in the light of additional information then available. Information contained in this paper is subject to later revision.

^{1/} Include a doctorate thesis, written in the Afrikaans language, in which relevant information on current practices in the Republic of South Africa is contained.

SUMMARY OF PRESENT STATUS:

4. The development of national accounts at constant prices is a function of a number of factors, amongst which the needs of national development planners and the present stage of statistical development in the country in question stand prominent. A total of fifteen countries in the region have thus far made such exercises with varying degrees of elaboration for selected periods, while additional countries are understood to be on their way of making similar attempts. The majority of the 15 countries started such work only very recently, i.e. since 1960 or thereabout, prompted mainly by the needs of development planners and economic analysis, to facilitate the task of making meaningful medium and long-term projections and intelligently based economic policy decisions. As expected, the availability of basic as well as current statistics relating to quantities and prices for a country puts a severe strain on the extent to which the latter's national accounts at constant prices could be developed. Thus, it is not unusual to find the same limiting factors at work for a country in the choice of methods of estimation with respect to estimates at current as well as constant prices.

5. A number of technical details relating to the compilation of national accounts at constant prices in the region are set out below. Reference is made to Table 1 for a summary of selected items of information concerning country practices in this respect.

- (i) Valuation at market prices or factor cost: Of the fifteen countries listed in Table 1, seven valued the domestic product at market prices while the remaining eight^{1/} valued it at factor cost, the valuation being on a gross basis for all;

^{1/} The exercise made by the I.R.E.S. of Lovanium University of the Democratic Republic of Congo, for 1963 and 1964 at 1958 prices, valued the domestic product at both market prices and factor cost. Tunisia also valued the domestic product at constant 1960 market prices and factor cost.

(ii) Gross domestic product by industrial origin and by type of expenditure

Of the same fifteen countries, a total of eleven have compiled the table "Gross domestic product by industrial origin", with an almost equal total number of countries for the table "Expenditure on gross domestic product". Six countries (viz. Democratic Republic of Congo, Ghana, Ivory Coast, Tunisia, Republic of South Africa, and Sudan) have compiled both these tables or variants thereof (including those not officially published). However, the calculations of the two tables are not necessarily independent of each other (and in one particular case the geographical coverage of the two series is different), and consequently cannot serve as independent checks of the magnitudes involved;

(iii) Other tables: Apart from the two main tables, i.e. the table of GDP by industrial origin and that for expenditure on GDP, relatively few countries have attempted constant price estimates of other tables, the number of countries attempting such tables being:

- Capital formation by type of capital good (7); by type of purchaser (4) and by industrial use (3);
- Composition of private consumption expenditure (Nigeria and the Republic of South Africa only, if the former Federation of Rhodesia and Nyasaland is excluded);
- Uses and resources (3, excluding the former Federation of Rhodesia and Nyasaland);
- African rural household production for own consumption (3); and
- Inter-industry transactions (Ivory Coast only);

(iv) Items separately shown: Few countries seem to have made estimates at constant prices, of such items as net factor income from abroad, trading gain (or loss) due to changes in the terms of trade, indirect taxes, subsidies, etc. For some countries at least it is not clear whether the deflation of imports and exports covered goods and non-factor services or simply goods only. Table 2 indicates the items of the Expenditure on Gross Domestic Product table for which separate estimates have been shown at constant prices in country publications or other official documents, and Table 3 shows the branches of economic activity of the Gross Domestic Product by

Industrial Origin table for which separate constant price estimates have been included in similar sources. The fact that no "x" is inserted for some item for a particular country does not necessarily mean that such estimates have not been attempted by that country. It may well be that such estimates, though made, have not been officially released by that country; or that although officially released, are not yet available to the ECA Secretariat in time for inclusion in this paper.

6. The methods used by the 15 African countries in obtaining constant price estimates can be conveniently described in the broad categories as listed in the U.N. document A System of Price and Quantity Indexes for National Accounts (E/CN.3/L.46) as follows:

- (i) Extrapolation of base year values by quantity indexes: For the construction of such quantity indexes, quantity indicators would be required, to be made up of either output series, i.e. production of finished goods adjusted for changes in the volume of work-in-progress, or input series, i.e. materials and services used up in the process of production. As is clear from Table 4, most of the 15 countries have made use of quantity indicators of one kind or another in their estimation work, with five countries (namely, Morocco, Nigeria, Rep. of South Africa, Tunisia and Uganda) relying predominantly on this approach, to be followed by Ghana, Sudan, Tanzania, and the U.A.R., which have made use of quantity indicators in selected branches of economic activity, e.g. agriculture.
- (ii) Deflation of current value series by indices of selling prices: The majority of the 15 countries under study have deflated some of their current value series by conventional index numbers i.e. wholesale or consumer price indices, or components thereof. In addition, import and export price (or unit value) indices relating to goods, with or without adjustment as to coverage and weighting of such indices, have also been used as deflators. In some cases, especially constructed index numbers, by either collecting new price series or re-weighting existing series or both, have been effected to deflate particular current value series.

- (iii) Deflation of current value series by cost indices: Input costs of production include material costs and factor payments. The majority of the countries in question have made use of price indices of construction materials and indices of earnings and wage rates, the latter type of indices being extensively made use of by one particular country, Tanzania, in arriving at constant price estimates of domestic product.

7. With respect to systems of quantity and price index numbers, the Annex provides a summary of the structural information on such indices for the countries in Africa. As such information has been compiled from data included in national and international publications, with only limited data obtained direct from the countries through correspondence, it is clear that the Annex includes only the more important index numbers compiled by the countries, while information on the systems of quantity and price indices, compiled by the countries for the purpose of deflating current value series but hitherto unpublished, is completely lacking. From the Annex the following summary may be made:

- (i) Consumer price indices: Almost every country in the African region now has compiled a consumer price index, with a few relating to the consumption and expenditure pattern of European families only. With a single exception, where unweighted geometric averages are used, Laspeyres formula or base-weighted arithmetic average, has been adopted in each case;
- (ii) Wholesale price indices: Relatively much fewer countries have compiled wholesale price indices, again Laspeyres formula being employed. In some cases, the indices relate to particular commodity groups or sectors only, e.g. building materials (Ivory Coast), Ethiopia (imports and exports). The weights are based either on value of domestic production, or value of domestic consumption, or value of goods sold in domestic markets, in the base year. In the case of wholesale price indexes for imports and exports, the values of same in the base year are used instead. It would seem that the Republic of South Africa is the

Table 1. National accounts estimates for countries in Africa (at constant prices)
(An "X" indicates the availability of particular statistical tables published)

Country	Tables	Domestic product at				GDP by industrial origin	Expenditure on Gross Domestic Product	Capital formation by				Composition of private consumption exp.	Inter-industry tables	Taxes on uses and resources	African rural household production for own consumption	Base year	Periods covered
		Market prices		Factor cost				Type of capital good	Type of purchaser	Industrial use							
		C ^{1/}	M ^{2/}	G	K												
											(1)						
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)			
1. Algeria		X					X									1957	1950-58
2. Congo (Dem.Rep.of)	(a) 6/	X		X		X	X						X			1950	1950-59
" " " "	(b) 6/	X				X ^{5/}	X						X			1958	1963, 1964
3. Ghana		X				X ^{2/}	X ^{2/}						X			1960	1959-65
4. Ivory Coast		X		X		X ^{2/}	X ^{3/}					X	X ^{4/}			1963	1960
5. Malawi		X				X ^{1/}	X ^{3/}	X	X	X			X ^{4/}			1954	1954-63
6. Morocco		X		X		X	X ^{2/}	X	X	X			X ^{4/}			1960	1953-1965
7. Nigeria		X		X		X	X ^{2/}	X	X	X			X ^{4/}			1957	1950-1963
8. Rhodesia, Southern		X		X		X ^{2/}	X	X	X	X			X ^{4/}			1954	1954-64
9. South Africa (Rep.of)		X		X		X ^{2/}	X	X	X	X			X			1958	1953-65
10. Sudan				X		X	X						X			1961/62	1955/56-1962/63
11. Tanzania (Tanganyika)				X		X	X ^{3/}									1960	1960-64
12. Tunisia		X		X		X	X ^{3/}	X								1960	1960-64
13. Uganda				X		X	X									1960	1960-64
14. U.A.R. (Egypt)				X		X	X									1954	1952-1961
15. Zambia				X		X	X ^{3/}	X	X	X			X ^{4/}	X		1954	1954-1964
Total number of countries		7		10		11	10	7	4	3	5	1	6	3			

Notes: 1/ G = gross; N = net.

2/ Represent variants of the standard tables.

3/ Gross national product.

4/ For the former Federation of Rhodesia and Nyasaland only.

5/ Estimates not yet published.

6/ Data at constant prices of 1958 for 1963 and 1964 were compiled by the I.R.A.S. of Iovanian University, Congo(Kinshasa).

7/ Gross domestic production.

8/ Estimates for this table are available for 1950-57 only.

Table 2. Expenditure on the gross domestic product and related aggregates
(At constant prices)

(An "X" indicates that separate estimates for particular items have been published)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Private Consump. exp.	Govt. Consump. exp.	Gross domestic fixed capital formation	Changes in stocks	Imports & Exports of goods and services	Net factor income from abroad	Trading gain
1. Algeria	X	X ^{1/}	X ^{2/}		X		
2. Congo (Dem.Rep.of)	X	X	X	X	X		
3. Ghana ^{3/}							
4. Ivory Coast	X ^{4/}		X	X	X		
5. Malawi	X	X	X	X	X	X	X
6. Nigeria	X						
7. Rhodesia, Southern	X	X	X	X	X	X	X
8. South Africa (Rep.of)	X	X	X	X	X	X ^{5/}	X ^{6/}
9. Sudan	X	X	X	X			
10. Tunisia	X	X	X	X	X		
11. Zambia	X	X	X	X	X	X	X

Notes: 1/ For administrations.

2/ Including changes in stock.

3/ Breakdown included in unofficial reports, not so far published.

4/ Including consumption expenditure of administrations.

5/ Excludes undistributed earnings of foreign-controlled subsidiaries.

6/ Calculated, but not so far published.

Table 3. Industrial origin of gross domestic product

(At constant prices)

(An "X" indicates that separate estimates for particular items have been published)

Country	Branch of economic activity												
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
1. Congo (Dem. Rep. of)		X	X	X	X	X	X	X 1/2/	2/	X	X	X	X
2. Ghana		X	X	X	X	X	X	X 1/2/	2/	X	X	X	X
3. Ivory Coast		X	X	X	X	X	X	X 1/2/	2/	X	X	X	X
4. Morocco		X	X	X	X	X	X	X 1/2/	2/	X	X	X	X
5. Nigeria		X	X	X	X	X	X	X 1/2/	2/	X	X	X	X
6. South Africa (Rep. of) 6/		X	X	X	X	X	X	X 1/2/	2/	X	X	X	X
7. Sudan		X	X	X	X	X	X	X 1/2/	2/	X	X	X	X
8. Tanzania (Tanganyika)		X	X	X	X	X	X	X 1/2/	2/	X	X	X	X
9. Tunisia		X	X	X	X	X	X	X 1/2/	2/	X	X	X	X
10. Uganda		X	X	X	X	X	X	X 1/2/	2/	X	X	X	X
11. U.A.R. (Egypt)		X	X	X	X	X	X	X 1/2/	2/	X	X	X	X

Notes:

- 1/ Partially included in "Agriculture"
- 2/ Probably included with "Transport"
- 3/ Breakdown included in unofficial reports, not so far published.
- 4/ Included in "Services".
- 5/ Ownership of buildings.
- 6/ Although no official figures have been published, it is known that detailed estimates have been made.
- 7/ Fishing included in "Manufacturing"
- 8/ Basic metals industry included in "Mining and Quarrying"
- 9/ Included with "wholesale and retail trade"

Table 4. Methods used by countries in obtaining constant price estimates
(An "X" indicates the use of a particular method or practice by countries)

Country	Methods	Extrapolation of base year values by quantity indices, using indicators of:				Deflation of current values by indices of:						
		Output series	Input series		Energy	A. Selling prices						B. Cost prices of:
			Materials	Employment		Wholesale prices	Consumer prices	Import prices	Export prices	Construction materials	Wage rates & earnings	
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	
1. Algeria		X(f,h,i,j)		X(b)			X(a,b)	X(o')	X(e)	X(o)		X(b)
2. Congo (Dem. Rep. of)		X(d,h,i,l)		X(j,o)			X(a,n)	X(a,o,c')	X(e)	X(o,c')		
3. Ghana		X(e,h,j)					X(a)	X(e,c',f)	X(e)			
4. Ivory Coast		X(h,i,j,k)					X(m,a)	X(f,c,n,k,o)	X(e)			
5. Morocco		X(h,i,j,k)						X(c')				
6. Nigeria		X(h,i,j,k)					X(a,k,m)	X(a,b,c')				
7. Rhodesia, Southern		X(h,d)					X(a)	X(f,g,c')				
8. Malawi		X(h,d)					X(a)	X(f,g,c')				
9. Zambia		X(h,d)					X(a)	X(f,g,c')				
10. South Africa (Rep. of)		X(a,h,i,j,m,n)					X(b)	X(o',e,f,k,l)				
11. Sudan		X(h,j)										
12. Tanzania (Tanganyika)		X(h,i,k,l)										
13. Tunisia		X(h,i,d)										
14. Uganda		X(h,e,i,j,l)										
15. U.A.R. (Egypt)		X ₂										
Total number of countries		14	2	4	0	3	13	14	9	10	7	

Key for symbols

- a = Private consumption expenditure
- b = Government consumption expenditure
- c = Gross fixed capital formation (construction); or value added in construction
- c' = Gross fixed capital formation (plant, machinery, equipment)
- d = Increase in stocks
- e = Exports
- f = Imports
- g = Net factor income from abroad

- h = Value added in agriculture
- i = Value added in mining
- j = Value added in manufacturing and energy
- k = Value added in wholesale and retail trade
- l = Value added in transport & communication
- m = Value added in other services
- n = Indirect taxes and subsidies
- o = Intermediate goods

Notes: 1/ For unspecified products and services

2/ Where quantity figures are available they are re-valued at base year prices; where quantity figures are not available, wholesale price indices are used to deflate the components of domestic product obtained by the production approach, and consumer price index numbers are used to deflate data obtained through the expenditure approach.

3/ For "missions".

only country in the region that has replaced or modified the traditional systems of wholesale price indices by the sector approach, i.e. by the calculation of sector indices classified by kind of industrial activity of the producers involved in transactions covered, even though there is still quite a gap between the model system of index numbers of producer prices proposed by the United Nations^{1/} and the system currently practised in that country;

- (iii) Index numbers of industrial production: Relatively few countries have so far compiled index numbers of industrial production. The scope and coverage of such indices is in the main related to mining and manufacturing and electricity. Only in one case does the general index cover construction as well. The Laspeyres formula has been invariably used in the computation of the index, while "weights" are based on either gross value of production, or value added, or ex-factory prices, in the base year. Therefore, it may be said that the recommendations of the United Nations^{2/} on the choice of formula and weighting system for the compilation of production indexes have largely been followed.

COUNTRY PRACTICES:

8. Country practices vary according to the type and nature of basic and current statistics available. In this paper country practices will be examined by reference to (i) the items contained in the right half of Account I, namely, Expenditure on gross domestic product, and (ii) those of one of the leading supporting tables of the United Nations system^{3/},

1/ The Gathering and Compilation of Statistics of Prices (E/CN.3/328).

2/ Index Number of Industrial Production: Studies in Methods, No. 1
(United Nations publication. Sales No.: 1950 XVII.4), paragraph 38.

3/ A System of National Accounts and Supporting Tables: Studies in Methods, Series F. No. 2, Rev. 1 (United Nations publication. Sales No: 59.XVII.11).

viz. Table II. Industrial origin of gross domestic product at factor cost, and (iii) miscellaneous entries, such as (a) indirect taxes and subsidies, (b) net factor income from abroad, (c) trading gains, and (d) statistical discrepancy or balancing item.

(A) ESTIMATION OF EXPENDITURE ON GROSS DOMESTIC PRODUCT:

9. The methods used by the countries, with one or two exceptions, for obtaining constant price estimates of expenditure on gross domestic product follow closely the suggestions contained in the publication, Quantity and Price Indexes in National Accounts ^{1/}, in the section termed "Still simpler short-cut methods" for reducing the current value of domestic product to constant prices. The methods suggested for use by countries where "the relevant statistical information is meagre" consist of the deflation of current value series by a comprehensive index-number of prices either retail or wholesale, and of further refinements of the approach by (i) re-combining the existing price series with different weights, (ii) introducing price index numbers for merchandise imports and exports with appropriate weights, (iii) deflating wages and salaries paid by government by an index of wage and salary rates while other goods and services bought by government could be deflated by an index of a suitable combination of available commodity prices, and (iv) gauging the price movements of construction and machinery for the deflation of fixed capital formation (capital goods). "The former could perhaps be approximated by means of information on the volume and value of production in the construction trades and the latter from suitably re-weighted average values of import or export classes" ^{1/}. As will be clear from later paragraphs, the countries have in fact employed numerous adjustments and approximations with considerable ingenuity, depending on the types of data available. Descriptions of country practices

^{1/} Richard Stone, Quantity and Price Indexes in National Accounts, published by O.E.E.C., 1956. pp. 112-113.

in estimation of expenditure on gross domestic product at constant prices will proceed under the following headings:

- (a) Private consumption expenditure
- (b) Government consumption expenditure
- (c) Gross domestic fixed capital formation
- (d) Increase in stocks
- (e) Imports and exports of goods and services.

(a) Private consumption expenditure:

10. As was mentioned in paragraph 4, the methods used by the countries in obtaining constant price estimates are seriously conditioned by those used in deriving such estimates at current prices. In the current price estimates of private consumption expenditure, Ghana and Nigeria have adopted essentially the family budget approach, while Malawi, Southern Rhodesia and Zambia, components of the former Federation of Rhodesia and Nyasaland, made use of a combination of the commodity flow, retail valuation, and the family budget approaches ^{1/}. Sudan and Tunisia first estimated the gross domestic product by industrial origin and subsequently deduced private consumption expenditure as difference between the total GDP and the sum of its other expenditure components. This was done with respect to estimates at both current and constant prices in the case of Sudan.

^{1/} For the 4 different approaches of estimating private consumption expenditure at current prices, viz. commodity flow, retail valuation, retail sale, and family budget, see the Methods of National Income Estimation: Studies in Methods, Series F, No. 8 (United Nations publication. Sales No.: 1955. XVII.5).

11. In the current value estimate of private consumption expenditure for Ghana, reliance has been placed on the 1961/62 household expenditure survey of 2849 rural and urban households, accounting for about 0.2 % of the estimated total number of households in that country, while in the case of Nigeria, rural economic surveys consisting of 192 or so units of study, i.e. villages or groups of villages of a specified size (N.B. with an estimated total of about 9600 households in sample for general studies, and a sub-sample of some 3840 households for consumption and expenditure studies, making an overall sampling fraction of about 0.125 per cent and 0.05 per cent respectively), have been conducted to obtain household consumption and expenditure data in addition to other pertinent information on agriculture, household composition, occupation, etc. For Malawi, Rhodesia and Zambia, similar estimates at current prices were arrived at by making use of (i) retained imports plus local production, adjusted for distributors' mark-ups, (ii) known physical quantities of supply multiplied by the average retail prices, and (iii) estimates of per capita consumption obtained from urban and rural family budget surveys.

12. The methods used by the 11 countries (see Table 2) that have made separate estimates of private consumption expenditure at constant prices, can be summarized as follows:

- (1) Algeria: Current series deflated by the composite consumer price indices for Algiers.
- (2) Congo (Democratic Republic of): African and non-African consumption deflated respectively by a cost of living index for African personnel of the Administration and that for non-Africans in Kinshasa (formerly known as Leopoldville).
- (3) Ghana: Largely deflated by index numbers of retail prices, import prices, and earnings in service industry, as the case may require. Quantity indicators are also used where available.
- (4) Ivory Coast: The consumption expenditure of households and administrations are given together and obtained as the difference between the total domestic product at market prices and gross domestic capital formation and exports, all valued at 1963 prices.

In arriving at gross domestic product at constant prices, the following steps have been taken: (i) Imports are deflated by specially constructed price indices, based on external trade statistics, distinguishing intermediate goods, capital goods and goods for final consumption; (ii) Local production is valued at 1963 prices, branch by branch; (iii) Services are deflated in the same way as for wages and salaries (i.e. a cost of living index for Europeans is used to deflate earnings of Europeans and an index of minimum wages for occupations is used to deflate the earnings of Africans); (iv) Construction is estimated as a function of wages and salaries paid and intermediate goods used by the industry; (v) Intermediate goods (including taxes and trade margins) are deflated by specially constructed price indices for such goods imported and locally produced respectively; and (vi) Exports are deflated product by product for such important products as coffee, cocoa, bananas and forest product, while for the remaining export products, they are estimated as a proportion of corresponding local production at constant prices.

T The derived consumption expenditure of households and administrations is checked afterwards for accuracy by using the cost of living index for Abidjan as deflator for consumption expenditure of urban households; and by using price indices of imported textiles and certain food products as deflator for corresponding consumption expenditure of rural households, in addition to valuing subsistence consumption at producer's prices;

(5) Malawi, Rhodesia and Zambia: The deflation of current consumption expenditure is done in two parts:

(i) African rural household consumption: by valuing all consumption data at producer prices of the base year plus an arbitrary 25 per cent mark-up for African rural household services;

(ii) Other private consumption: Deflated by appropriate composite consumer price indices. For the African element of expenditure on consumer goods, new weights and new price series had to be utilized to provide suitable deflation indices for a number of commodities and groups. For "financial services" and "religious organizations", current series are deflated by an earnings index of those employed in the financial sector and in religious and educational establishments of missions and churches respectively. For the deflation of "resident expenditure abroad", special price indices have been constructed: an index of the fares on air, sea, and rail routes to the United Kingdom, Republic of South Africa and Europe, weighted on the basis of the estimated average annual expenditure of residents on each route and by method of travel; and an index of travel expenditure, a weighted average of the consumer price indices of the United Kingdom and Republic of South Africa, the weights reflecting the estimated expenditure of residents in these countries.

(6) Nigeria: For agricultural products and a number of selected goods for private consumption (e.g. clothing and footwear imported, motor cars, hollow-ware, electricity, kerosine, etc.) and selected services (e.g. travel, education), either current quantities are multiplied by the retail prices of the base year or quantity indicators are used to extrapolate the base year value. For the remaining items, deflation by index numbers of retail prices, import prices, producer prices (e.g. of cotton), and a general price index for services, etc. has been effected.

(7) Republic of South Africa: The methods used by that country consist of: (i) extrapolation of base-year values by volume indices wherever suitable quantity indicators can be found; (ii) deflation of current values by appropriate price series, when method (i) cannot be applied; (iii) establishment of upper and lower limits of prices and ascertaining of price trends for

such commodities and services that are important, but for which both methods (i) and (ii) cannot be applied; and (iv) deflation of current expenditure by the consumer price index when all the above three methods cannot be used. The items of expenditure deflated by the consumers' price index accounted for 5 per cent only of the total private consumption expenditure of that country in 1959.

- (8) Sudan and Tunisia: Private consumption expenditure derived as a residual or balancing item.

13. Composition of private consumption expenditure: Only two countries in the region have so far published separate tables on the composition of private consumption expenditure at constant prices, viz. Nigeria and the Republic of South Africa, if the former Federation of Rhodesia and Nyasaland is excluded. The classification of items in both cases either follows entirely the U.N. classification ^{1/} or is done such that approximations to it can be achieved through further groupings or adjustments. The methods used by both countries in deflating the various components of private consumption expenditure have already been outlined in the foregoing paragraph.

(b) General government consumption expenditure:

14. Eight countries (see Table 2) in the region have published separate estimates of government consumption expenditure at constant prices. The methods used in obtaining such estimates comprise the following:

- (i) Extrapolation of base-year expenditure by an index of employment in administrative services (e.g. Democratic Republic of Congo);
- (ii) Deflation of current values by a composite cost of living index (e.g. Sudan, Tunisia);
- (iii) Deflation of current values by indices of wages and earnings (e.g. Ghana, Malawi, Rhodesia, Zambia).

Algeria used a specially constructed price index, taking into account the structure of purchases of Algerian and "metropolitan" administrations in the

1/ A System of National Accounts and Supporting Tables: op.cit., p.23

base-year; the three countries, Malawi, Rhodesia and Zambia, deflated current expenditure by an index of average wages of government employees, excluding the public works departments, while the Republic of South Africa dwelled mainly on the use of price deflators for this item, namely, to deflate wages and salaries paid by government by an index of wage and salary scales and to deflate other government expenditure by a wholesale price index of the different types of goods and services bought by government, the individual prices series being weighted by the values appearing in the 1956/57 input/output table for that country. In addition, information on practices on this score is available for two more countries, viz., Ghana and Nigeria: the former used as deflator an index of earnings in the public service derived from employment statistics, and a notional price index for other current government purchases, while the latter seems to have used exactly the same methods in arriving at constant price estimates for both private and government consumption expenditure.

(c) Gross domestic fixed capital formation:

15. Nine countries in the region have published estimates of gross domestic fixed capital formation at constant prices in terms of aggregates, and seven published tables on breakdown of such capital formation by type of capital good, four for breakdown by type of purchaser and three only for breakdown by industrial use. However, information on methods is available for twelve African countries.

16. The most popular methods used by the countries seem to be a combination of two index numbers, namely, a price index of imported machinery and equipment, readily available from external trade statistics, and a price index of building materials, or variants of such indices. Some countries have also introduced additional indices for deflation purposes, such as those of wage rates or earnings of particular types of labour, etc., depending on the availability of data. A country description of the methods used is given below:

- (1) Algeria: Current values of buildings and public works deflated by a specially calculated index of costs of building materials for Algeria; those of equipment deflated by a wholesale price index for industrial equipment for "metropolitan" France;

- (2) Democratic Republic of Congo: Current values deflated by a price index obtained by averaging price indices for imported equipment and for building materials;
- (3) Ghana: (i) Building and other construction works: deflated by price indices implicit in the current value estimates.
(ii) Registered vehicles: deflated at cost including purchase tax (i.e. implicit prices obtained from c.i.f. value plus duty, marked up for landing and delivery costs and distributors' margins plus purchase tax).
(iii) Other imported transport equipment and other machinery: deflated by price indices of imported machinery and equipment;
- (4) Ivory Coast: Machinery and equipment is deflated by a specially constructed price index of imported equipment, while the value of building and construction is estimated as a function of wages and salaries paid and intermediate goods used, both of which are deflated by appropriate price indices;
- (5) Morocco: Gross domestic fixed capital formation in current prices was established by valuing building and construction from the "purchasing" side and plant and machinery from the "selling" side, and then converted into constant prices by using price indices for building and construction and imported equipment respectively as deflators;
- (6) Malawi, Rhodesia and Zambia: (i) Land improvement: deflated by an index of average earnings of farm labour; (ii) Building and works: current values deflated by an index of building costs, which is base weighted and combines an index of the costs of building materials and an index of average earnings of all employees in the industry; and (iii) Imported machinery and transport equipment: deflated by the average value index of same;
- (7) Nigeria: (i) Buildings: Output at current prices deflated by an index of building costs;
(ii) Civil engineering: Components of current output separately deflated by appropriate cost indices for roads, bridges and other works;

(iii) Transport equipment: Current values deflated by delivered price index (for road vehicles), by import price index for railway vehicles (for railway transport equipment) or by import price index for plant, machinery and equipment (for ships and aircraft);

(iv) Plant and machinery: deflated by import price index for same;

(v) Plantation and mining development: current expenditure deflated by an index of wage rates for unskilled labour;

(vi) Land clearance by peasants: current cost of preparing virgin land for farming deflated by same index as for (v);

(8) Republic of South Africa:

(i) Building and construction: current values deflated by an implicit price index for the construction industry; and

(ii) Machinery and equipment: for 1946-60, an index of wholesale prices, calculated by making use of five price series, namely, those for agricultural implements, tractors, lorries, metals, and the minimum wage rates for the metal industry, and by giving them equal weights, was used to deflate current output; from 1961 onward, a wholesale price index for machinery has been used instead;

(9) Sudan: (i) European-style building: available quantities of cement used as indicator;

(ii) Machinery and equipment: current values deflated by an index of import prices for same;

(10) Tunisia: Current series deflated by a price index of construction and an import price index for mechanical and electrical goods respectively.

(d) Increase in stocks:

17. Information on country practices for this item is available for eight countries of the region. The methods used by the countries include: (i) re-valuation of stocks at base-year prices (e.g. Ghana), (ii) deflation of inventories at current prices by the import price index (e.g. Democratic Republic of Congo), (iii) deflation of same by a wholesale price index (e.g. Republic of South Africa), (iv) a combination of the techniques of re-valuation at base-year prices and of deflation by

appropriate price indices (e.g. Malawi, Rhodesia, Tunisia, Zambia), and (v) deflation by the same price indices as used for estimating gross domestic fixed capital formation (e.g. Algeria).

18. Ghana re-valued stock changes at the prices of the base-year: cocoa held by the Ghana Agricultural Produce Marketing Board, the largest part of the stock estimate, was valued at cost of purchase by the Board; the difference between imports and registration of motor vehicles, taken as stock change, was valued at estimated wholesale level; and the difference between production and export of gold, diamonds, manganese and bauxite was valued at export prices (excluding duty) of the base-year. For the three countries, Malawi, Rhodesia, and Zambia, the estimation procedure adopted has been to apply base-year prices to the quantity of the change in the stocks of agricultural produce, minerals and other commodities for which quantitative data are available, and to deflate current values by suitable price indices where estimates of stock changes are based on accounting data, for which value figures only are available. Tunisia adopted a similar stand: for locally produced goods, quantity figures for the stock change are re-valued at base-year prices, while stocks of imported goods at current prices are deflated by the import price index. In the case of the Republic of South Africa, the stock valuations at the end of the year was deflated by the average wholesale price index for the last five months of the year for stocks held by the manufacturing industry, and by the same index for the last four months of the year for stocks held by the distributive trade, based on their estimated respective periods of turnover, while inventories held by the other branches of production were deflated by the same index for the whole year.

(e) Imports and exports of goods and services:

19. Information on the procedures adopted in deflating current values of imports and exports to arrive at constant price series is available for ten countries of the region. It is however, not clear:

- (i) how many countries have attempted the deflation of import and export of non-factor services (i.e. transport, insurance and other services, including tourist travel both in the country and abroad), and if so, what are the procedures adopted for such deflation; and
 - (ii) whether adjustments have been made to the existing national import and export indices in coverage and timing to conform to the national accounting concept before they are used for deflation purposes or for those of extrapolating the base-year values. For instance, the existing or conventional quantum import indices are commonly valued on a c.i.f. basis, while the indices defined for national accounting purposes (in conformity with balance of payments definitions)^{1/} are valued f.o.b. the exporting country, and the transport and insurance costs, to the extent that these services are supplied by foreigners, are presented as separate entries.
20. Country practices on this score are summarised as follows:
- (i) Deflation of current values of imports and exports by the price index of imports alone. Both Sudan and Tunisia employed this procedure on the ground that "the value of exports represents a purchasing power from abroad";
 - (ii) Deflation of current values of imports and exports by their respective unit value indices: this method seems to have been favoured by the majority of the countries of the region that have attempted constant price estimates of this item. Ghana deflated the adjusted value of exports of gold and other commodities and the c.i.f. value of commodity imports by implicit price indices derived from external trade statistics; the three countries, Malawi, Rhodesia and Zambia, used currently weighted unit value indices of imports and exports to deflate the current values of goods and services imported or exported respectively. The U.A.R.

^{1/} A System of Price and Quantity Indices for National Accounts. op.cit. paragraphs 205-207.

- used the same procedure except that it is not clear whether that country has used the same price indices to deflate the import and export of services or not;
- (iii) Extrapolation of base-year values by volume indices of imports and exports respectively: The Republic of South Africa used such indices to deflate the current values of import and export of goods as well as services because of the fact that the volume of non-factor services imported or exported is expected to be closely correlated with the volume of trade in merchandise;
- (iv) A combination of some of the above procedures: The Democratic Republic of Congo employed a mixture of such procedures by extrapolating base-year values of commodity imports by a quantum index of imports; deflating the import of services by an unspecified general price index; and by deflating current values of exports by an export price index. For the practices of Ivory Coast, see paragraph 12 (4).

(B) ESTIMATION OF GROSS DOMESTIC PRODUCT BY INDUSTRIAL ORIGIN:

21. For measurement of work done by the various industries, the United Nations has considered it desirable to use the Geary formula^{1/} for the calculation of an index of work done, although the practical difficulties in the way of computation in applying that formula have been rated great. In the U.N. document A System of National Accounts (Proposals for the Revision of the SNA, 1952)^{2/}, the importance of deflating inputs as well as outputs, that is, the double-deflation method in constructing index numbers of production, is again emphasised. This is considered necessary in order to obtain the contribution of each branch of production to "total unduplicated output", and is regarded desirable for the purpose of input-output analysis at constant prices.

^{1/} Index numbers of Industrial Production, op. cit., para. 52.

^{2/} A System of National Accounts (Proposals for the Revision of SNA, 1952): (E/CN.3/320), paras. 4 and 5 of Chapter III.

22. In actual practice, however, the double-deflation method has only been very sparingly employed by the countries in the region, due to the non-availability of the necessary quantity and price data. Out of the 10 countries in the region that are known to have made constant price estimates of gross domestic product by industrial origin, the majority based their estimates either on the assumption that the input-output ratio (or relationship) remained constant during the period under investigation, or on the assumption that the productivity of labour remained constant, or a mixture of such assumptions. Five countries (viz. Ivory Coast, Morocco, Nigeria, Tunisia and Uganda) made most use of quantity indicators (of output or input), while one country, Tanzania, apart from estimates for agriculture and mining sectors, relied almost entirely on the wage bill deflation approach, dictated mainly by the relative abundance of annual employment and earnings data in that country. A description of country practices of estimating gross domestic product at constant prices by industrial origin, will be given in the following paragraphs in the following order:

- (a) Agriculture, forestry, hunting and fishing;
- (b) Mining and quarrying;
- (c) Manufacturing;
- (d) Construction;
- (e) Electricity, gas and water;
- (f) Wholesale and retail trade;
- (g) Banking, insurance and real estate;
- (h) Transport and communications;
- (i) Ownership of dwellings;
- (j) Public administration and defence;
- (k) Services.

(a) Agriculture, forestry, hunting and fishing:

23. In obtaining estimates of value added in agriculture, forestry, hunting and fishing, at constant prices, varied practices are in use by the countries, depending on the degree of sophistication of available statistics. Where data permit, the double-deflation method has been attempted (e.g. Republic of South Africa and Tanzania); in most cases, where estimates of agricultural production in physical quantities are available, the method usually used by the countries consists in the re-valuation of such quantities at base-year prices, and in using the implicit price index for gross value of production thus obtained, to deflate the values added at current prices. In symbols the method may be written as:

$$V_o = V_n \times \frac{P_o Q_n}{P_n Q_n}$$

Where V_o = Value added at constant prices;

V_n = Value added at current prices;

P_o, P_n = the prices of commodities in base and current years;

Q_n = current quantities produced.

In some instances, the values added in base-year are extrapolated by an index of agricultural production (e.g. Morocco); in yet other cases, especially for the subsistence or traditional sector of agriculture, the output is based on estimated growth of population, with or without concomitant assumptions about changes in productivity of labour (e.g. Ghana, Sudan, Uganda, etc.)

For exports of agricultural commodities, the quantities exported are either re-valued at base-year prices, or the current values of exports are deflated by the import or export price index. For own-construction activities in agriculture, the estimated values at current prices are usually deflated by appropriate index numbers of wage rates to arrive at constant price estimates. A description of practices by country is given below:

- (1) Ghana: Different treatments are applied to the various components of the agriculture sector as follows:
 - (i) Local food production (excluding fish, which is based on fish landings): based on population estimates by region and by urban and rural;
 - (ii) Cocoa production: based on quantity of cocoa purchased annually by the Cocoa Marketing Board. Value added by the Board is arrived at by double-deflation method, with cocoa purchases, transport and other service inputs deducted from exports and stock changes, all in base-year prices. The quantities of exports of other agricultural produce are valued at the export prices of the base year;
 - (iii) Forestry: Forestry and sawmilling output is based on volume of exports of logs and sawn timber plus locally used sawn timber, while firewood and charcoal consumption is based on population.
- (2) Morocco: Extrapolation of the value added in base year by an index of agricultural production, which is obtained by valuing current quantities by base-year prices.
- (3) Nigeria:
 - (i) Agriculture: Current quantities of crops production are re-valued at the producer's prices of the base year, while the output of the livestock sub-sector is deflated by an index of meat prices. Land development expenditure at current prices for preparing virgin land for farming purposes is deflated by an index of wage rates for unskilled labour;
 - (ii) Fishing: Output at current prices deflated by an index of fish prices;
 - (iii) Forest products: The current quantities of timber are re-valued at base-year prices, while the current output of firewood is deflated by an urban consumers' price index for same.

(4) Republic of South Africa:

- (i) Agriculture, forestry and hunting: The double-deflation method is used, with the current quantities of output re-valued at base-year prices and the current values of inputs (e.g. seeds, fertilizers, etc.) deflated by a specially calculated price index for inputs;
- (ii) Fishing: Extrapolation of value added in the base-year by an index of the volume of fish landings;
- (iii) Own-construction activities in agriculture (e.g. dams, furrows, outbuildings, etc.): current values deflated by a combined index of wage rates of farm workers and of prices of agricultural implements and their spare parts.

- (5) Sudan: (i) The output of the traditional part of the economy has been estimated based on certain assumptions about the growth of population and of labour productivity;
- (ii) Current values of exports are deflated by an import price index.

(6) Tanzania: Current quantities of crop production are re-valued at the producer's prices of the base-year, while the current values of inputs are deflated "roughly".

(7) Tunisia: For agricultural commodities in general, with the exception of wine and olive, current quantities are re-valued at base-year prices; for wine and olive as well as raisins, the procedure adopted has been to deflate the current values of exports of such products by an index of import prices, and to re-value that part of the production that is consumed in the country, at base-year prices.

(8) United Arab Republic: The estimation procedure used consists in the re-valuation of agricultural commodities produced at producer's prices of the base-year, wherever quantity figures are available, and in the deflation of services connected with agriculture by a wholesale price index number for agricultural commodities.

Similar procedures are applied in the estimation of values added by the other branches of production at constant prices (e.g. mining, manufacturing, etc.).

(9) Uganda:

- (i) Agricultural crops: Estate production of cash crops is re-valued at base-year prices; quantity indicators, such as volume of purchases of coffee from African growers, sales of cotton harvested during the season, etc., have been used to estimate the net output resulting from the production of these two crops by "African enterprises", while the quantities of subsistence production of staple food crops are obtained by multiplying assumed quantities per capita by the size of population, and then re-valuing such quantities at base-year prices. Exports of agricultural commodities are also re-valued at prices of the base-year;
- (ii) Livestock: Estimated numbers of animals slaughtered are re-valued at base-year prices;
- (iii) Fishing: Landed quantities of fish are used as indicator for extrapolating value added in the base-year;
- (iv) Forest products: Both commercial production and subsistence consumption per capita of fuel has been taken as constant. The resulting quantities are multiplied by base-year prices;
- (v) Farm costs: Imported quantities of insecticides, wires, agricultural tools and implements are used as indicator. For other implements, the price index of imported agricultural machinery and appliances has been used to deflate current values.

(b) Mining and Quarrying:

24. Information on methods used to estimate value added by mining and quarrying at constant prices is available for 8 countries in the region. The country practices in this respect consist in (i) the re-valuation of current quantities at base-year prices (e.g. Tanzania, Tunisia, Uganda,

and U.A.R.); or (ii) the extrapolation of base-year values added by index numbers of mineral production (e.g. Morocco, Republic of South Africa); or (iii) the extrapolation of base-year figures by indices of current tonnages produced (e.g. Nigeria), or by a volume index of exported mineral products, adjusted for stock changes (e.g. Ghana). The current values of own-construction activities in mining in the Republic of South Africa, estimated mainly from the wages and salaries bill paid to workers in the developing mines, have been deflated by an index of wage rates, calculated by using the average earnings of mine workers in gold and diamond mines, while the current values added by quarrying in Uganda is deflated by a price index for the construction industry, to arrive at constant price estimates.

(c) Manufacturing:

25. Again information on country practices for constant price estimates of value added by the manufacturing industry is available for 8 countries in the region. The methods used include: (i) the double-deflation method for selected industrial groups (e.g. Uganda), (ii) re-valuation of current quantities at base-year prices (e.g. UAR and Sudan, for those parts of the manufacturing industry for which quantity figures of production are available), (iii) projection of base-year values added by an index of numbers of employees (e.g. Ghana), (iv) extrapolation of base-year figures by an index of industrial production for manufacturing (e.g. Morocco, Republic of South Africa), (v) deflation of current values by a price index of the most important input or output (e.g. Nigeria), and (vi) deflation of the wage bill, with the "other surpluses" (e.g. profit margins) kept un-deflated (e.g. Tanzania).

26. An attempt at double deflation has been carried out by Uganda for some selected industries, for instance, tobacco manufactures, spinning, weaving and finishing of textiles, cement, tea, beer, etc. The total output of beer including excise tax is deflated by the Kampala cost of living index for same, while the current values of raw materials are deflated by a weighted price index of those materials that enter into the

production of beer. In the case of the Republic of South Africa, a volume index of net output has been used to extrapolate the value added by manufacturing in the base-year. The construction of the volume index has some special features: it uses the Laspeyres' formula, but instead of re-valuing the output of the different years at base-year prices, the output of each year is re-valued in the prices of the immediate preceding year. The index is then chained. By using this method, year-to-year changes in the ratio of value added to the volume of gross output is immediately reflected in the volume index of net output, and therefore the index was considered to provide a good indication of the "real" value added in manufacturing.

27. In arriving at constant price estimates of the value added by manufacturing, Nigeria has relied on the deflation of current values by price indices of the most important input or output for each industrial group. Thus, the deflator used for handicrafts and metal products industries is an index of wage rates for unskilled labour (input); that for the textile industry, (the c.i.f. value plus duty) price of bleached cotton piece goods (input); producer's price index of groundnuts (input) is used to deflate the current value added by the groundnut oil industry, while a price index of beer (an output) is used to deflate "beer and soft drinks".

28. The wage bill deflation approach of Tanzania deserves special mention. Apart from the agriculture and mining and quarrying sectors, where the quantities are re-valued at the producer's prices of the base-year, the contributions to gross domestic product of the other branches of production at constant prices, have almost entirely been estimated based on the deflation of the wage bill, the logic behind this approach being: (a) the existence of detailed annual statistics on employment and earnings, and (b) the fact that by assuming that the only price changes were those due to wage rate revision, keeping the other surpluses undeflated, the method produces a real growth consistent with various indirect physical indicators. The wage bill deflation method consists

in the calculation of the wage bill at constant wage rates: for the public sector, broad percentage changes in basic salaries for various large groups were ascertained; for the private sector, the small changes in average earning of the non-African employees were assumed to be due to changes in wage rates, while for African employees, the changes in rates was estimated from the distribution of employees by basic rates of pay for unskilled and semi-skilled workers. The changes in these rates were assumed to be a price change, thereby leaving out of account the wage increases due to promotion and up-grading of African employees, and any changes in hours of work and possibly in intensity of work as well.

(d) Construction:

29. The countries in the region that have made constant price estimates of value added by the construction industry, have more or less followed the same methods as those used for manufacturing. Their practices in this field consist of:

- (i) Extrapolation of values added in base-year by an index of employment: Ghana used the average numbers of employees, obtained from private employment statistics, as indicator for such extrapolation in the case of private construction and other industries (excluding electricity); Uganda assumed that the net output at constant prices per employee in the building industry remained constant;
- (ii) Deflation of current values by index numbers of wage rates or of building materials: Nigeria deflated the value added at current prices by an index of wage rates for skilled labour in building and civil engineering trades, while Morocco and Tunisia used a price index of building materials as deflator. Ivory Coast used a variant of this method;
- (iii) Wage bill deflation method: Tanzania deflated the wages and salaries bill of the industry by appropriate indices of wage rates, while keeping the other incomes unadjusted;

- (iv) Deflation of all components of inputs (i.e. material costs and factor incomes): The Republic of South Africa relied on this method to arrive at constant price estimates of the value added by construction. One reason for adopting this method was the availability of breakdown of the gross value of production at current prices into such items as material costs, overhead costs, wages and salaries, and other incomes (mainly profits). For deflating current values of materials used, a combined wholesale price index of metals and metal products and of building materials, given the relative weights of 4:1, was calculated and used as deflator; for overhead costs, the general wholesale price index was used; for the deflation of wages and salaries at current prices, a combined index of wage rates for the white and coloured workers, weighted by wage payments by the industry to each category of such workers, was calculated. The index of wage rates for "white workers" was calculated based on the minimum wage scale for workers in different occupations and for different salary groups, while the corresponding index for "coloured workers" was derived from information obtained from industrial censuses. To obtain estimates of "other incomes" (including profits) at constant prices, it was assumed that the item would account for the same proportion of the total value added, whether at current or constant prices.
- (v) Other methods: The Sudan used the available quantities of cement as indicator in estimating the output of European-style housing, and the estimated rate of population growth for the estimation of construction of the traditional-type of housing.

(e) Electricity, gas and water:

30. The methods used by the countries in estimating the value added by electricity, gas and water industry at constant prices, can be summarised under the following heads:

- temps uniforme*
- (i) Double-deflation method: Uganda re-valued the quantities of electricity sales for various purposes (e.g. flat-rate lighting, flat-rate commercial power and heating and security lighting, street lighting, industrial power, sales to Kenya, etc.) at their respective rates of the base-year, and deflated materials expenses at current prices by appropriate price indices. The value added at constant prices was then obtained by subtracting the latter sum from the former, all valued at base-year prices;
 - (ii) Output in physical quantities multiplied by the prices of the base-year: for example, Tunisia and the U.A.R.;
 - (iii) Extrapolation of the value added in base-year by an index of quantities produced, sold or consumed (e.g. Ghana, Morocco, Nigeria, Republic of South Africa, and Tanzania): Nigeria used the kilowatt-hours of electricity generated, and the gallonage of water consumed in the Lagos area, as indicators for extrapolation purposes, while Tanzania used the number of units of electricity sold as indicator.

(f) Wholesale and retail trade:

31. Information on the methods used for estimating value added at constant prices by wholesale and retail trade, is available for 7 countries in the region. Country practices in this respect range from the deflation of current values by a consumers' price index (e.g. Nigeria), or price indices of exports and imports (e.g. Sudan), or by an index of wage rates and net profits (e.g. Republic of South Africa), to the re-valuation at constant prices of locally produced agricultural produce and imported goods handled by the distribution trade (e.g. Tanzania), or the extrapolation of base-year value added by a volume index (e.g. Morocco).

32. Nigeria deflated the current values added by distribution by the general urban consumers' price index, while the double-deflation method was used for the estimation of value added at constant prices by Marketing Boards, through the re-valuation of quantities sold, purchased, added to or subtracted from stock, all at base-year prices, the buying allowances at current prices being deflated by appropriate price indices so as to be expressed also in the prices of the base-year. Sudan deflated the current values added by distribution by price indices of imports and exports because of the fact that the output of the distribution trade for that country consisted largely of the trade margins on imports and exports. In the case of the Republic of South Africa, a peculiar procedure was adopted: the current values added by the wholesale and retail trades were deflated by their respective indices of wage rates and net profits, the calculation of such an index for the retail trade being facilitated by annual surveys of retail businesses conducted in that country.
33. Tanzania estimated the "real" output of the distribution trade from its turnover at constant prices calculated from the volume of produce handled, much of which consisted of local agricultural produce and imported goods, for both of which reasonably good statistics were available. Morocco calculated a production index for the branch "Commerce" by adding together the value of imports, value added in agriculture and value added in industry and handicraft, all at base-year prices, adjusted for changes in stock, and used this index to extrapolate the value added in base-year by distribution. Tunisia, on the other hand, assumed that "commerce" represented the same proportion of the total of all other sectors, whether valued at current or constant prices.
34. Uganda adopted different methods to arrive at constant price estimates of the values added by the wholesale and retail trade, depending on the types of agents handling such trade as well as on the types of goods handled. For instance, for commodities traded by "African enterprises" (or the traditional sector), arbitrary percentage margins were placed on fresh produce traded; the numbers of animals (cattle, etc.) sold were

important

used as indicator for traders' and butchers' margins on livestock; and the output of African shopkeepers was deflated by a retail price index in African markets for Kampala. In the case of commodities traded by the corporate and non-African enterprises (or the modern sector), trade margins on locally produced goods were estimated in considerable detail for 1962, and the relationship between trade margins and total output was assumed to remain constant and unchanged for the other years under investigation; for imported commodities, the trade margins on those imported from East Africa and those from outside East Africa were calculated separately at current prices, and then deflated by appropriate price indices specially calculated for this purpose.

(g) Banking, insurance and real estate:

35. Rather scarce information is available on country practices in this respect for the region. It is known that Nigeria used an index of salaries of senior staff of banks for the deflation of values added by banking at current prices. On the other hand, rather detailed information on the methods used for the estimation of the contribution to gross domestic product by banking, insurance and real estate at constant prices, is available for the Republic of South Africa and is detailed below:

- (i) Banking (excluding other financial institutions): Three indicators were used, viz., current deposits and bank debits, time (or savings) deposits, and loans and advances made by the banking sector. The current values of the three series were deflated by the consumers' price index, and combined into one volume index by giving them the weights 2:1:1. The resulting volume index was then used to extrapolate the value added by banking in the base-year.
- (ii) Building societies: Two indicators were used for this sub-sector, namely, the loans given out and the value of shares issued by these societies. The former was deflated by an implicit price index for the construction industry, and the

Trust company
Société de gestion de portefeuille

latter by the consumers' price index. The resulting indices were then combined into one volume index by giving the two series equal weights.

- (iii) Stockbrokers: The numbers of shares bought by the share-brokers weekly, were used as indicator of the services rendered by them.
- (iv) Trust companies: Total deposits held by these institutions were deflated by a general retail price index, the relative weights of 5:3:2 being given to such institutions engaged in mining, manufacturing and commerce activities to arrive at a combined volume index for extrapolation purposes.
- (v) Insurance: This sub-sector was divided into life insurance and other insurance for estimation purposes. The estimated profits of life insurance companies deflated by a consumers' price index, and the value of contracts made by "other insurance" deflated by the same index, were combined into one volume index by weights proportional to their respective values added in the base-year.
- (vi) Estate agents: The values of property transferred, deflated by the implied price index for the construction industry, were used as indicator for extrapolating the value added figure for the base-year.

implied price index
ta cite

(h) Transport and communications:

36. The majority of the countries that have made constant price estimates of the contribution to gross domestic product by the transport and communications sector, seem to have favoured the use of volume indices of services rendered by the sector, to extrapolate the value added in the base-year (e.g. Ghana, Morocco, Nigeria, Tanzania and the Republic of South Africa), while relatively fewer countries attempted the other methods, for instance, the double-deflation method (e.g. Uganda), and the deflation of current values by appropriate price indices (e.g. Sudan; and Nigeria for communications only).

37. In view of the varied practices of the countries in this respect, details are given below for selected countries of the region:

- (1) Ghana: (i) Railway and Harbour Administration: Extrapolation of base-year value added by a weighted index of rail passenger miles, freight tons, and port loadings and unloadings; (ii) Post and telecommunications: Numbers of letters, postcards, and numbers of telephones are used as indicators.
- (2) Morocco: Extrapolation of base-year value added by a production index for "transport and services", which is obtained by assuming an annual rate of increase of 3.5%, a rate slightly higher than that of population growth.
- (3) Nigeria:
 - (i) Road, rail and water transport: Extrapolation by index of net ton-mileage;
 - (ii) Air transport: Extrapolation by index of net passenger-mileage;
 - (iii) Communications: Output deflated by an index of wages and salaries rates for Post Office staff.
- (4) Sudan: Current values deflated by price indices of imports and exports.
- (5) Tanzania: Motor transport enterprises were mainly concerned with crops for local consumption and the transport of exports to the railways. A volume index of such produce handled was used as indicator.
- (6) Tunisia:

Almost the same as for Ghana.
- (7) Uganda: Uganda's case is interesting and deserves special mention, due partly to its use of the double-deflation approach and partly to the fact that its transport (apart from road transport) and communications services form part of those of a joint service organization, viz. the East African Common Services Organization (or E.A.C.S.O.). Apart from transportation

services provided by African enterprises (or the traditional sector), where the net output per vehicle was assumed to be constant and therefore the estimates at both current and constant prices are the same, a description of the methods used in obtaining constant price estimates of value added by transport and communications (i.e. those provided by the corporate and non-African enterprises and public services, or the modern sector) in Uganda is given below:

- (i) East African Airways: Passenger-miles, cargo ton-miles, and mail ton-miles were used as indicators and a volume index was obtained by combining the three series weighted by the incomes in base-year from passengers' fares, cargo and mail revenues. Current expenditures, broken down into hire of aircraft, meals for passengers, aircraft fuel and oil, and other expenses, were deflated by appropriate prices indices, e.g. hire of aircraft (deflated by an index of fleet earnings), meals for passengers (by that part of the Kampala cost of living index relating to food, drinks and tobacco), etc. The price index implicit in the net output thus obtained, was then used to deflate Uganda's part of value added at current prices by the E.A.A.;
- (ii) Private road transport: Current values deflated by the same index as for the road services of the East African Railways and Harbours;
- (iii) East African Railways and Harbours: The output in current prices was sub-divided into passengers and goods carried, for each of the following categories: Railways, water transport services, road transport services and miscellaneous services. The indicators used for extrapolating the output (or gross value of production) consisted of number of passengers carried for the passenger traffic, and number of ton-miles for the goods traffic, while the item "miscellaneous services" was deflated by the price index implicit in the calculation for

goods. The inputs, composed mainly of coal and wood, fuel and diesel oils, and other expenditure, were deflated by appropriate price indices or re-valued at base-year prices.

- (iv) East African Posts and Telecommunications: Information on changes in rates and on quantity of services rendered (e.g. letter sent, telephone calls, etc.) was used to calculate a price index for post, telephone and telegraph services respectively, while inputs were deflated by an appropriate price index. The resulting values at both current and constant prices for the E.A.P.T. and E.A.R. H. were pooled together, and the implicit price index was then used to deflate Uganda's part of the values added at current prices.

(i) Ownership of dwellings:

38. Information on estimation procedures at constant prices for this sector is available for 6 countries in the region. The countries either extrapolated the value added in base-year by an index of numbers of enumerated houses, or by estimated numbers of rooms and population data (e.g. Ghana, Republic of South Africa), or deflated the current values by an index of rents or the cost of living index (e.g. Nigeria, Sudan), while Uganda made use of a number of physical indicators and other assumptions to derive estimates for this sector.

39. The procedure adopted by Ghana consists in the projection of estimates of net rent (i.e. gross rent less intermediate goods and services used) by the estimated numbers of rooms and population data (N.B. the volume of rental services per capita was assumed to be constant). A special rent survey was carried out in the enumeration areas for the 1961/62 Household Expenditure Survey to provide data on the numbers of urban and rural households paying rent and the average rents paid. It was assumed that the non-rent paying persons (owner-occupiers, persons living in government or business accommodation, etc.) would pay the same rent as the rent-paying persons, and that the average rent per high-income household not

covered by the said rent survey, would be equal to that paid by non-government officers for government accommodation. The Republic of South Africa, on the other hand, used an index of numbers of houses enumerated in population censuses, further supplemented by annual figures of houses completed, as indicator for the extrapolation of value added figures in base-year due largely to the availability of information from such sources. The total numbers of houses were further broken down into two categories, viz, urban and rural, each of which was further sub-divided into three types by kind of occupant, i.e. white, Bantu, and Asians and coloured.

40. Nigeria and Sudan used roughly the same procedure: the former deflated the value added at current prices by an index of rent in the main urban areas, while the latter used the cost of living index, presumably the part relating to rent, as deflator, Tanzania calculated this item at both current and constant prices, while Uganda, being extremely short of information "regarding the quantity of housing or the prices paid", resorted to the use of other methods and assumptions. For the latter country, it was assumed that expenditure on housing amounted to about 10 per cent of the incomes of selected groups of African employees and tax-payers; then the 1960 incomes were applied, using the numbers of employees and tax-payers as indicators. The rest of rent was assumed to concern shops, etc., and the number of companies registered was used as indicator.

(j) Public administration and defence:

41. For the estimation of contributions to gross domestic product at constant prices, the countries in the region seem to have relied almost entirely on the deflation of current values by appropriate price index numbers, for instance, by an index of wage rates or earning in the public sector (e.g. Ghana, Republic of South Africa, Tanzania), by an index of salaries of senior civil servants (e.g. Nigeria), or by a cost of living index (e.g. Sudan, Tunisia). Uganda constituted an exception by using the numbers of employees as indicator for general government as well as for

government enterprises, while Ghana used the same index of earnings in the public service to deflate the value added at current prices by public corporations as well.

(k) Services:

42. Under this sector are included education, medical and health services, domestic services, hotels and restaurants, other personal services, religious organizations and welfare institutions, trade associations, and various other services. As expected, information on country practices for this sector is relatively meagre for the countries in the region.

43. Educational services: Information on practices is available for 3 countries, namely, Ghana, Republic of South Africa and Tunisia. Ghana used the enrolment of pupils in private, assisted and autonomous educational institutions as indicator, while the Republic of South Africa extrapolated the base-year figures by a volume index constructed by allocating weights to the number of pupils and teachers. Tunisia deflated the current values by a cost of living index.

44. Medical and health services: Tunisia deflated the current values by a cost of living index, while rather sophisticated procedures were employed by the Republic of South Africa. For the latter country, the procedure used **consists in** the sub-division of the health services into two parts: public and private, and in the selection of suitable quantity indicators and weighting factors so that a volume index can be constructed for the services as a whole. For public health services, a volume index of services rendered was constructed by combining, with appropriate weights, two groups of indicators: one representing the numbers of registered doctors, specialists, dentists, and medical services, internally weighted by their respective numbers in 1958, and the other representing the numbers of patients treated by public hospitals, and the numbers of births and deaths that occurred in such hospitals, internally weighted in the ratios 8:1:1. for private health services, the numbers of patients

treated by private clinics and the hospitals run by mining enterprises, the numbers of diplomaed nurses, and of nurses under training were used as indicators and combined into one volume index by allocating to them the weights 8:1:1. The respective volume indices for the public and private health services were then further combined into one index by allocating weights proportional to their respective values added in 1958, the base-year. The resulting volume index for the medical and health services of that country as a whole, was then used to extrapolate the value added in the base-year.

45. Domestic services: Information on practices for this item is available for 5 countries in the region: Nigeria and Tanzania deflated the current values by an index of wage rates for domestic servants; the current value series for Tunisia was calculated at constant prices; the Republic of South Africa used the numbers of white-occupied houses in both urban and rural areas as indicators, weighted by the levels of average earnings of domestic servants in these areas in 1958, while the estimates for Ghana were related to the size of population.

46. Hotels and restaurants: Information regarding country practices on this item is available for 2 countries only, viz., the Republic of South Africa and Tunisia. The former deflated the value added by this sub-sector at current prices by that part of the cost of living index that relates to food, while the latter used the numbers of bed-nights in hotels and restaurants as indicator.

47. Religious and welfare institutions, trade associations: Information on estimation procedures for these services is available for 2 countries only in the region, namely, Nigeria and the Republic of South Africa. Both countries seem to have favoured the use of quantity indicators: Nigeria used the numbers of persons of each category employed by the "missions" as indicator for the extrapolation of the value added in the base-year, and the Republic of South Africa used the numbers of the respective memberships of trade unions and employers' associations as

indicators of their activities. Similarly, the numbers of visits made to museums, game parks, libraries, etc., were used as indicators of the activities of cultural institutions in that country.

48. Business services: Information on country practices for this item is available for one country only, the Republic of South Africa, where nine indicators, including such series as the number of contracts registered, number of cases defended in courts, number of divorces, etc., weighted by the fees charged in 1958 for each of such services, were used and combined into one volume index to extrapolate the value added in base-year for legal services. In the case of the services of architects, the number of building plans registered and the number of buildings completed were used as indicators and combined into one index by the weights of 2:1.

(C) ESTIMATION OF MISCELLANEOUS ENTRIES:

49. Under this heading are included the following selected items, on which country practices in the African region will be described:

- (a) Indirect taxes and subsidies;
- (b) Net factor income from abroad;
- (c) The trading gain (or loss); and
- (d) Statistical discrepancies or balancing item.

(a) and (b) consist of actual transactions: the former relating to goods and non-factor services and the latter, factor incomes, while (c) and (d) represent adjusting entries, in the sense that they are calculated either to provide a measure of the "real" income of the residents of a country by taking into account the estimated trading gain (or loss) due to changes in the terms of trade or to balance national accounting aggregates obtained by making use of more than one approach (e.g. production, income or expenditure).

(a) Indirect taxes and subsidies:

50. The Secretariat's knowledge of country practices in this respect is very limited for the time being, and covers one country only, the Republic of South Africa. It is hoped that more countries of the region would make such methodological material concerning constant price estimates of this item, available to workers in this field. The procedures adopted by the said country are set out below:

(1) Indirect taxes: Indirect taxes in that country include customs duties, excise taxes, property taxes, and other taxes and fees. The estimation procedures used for the different types of taxes are as follows:

(i) Customs duties: Base-year values extrapolated by the volume index of imports;

(ii) Excise taxes: Excise taxes on products at constant prices were obtained by re-valuing current quantities at base-year prices;

(iii) Property taxes: Special difficulties were experienced with the estimation of such tax receipts at constant prices, due to the changes over time in the tax rates as well as in the dutiable values of the properties subject to such taxes. The procedures adopted to overcome such difficulties consist in the deflation of current dutiable values of such properties, obtainable from an annual survey, by the price index for the construction industry, and in using an index of the resulting series for the extrapolation of base-year values;

(iv) Other taxes and fees: This omnibus item includes licence fees, stamp duties, automobile tax, taxes on recreation, export tax on diamonds, etc. In the majority of cases, extrapolation of base-year values by quantity indicators were used: for instance, the number of licences issued for licence fees; the volume index of legal services for stamp duties; the numbers of different types of cars registered each

year for the automobile tax; and the volume of diamond exports for the export tax on diamond. Taxes on recreation, however, were deflated by the consumers' price index.

- (2) Subsidies: Subsidies on products at constant prices were obtained by multiplying current quantities by base-year rates.

(b) Net factor income from abroad:

51. The knowledge of the Secretariat on country practices in this field covers 5 countries in the region, namely, Ghana, Malawi, Rhodesia, Republic of South Africa, and Zambia. Ghana kept the current values of net factor income from abroad undeflated, while Malawi, Rhodesia, and Zambia deflated the net factor income paid abroad by an index of import prices to give a measure of the loss of social welfare in terms of imported goods and services that could have been obtained from abroad. In the case of the Republic of South Africa, three actual situations were distinguished:

- (i) An import surplus with a negative income flow;
- (ii) An export surplus with a bigger negative net income flow; and
- (iii) An export surplus with a smaller negative net income flow.

The treatments accorded by the country to the above situations are different in each case: for (i), the negative net income flow was regarded as a substitute for imports and deflated accordingly by the import price index; for case (ii), a mixed treatment was used: the export price index was used to deflate that part of the negative net income flow, that could be financed by the export surplus, and the import price index was used to deflate the remaining balance; and in case (iii), the whole amount of negative net income flow was deflated by the export price index, as it could be financed with the export surplus.

(c) The trading gain (or loss):

52. 4 countries in the region have described the methods used by them in obtaining the trading gain (or loss) at constant prices, due to changes in the terms of trade. The methods used by them are the same, except that the three countries, Malawi, Rhodesia and Zambia deflated the current

value of exports, first by the import price index and then by the export price index, taking the difference between the two resultant figures as the trading gain (or loss) at constant prices, while the Republic of South Africa took a more conservative view and deflated only that part of the exports that had actually been exchanged for imports, or, in other words, the lower of the two values, imports or exports, by the same procedure.

(d) Statistical discrepancy or balancing item:

53. This residual item at current prices is usually the result of adopting more than one approach (i.e. production, expenditure, or income) to arrive at national income or product or expenditure aggregates. Four countries of the region indicated the method used by them in estimating this item at constant prices, namely, Ghana, Malawi, Rhodesia and Zambia. The methods used by them are the same and consist in the deflation of this residual item at current prices by a price index for all the remaining items of the gross domestic product. Thus, Ghana deflated the residue by the implicit price index for all the known items, and the other three countries, Malawi, Rhodesia and Zambia, deflated the item "statistical discrepancy" by the composite price index for estimated domestic expenditure plus net exports of goods and services.

CONCLUDING REMARKS:

54. From the material contained in the preceding sections of this paper, it is clear that national accounting work at constant prices in the African region is still at the beginning stages of its development. Even among the dozen or so countries that have made such exercises for one period or another, further articulation of the system of accounts (both at current and constant prices), gradual building up of an integrated system of price statistics, the development of interrelated systems of quantity and price index numbers and other indicators, and above all, the further development of basic statistical data in general to improve the quality and reliability of estimates at current prices, would be needed if the needs of economic planners in those countries were to be met. For countries that have not

so far made estimates of national accounts at constant prices, an excellent opportunity now exists for them to devote attention to the basic concepts and problems of factoring national accounting flows into meaningful and consistent quanta and price elements under varying circumstances, and to develop interrelated systems of quantity and price index numbers accordingly for the deflation of such flows, and to benefit from the experiences of those countries that have attempted such estimates. The Working Group, therefore, may wish to put forward appropriate and timely recommendations relating to this subject for adoption and implementation by countries of the region.

ANNEX: Synoptic table on selected quantity and price index numbers of African countries.