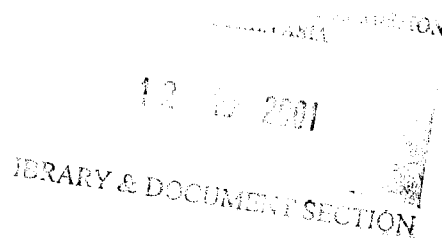




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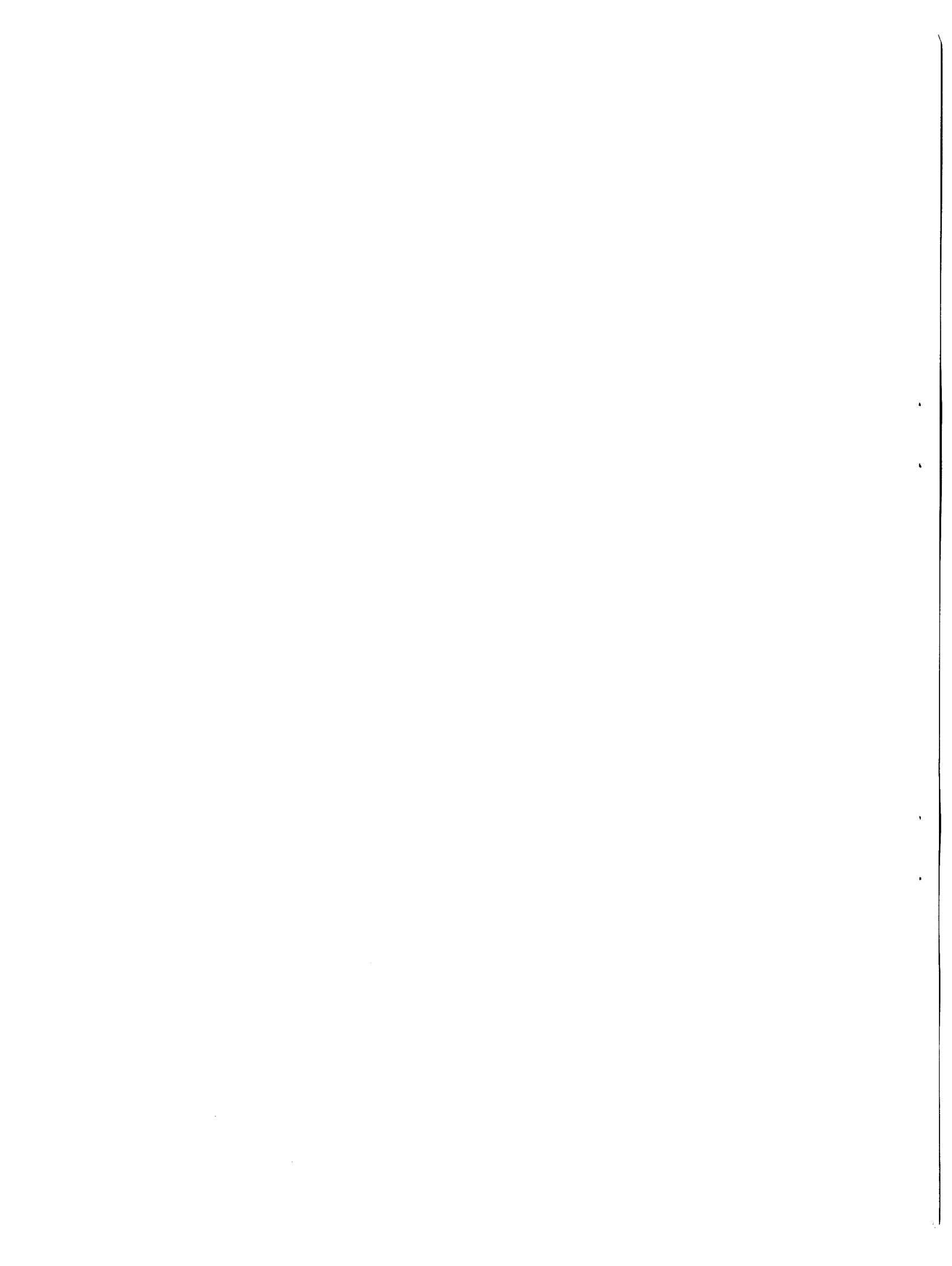


**DIVERSIFICATION AND STRUCTURAL TRANSFORMATION
OF AN AGRARIAN ECONOMY: THE CASE OF SUDAN**

by

Ali Abdel Gadir Ali

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Diversification and Structural Transformation of an Agrarian Economy:
The Case of Sudan

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Abstract:

The paper looks at Sudan's diversification experience since independence in 1956 up to the recent commercial exploitation of oil reserves. The evidence presented indicates that over the 42 years period under review the agrarian economy that Sudan inherited from the colonial powers remained agrarian with no significant diversification having taken place. Four explanation are offered, First we note that all the conscious efforts at planning the development of the economy did not adopt an explicit diversification philosophy or vision. Second, all these planned development efforts suffered from political instability that characterized Sudan, and continues to do so. All plans were either discontinued midway, extended at the end of the planning horizon or simply neglected and replaced by rolling investment programs in the context of economic reform policies. Third, while all the plans recognized a role for the private sector, especially in the construction and industrial sectors, and despite the relatively high real rates of return to industry the response of the private sector was very weak. Fourth, while the various plans accorded investment in infrastructure a priority no serious minded thinking was given to the sequences of projects and the possible complementarities between the sectors. Thus, for example, it could be argued that investments designed to reduce the transaction costs, inclusive of infrastructure projects, could have been sequenced to take place prior to investments requiring an active participation of the private sector.

I. Historical Background and Introduction:

Sudan, with its current international borders, became independent on the first of January 1956. As such it was one of the first countries in Sub-Saharan Africa to gain independence from the late colonialism that targeted Africa in the 1860s. Unlike many Sub-Saharan African countries, Sudan was nominally under a Condominium rule of Britain and Egypt over the period 1899-1956. Prior to that some parts of Sudan were under a Turko-Egyptian rule that lasted for just over 60 years (1824-1885) before it was overthrown by a religious-nationalist revolution in 1885, the Mahdist revolution.

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The period 1899-1956, under the British colonial administration, saw the laying of the foundation of the modern economy of Sudan. The center piece of this foundation was long-staple cotton. Brown (1992:80) summarized the story succinctly by noting that in “1913 the Condominium administration, backed by the British government, raised a loan to finance the construction of a dam at Sennar on the Blue Nile. Work began in 1914, was interrupted by the First World War, and in 1925 was completed. The Gezira irrigated cotton scheme, located in the triangle of land south of the confluence of the two Niles thus came into being. Ultimately covering an area of over two million feddans, it was to become the world’s largest single farming enterprise under one management, and the most important source of foreign revenue for Sudan” (for the detailed history of the Gezira scheme see Gaitskell (1959), and for a socio-political critique of Gezira as a development project see Barnett (1977))¹.

Drawing on the dominant traditions of crop sharing in northern and central Sudan, the Gezira scheme was organized as a partnership between the Sudan Plantation Syndicate (SPS, a British management company representing British share holders), the colonial government and the tenants. The net profits of the scheme (after deducting the costs of non-labor inputs, overhead production costs, transportation and marketing from the gross proceeds of cotton sales) were distributed between the three partners such that tenants received 40%, the government received 35% and SPS received 25%. In 1925 the total irrigated area of the scheme was 240 thousand feddans, increasing to about one million feddans by independence in 1956.

The centrality of cotton to the colonial administration is attested to by the replication of the Gezira model in the eastern part of the country. Unlike the gravity irrigated Gezira the Gash delta cotton scheme was developed on the basis of flush irrigation. While the annual area fluctuated depending on rain levels, the total area under the scheme increased from about 9100 feddans in 1920 to about 68800 in 1956. A smaller scheme was also initiated in the delta of river Baraka in eastern Sudan with a total area of 30 to 40 thousand feddans. A score of pump schemes were also started on the White and Blue Niles.

Complementary to cotton was the transport and communication network. It is estimated that between 1919 and 1939 about 56% of total government capital expenditure was devoted to the Gezira scheme and 24.1% was devoted to the development of the railway system. The limited investment that was undertaken in industry was devoted to cotton ginneries (large ones in Port Sudan, Sennar and Atbara and six smaller ones in various parts).

¹ One feddan = 1.038 acres = 4201 square meters.

Another agricultural pillar of the modern economy of Sudan was initiated by the colonial state in the wake of the Second World War. Large scale mechanized production of sorghum (*dura*), the main food staple of the northern part of the country, was started in 1945 near Gedaref in eastern Sudan. The first Mechanized Crop Production Scheme covered about 12000 feddans under the management of the Middle East Supply Corporation (MESC). Labor difficulties encountered by MESC resulted in the government taking over the scheme in 1947 where a share cropping arrangement similar to the Gezira formula was introduced. Under the government, the scheme covered 25000 feddans and involved about 1000 cultivators, up to 1953. During the period 1947-1953 a number of entrepreneurs expressed interest in investing in mechanized farming under a different land tenure system. Eventually, the crop sharing arrangement was abandoned and leaseholds were sold to private investors. At independence in 1956 there were more than 300 private mechanized schemes covering about 388 thousand feddans.

At independence in 1956 the production structure of the Sudan economy was dominated by agriculture, which contributed about 61% of GDP. There was virtually no industrial sector to speak of (with a contribution of about 1.1% of GDP) with the services sector accounting for the remaining 37.9% of GDP: with transport accounting for 13.2% of GDP; government services for 6%; construction for 5.7%; real estate for 2.9%; and public utilities for 0.4%; and, the residual being unclassified (see for example, Brown (1992: table 3.1, 86)).

At independence, it is estimated that total investment amounted to about Ls. 21.1 million in current prices. The sectoral distribution of this investment was such that the bulk was in the real estate sector (38.7%) followed by the public sector (accounting for 21.7%) and transport (19.7%) and agriculture (8.5%). Investment in manufacturing amounted to only 2.5% of the total. Of the total investment in 1955/56, it is estimated that 54% was contributed by the public sector leaving a balance of 46% for the private sector. Of the private sector's total investment 84% was devoted to the real estate sector, 5% to manufacturing, 4% to agriculture and 3% to transport.

Given the structure of the economy, the composition of Sudan's exports at independence was dominated exclusively by primary products. Total exports amounted to about Ls. 65.4 million in current prices (about 23% of GDP). Cotton dominated Sudan's exports with a share of 80% of total exports. Gum Arabic and groundnuts ranked second to cotton with a share of 7% each, while melon-seeds and hides and skins ranked third with a share of 2% each.

It was this economic structure, possibly typical of that of most developing countries at the wake of independence, which was inherited by the post-colonial state in Sudan with the responsibility to structurally transform it in the long run.

Having noted the above background the rest of this paper is structured in the following fashion. In section (2) we review very quickly the stylized facts about structural transformation on the understanding that the issue of “diversification” from a development perspective is fundamentally linked to the transformation of economies and societies. Of the many structural transformation indicators we look at the stylized facts related to sectoral GDP shares, employment share of agriculture and the relative productivity of labor in the non-agricultural sectors to that in agriculture. On the basis of these stylized facts section (3) evaluates Sudan’s structural transformation experience. In a highly selective fashion section (4) undertakes an empirical evaluation of the various development plans, programs and policies that have been implemented in the country from the perspective of “diversification”. The most important indicators of “diversification” used in these sections are the sectoral shares in GDP and the commodity composition of exports. A before-and-after approach is used for conducting the evaluation. Section (5) deals with oil exploitation in Sudan and its implication for diversification while section (6) concludes.

II. Structural Transformation: Stylized Facts:

As is well known the most widely used empirical methodology for looking at the pattern of structural transformation is that of Chenery and Syrquin (1975) and Syrquin and Chenery (1989-a and b; hereinafter SC). In this methodology a number of variables reflecting economic structures are identified and each is regressed on per capita income (GNP or GDP, to capture the stage of development) and population (to capture the size of the economy) and a time trend. In Syrquin and Chenery (1989-a and b) the cluster of variables used included: a final demand cluster (as share of GDP: private consumption; government consumption; investment, exports, imports and food consumption); a merchandize trade cluster (as share of GDP: primary exports; manufactured exports; primary imports and manufactured imports); a production cluster (value added as share of GDP: agriculture, mining, manufacturing, construction, utilities and services); an employment cluster (shares in total employment: agriculture, industry and services); and, a relative price cluster (with 1970 as base year: demand and production).

The SC (1989-a) study covered the period 1950-1983 for a maximum of 108 countries where centrally planned countries and countries with a population of less than a million in 1965 were excluded from the analysis. Following Chenery and Syrquin (1975; which covered the period 1950-1975) the cross-country regression equation used is the following:

$$(1) \quad x = \alpha + \beta_1 \ln y + \beta_2 (\ln y)^2 + \gamma_1 \ln N + \gamma_2 (\ln N)^2 + \sum \delta_i T_i$$

where x is the relevant structural variable; y is per capita gross national product (GNP) in 1980 dollars; N is population in millions; and T is a dummy variable for four time periods such that $T_1 = 1$ if $t \geq 1960$, $T_2 = 1$ if $t \geq 1967$, $T_3 = 1$ if $t \geq 1973$, and $T_4 = 1$ if $t \geq 1979$. Regarding the treatment of time it is noted that the time variables are defined in an incremental way such that the coefficient of T_2 , for example, would measure any shift after 1967 over and above the post-1960 shift captured by the coefficient of T_1 .

Equation (1) was estimated for pooled samples combining individual time series for all countries or group of countries. As such most of the variation to be explained in such regressions would be due to variation among countries. To eliminate the variation between countries and pool the within country variation average time-series relations are estimated by allowing each country to have its own intercept and the population variable is eliminated in view of the fact that it will only capture a time trend. For this equation (1) is amended to take the following form:

$$(2) \quad x_i = \alpha_i + \beta_1 \ln y + \beta_2 (\ln y)^2 + \sum \delta_i T_i$$

In addition to these pooled estimates individual time-series relations within countries were also estimated for countries for which a minimal number of annual observations were available with the log of per capita income as the only explanatory variable.

Based on equation (1) the dimensions of structural transformation were investigated. Noting that the annual per capita income growth rates for the period 1950-1983 ranged from a low 0.8 per cent for the low income group to a high of 3.6 per cent for the middle-upper income group (with an overall rate of 2.4 per cent for all countries) the transformation was defined as having taken place over the per capita income range US\$300-US\$4000 in 1980 dollars.

Of the many findings relating to the various indicators of structural transformation we note the following results.

- (a) The behavior of sectoral shares in GDP: the share of agriculture is predicted to decline from about 39.4% of GDP for an income level of US\$300 to 9.7% for an income level of US\$4000; that of manufacturing is predicted to increase from 12.1% to 23.6%; and that of services from 32.4% to 44.7%. In addition to these, other finer sectoral classification included mining (whose share is predicted to increase from 5% of GDP for a per capita income of US\$300 to 6.1% for a per capita income of US\$4000); construction (with share increasing from 4.4% to 6.7%); and utilities (from 6.7% to 9.3%).

- (b) The industrialization process: during the process of transformation, the composition of the manufacturing sector changes considerably. To look at this composition Syrquin and Chenery (1989: 156) defined three industry groups “according to the stage at which they make their major contribution to the rise of industry”. Early industries (e.g. food, textiles, clothing), characterized by simple technologies and low income elasticities of demand, see their share in GDP remains to increase marginally from 6.8% for per capita income of US\$300 to 7.8% for per capita income of US\$4000. Within manufacturing their share goes down. Middle industries (e.g. chemicals and nonmetallic minerals) double their share in GDP from 3 percent to 6.5 percent. Late industries (e.g. machinery, paper and metal products) account for virtually all of the increase in the manufacturing share in GDP. Their share increases from 1.8% of GDP for per capita income of US\$300 to 10.2% of GDP for per capita income of US\$4000.

- (c) The composition of merchandize exports: during the process of transformation the share of exports in GDP increases from 15.2% for a per capita income of US\$300 to 21.2% for a per capita income of US\$4000. The corresponding share of primary exports declines from 13.9% of GDP to 11.8%, while that of manufacturing increases from 1.3% of GDP to 9.4%. Thus, during the transformation the share of primary exports in total exports declines from 91.5% to about 55.7% while that of manufacturing increases from 8.5% to 43.3%.

In a recent paper O’Connell and Ndulu (2000: 5-6) estimated a variant of equation (1) for a sample of 85 countries over the period 1960-1998. The estimated variant took the form:

$$(3) \quad x_{it} = \beta_1 \ln y_{it-1} + \beta_2 (\ln y_{it-1})^2 + \gamma_1 \ln N_{it-1} + \gamma_2 (\ln N_{it-1})^2 + \gamma t + \mu_i + \varepsilon_{it}$$

where t an index of time and μ_i is a country fixed effects term. The regressions are undertaken for countries that had at least four half-decadal observations and per capita income is in 1985 international prices. These results are reported in table (1) where figures between brackets are absolute t-values and where SSA is a dummy for Sub-Saharan Africa.

Table (1) : Structural Transformation in a Sample of Countries: Sectoral Shares

Explanatory Variables	Share of Agriculture	Share of Industry	Share of Services	Share of Manufacturing
$\ln y_{it-1}$	-63.62 (8.15)	47.25 (6.05)	16.37 (2.15)	11.75 (1.75)
$(\ln y_{it-1})^2$	3.50 (6.84)	-2.38 (4.64)	-1.12 (2.26)	-0.42 (0.96)
$\ln N_{it-1}$	10.97 (1.09)	-8.46 (0.84)	-2.51 (0.26)	-5.34 (0.64)
$(\ln N_{it-1})^2$	-0.29 (0.95)	-0.32 (1.04)	-0.03 (0.09)	0.40 (1.58)
Centered Trend	-0.76 (2.14)	-0.85 (2.39)	1.60 (4.66)	-0.85 (3.05)
SSA*Centered Trend	-0.87 (3.44)	1.16 (4.57)	-0.29 (1.17)	0.11 (0.48)
Constant	201.14 (2.17)	-137.62 (1.48)	36.48 (0.40)	-67.64 (0.86)
R-squared (%)	53.0	35.4	22.0	26.0
#of Observations	490	490	490	383
# Countries	85	85	85	69

Source: O'Connell and Ndulu (2000: 27, table 2.3.1).

The above results confirm a number of stylized facts about structural transformation on the basis of sectoral shares. These have to do with the behavior of sectoral shares over long periods of time. A first stylized fact is that the share of agriculture in GDP tends to decrease to a minimum as the economy develops. This is reflected in the coefficient of $(\ln y)$ being negative and significant and that of the squared $(\ln y)$ being positive and significant. Differentiating the share of agriculture with respect to per capita income, and equating the result to zero, it is an easy matter to see that the share of agriculture will attain a minimum at a value of per capita income equals to \$8854 in international prices of 1985.

A second stylized fact is that the share of industry tends to increase towards a maximum as the economy develops. This is reflected in the coefficient of $(\ln y)$ being positive and significant and that of the squared $(\ln y)$ being negative and significant. Differentiating the share of industry with respect to per capita income, and equating the result to zero, it is an easy matter to see that the share of industry will attain a maximum at a value of per capita income equals to \$20465 in international prices of 1985.

A third stylized fact is that the share of services tends to increase towards a maximum as the economy develops. This is once again reflected in the coefficient of $(\ln y)$ being positive and significant and that of the squared $(\ln y)$ being negative and significant. Differentiating the share of services with respect to per capita income, and equating the result to zero, it is an easy matter to see that the share of services will attain a maximum at a value of per capita income equals to \$1492 in international prices of 1985. The share of the manufacturing sector, however, is positively related to the level of development but does not have a significant time pattern in view of the fact that the coefficient of the squared per capita income terms is not significantly different from zero.

In addition to sectoral shares, O'Connell and Ndulu (2000) used the employment share of agriculture and the ratio of the average productivity of labor in non-agriculture to that of agriculture as indicators of structural transformation.

**Table (2) : Structural Transformation in a Sample of Countries:
Employment and Labor Productivity**

Explanatory Variables	Employment Share of Agriculture	Ratio of Labor Productivity
$\ln y_{it-1}$	5.32 (1.18)	12.83 (3.47)
$(\ln y_{it-1})^2$	- 0.73 (2.49)	-0.70 (2.82)
$\ln N_{it-1}$	-11.94 (2.00)	6.21 (1.39)
$(\ln N_{it-1})^2$	-0.01 (0.03)	-0.25 (1.73)
Centered Trend	-0.92 (4.22)	-0.28 (1.48)
SSA*Centered Trend	0.17 (1.05)	-0.12 (1.00)
Constant	237.11 (4.83)	-85.23 (1.92)
R-squared (%)	73.9	22.0
#of Observations	761	365
# of Countries	134	71

Source: O'Connell and Ndulu (2000: 27, table 2.3.1).

As is clear from the table a fourth stylized fact of structural transformation is that the employment share of agriculture tends to decline as the economy develops. This is clear from the significant quadratic term on per capita income and the insignificant linear term. The fifth stylized fact is that the ratio of labor productivity in the non-agricultural sectors to that of agriculture tends to increase to a maximum as the economy develops as captured by the signs and significance of the coefficients of the per capita income terms. The maximum ratio of productivity is reached at an income level of \$9347.

III. Sudan's Structural Transformation Experience:

We use World Bank (2000) data on sectoral shares, the details of which are reported in annex table (A.2), to look at the experience of Sudan compared to that of Africa. We note the following results.

The Agricultural Sector: the transformation experience of Sudan conforms to the observation that in the 1990s “agriculture still tends to contribute roughly a third of total GDP in African countries, a share nearly two standard deviations above the non-African-developing-country mean”. Over the whole period 1960-1998 the share of agriculture has declined from 55.35% of GDP in 1960 to 39.29% in 1998. Thus by the end of the period agriculture continues to dominate the production structure of Sudan. The pattern of decline, however, was not uniform where some periods recorded fluctuations. For the whole period 1960-1987 we estimated a trend annual rate of decline of 1.67 percent (with a t-value of 8.1 and an R-squared of 72%). During the period 1960-1973 a trend annual rate of decline of 2.1 percent (with a t-value of 2.83 and an R-squared of 40%) is estimated. However, the period saw the share of agriculture declining from a high of 55.4% in 1960 to a low of 36.8% in 1968 before increasing to 44.9% in 1973. Over the period 1973-1977 the share of agriculture declined in a sustained fashion at a trend rate of decline of 3.7 per cent per annum (with a t-value of 3.4 and an R-squared of 80%). The share declined from 44.9% in 1973 to 39.9% in 1977. During the period 1977-1987 a rate of decline of 1.5 per cent is estimated (with a t-value of 2.43 and an R-squared of 40%), and the share declined from 39.9% in 1977 to 32.8% in 1987.

The Industrial Sector: the transformation experience of Sudan conforms to the observation that “Africa's share of GDP in industry has risen very slowly since the early 1970s”. For the whole period 1960-1987 we estimate a trend rate of increase of 0.35 per cent (with a t-value of 1.67 and an R-squared of 9.7%) that is not significant at the 10 per cent level. During this period the share of industry increased from about 13.5% of GDP in 1960 to about 16.3 in 1987. The increase in the share of industry was not significantly different from zero for the sub-period

1960-1973 (a trend rate of increase of 0.51 per cent with a t-value of 0.83 and an R-squared of 5.5%). For the period 1973-1977 the share of industry recorded a decline at a trend rate of 2.12 per cent, but is not significantly different from zero (with a t-value of 1.69 and an R-squared of 49%). The period 1977-1987 recorded a significant trend rate of increase of 3.12 per cent (with a t-value of 12 and an R-squared of 94%). By 1998 the share of industry amounted to 18.2% of GDP.

The Services Sector:

the transformation experience of Sudan does not confirm to the observation that on “the services front, the African average shows a pattern of increase until the early 1980s and a decrease thereafter. The African boom-and-bust pattern is consistent with accounts that emphasize over-stretching of the African public sector by mid-to-late 1970s”. For the whole period 1960-1987 the share of the services sector in GDP increased at an annual trend rate of 1.55 per cent (with a t-value of 8 and an R-squared of 71%), and the share increased from 31.1% of GDP in 1960 to 50.9% in 1987. Significant trend rates of increase are estimated for the two sub-periods 1960-1973 (2.54 per cent with a t-value of 3.95 and an R-squared of 56%) and 1973-1977 (4.1 per cent with a t-value of 5.4 and an R-squared of 91%). The share of services fluctuated along an increasing trend during the period 1977-1987. Thus, during this period the share of services registered a non-significant rate of increase of 1.7 per cent (with a t-value of 0.44 and an R-squared of only 2.2%). By 1998 the share of services amounted to 42.6% of GDP.

O’Connel and Ndulu (2000: 6) also looked at the extent to which “the patterns of sectoral transformation in African countries depart in systematic ways from what would be expected given the continent’s overall growth”. Using the results of the estimated model Ndulu and O’Connell (2000: 10-17, table 3.3.A) provided actual and predicted sectoral shares for a number of countries. In the estimation of the model sectoral shares (i.e. the dependent variables) are calculated on the basis of constant 1995 dollars. Due to missing observations Sudan was not included in the regression sample and as a result no actual values are reported. In what follows we use the data in annex table (A.2) to compute the means for the half decades and compare them with the predicted shares. At this stage, our results should be taken as indicative. Table (3) summarizes the results.

**Table (3): Structural Transformation in Sudan:
Actual and Predicted Sectoral Shares (percentages)**

Period	Agriculture:		Industry:		Services:	
	Actual	Predicted	Actual	Predicted	Actual	Predicted
1960-1964	52.42	32.42	13.56	25.52	34.02	42.06
1965-1969	39.83	31.63	15.59	25.17	44.58	43.20
1970-1974	44.33	31.42	13.79	24.34	41.88	44.24
1975-1979	38.77	30.94	13.11	23.88	48.13	45.18
1980-1984	34.12	28.58	14.87	25.18	51.01	46.24
1985-1989	34.20	29.11	16.37	23.76	49.43	47.12
1990-1997	39.52	28.93	17.09	22.91	43.39	48.17

Source: Ndulu and O'Connell (2000: 16) for the predicted shares.

On the basis of the above table we note the following results:

- (i) Sudan's transformation experience does not conform to the observation that "agricultural output shares are just slightly higher in Sub-Saharan Africa than predicted on the basis of income and population". As the table shows the actual share of agriculture in GDP is markedly higher than the predicted share for all half-decade periods. The difference narrowed for some periods but has also widened for others;
- (ii) Sudan's transformation experience does not conform to the observation that "given income and population the size of industry is markedly larger than would be predicted based on cross-country norms". As the table shows, for all half-decades the actual share of industry in GDP is markedly lower than what is predicted by the cross-country norms;
- (iii) Sudan's transformation experience partly conforms to the observation that "given income and population, the size of the services sector is markedly lower than would be predicted based on cross-country norms". As the table shows, the observation applies to the half decades of 1960-1964, 1970-1974 and 1990-1997; for the remaining periods the actual share of services is higher than the predicted share.

Regarding the fourth and fifth stylized facts we note that there does not exist sufficiently long time series data to enable us to properly look at these aspects of transformation. In what follows we use data from the LAS et al (1999) combined appropriately with the GDN data source. Perhaps not surprisingly Sudan's experience conforms to the fourth stylized fact where it is expected that the share of agriculture in labor force to decline with the development of the economy. Evidence from LAS et al (1999) shows that the share of agriculture in total labor force has declined from about 66% in 1985 to about 60% in 1998. The results regarding the fifth stylized fact on relative sectoral productivities are summarized in table (4) for selected years over the period 1985-1998.

Table (4): Sudan: Agricultural vs. Non-agricultural Productivity

Year	Y _a (million US\$)	L _a (million)	Productivit y (y _a = Y _a /L _a : US\$/work er)	Y _n (US\$ million)	L _n (million)	Productivit y (y _n = Y _n /L _n : US\$/work er)	Ratio: y _n /y _a
1985	5370.8	5.591	960.6	10642.3	2.284	4659.5	4.85
1990	5867.3	6.279	934.4	13625.4	2.692	5061.4	5.42
1995	9874.7	7.152	1380.7	16352.6	3.066	5333.5	3.86
1998	12295.5	7.628	1611.9	18998.7	3.427	5543.8	3.44

Source: own calculations.

As noted in section (2) the ratio of labor productivity in the non-agricultural sectors to that in agriculture is expected to increase during the early stages of development up to a per capita income of US\$ 9347 (in 1985 PPP). Contrary to this expectation the above results show that the productivity ratio in Sudan exhibited a declining trend since the early 1990s. However, given data limitations these results should be treated with a lot of caution.

IV. Diversification Experience: Plans, Programs and Policies:

4.1. The Ten Year Plan:

The first systematic attempt at diversifying the Sudan economy was made in the context of the ten-year plan (TYP) 1961/62-1970/71. The TYP was drawn-up in response to the realization that the development programs for the period 1946-1961, though greatly stimulated the Sudanese economy, were no more than a collection of capital projects without defined targets or an underlying theme.

The case for diversification was made on a number of sensible observations about the Sudan economy at the time. The observations included, among others, the crucial dependence of the economy on one crop (cotton) that had a fluctuating international price and that faced a stiff competition from man-made fibers. Depressed domestic output, reduced foreign demand or a decline in international price for cotton would immediately imply adverse impacts on the balance of payments and fiscal resources. Moreover, the economy also depended on importing a wide range of goods, especially consumer goods, and on import and export duties for fiscal resources. Thus a tradeoff presented itself in the form that if consumer goods imports are curtailed, government revenue would decline, but they are not curtailed imports of goods for the purposes of development projects would be reduced. These, of course, were the types of consideration used at the time for advocating a development strategy based on import substitution².

Consistent with the then ruling development paradigm, and similar to development plans elsewhere in the developing world, the TYP stated its qualitative objectives as follows: (a) an appreciable increase in real income per head through a satisfactory growth of the total national production; (b) to promote a broadening of the structure of the Sudan economy; (c) a considerable increase in the exports and import substitution; (d) further improvement of social conditions and services including general and technical education and the creation of sufficient opportunities of productive employment; and, (e) the maintenance of a relatively stable price level.

In quantifying the growth objective it “was considered desirable to bring the economy, within one generation, very near to the stage of self-sustained growth which could be defined as that stage of economic development in which the forces induced by the initial growth process, are able to stimulate growth without more external impulses”. Comparing 1962 per capita income levels in Turkey (US\$212), Morocco (US\$156) and Tunisia (US\$193) to that of Sudan (US\$95), and considering these three comparators as close to the stage of self sustained growth, it was concluded that a doubling of per capita income in Sudan would be required to approach the stage of self sustained growth. Noting that the annual population growth of Sudan was 2.8% per annum, it was further concluded that doubling per capita income over a period of 25-30 years would call for a quadrupling of GDP over the same period. This implied an annual rate of GDP growth of about 5.4 per cent for the first ten years (see, for example, Mirghani (1983)).

² As is well known the import substitution strategy (ISI) came to acquire a bad name under the neoclassical resurgence in the late 1970s. Bruton (1998) and Rodrik (1999) give a more balanced assessment of the ISI strategy. Indeed, Rodrik (1999: 74) argues that “as a strategy of industrialization intended to increase domestic investment and enhance productivity, import substitution apparently worked well in a very broad range of countries until the mid-1970s. Had the world come to an end in 1973, ISI would never have acquired its dismal reputation; nor would East Asia have earned its ‘miracle’ appellation”.

To further disaggregate the required growth rate the TYP adopted an analytical approach that looked at the economy as composed of two sectors: modern and traditional. The sectoral classification, however, was based on a Sudan specific requirement having to do with the availability of relevant national accounts information on production in the economy rather on a Lewis (1954) type classification of the dual economy. The modern sector was defined as that part of GDP that is produced by capital goods included in the estimate of capital formation (e.g. machines and other equipment, which are mostly imported; and European styled buildings and civil engineering works, with their high cement content). Thus the modern sector came to include all irrigated agriculture; mechanized rain land cultivation; slaughter houses and dairy farms; forestry output; transport and distribution; public utilities; building and civil engineering; banks; professionals and other services; non-government education; and government services. On the basis of this definition it could be estimated that in 1955 the share of the traditional sector was about 50% of GDP. Assuming that the traditional sector will grow at an annual rate of 3.3 per cent during the plan period, a modern sector's growth of 8 per cent per annum was calculated as a requirement for achieving the target growth rate of the TYP. Maintaining the assumption about the growth rate of the traditional sector for the whole plan period thus amounted to looking at the remaining details of the plan as being concerned with the growth of the modern sector, given an overall macroeconomic framework.

An important parameter used in the planning exercise was the capital output ratio. After taking into consideration the nature of the priority projects to be implemented, and based on detailed information on sectoral capital use and output performance, the TYP assumed that the capital output ratio would decline from 4.2 in 1961/62 (i.e. a rate of return to capital of about 23.8%) to 2.61 in 1970/71 (i.e. a rate of return to capital of about 38.3%). This pattern of decline for the capital output ratio was dictated by a desire to be conservative in view of the dominance of infrastructural projects in the plan, but nonetheless reflected a fairly decent return on capital implying that at the time of the plan the Sudan boasted a fairly decent efficiency use of capital. In this respect it may be useful to note that detailed calculations for the plan indicated that for the agricultural sector the capital output ratio was 1.7 for modern cotton and crop production; 2.7 for coffee production; 0.8 for timber production; 4.2 for Managil irrigation project; and 3 for Khashm Elgirba irrigation project. Table (5) summarizes these important planning parameters, where in the usual notation I_g , I_p , I , K and Y stand respectively for private investment, government investment, total investment, capital stock and GDP and where the change in the relevant variables is indicated as Δ . The incremental capital output ratio is given by $v = \Delta K / \Delta Y$.

Table (5): Incremental Capital Output Ratios in the Modern Sector of Sudan
(Δx in Ls. Million: 1961/62-1970/71)

Sector	$I_g = \Delta K_g$	$I_p = \Delta K_p$	$I = \Delta K$	ΔY	$v = \Delta K/\Delta Y$
Agriculture	90.1	30.0	120.1	45.4	2.6
Public Utilities	15.9	00.0	15.9	3.6	4.4
Mining	0.4	4.0	4.4	2.5	1.8
Manufacturing	25.3	51.0	76.3	34.0	2.2
Construction	0.3	10.0	10.3	16.0	0.6
Industry: Total	41.1	65.0	106.9	56.1	1.9
Transport	63.0	32.0	95.0	30.2	3.2
Housing	00.0	55.0	55.0	8.4	6.5
Services	90.0	5.0	95.0	18.9	5.0
Social Services: Total	90.0	60.0	150.0	27.3	5.5
Modern Sector: Total	285.0	187.0	472.0	159.0	3.6
Replacement	52.0	41.4	93.4	-----	-----
Overall Total	337.0	228.4	565.4	159.0	2.5

Source: compiled from Mirghani (1968: table 16; 84-85).

The importance of these parameters lies in the fact that they reflect the real returns to investments in the various sectors. Thus it is perhaps clear that according to these estimates the most profitable sector was construction with a rate of return of about 67%, followed by mining (55.6%) and industry (52.6%). For the purposes of investment decisions the rate of return to projects in these sectors would need to be compared with the rate of the real rate of return in the banking sector. At the time of the plan Sudan was a very low inflation economy and had a fixed nominal interest rate of around 6%, implying a real rate of return of about 4.5%.

On the basis of the stated objectives of the TYP, the case for diversification and the technical information on capital output ratios a total investment quantum for the modern sector (inclusive of expansion investment and replacement) of Ls. 565.4 million was estimated for the plan period. Out of this total the public sector was to contribute Ls.337 million while the rest (Ls. 228.4 million) was left for the private sector. The sectoral allocation of the expansion investment was such that agriculture was allotted 25.4%, industry 22.7%, transport and distribution 20.1% and social services and housing 31.8%.

The diversification content of the TYP can be looked at in terms of its sectoral transformation targets, projects portfolio or the composition of exports. In terms of sectoral transformation targets it can be shown that indeed for a ten years period the diversification content of TYP was indeed very modest (see, for example, Mirghani (1983: 123, table 28). The plan envisaged the share of the agricultural sector (broadly defined to include forestry, livestock, fisheries and forestry) in GDP from 57% in 1960/61 to 51% in 1970/71. This implies a rate of decline for the share of agriculture of about 1.11 per cent per annum, which in turn implies an annual growth rate of agricultural GDP of 4.3 per cent. Similarly, the plan envisaged increasing the share of the industrial sector (including public utilities) from 9% of GDP in 1960/61 to 16% of GDP in 1970/71. This implies a rate of increase for the share of the industrial sector in GDP of about 5.9 per cent, which implies an annual growth rate of the industrial GDP of 11.3 per cent. The share of the remaining residual sector that includes transport, commerce, administration and services is envisaged to decline from 34% of GDP in 1960/61 to 33% of GDP in 1970/71.

The projects portfolio of TYP included a number of projects for which a total of about Ls. 140 million of investment was already committed. Of this total about 46% was for agricultural projects (about Ls. 65 million), about 9% was for industry (about Ls. 13 million), about 30% for transport (about Ls. 42 million), and about 15% for services (about Ls. 20 million). A closer look at the committed projects portfolio, however, would show that it had a very high infrastructural content. Thus in addition to all of the projects in the transport sub-sector, in agriculture two dams were to be constructed (Roseires dam and Khashm El Girba dams) and in industry the Sennar hydroelectric power project. Thus of the total committed investment 68% was allocated for infrastructure.

Not surprisingly, the commodity composition of exports was not envisaged to change significantly. The share of cotton exports (inclusive of lint, seed, oil and cakes) was planned to decline from 65% of total exports in 1960 to 61% in 1970/71. The combined share of gum Arabic, groundnuts, and sesame, however, was to increase from 24% of total exports in 1960 to 26% in 1970/71. Thus a marginal decline of only two percentage points was envisaged in the share of primary agricultural products from 89% of total exports in 1960 to 87% in 1970/71. The only significant change in this composition was a planned decline of the share of gum Arabic in total exports from 11% of total exports in 1960 to about 7% in 1970/71 and the increase in the combined share of groundnuts and sesame from 13% in total exports in 1960 to 19% in 1970/71. The share of the residual category of other exports was to increase from 11% of total exports in 1960 to 13% in 1970/71.

4.2. Quasi-Socialist Plans, the Bread-Basket Strategy, and the Economic Recovery Program:

Following the 1969 military take over, a five-year plan (FYP) for economic and social development for period 1970/71-1974/75 was drafted and adopted. Given the early pronouncements of the military regime this plan was supposed to have had “socialist” orientation. But as noted by a number of observers the new plan was not really much different from its predecessor, except perhaps that its parameters were a shade ad hoc! The sectoral targets of the FYP were to increase agricultural production by about 60.8%, animal products by 75.5% and industrial output by 57.4%. A total of 470 projects were identified according to which total investment (of Ls. 432.9 million) was allocated. The highest investment share of 34.2% went to the transport and communications sector (with 103 projects) followed by the agricultural sector (with 169 projects), which was allocated an investment share of 28.8%; the industrial sector (with 30 projects) was allocated an investment share of 15.5%. The remaining balance of total investment went for the services sector (with 163 projects an investment share of 16.7%) and other unspecified investment. Due to political instability and subsequent changes in the orientation of the military regime, the FYP ran very quickly into implementation problems. In 1974, supposedly the last year of the original horizon, the plan had to be extended in an ad hoc fashion to 1976/77.

In the wake of the oil price hikes of 1973 and the resultant accumulation of oil surplus funds in the Arab countries grand plans were designed to turn the Sudan into the “granary of the Arab world”. Like all grand designs this was based on the idea of exploiting complementarity between Arab oil money, Sudan’s natural resources and western technology. Besides other schemes the most influential instrument for implementing the grand design was a 25-year master plan (1976-2000) drafted by the Arab Fund for Economic and Social Development (AFSED). In April 1976 the Board of Governors of AFSED approved a detailed program for the first ten years of the master plan. The Arab Authority for Agricultural Investment and Development (AAAID), based in Khartoum, was created as an implementing agency in July 1977 with a capital of US\$ 500 million.

The project portfolio for the first ten years (1976-1985) included 100 projects, with a total cost of US\$ 6.6 billion, classified into four broad categories. (a) Direct investment projects with commercial returns included 31 projects with a total cost of about US\$ 3 billion (crops, 9 projects; animal production, 9 projects; agro-industry, 11 projects; and, transport, 2 projects). (b) Sudanese public and private investments in agricultural projects included 25 projects with a total cost of about US\$ 1.7 billion (crops, 9 projects; animal production, 10 projects; and, agro-industry, 6 projects). (c) Infrastructure investments in transport and electric power, with a total

cost of US\$ 1.8 billion, included 34 projects (direct investment with commercial returns, 20 projects; and investments with indirect returns). (d) Institutional services with 10 projects costing US\$ 172 million.

In terms of the usual sectoral classification it is an easy matter to show that the first phase of the master plan allocated 55% of total investment to agriculture, 22% to industry (inclusive of power), and 21% to transport and communication. Given the sectoral emphasis of the master plan on the agricultural sector the investment allocation was largely in line with the investment priorities of Sudan's six years development plan (SYP) for the period 1977/78-1982/83. The SYP envisaged a total investment over the plan period of about US\$ 7.7 billion, of which 26.8% was allocated to agriculture, 20% to industry inclusive of power, 18.7% to transport and communication, and 26% to social services. It also envisaged roles for the public, private and mixed sectors in implementing planned investment and as such a number of the projects on the first phase of the master plan were incorporated.

In terms of quantitative objectives the plan envisaged increasing GDP by 7.5 per cent per annum over the plan period, with agriculture growing at 6.5 per cent and industry growing by 9.5 per cent. Thus the SYP envisaged a medium term transformation in the structure of the economy such that the share of agriculture in GDP would decline to about 37% from about 39% in the base year.

No sooner than the SYP document was approved the Sudan was engulfed in a macro economic experiment of implementing an economic recovery program under the auspices of the IMF and the World Bank. The details of the policy content and the evaluation of Sudan's experience thereof are to be found, among others, in the various Sudanese contributions in Ali (1985) and DSRC (1986) and Hag Elamin and Elmak (1997) as well as non-Sudanese contributions by, among others, Brown (1992) and Wohlmuth and Hanshom (1986). The experiment began in June 1978 with the first IMF sponsored devaluation of the Sudanese pound. Thus, over the period 1978-1984 the Sudan economy, for all intents and purposes, was managed by remote control by the IMF in collaboration with the World Bank. As is well known these economic reform programs came to be known as structural adjustment programs (SAPs) in World Bank terminology after 1980.

The relevance of SAPs to the issue of diversification obtains from the adjective "structural" and the implicit theoretical perception that these are policy packages that embody a price-mediated "development" program that could change the production structure and resource allocation

towards increased production efficiency and enhanced competitiveness. This approach to development policy should be contrasted with that of the planning approach where the allocation of investment is used as the relevant policy tool. As such, therefore, the program for Sudan, as in many developing countries, revolved around a series of devaluations of the Sudanese pound starting in June 1978, but included wide-ranging measures that covered almost all sectors.

Perusing the official documentation of the IMF (1984: 34-39), a summary of the policy actions by sector is as follows: (a) the agricultural sector: the policy actions included exchange rate adjustment for export crops; elimination of export taxes; cost recovery and reform of the pricing system to eliminate subsidies; physical rehabilitation and input procurement plans; and, the institutional reform of public enterprises; (b) manufacturing sector: the policy actions included institutional reform of public enterprises; physical rehabilitation; and, privatization and management contracts; (c) the government sector: the policy actions included increasing taxes on imports; increasing departmental fees and charges; increasing excise taxes and duties on cigarettes, liquor and luxury imports; increasing the prices of sugar, petroleum products and cement products; raising charges for public utilities; reducing credit ceilings and increasing interest rates; and, (d) the external sector: the policy actions included liberalization of foreign trade transactions; creating a market for foreign exchange; and, devaluation of the Sudanese pound.

Perhaps the most relevant assessment of the SAPs period in Sudan from a diversification perspective is the conclusion arrived at by Wohlmuth and Hanshom (1986: 19) who noted that “it may be argued that the stabilization policy failed both in respect to its own targets and, more important, in respect to a solution to Sudan’s economic problems in the long-term perspective. Furthermore, it may be argued that this failure is due to the adjustment strategy that aimed at improving the debt service capacity of the country in the short term, but lacks any consideration of the basic structural deficiencies. During the stabilization period since 1978 the structural malformation of the Sudanese economy was rather reinforced than surmounted”. We hasten to note that this assessment is identical to the one arrived at by Sudanese economists (see, for example, the contributions in Ali (1985) and DSRC (1986)).

To appreciate this type of assessment from a diversification perspective we present in table (6) a before-and-after comparison of the structure of the economy two seven years periods: 1971-1977 (the before period) and 1978-1984 (the after period).

Table (6) : SAPs and Structural Diversification of Sudan's Economy: Before and After

Year/Period	GDP Share of Agriculture (%)	GDP Share of Industry (%)	GDP Share of Services (%)
1971	44.57	13.71	41.72
1972	44.16	13.51	42.33
1973	44.88	13.62	41.49
1974	44.42	13.76	41.82
1975	40.57	13.99	45.44
1976	38.84	13.50	47.66
1977	39.89	12.36	47.74
Mean and (S.D)	42.48 (2.59)	13.49 (0.53)	44.03 (2.84)
1978	38.95	12.41	48.64
1979	35.58	13.27	51.15
1980	32.86	14.13	53.01
1981	36.37	14.29	49.35
1982	36.90	14.65	48.45
1983	33.73	15.31	50.96
1984	30.75	15.98	53.27
Mean and (S.D)	34.51 (2.15)*	14.29 (1.20)*	50.69 (1.97)*

Source: own calculations.* As is well known the standard errors (s.e) for testing the two means for each sectoral share can be calculated as : $s.e. = \sqrt{[(\sigma_{ib})^2 / 7 + (\sigma_{ia})^2 / 7]}$, where subscripts (ib and ia) refer respectively to the before and after sectoral shares.

From the above table it is perhaps clear that apart from a distorted structural shift from commodity producing sectors to the services sector, the structure of the economy remained as it was before the implementation of SAPs. Indeed from the information provided in the table it can easily be shown that there was a statistically significant decline in the share of agriculture (with a standard error of 1.43 and a t-value of 5.22) and a statistically significant increase in the share of services (with a standard error of 3.46 and a t-value of 1.92) while there was no statistically significant change in the share of industry (with a standard error of 1.35 and a t-value of 0.59).

A similar assessment on the exports side obtains. Over the period 1971-1977 the combined share of (ranked in order of importance) cotton, groundnuts, sesame, gum Arabic, livestock and sorghum accounted for 88 per cent of total exports. Cotton was by far the dominant export crop during this period with an average share for the period amounting to about 53 per cent of total exports followed by groundnuts with an average share of 14 per cent. Over the period 1978-1984 the commodity composition remained virtually the same with the above major six export crops contributing an average of 89 per cent of total exports. In terms of importance cotton maintained its dominating position as the leading export crop, albeit at a reduced share of 45 per cent. A

significant reordering, however, occurred in the position of other crops. Sorghum, the main staple of Sudan, came to rank second with an average share of 10 per cent of total exports followed by groundnuts and sesame with 9 per cent each. Table (7) provides the details of the commodity composition of Sudan's exports for the two periods, where for each period we also provide the mean and the standard deviation for the share of each export crop.

Table (7): The Composition of Sudan's Exports: 1971-1984 (percentages of total exports)

Year/Period	Cotton	Gum Arabic	Sesame	Groundnuts	Sorghum	Livestock
1971	61.92	7.39	7.04	8.18	0.97	2.73
1972	59.84	7.31	7.07	7.18	1.37	3.05
1973	55.99	5.43	7.52	9.05	2.09	4.11
1974	35.49	11.56	13.52	15.82	3.61	5.66
1975	46.03	4.85	7.80	23.93	1.44	2.69
1976	50.67	5.80	8.96	20.73	1.66	2.12
1977	57.86	5.86	7.95	13.77	2.09	3.21
Mean (S.D.)	52.54 (9.29)	6.89 (2.26)	8.55 (2.29)	14.12 (6.45)	1.89 (0.86)	3.37 (1.18)
1978	60.75	7.32	9.49	11.62	1.33	5.34
1979	65.02	7.95	2.71	6.15	5.80	4.17
1980	44.93	6.60	9.18	6.67	15.85	8.00
1981	19.63	9.95	10.42	19.63	15.62	9.27
1982	25.07	8.30	7.89	9.42	22.25	12.21
1983	48.85	9.40	8.66	4.92	8.22	8.96
1984	49.55	8.12	11.76	6.11	0.88	9.90
Mean (S.D.)	44.83 (16.96)	8.23 (1.15)	8.59 (2.88)	9.22 (5.14)	9.99 (8.11)	8.26 (2.74)
t-values	-1.06	1.40	-0.03	-1.57	2.63	4.33

Source: own calculations.

Performing the usual t-test for the difference between two means confirms that the shares of cotton (with a t-value of -1.06), gum Arabic ($t=1.4$), sesame ($t=-0.03$), and groundnuts ($t=1.57$) did not change in a statistically significant manner over the two periods. On the other hand, the share of sorghum (with a t-value of 2.63) and livestock ($t=4.33$) increased in a statistically significant manner. The overall share of Sudan's six major export crops in total exports remained almost the same increasing marginally from 87 per cent for the first period to 89 per cent for the second period, but the increase is not statistically significant (with a t-value of 1.32).

Thus, far from diversifying the economy the bread basket strategy, which informed the project content of the SYP, and the economic reform program, which detailed the policy package, clearly reinforced the structural malformation of the Sudanese economy instead of surmounting it as noted earlier.

4.3. The National Economic Salvation Program:

Following the change in the political regime in June 1989 the new government designed a medium-term economic program, the national economic salvation program (NESP), with the expressed objective of reinvigorating the Sudan economy. According to Hag Elamin and Elmak (1997: 10-11) the most important objectives of this program included: (a) giving priority to the agricultural sector to achieve self-sufficiency and food security; (b) liberalizing the economy, deregulating price controls and removing administrative and legal barriers in order to stimulate agricultural exports; (c) enhancing the role of the private and privatizing state-owned enterprises.

Various policy measures, not substantially different from those recommended by the IMF and the World Bank but couched in ideological rhetoric, were adopted to achieve the above major objectives. At the macro level, these included the unification of the exchange rates at substantially devalued official rate and the complete liberalization of the foreign exchange market with a view of attaining free convertibility of the Sudanese pound; lifting of price controls and regulations; and, abolishing minimum export prices and licensing systems and liberalizing imports.

At the sectoral level an extensive set of policy measures was designed for the agricultural sector. These included, among others, the removal of subsidies on production inputs and services provided by the agricultural production corporations (e.g. fertilizers, insecticides, land and water); reduction of subsidies on food crops; decontrol and deregulation of agricultural prices (with the exception of wheat); abolishing of the monopolies of marketing boards; and, reduction of export taxes.

With minor adjustments, and twists and turns, the above policy focus was to rule over the period 1990 up to the time the Sudan exported its first oil shipment in August 1999. Thus, without loss in generality, for the purposes of looking at signs of diversification during this period we can compare the NESP period with the period 1985-1989 as a reference. In terms of political orientation, we hasten to note that this reference period was a democratic transition between two military regimes. As a transition period no clear development orientation, or strategy, was developed and most of the time the economy was managed on an ad hoc basis.

Without presenting detailed information on yearly structural changes, suffice it to note that over the reference period 1985-1989 the average sectoral shares were such that agriculture accounted for 34.65% of GDP (with a standard deviation of 1.73 percentage points), industry accounted for 14.78% of GDP (with a standard deviation of 3.19 percentage points) while services accounted

for 50.93% (with a standard deviation of 3.34 percentage points). Over the NESP period (1990-1998) the corresponding average shares were 36.59% of GDP for agriculture (with a standard deviation of 4.05 percentage points), 19.74% of GDP for industry (with a standard deviation of 4.07 percentage points), and 45.93% of GDP for services (with a standard deviation of 3.63 percentage points). Noting that for the reference period we have four observations and that for the NESP period we have 6 observations, it is an easy matter to calculate the relevant standard errors for testing the difference between the means of the two periods. The results indicate that the t-value for agriculture is 1.03 (based on a standard error of 1.87); that for industry is 2.16 (based on a standard error of 2.30); and, that for services is 2.24 (based on a standard error of 2.24). Thus while agriculture share did not change significantly there are signs that the share of industry has increased over this period and that of services has declined.

The detailed results for the composition of exports over the two periods are presented in table (8).

Table (8): The Composition of Sudan's Exports: 1985-1998 (percentages of total exports)

Year/Period	Cotton	Gum Arabic	Sesame	Groundnuts	Sorghum	Livestock
1985	44.31	7.81	11.58	2.95		17.17
1986	44.01	17.01	7.07	1.26	1.67	8.02
1987	30.41	17.84	9.00	1.71	16.62	2.60
1988	42.71	12.29	11.74	6.21	4.66	5.43
1989	44.62	10.35	11.03	3.11	3.78	10.15
Mean (S.D.)	41.21 (6.08)	13.06 (4.30)	10.08 (2.01)	3.05 (1.94)	6.68 (6.74)	8.67 (5.53)
1990	49.78	13.32	9.89	2.95	2.75	10.90
1991	34.99	11.23	12.08	2.18		9.34
1992	17.73	5.61	14.78	4.45	11.98	20.53
1993	19.07	16.11	15.25	5.13	6.94	17.86
1994	20.71	13.59	14.84	5.29	6.09	19.04
1995	22.14	9.25	14.51	3.82	7.92	18.83
1996	20.67	4.71	22.75	3.68	0.42	17.67
1997	19.18	3.98	20.18	11.69	0.00	13.18
1998	16.05	3.98	17.69	10.67	0.91	20.19
Mean (S.D.)	24.48 (10.95)	9.09 (4.68)	15.77 (3.93)	5.54 (3.35)	4.63 (4.29)	16.39 (4.16)

Source: own calculations.

Over the period 1985-1989 the average combined share of (ranked in order of importance) cotton, gum Arabic, sesame, livestock, sorghum and groundnuts accounted for about 81 per cent of total exports (with a standard deviation of 2.61 percentage points). Cotton continued to be the

dominant export crop during this period with an average share for the period amounting to about 41% per cent of total exports followed by gum Arabic with an average share of 13 per cent, sesame (with a share of 10%), livestock (9%), sorghum (6%) and groundnuts (3%). Over the NESP period of 1990-1998 the commodity composition remained virtually the same with the above major six export crops contributing an average of 77% of total exports (with a standard deviation of 7.47 percentage points). In terms of importance, however, cotton lost its dominating position as the leading export crop, with a substantially reduced share of 25% of total exports. A significant reordering also occurred in the position of other crops. Livestock and sesame became the second most important export commodities each with an average share of about 16 % of total exports.

Performing the usual t-test for the difference between two means confirms that the share of cotton has declined in a statistically significant manner (with a t-value of -3.67) while the shares of sesame and livestock have increased in a statistically significant fashion (with respective t-values of 3.81 and 2.72). The shares of gum Arabic ($t=-1.6$), and sorghum ($t= - 0.56$), have declined but not in a statistically significant fashion, while the share of ground nuts ($t = 1.76$) has increased but not in a significant fashion. The overall share of Sudan's six major export crops in total exports remained almost the same decreasing from 81 per cent for the first period to 77 per cent for the second period, but the increase is not statistically significant (with a t-value of -1.48).

In addition to the traditional six export crops the NESP period witnessed the emergence of hibiscus (with an average share of 2.7% of total exports for the eight years period starting 1991), sugar (with an average share of 4.89% over the five years period starting 1994) and gold (with an average share of 6.73% over the five years period starting in 1994). While this may be an important milestone to note in terms of diversifying the export composition of the country, their manufacturing content is possibly largely confined to sugar.

V. Oil and Diversification:

In August 1999 Sudan exported its first oil shipment after about forty years when oil explorations first started and about twenty years when serious efforts at oil exploration began³. According to an IMF report proven reserves are estimated at about 270 million barrels (which would last for about five years) but may increase to range from about 700 million barrels to one billion barrels (lasting for about 13 to 19 years).

³ According to an Amnesty report the major companies currently active in the oil sector are the following. The Great Nile Petroleum and Oil Corporation (GNPOC) holds the concession for the two main oil producing areas. China National Petroleum Corporation (CNPC) holds a 40% share in the project, Petronas Bhd of Malaysia holds a 30% share, Talisman Energy of Canada holds a 25% share and Sudapet of Sudan holds a 5% share.

Not surprisingly, the advent of oil ushered Sudan into a phase of compulsory diversification. This, however, is a diversification that will continue to characterize the economy by heavy reliance on natural resources and primary exports. Before we explore this change in the structure of production it may be instructive to take note of the revenue that accrued to the government in the year 2000, given the then prevailing sharing agreements and prices. The estimates are provided by the IMF (2000: 25, table 8) and are based on official government documents. According to these estimates total yearly production amounted to about 52.8 million barrels of which total cost of production amounted to 22.18 million barrels (i.e. 42% of total production). Thus oil profits amounted to about 30.62 million barrels of which the government received 22.05 million barrels (i.e. 72% of total profits). Of this total, 15 million barrels were allocated for local consumption (3 million for El Obeid refinery and 12 million for Khartoum refinery), 4.7 million represented the transportation fees (i.e. 31.4% of the total local consumption or 21.3% of total share of the government), and 2.34 million represented exports (i.e. 10.6% of the total share of the government).

The export price realized by the government averaged about US\$20.75 per barrel. This was based on a UK Brent spot price of US\$24.5 per barrel minus a price adjustment of US\$ 3 per barrel minus port fees of US\$ 0.75 per barrel. On the basis of this export price it is estimated that the total gross revenue generated by the government from oil in 2000 amounted to about US\$ 360 million (US\$ 49 million from exports, US\$ 62 million from El Obeid refinery and US\$ 249 from Khartoum refinery). Net government revenue from oil, after deducting oil related loan repayments, amounted to US\$ 292 million.

In terms of diversification preliminary projections by the IMF show that the share of the oil sector in GDP will increase from about 4% in 2000 to 6.4% in 2005 and that the value of crude oil exports will increase from about US\$ 813 million in 2000 to about US\$ 1.1 billion in 2005. The share of oil exports has already started to dominate the exports composition where it reached 35.4% in 1999 (having been US\$ 275.9 million out of US\$ 780 million).

VI. Concluding Remarks:

In this paper we looked at Sudan's diversification experience since independence in 1956 up to the recent commercial exploitation of oil reserves. The evidence presented indicates that over the 42 years period under review the agrarian economy that Sudan inherited from the colonial powers remained agrarian with no significant diversification having taken place. The question

that remains is to try to provide some explanations as to why this has been the case. In this respect we note the following four explanations.

First we note that all the conscious efforts at planning the development of the economy did not adopt an explicit diversification philosophy or vision. The pioneering TYP was a very conservative document that only replicated the agricultural investment emphasis of the colonial period. While such emphasis can be appreciated in the light of the accumulated knowledge at the time about the design and implementation of agricultural projects, it hardly embodies a genuine diversification orientation. The same observation holds for the FYP, the SYP and the economic reform programs. Under the economic reform program the most important policy instrument was the devaluation of the Sudanese pound. A major justification of this policy was its potential impact on agricultural producers! A similar policy emphasis was adopted under the economic salvation period.

Second, all these planned development efforts suffered from political instability that characterized Sudan, and continues to do so. All plans were either discontinued midway, extended at the end of the planning horizon or simply neglected and replaced by rolling investment programs in the context of economic reform policies. As is well known Sudan changed political regimes over the period under consideration in a predictable fashion in a cycle of democratic-military regimes with the democratic regimes being short-lived while military regimes with relatively long durations. This political cycle substantially affected the manner in which the economy was managed and undermined the capacity of government to think through long-term development in a systematic way. Significant in this respect is the uncritical borrowing of development thinking, and models, from neighboring countries.

Third, while all the plans recognized a role for the private sector, especially in the construction and industrial sectors, and despite the relatively high real rates of return to industry the response of the private sector was very weak. This, of course, was understandable during the early years of independence given the embryonic nature of the sector at the time and its relative lack of experience outside the trade and construction sectors. Given the experience it must have been the case that the private sector perceived very high risks for investment in industry, so that the adjusted real rate of return to such investments must have been perceived to be very low. One possible reason for this type of perception would be the perceived high transaction costs due to the extremely underdeveloped infrastructure of the economy.

Fourth, while the various plans accorded investment in infrastructure a priority no serious minded thinking was given to the sequences of projects and the possible complementarities between the sectors. Thus, for example, it could be argued that investments designed to reduce the transaction costs, inclusive of infrastructure projects, could have been sequenced to take place prior to investments requiring an active participation of the private sector.

Be the above as it may, the experience of Sudan clearly demonstrates that diversifying an agrarian economy is not a mundane business that can be undertaken by marginal tinkering with existing socio-political and economic structures. Such tinkering as did happen in the case of Sudan only resulted in increased debts, deepened poverty and a complicated political landscape. With the advent of oil a diversified Sudan economy will indeed emerge, but such an oil-based economy is not what development transformation, and economic diversification, are about.

Selected Bibliography:

Ali, A.A.G., Elbadawi, I. And F. Ibrahim, (2001), "Explaining Sudan's Growth Experience"; preliminary report; AERC, Nairobi.

Ali, A.A.G., (ed.), (1985), *The Sudan Economy in Disarray*; printed by Biddles Ltd., London.

Barnett, T., (1977), *The Gezira Scheme: An Illusion of Development*; Frank Cass, London.

Beshai, A., (1976), *Export Performance and Economic Development in Sudan: 1900-1967*; Ithaca Press, London.

Brown, R., (1992), *Public Debt and Private Wealth: Debt, Capital Flight and the IMF in Sudan*; Macmillan, London.

Bruton, H., (1998), "A Reconsideration of Import Substitution"; *Journal of Economic Literature*, vol. 36.

Chenery, H. and M. Syrquin, (1975), *Patterns of Development, 1950-1970*; Oxford University press, oxford.

Economist Intelligence Unit (EIU), *Quarterly Economic Reports: Sudan*; various issues from 1980 to 1998-1999.

Gaitskell, A., (1959), *Gezira: A Story of Development in the Sudan*; Faber and Faber, London.

Hag Elamin, N.A. and E. M. Elmak, (1997), "Adjustment Programs and Agricultural Incentives: A Comparative Study"; AERC Research paper no. 63, AERC, Nairobi.

Hussain, M.N., and A.P. Thirlwall, (1984), "The IMF Supply-Side Approach to Devaluation: An Assessment with respect to Sudan"; *Oxford Bulletin of Economics and Statistics*, vol. 46, no. 2.

IMF, (2000), *Sudan- Staff Report for the 2000 Article IV Consultation and Fourth Review of the First Annual Program Under the Medium Term Staff-Monitored Program*; EBS/00/83; Washington D.C.

IMF, (1990), *Sudan: Recent Economic Developments*;

IMF, (1984), *Sudan: Staff Report for 1984 Article IV Consultation*; SM/84/283; Washington D.C.

ILO, (1987), *Employment and Economic Reform: Towards a Strategy for the Sudan*; ILO, Geneva.

ILO, (1976), *Growth Employment and Equity: A Comprehensive Strategy for the Sudan*; ILO, Geneva.

Middle East Economic Digest, (1977), *Sudan: A MEED Special Report*; London.

Mirghani, A. R., (1983), *Development Planning in the Sudan in the Sixties*; University of Khartoum Press, Khartoum.

Ndulu, B. and S. O'Connell, (2000), "Background Information on Economic Growth"; AERC, Nairobi.

O'Connell, S. and B. Ndulu, (2000), "Africa's Growth Experience: A Focus on Sources of Growth"; AER, Nairobi.

Pritchett, L., (2000), "Understanding Patterns of Economic Growth: Searching for Hills among Plateaus, Mountains, and Plains"; *World Bank Economic Review*, vol. 14, no. 2.

Rodrik, D., (1999), *The New Global Economy and Developing Countries: Making Openness Work*; Policy Essay no. 24, Overseas Development Council, Washington D.C.

Syrquin, M. and H. Chenery, (1989-a), "Three Decades of Industrialization"; *World Bank Economic Review*, vol. 3, no. 2.

Syrquin, M. and H. Chenery, (1989-b), "Patterns of Development, 1950 to 1983"; *World Bank Discussion paper no. 41*; World Bank, Washington D.C.

Wohmuth, K. and Hansohm, D., (1986), "Sudan: A Case for Structural Adjustment Policies"; *Discussion paper no. 8*, SERG, University of Bremen, Germany.

World Bank, (2000), *World Development Indicators: CD*; Washington D.C.

