PETROLEUM STATISTICS

1. Introduction

In the last decade or so, petroleum (oil) has claimed the top position in Nigeria's export list, constituting a very fundamental change in the structure of the country's international trade. Oil prospecting began in Nigeria as far back as 1908 but production and export started in 1958 in Shell's field located at Oloibiri. Other companies joined soon after independence and the number of oil producing and exporting companies now stands at 11.

The share of oil in total export value rose from less than 1 per cent in 1958 to a peak of 97 per cent in 1984 and has not been less than 90 per cent since then. In the first half of 1990, it accounted for over 95 per cent of total exports and its share of GDP has ranged between 25 and 30 per cent in recent years. Nigeria produced more than 1.8 million barrels per day in 1990, and is the sixth largest oil producing country in the world.

In the early sixties, oil was relatively insignificant to the Nigerian economy, and due to the lack of expertise the role of Government in the industry was primarily regulatory – being limited to the collection of royalties and other dues from by the oil companies. By the end of the civil war in 1970, oil had become an important component of the nation's economy. In the bid to strengthen its control over the industry, the Nigerian National Oil Corporation (NNOC) was established and given responsibility for both up-stream and down-stream activities in the sector. The NNOC also looked after Government's participation in the activities of the oil companies.

Before 1977, the Ministry of Petroleum Resources (which also had regulatory functions) operated side-by-side with the NNOC. That year, they were merged to form the Nigerian National Petroleum Corporation (NNPC). The NNPC combined the commercial functions of the defunct NNOC (that is, exploration, production, transportation, processing of oil, refining and marketing of crude oil and its refined products) with the regulatory functions formerly exercised by the Ministry of Petroleum Resources.

In March 1988, the NNPC was declared a commercial, integrated international oil company whose functions were to explore, develop, produce, process and market crude and refined petroleum, its by-products and derivatives at internationally-competitive prices in Nigeria and abroad. The Petroleum Inspectorate, hitherto an integral arm of the Corporation, was transferred to the re-created Ministry of

Petroleum Resources (MPR) and made a Directorate. It retains its regulatory functions.

In the Ministry of Petroleum Resources, there is a Department of Petroleum Resources (DPR) which has four divisions:

Resources Management Division.

Inspections Division.

Technical Control Division.

Service Division, which has three branches including Economics, Planning and Statistics.

2. Coverage, Scope, Uses And Users Of Petroleum Statistics

The NNPC is geared towards efficiency, profitability and financial autonomy in all its operations. To this end, the Corporation invested in a number of subsidiaries with critical responsibilities. Among these are the Nigerian Petroleum Development Company Limited [NPDC] and the Integrated Data Services Limited (IDSL).

The NPDC is the petroleum producing company of the NNPC Group. It is involved in exploration and production of crude oil and gas, like other oil producing companies in Nigeria such as Shell, Agip, TotalElf, ExxonMobil and Chevron.

Its mission is to profitably operate an optimum-size petroleum exploration and production business, nationally and internationally, taking full advantage of local expertise in upstream operations. Its objectives are to effectively and gainfully produce and market hydrocarbons, sustain exploration activities supportive of its hydrocarbon reserve base and develop local expertise, particularly in production operations.

The mission of IDSL is to valuably provide efficient services in seismic data acquisition, processing and interpretation as well as petroleum/reservoir engineering data evaluation, computer and other ancillary services in Nigeria and the African sub-region — solely or in partnership — using high-caliber professionals and modern computer technology.

The objectives of the company include the following:

[a] to profitably offer geographical data acquisition services to the oil industry, nationally and within the African sub-region.

[b] to carry out geological, geophysical and petroleum engineering data processing and interpretation for local and international clients.

[c] to offer auxiliary computer and storage/ archival services and to establish a full-scale data bank on a commercial basis.

Due to the dominant position of oil in the Nigerian economy, petroleum statistics are needed for effective development planning and implementation. In addition, these statistics are also required by

private researchers, universities and such international organisations as the Organisation of Petroleum Exporting Counctrie (OPEC).

3. Sources and Methods of Compiling Petroleum Statistics

The NNPC and MPR are the two sources of petroleum statistics in Nigeria, while OPEC is a major international source. The first two (NNPC and MPR) rely on the following agencies as primary sources of data on petroleum:

* Oil exploration and production companies (11).
* Oil refineries (4).
* Oil and gas marketing companies (9).
* Major companies licensed to undertake bunkering (5).
* Independent petroleum marketing companies (over 400).
* Oil industry service companies.

The number of activity units, where known, is in parentheses.

Most of the statistics in the petroleum sub-sector are products of the administrative system. Such data are records of activities which take place on a regular basis like output of crude petroleum (recorded monthly by each oil company) and export (recorded monthly by each oil company). Most of these administrative statistics are also published as reports by the agency generating the data, agencies in or outside the NNPC Group and the MPR. These statistics are classified as returns to agencies which do not generate but publish, use or store them. Few datasets in this sub-sector are based on surveys and in most cases such surveys are ad-hoc, being one-shot undertakings. Most reports are based on returns sent in by primary producers.

Of the 34 data series handled by both the NNPC and the MPR, 26 are administratively collected in the form of regular reports or returns. The remaining 8 emanate from mainly ad-hoc or one-shot surveys, which are not based on any rigorous sample selection procedure.

As NBS's preliminary study shows, the surveys are either nationwide, State-wide or cover all oil-producing areas. The observed units are either all or selected petroleum products or oil producing areas. Since none of the surveys has been used as a source of any of the data series to be stored by the NBS, a detailed discussion of their methodology will not be undertaken here.

Instruments of Data Collection

The instruments most frequently used in collecting data are forms, which have to be completed regularly by the six categories of data producing agencies listed above. Most of the returns are rendered on specially-designed forms on daily, weekly and monthly bases. Where the returns are in respect of one product such as crude oil, they are less formal and come in the form of letters.

Table 1 shows the frequency with which the 34 series reported during the preliminary survey are collected. It reveals that monthly returns are the most-frequently collected and used.

TABLE 1: FREQUENCY OF DATA COLLECTION

Mode of Colln.	Daily	Weekly	Monthly	Qutly	Annually	Ev. 2 Yrs.	Once	Total
Survey	-	-	-	-	-	1	7	8
Returns	3	3	12	-	-	-	-	18
Reports	2	1	-	1	3	-	1	8
Total	**5**	**4**	**12**	**1**	**3**	**1**	**8**	**34**

Some other important aspects of the 34 surveys/returns/reports are discussed below.

Items of Data Collection

The following are the items of data or variables on which observations are recorded and returns rendered in the petroleum sub-sector:

- Number of wells (company/exploration/discovery/abandoned/code appraisal/development/drilling).
- Depth of wells (company/exploration/appraisal/development).
- Production of crude petroleum (oil field/crude type/company).
- Disposition of crude petroleum refinery lifting (crude type/refinery) export (company/destination).
- Production of refined petroleum products (refinery).
- Distribution of petroleum products (products/State).
- Mode of evacuation of refined petroleum products (refinery/mode).
- Import of refined petroleum products (company).
- Off-shore and local refinery take-off (company/refinery).
- Exports of crude petroleum (company/destination).

The details in respect of each item are in brackets. There are others which are not returns but are reported in periodical reports and bulletins.

Methods of Analysis

Most administrative statistics are obtained by total enumeration of the relevant population. The pieces of statistical information are returns by various agencies (companies, refineries), in respect of different products (crude petroleum, refined petroleum products) consisting of different types (crude types, various refined products), consumed, produced at, evacuated from or exported to different

locations (oil fields, States, other countries). As a result, no rigorous statistical formula is required for data processing. The processing usually carried out are editing, cross-tabulation, extraction and aggregation.

For example, crude oil export is cross-tabulated by companies, destinations and crude types. It is then aggregated over all destinations for each company and crude type. A second level of aggregation is over crude types for each company. A final aggregation over companies yields the national aggregate of crude oil export.

Besides the items on crude petroleum and its derivatives, there are others on employment, labour relations, remuneration, revenue, expenditure and accidents reported by all the companies operating in the sub-sector. Some of them are cross-tabulated for individual companies and their units or departments (such as accidents), while others are reported in less detail.

There is no conflict in the petroleum statistics generated by the NNPC and the MPR. This is apparently because the same sources, which cannot conceivably supply contradicting information on the same item, are used. Hence, it has been possible to discuss data obtained from the two sources simultaneously. However, this duplication of effort cannot be justified and should be discouraged.

Macro Indicators Generated or Computable from the Data Items

As already stated, most of the data items produced in this sub-sector can be added up to obtain national aggregates such as output or export of crude oil per annum, total domestic consumption of petroleum products, total number of oil spills and aggregate quantity of oil spilled.

Also, rates or averages can be computed from the items of data produced. Such averages include average quantity of crude petroleum produced daily (expressed in barrels), average quantity of oil per spill and average number of casualties per accident in the sub-sector as well as average quantity of gas flared daily .

4. Current Methods of Storage and Dissemination

Most of the information recorded for the statistical units described above are published in the publications of the NNPC and the MPR. Although observations are supposed to be recorded daily, the returns are rendered on them less frequently. The most used frequencies are weekly, monthly and, in some cases, annually. The typical frequency is annual.

The following are the publications of the NNPC and the MPR. The agency responsible for the publication is indicated in brackets:

- Monthly Petroleum Information (BEAD/CPDD/NNPC)

- Quarterly Petroleum Information (BEAD).
- Annual Statistical Bulletin (BEAD).
- Petroleum Products Statistical Bulletin (Annual) (BEAD).
- NNPC Annual Report.
- Annual Report of the Inspectorate Division of the Department of Petroleum (MPR).
- HaNBSook on Forecast of Refined Petroleum Products Consumption in Nigeria (1988-2602) (PPMC/NNPC).
- Petroleum Statistics (NNPC).
- Daily Oil Production Statistics (PSU/MPR).
- Gas Flare Reports (Annual) (PSU/MPR).
- Gas Production and Utilisation Statistics (Quarterly) (PSU/FPR.)
- Monthly Report on Gas Production and Utilization (PSU/MPR).
- Daily Production Report on Oil Condensate (PSU/MPR).

A few of these publications are for limited circulation to management. These are the ***Handbook on Forecast of Refined Petroleum Products Consumption in Nigeria*** and ***Petroleum Statistics***, both of which are published by the NNPC.

Most of the other publications are widely circulated, free and on sale on a regular basis to organisations and researchers on the mailing list of the NNPC and the FMPR. These include NNPC branches, DPR, NBS, CBN, Universities, Nigerian Embassies, Libraries in Nigeria, World Bank and OPEC.

Mechanics for Data Transfer to the National Bureau of Statistics

The following Units/Divisions/Companies of the NNPC and the MPR perform a coordinating role in respect of petroleum statistics:

(1) The Statistics and Data Bank Deparment: NNPC.
(2) The Oil Industry Analysis and Computer Section: Economic Research and Intelligence Department (ERID) of the Corporate Planning and Development Division (CPDD).
(3) Integrated Data Services Limited: NNPC.
(4) Statistics Unit, National Petroleum Investments and Management Services: NNPC.
(5) Planning and Statistics Unit of the Department of Petroleum Resources: MPR.

The list shows that there is no single division or unit that can be described as the data bank of the petroleum sub-sector. The list of activity units responsible for rendering returns and reports on petroleum data is so extensive that it seems more feasible for the National Bureau of Statistics to use only one or two of the five as its sources of petroleum data. This is more so because NBS will in most cases store aggregate data for the whole country. Only in a few cases such as consumption of petroleum products and share of each

producing company in production and export of petroleum products will the NBS store data on State or company basis. The MPR is currently making efforts to establish a sectoral data bank.

Generally, the relevant data collected (and in respect of which hard copies of the publications listed above are available) have been grouped in the SOR under the following twelve categories:

- Seismic activities.
- Drilling activities.
- Crude oil and natural gas production activities.
- Statistics of refined petroleum products.
- Mode of evacuation of refined petroleum products.
- Crude oil exports by participating category.
- Licenses, revenue and expenditure in the petroleum sub-sector.
- Accidents.
- Employment, labour relations and remuneration.
- Research and development matters.
- Statistics relating to environmental matters.
- International statistics.

The sources of data in these publications are usually listed at the bottom of each table. They overlap for many of the publications and for several tables appearing in the same publication.

5. NBS Data Base Coding System for Petroleum Statistics

The Database Coding System (Statement Of Requirements) for Petroleum Statistics shows the structure of data as contained in the NBS's TSDB.

The Division Code

Attempts have been made to follow the coding system used in the International Standard Industrial Classification [ISIC], revision 3 released in 1988. Thus, the division code or the first two digits of the code assigned a six-code-variable (which identifies the division to which the dataset belongs) is wherever feasible taken from the ISIC. The ISIC division code has been allocated on the basis of exact correspondence in respect of most sectors, except where proximity to the nearest closely-related ISIC code and existence of un-used codes were the basis for the allocation.

Going by this system, the ISIC division code 11, coincides with the NBS's TSDB code.

The Items and Details Codes

While efforts have been made to ensure that the Division code or the first two digits of the code assigned to each variable conforms as much as possible with the ISIC code, the items and details codes

which form the last four digits of the code assigned to each variable are arbitrarily determined. The Division-Item-Detail [DID] coding system is the basis for coding NBS's datasets. The item under each dataset is the elementary entity or group of elementary entities [multiple-item cases] about which statistical data are gathered.

Generally, NBS is using a six-digit-code for attributes [variables]. The first two digits are used to identify a particular division, while the first four are used for a particular item under the division.

In coding the details, six digits are used to identify a particular attribute [variable] as follows: the first two digits for the division, the next two for the item under that division and the last two [that is, the 5th and the 6th digits] for the detail [variable of interest] under the division and the item. In all, there are 13 items with details under Petroleum dataset.

In the data base structure prepared for the petroleum sub-sector, crude oil production and exports have to be given different item codes depending on whether they were measured in barrels, cubic metres or metric tonnes. Also, refinery production was given different codes depending on whether it was measured in metric tonnes or '000 litres.

One argument in favour of storing the same quantity of petroleum in different units is that different types of crude often have diverse conversion factors. If several crude types are aggregated, no single conversion factor can be validly applied to it.

Based on this coding system, the NBS's Statement Of Requirements [SOR] for Petroleum Statistics is as shown below:

6. CONCLUDING REMARKS

Information published in different reports by different agencies in respect of identical items of petroleum statistics is in agreement in most cases. This may be due to the fact that most of the oil producing, refining and marketing companies render identical returns to all the agencies responsible for collating, aggregating and publishing the data.

In spite of this observation on petroleum data there are some limitations. One of them is that the statistics are not timely enough. Most of the petroleum statistics are generated and recorded daily. Datasets on lifting, sales, distribution, import and export are supposed to be reported by petroleum companies not later than 21 days following the month of activities. Most data sets published on petroleum refer to annual periods. The reference periods of some are one month or one quarter. These data are usually published with not less than two-year lags. According to the agencies responsible for publishing these data, some reporting agencies do not keep the deadline for submitting returns and a few never bother.

The publishing agencies often complain of printing bottlenecks, but this is hardly tenable since most of the reports are printed by private firms. It is hoped that if these agencies are computerised the time-lag will be considerably shortened.

Another problem observed in respect of petroleum data has to do with units of measurement. Apparently, the companies making returns are not consistent in the units of measurements used. Crude or refined oil is volatile. The use of barrels at different API, temperature and Specific Gravity (SG) may lead to different quantities in barrels but this should be anticipated and allowed for. What is undesirable is the use of different units in respect of the same consignment by two agencies that are reporting the quantity of oil in that consignment. The ideal situation is for all agencies to use the same unit in measuring the same consignment and make due allowance for evaporation. If the consignment has to be stated in other units this should be done by use of an agreed universal conversion factor.