

POLITICS AND ECONOMICS OF MINERAL
RESOURCES IN DEVELOPING COUNTRIES

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by

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I

As a geologist whose main interest in research has been concerned largely with the Petrology of the Basement Complex of Nigeria, a group of rock so far not known to be associated with any mineral of economic significance, it may appear strange to address you on the subject of Politics and Economics of mineral Resources. My justification for doing this is largely in difference to this distinguished audience: For, were I to proceed on a lengthy discussion the metasomatic transformation of older granite to Bauchaite, most of this distinguished audience will be justifiably bored. I decided on this topic because the relatively new subject of mineral economics is of fundamental importance to Africa at this time and represents a new area in which my Department hopes to co-operate seriously in future with the Department of Economics. Such co-operation is today an urgent matter because of the need for a new awareness of the implications of the peculiar position of Africa as exporter but not user of mineral material. This position requires that more emphasis be placed on the importance of sound economic and political policy which takes account of not only the immediate but also the long term interests and security of African countries.

Importance of Minerals to Man

Minerals are the material of which the earth is made. Soil and rocks are made of one or more minerals. A mineral which can be used in bulk or from which a useful metal can be extracted is known as an economic mineral. Man as the inhabitants of the earth learnt to use minerals rather early and we have always believed that the first man himself was of mineral material, for as the Bible puts it—

The Lord God formed man
Of the dust of the ground
Gen. 2:7

The first earth material used by primitive man were non-metals such as flint, chert and quartz for the manufacture of his weapons and tools. Later he learnt to use clay for pottery and building, coloured minerals for cosmetics and decorative art and soft rocks for carving. But it was only with the advent of industrial revolution in England, in the nineteenth century, that real exploitation of earth material in a way to influence essentially our material civilization began. Since then at an ever accelerating rate minerals have become the fundamental material of life and civilization.

Countries with access to abundant supply of mineral resources and with the requisite technical knowledge became great industrial nations. The present ambition of the new developing nations to become greatly industrialized will be determined not only by the acquisition of technological know-how but by the extent to which the management of their own resources now and their political relationship with other nations in future can ensure sufficient availability of raw minerals and fuel.

The almost insatiable demand for minerals to sustain and enhance modern industrialized economic life has caused the world to exploit and consume in the period between the two world wars more minerals than in all previous history, and the consumption of metal, fuel and other bulk minerals has, since the end of the Second World War, climbed more steeply to even greater levels. In the period between the two world wars, and more so since 1945, African and other undeveloped countries have become important in the world politically and economically, purely as supplier of raw materials to meet escalating demand by industries in Europe and America. In the next decade or two, if the present aspirations of African countries is reflected in the progress of industrialization their own consumption of mineral material will reach a level which we can now hardly conceive of and which is at present not sufficiently appreciated.

Nature of Minerals

It is for this reason that it is very important to underline certain characteristics of minerals.

Minerals are formed by processes which are extremely slow. The formation of an economic deposit runs into millions of years. One foot of limestone probably took up to 5,000 years to form. In the case of petroleum, perhaps not less than a million years is required to complete the physico-chemical processes by which organisms are converted to oil and the oil accumulated in a form suitable for exploitation. Indeed, many minerals do not form originally in a manner in which they can be economically exploited. Geological processes must concentrate them and make them easier and cheaper to mine. For example, gold and tin are naturally found disseminated in rocks. It is after they are released by weathering processes and concentrated by river systems along their channels that they can be economically exploited. Other minerals require more complicated natural methods involving chemical processes of solution and reprecipitation before they can be enriched in restricted zones where they may be mined at a profit. Most minerals in veins and in igneous rocks have formed at considerable depth. They are not available for exploitation until the slow action of weathering and erosion have brought them relatively close to the surface. All of these are infinitely slow and require millions of years.

In contrast to the rate of population growth, the demand for minerals to produce capital and consumer goods has grown at a rate many times in excess of that at which these minerals can be replaced by accessible deposits. This has brought about gradual depletion of high grade mineral deposits and growing dependence on lower grade ones.

Minerals are exhaustible wealth. All deposit, no matter the extent of their reserve, are predestined to exhaustion. It is however, worth noting that at existing levels of technological know-how only a small fraction of mineral deposits can be recovered for human use. This is serious, particularly, in the case of important fuel material such as petroleum where only 25 to 30 per cent of that which is present underground, can be brought to the surface at profit. That is, vast amount of between 70 and 75 per cent of

the discovered oil in the rock will be abandoned and left behind unless technological progress ensures that better and cheaper methods of recovery become available.

In the early operation of a mine, the deposit are in general richer and more easily accessible. With time and exploitation, the deposit gets poorer and more expensive to operate. As a general rule, most mines now in operation will become poorer, more expensive, difficult and less profitable to operate with time, and must eventually be abandoned with large tonnage of minerals left behind because they cannot be extracted at profit.

Classification and Distribution of Economic Minerals

Because it is the strategic minerals and fuels that enter into international politics and economics we should at this point consider their distribution. To do this, it is necessary to introduce a simple classification of minerals by substance and uses. Eleven classes are recognized. These are :

1. Fuels — Coal, Petroleum, Natural gas, peat Uranium.
2. Metallic ores — Iron ores, copper ores, gold and silver ores, tin ores, lead, zinc, aluminium ores of ferroalloy metals; etc.
3. Ferroalloys (Steel) — Ores of Manganese, chromium Nickel, Tungsten, molybdenum, cobalt tin, Niobium, etc.
4. Abrasives — Corundum, garnet, rough diamond, etc.
5. Various Industrial Minerals — Graphite, Barytes, borax, asbestos, sulphur, etc.
6. Chemical Minerals — Salt, sulphur, borax, evaporites.
7. Monetary metals — Gold, Silver ores, platinum, etc.
8. Precious stones — Diamond, opal, tourmaline, topaz, etc.
9. Fertilizers — Potash salts, phosphate, green sands, etc.

10. Ceramic — Clay, Felspar, quartz, refractory minerals, etc.
11. Structural Materials — Stone, glass, sand, cement, rock, clay, asphaltum.

Strategically, the most important classes of minerals are the first four as well as a few other non-metallic industrial minerals such as sulphur, mica and quartz. These are the critical minerals which have significant impact on international relations and world trade and whose distribution carry with it political and economic significance.

These minerals in general occur in more or less appreciable amount in all continents of the world. However, the heavy consumption of metal and fuel minerals by industry and the long period of continuous exploitation had left the Western industrialized countries without enough mineral resources to maintain their strategic and economic needs. Indeed so great has been the consumption of certain minerals, such as fuel and ferro-alloy metals, that world supply is rapidly falling short of need.

The underdeveloped countries of Africa have relatively young mining industries and are not yet large consumers of minerals. This position makes them important as the major source of mineral requirements for the industrial and defence needs of Europe and America. Table I shows the degree of the dependence of the latter on foreign sources of mineral supply. Similar tables for Britain, France and other Western European nations will show even greater dependence on developing countries for mineral fuels and metals.

Today the major reserves of petroleum and mineral raw material are in poor developing countries of the world. These reserves are however being developed and are owned by a few giant corporations of America and Western Europe whose investments in developing countries have recently risen sharply in the face of escalating energy demand in their home countries. Today over 90 per cent of traded crude oil is exported from low income to high income countries. Such a situation has tremendous implications for the economies and international political relations of these countries; hence the subject matter of this inaugural lecture.

TABLE 1

United States Reliance on Foreign Ores During World War II, 1942-1944

<i>Mineral</i>	<i>Per cent Foreign</i>	<i>Chief Foreign Sources</i>
Antimony	83.2	Mexico, Bolivia, Peru
Beryl	90.6	Brazil, Argentina, India
Asbestos	100	<i>Rhodesia, South Africa</i>
Chrome	89.6*	<i>South Africa, Turkey, New Caledonia, Cuba</i>
Cobalt	85.6	<i>Belgian Congo</i>
Corundum	100	<i>South Africa</i>
Copper	37.6	<i>Chile, Congo, Canada</i>
Diamonds	100	<i>Congo, Brazil, Angola, South Africa</i>
Graphite	100	<i>Madagascar, Ceylon</i>
Lead	44.2	Mexico, Peru, Australia, Canada
Manganese	85.5*	India, Africa, Cuba, Brazil
Mercury	43.2	Mexico, Canada
Mica	88*	Brazil, India
Quartz (radio)	99†	Brazil
Nickel	100	Canada, New Caledonia, Cuba
Tantalum	99	<i>Brazil, Congo, Nigeria</i>
Tin	100	<i>Bolivia, Congo, Nigeria</i>
Vanadium	32.4	Peru
Tungsten	61.1	China, Bolivia, Brazil
Zinc	36.7	Mexico, Peru, Australia, Canada

*Indicates that the remainder, or domestic sources, was mostly unusable; therefore these figures in reality should be higher.

From A. M. Bateman, *The Formation of Mineral Deposits*, p. 319; John Wiley & Sons, Inc.

The international trading pattern resulting from the distribution of supply and demand in strategic minerals and petroleum constitutes a major and laterly explosive factor in the world's economic and political relations today. The domination of the world's major mining industries and their development by giant corporations or a few powerful nations of the Western world as well as total lack of indigenous participation by the poor nations of Africa and other underdeveloped countries represents a state of stabilized disequilibrium which may lead to unrest and major aggressions in future.

Many of the underdeveloped countries were former colonies, whose economy was not only integrated into that of the master country but geared to meet its needs. Thus, in most African countries the system is well established of selling mineral and other resources to Britain, France, Belgium and United States and receiving manufactured goods in exchange. It was not in the interest of the master country to promote in the colonial territory industrialization based on local mineral resources, since this not only endangered the supply of raw materials for home industry, but reduced the market in the colonies.

With independence, this relationship has continued almost unchanged for a number of political, economic and social reasons. Foremost among these is the fact that nearly all independent African countries are operating an economic structure superimposed from their former colonial status. That structure was, as far as mining is concerned, designed to maintain exportation of mineral and fuel resources and not their local development and utilization through industrialization.

The whole situation is historical. Most of these African countries attained independence not by revolution but by negotiation and subsequent political settlement, which ensured that the emerging political framework will not bring about drastic economic changes which might lead to the interruption of the flow of strategic and fuel minerals to the master country. There was also developed in African countries, perhaps understandably, a desire to copy the habits and living standards of the master countries. This gave rise

to a perverted appetite for imported luxury goods and extreme reluctance to destroy the colonial economic structure and undergo the painful task of building up from a new foundation a structure related to their ultimate well-being. In general, independence has left former colonies far more economically dependent on the master country than ever before.

A second reason for this situation is that the generation of technological manpower needed to develop and operate mines and to grow industrially, has proved elusive to nearly all of the African countries. Even countries whose economy depends solely on mining continue to depend completely on experts from developed countries. This resulted directly from the fact that mining and development of mineral resources in African countries remain firmly in the hands of a few giant foreign corporations. Effective or meaningful indigenous participation in mining industry and development of mineral resources has in consequence been largely discouraged.

Beyond formal University education, the transfer of technological knowledge is possible only within the industry and only through deliberate exposure of the trainee to certain operational and organizational practices and procedure during periods of apprenticeship. The painfully slow progress so far achieved in the local development of technological know-how results from the lack of desire on the part of foreign companies to transfer technological know-how to young Africans. Even in countries where today young African engineers, geologists and scientists are being employed by these companies, this is meant to placate host governments, or fulfil contractual obligations rather than effectively bring Africans into that kind of deliberate exposure to organizational structure and operational practices. The main reasons behind this attitude are to ensure protection against nationalization and to maintain a monopoly as much as it is possible.

A third factor responsible for the persistence of this dependent relationship is that capital fund for development of mineral resources is very much beyond the reach of most African countries. The exploration, prospection, and preliminary work required to determine the economic merit of a deposit before mining can commence demand not only specialized manpower but heavy

capital outlay. Most prospects, after such heavy expense, do not necessarily turn out to be profitable. The few which do, cannot be determined until much development work had been undertaken over a number of years. Such risky investments is difficult for governments in developing countries to justify in the face of numerous development projects competing for capital fund. The problem may of course be one of right planning and ordering of well defined priorities.

Fourthly African countries with rich mineral or petroleum resources have become over-dependent on foreign exchange income from sale of their mineral resources. Their governments' used to the ostentatious living which such income makes possible, are very wary of interfering with delicate relationship which guarantees free flow of their mineral products to traditional markets. The unwillingness to forgo this income even for a short while is the dominant reason for the political ineffectiveness of African countries even in matters affecting their interests so directly.

Apart from these four reasons, there is the factor of international political protection for these giant corporations. If the industrial nations are to maintain their present position, they must continue to have access to industrial raw material and fuel resources from underdeveloped countries. An interruption of the flow of these raw material and fuel has serious economic and strategic implications for these countries. Therefore, the giant corporations, with investment in mining industry, in underdeveloped countries, have political backing and support of their governments, who are therefore, understandably, anxious that the sources of these minerals and fuel be under the control of a friendly government. This factor greatly has influences on their political policy *vis-a-vis* individual African countries.

If the flow of strategic or fuel mineral from a developing country is affected or interrupted by the sudden emergence of a radically nationalistic government or policy, conditions are bred that would threaten the survival of such a government and make it either collapse or more amenable. This is easily achieved because the political and economic apparatus of most underdeveloped countries are generally liable to outside manipulation.

The above reasons are the major factors which tend to perpetuate the situation today where the development and exploitation of mineral resources in underdeveloped countries are under the control of a few developed nations of the Western world. There is no doubt that the present trend must be changed towards greater home utilization of the major part of raw mineral resources and consequently progressive reduction in the amount available for export. Therefore, in the development of African countries, a point will be reached at which they will not only seek complete control of their mineral resources, but their interest and that of these powerful nations will become divergent. It may thus be anticipated that in many African countries conditions of unrest of world-wide consequences is a more likely future prospect as they gradually strive to achieve greater control of their economics.

Pattern of Trade Relationship between Underdeveloped Countries and the Industrial Nations

An industrial nation, of necessity, must import those mineral materials which it requires for her strategic and industrial need, if it is either lacking or not self-sufficient in those minerals. (A state of not being self-sufficient could arise from attempts to conserve home reserves for strategic reasons). The import of such raw materials as petroleum, ore minerals of ferro-alloy metals and other strategic minerals from underdeveloped countries by developed nations, must unavoidably create a balance of trade deficit for the industrial nations, unless the underdeveloped countries can be persuaded to buy manufactured goods, preferably luxury items, in return.

The desirable policy in such a situation is for underdeveloped countries to ensure that the major items imported from industrial nations in exchange for export of mineral resources and petroleum are essential machinery and plants, not luxury consumer goods. Such a policy will accelerate the pace of their industrialization and greater home demand for their own mineral raw material and petroleum, thus creating dwindling supply for export. Besides industrialization also means less demand for imported manufactured goods.

We have today in Africa, and very much so in our own country, this pitiable situation in which an alarmingly large inflow of consumer luxury goods is exchanged for the export of mineral resources. This position, viewed against the exhaustible nature of mineral resources, has serious implications for the economy of these countries. It can be likened to the case of a man who; haven inherited a landed property proceeds to sell the same piecemeal, with all the forest and agricultural resources, expending the proceeds on pleasurable pursuits. The poverty and misery which will overtake him are inevitable and certain.

In their ambition to become industrialized, the only advantage African countries can have against those already industrialized countries would be cheaper products, resulting from access to low wages labour. Therefore the most serious effect of the large scale importation of luxury goods in exchange for petroleum and other mineral resources, is perhaps the tendency to inflation and galloping wage increases, which then robs African countries of their most important advantage.

III

The price of minerals on the world market like that of all other commodities primarily depends on the relative position of demand and supply. A decline or rise in the price of a mineral may reflect a real change in the balance of supply and demand by an excess of production over consumption or vice versa. In the case of petroleum and other strategic minerals, demand for which is always high, prices are controlled by political and economic policies of the major Western powers. For instance, the price of a mineral like copper, on which a country like Zambia so much depends, may be induced to fall by increased bank rate of interest and/or restriction on bank loan in major buyer-countries. The introduction of metal into the world market from U.S. Government stock pile can have a devastating effect on the world price of any metal. Although the U.S.A. has no known reserve of tin minerals, its announced intention to release tin metal from stock may, if carried out, keep

the price of tin at the bottom for many years to come. The lack of common front to effect control on world mineral prices by exporting underdeveloped countries is therefore most unfortunate.

The underdeveloped countries, the major exporters of minerals, have little real control or even knowledge of the prices as a result of the vertical integration of mining, transportation, processing and marketing of strategic minerals by giant companies. The actual world value of a barrel of oil is, for example, not available to most developing countries, although their national income can depend largely on such sales. It is thus easy to appreciate why the interest of the consuming industrialized countries and the producing underdeveloped countries should be divergent; for while it is advantageous for the exporting countries to keep the world prices up, for the importing countries the reverse is the case. There is one other major advantage to underdeveloped countries in trying to keep prices high by cooperative restriction on production. This has to do with exploitation of low grade deposits.

A mineral deposit is of economic importance if it can be mined and brought to the users at profit. The cost of mining, dressing and transportation must be sufficiently lower than the world price to allow for such reasonable profit. In mining industries which are primarily export oriented as those of underdeveloped countries, only deposits rich enough to yield substantial profit can be worked. Marginal deposits are not worked. With low prices mining may be destructive and restricted to only the very rich part of a mine with no attempts made to extract every available metal. With high prices, not only will low grade ores which are otherwise worthless become valuable, but maximum exploitation of other deposits are made possible.

The producer countries can only influence prices to their own advantage if they can develop better political and economic sagacity and can achieve greater co-operation in restricting the flow of major strategic minerals to the world market. This will not only maintain prices at the optimum level but make massive stock-piling by richer countries impossible. The sad experience of Nigeria with columbite could have been avoided if prices were kept optimum in the world.

Closed Market System

There may be a wide gap between domestic and world market price of a mineral. This depends on the political and economic objective of the government concerned. Because of higher wages in the United States, an industry as labour intensive as mining is always in much difficulty to produce profitably within the world price system and is therefore unable to compete with the import of certain minerals and metals. Government protection of some sort is always sought. Tariffs, quotas and subsidies have been used to achieve protection for otherwise unprofitable domestic mining industry. The United States is, however, a consumer of metals and minerals and not an important exporting country. It is dependent on foreign nations for a high proportion of the metals and minerals essential for its military and industrial need. There is therefore a limit to which such protection is possible and many marginal mines are closed or destructively exploited.

In the U.S.S.R. where the socialist economy is insulated from the effect of world prices and generally discourages undue appetite for consumer goods, it has been possible to maintain relatively low wage labour. This permits the development of low-grade marginal deposit at reasonable cost and efficient exploitation of deposits generally. In any case, profit is not a major factor in Soviet mining industry. In common with the rest of Soviet industry, mining has been controlled by a system of economic planning shaped during the course of half a century. The actual cost of production, or the Soviet estimate thereof, has never been the prime factor in the selling price of a commodity in the country or to the non-communist world. The Soviet system permitted the establishment of selling prices at any level believed desirable to meet political and economic requirements. In the case of mining, the Soviet political and economic objective is to become increasingly self-sufficient in the supply of most strategic minerals, without serious regards for actual cost. In this respect they have succeeded to a degree which is possible only in such a disciplined and highly planned economy, which is freed from the vagaries of world prices generally.

It is not generally possible in countries with export oriented mining to maintain an independent domestic price widely different

from that on the world market price. The only course open to such countries is therefore to co-operate in maintaining high world prices. Unfortunately, the political control of important mineral producing areas of Southern Africa by Western powers, has put the prices of most strategic minerals outside the influence of developing countries by, even, such controlled production. Besides, the pattern of association of these countries with Western Europe and America has left them ineffective in influencing the prices they obtain for their minerals, a situation with important political implications for Africa.

Normally, the price of a mineral rises with increased inflation and wage increases in a country. For this reason access to cheap labour, whose wages can be kept low is vital to mining. In the case of gold for example, with the general rise in the cost and standard of living in the United States and other developed nations, large number of gold mines in these countries have been forced to close because of high labour cost. In South Africa, the policy of apartheid provides an ideal means of achieving an otherwise impossible practice of maintaining a two-tier level of economy and living standards in one country, thus protecting a mining industry, so sensitive to increased cost, from rising wages. Apartheid is perhaps essentially motivated by economics and should be regarded as a system of slavery. As long as South Africa remains an exporter of mineral raw material critical for the industries of Europe and U.S.A., apartheid will persist and will continue to get the support of Western powers.

The Western powers also depend on South Africa for many other minerals notably diamonds, manganese and uranium. Great potential reserve of these and other important industrial and strategic minerals are also to be found in South-West Africa. Apart from the question of low price, there is the more important issue of access to these vital raw materials. The political control of such mineral-bearing areas is of major interest to Western Europe, U.S.A. and Japan, hence their relation to the governments of South Africa, Rhodesia and Portugal which are, understandably, regarded as more reliable and stable allies than those of independent Black Africa. It is important to appreciate that because of this, the co-operation of U.S.A., United Kingdom and France in

the effort to free South-West Africa, Mozambique, Angola or the blacks of South Africa from the yoke of apartheid, is not to be seriously expected.

The now well-known policy of the Western powers over the Southern Rhodesia question is a good illustration of the political realities in Africa. The mandatory sanction resolution on Rhodesia passed by the Security Council could not have been passed if vetoed by U.S.A. or the United Kingdom. Yet, those two countries are mainly responsible for its failure. The United States, West Germany and Britain herself continue to import asbestos from Rhodesia. The United States buys Rhodesian chromite and pig iron; Western Germany buys copper, Japan iron ore and Italy pig iron. The Anglo-American Corporation continues to spend over half a million pounds annually in prospecting for copper nickel, chromium, uranium and gold in Rhodesia. On the general situation immediately after the sanction, *Journal of Mining* for November 1966, reported that Salisbury indicates that, in general, mining has so far been little affected by the sanctions.

Rhodesia is important to United States and other Western powers not only as a major supplier of some important industrial and strategic minerals but also by virtue of its strategic position in relation to maintaining peace in South and South-West Africa. In the same way, Angola and Mozambique not only hold important reserve of a number of critical and strategic mineral resources, but their positions are similarly essential to maintenance of stability in Southern Africa. Therefore, no serious support from Western powers may be expected for the liberation effort of Africa in these areas.

It is, of course, unrealistic for African countries to expect that the Western powers will do their fighting for them, particularly when they believe that freedom for Africans might affect their vital interests. It is for Africa to appreciate its own strength in the dominant control of mineral resources vital to the strategic and industrial need of these powers and convert it to political advantage.

The major problem of developing countries is the lack of long term objectives in their mineral resources development policy. In this regard they need to learn from the Soviet system of planning and conservation.

In the formulation of long term policy for the exploitation of mineral resources, developing countries and Africa should be guided by three main considerations:

1. Export of raw mineral resources is excusable only if the country possesses unlimited reserve well above its foreseeable need, or when dictated by the need for foreign exchange for major capital development programmes.
2. The ambition of any developing country to industrialize means in effect that their domestic consumption and therefore requirement for fuel, ferroalloy metals and other critical minerals will increase rapidly over the years and may sooner exceed local production.
3. A position of self sufficiency in the critical and energy minerals will become of utmost importance to African security and economy in only a matter of a few decades from now, as there will be nowhere else on the globe from where exploitation of mineral resources can be allowed on the terms on which resources of African countries are at the moment being exploited.

A sound mineral resources policy should therefore incorporate planned exploitation in such a way that healthy reserves are constantly maintained. The amount of minerals mined, exported, and/or locally utilized must in some way be related to some long term economic planning and the known reserve. A country, when it can afford it, may, for example, need to import minerals which it possesses, if strategic reasons dictate conservation of home reserve and foreign exchange requirement makes it feasible.

It is basically a bad policy to allow mining industry which is primarily export oriented. Minerals should as much as possible be locally processed or industrially utilized, and the products exported.

Export of raw minerals is justified only by the need for cash for the execution of major capital development plans. If a developing country finds itself in such a bad need of foreign exchange for development that it must export its mineral resources, its policy should be such as makes for exportation of minerals only to the extent of funds needed for capital development. Any excess over these will lead to flow of cash into areas of recurrent and non-essential expenditure. Ultimately it will lead to over-dependence on income from sales of raw minerals, dissipation of large sums of money on luxury goods, uncontrolled exploitation of the mineral resources, and ultimately rising wages and inflation. We are, sadly, beginning to witness this in our own country.

A country engaged in export oriented mining industry must aim at maximum income from minimum export tonnage. Apart from ensuring a fair tax and royalty income, the mining industry should be ideally under indigenous control. The lack of technical know-how and risk-capital in developing countries has however precluded any indigenous participation, let alone control in the mining industry. Therefore, the policy of developing countries in their mining industry should ensure transfer of technology and steady and rapid rate of capital formation. This aim is not just to maximize income but to ensure the most economical and least destructive exploitation of resources.

Local capital formation in developing countries is generally difficult, especially in mining. In these countries, indigenous involvement in mining often begins through Government participation, nationalization or the establishment of government-owned National Corporations. Nationalization of mining or any other industry is generally a negative policy. The nature of the organization and marketing of some industry such as petroleum makes it hardly worthwhile.

The establishment of National Corporations would be effective only if technical knowledge were locally available. Here distinction should be made between persons qualified in various technical fields and those who not only possess qualification but have acquired technical know-how through long exposure to practice. National Corporations in developing countries are understandably

not only lacking in technical manpower but also efficient organizational structure which can only be evolved through many years of experience. This intangible "organizational character" is the vital element in any successful industrial or business concern. The inability of national corporations to compete with private corporations is related to inefficient organizational structure. In the case of mining, particularly the petroleum industry, the reliance on foreign technical partners and, in many cases, a number of independent contractors inevitably results in incoherent and inefficient organizational structure. Where a national corporation seeks to exist side by side with more efficient and more experienced private ones, it is liable to subtle but crushing competition. Therefore, National Corporations in mineral resources industry should preferably be holding companies for taking participating shares in successful private companies.

The objective of participation should however be to ensure steady transfer of technological and management know-how to indigenous persons and the eventual control of the industry, rather than total elimination of the original private interest. The success of achieving this objective might well depend on the knowledge and assurance that original private interests will remain welcome partners, even though, with ever diminishing control.

Investment Policy in Mining Industry

A mineral deposit has no value and cannot materially affect the prosperity of the people of an area of the world where it occurs until it is found and brought into exploitation.

The first stage in this process is the discovery of the mineral. Many important mineral deposits have been found by non-geologists and by accident in the past. Owing to the fact that the easily discoverable mineral deposits which are as yet undiscovered are no longer common, elaborate scientific methods are now needed to detect ore at depth and under cover by heavy overburden. Geologists are thus constantly applying more and more sophisticated technology to the task of mineral exploration and discovery, but at greater and greater costs.

Finding a mineral is only the beginning. To determine its worth, extent, quality and profitability requires considerable prospecting. This involves a determination of the size of the reserve, its quality, the presence of other useful minerals that can be recovered as by-product and the presence or absence of other objectionable material. All this may entail extensive drilling and requires the services of experienced geologists, mineral dressers and metallurgists.

If the deposit proves unprofitable, it is abandoned. If it is considered valuable, mining engineers will begin planning the mine and the mining operation, the transportation of the ore and the mode and method of disposal of unwanted waste. Only after these have been done can mining operation commence.

The exploration, prospecting and preliminary work required to determine the merit of a deposit and before mining can commence demands not only specialised manpower but heavy capital outlay. Once mining operation begins, the returns must yield substantial excess over cost of extracting, dressing and transporting. That excess is not a certain profit, because of the exhaustible nature of mineral deposits; until the excess of sales over running cost has repaid the initial capital outlay for exploratory and development work, the venture cannot be regarded as profitable. If the deposit is exhausted before this happy stage is reached, the whole operation would have been a loss. Investment in a new mining venture is therefore at best a risky business and for this reason a larger profit is deemed necessary than is required for manufacturing.

In underdeveloped countries, the demand on capital fund is often greater than the fund available. It is therefore questionable whether any part of the available scanty capital fund should be devoted to such risk venture as mineral exploration. Having regards to this consideration and the lack of technological know-how the policy of a developing country should be to strive to attract foreign investors to participate in mineral resources exploration and development. Australia and Canada have adopted this policy with great success and even Russia is beginning to do the same. For a sound economic policy and planning, a country need to have a reliable knowledge of its potential wealth in mineral resources. That knowledge can only come through extensive and

costly exploration, for which the developing country must attract the experience and capital of foreign investors. Foreign investors will operate only if the conditions allow a chance of recovery of their capital outlay with some profit. Some liberal attitude may be necessary but this is not necessarily opposed to the policy of participation and maximization of income earlier described. There is no danger in such policy as long as the developing countries have clear vision of their long term objective and need.

Conservation

A state of self-sufficiency in raw mineral and fuel is the ideal one for a country. No one country, however, has all the mineral it requires to meet its industrial and strategic needs. What it lacks it must import, using all the political and economic advantages at its disposal to obtain not only the best terms but also uninterrupted supply. Those critical minerals it has constitute such economic, strategic and political advantage, only for as long as they are available. The aim of conservation is to reduce to a minimum even the probability of dependence on outside source for strategic and other industrial minerals over the foreseeable future.

Planning of economic development programme should be based on adequate information about a country's proven and potential mineral resources. Therefore, the mineral resources of a country should be assessed at regular intervals to maintain fullest possible information. For the poor, marginal ores or those containing objectionable impurities, necessary research should be initiated and vigorously pursued to make them available for economic exploitation within the shortest possible time. For the rich ore, conservation policy should ensure that exploitation is carried out in such a way as to ensure maximum recovery of the mineral and that the poorer facies of the deposit is not disposed off in such a way as to be irrecoverable.

For all mineral resources long term plan for their utilization should guide all development and exploitation. Mineral production should be restricted to the amount needed to meet home industrial programmes. In the event of a need for foreign exchange income for import of machinery, plants and other essential material and services needed to execute a well defined capital development

plan, which cannot be met otherwise, then the extra amount of tonnage needed to earn that amount might be produced for export.

Strict conservation of mineral resources by underdeveloped countries through controlled mineral production will not only keep the price up but may prevent large scale stock-piling by rich countries. Concerted effort in this direction by developing countries is essential for their future economic survival.

In a wider perspective, because of the irreplaceable and exhaustible nature of minerals, their conservation is of utmost importance to mankind as a whole. Global co-operation on proper evaluation of world mineral resources and their conservation will become essential to the maintenance of peace in the world in the nearest future. On it too may lie the guarantee of future political independence of the developing countries.

V

The policy of the Federal Government of Nigeria on mineral resources and petroleum is slowly emerging but quite little is as yet fully discernible. Government appears to have taken effective decision to maximise and increase income from petroleum as witnessed by:

- (a) the raising of the posted price
- (b) the devising of a new formula for the calculation of the taxes, royalty, etc. payable to Government; and
- (c) the establishment of a National Oil Corporation and the signing of participation agreements with various operating oil companies.

Maximizing of income is a good policy, but prematurely large income is not necessarily good. One must doubt the wisdom of the present policy which tends towards encouraging increased production especially as such rising production is not based on long-term capital development plan or sound projected national need or reliable knowledge of reserve.

The National Development Plan envisaged certain income from export of petroleum products. But while a situation in which export rises so steeply that income triples may be commendable for renewable resources like agricultural product or industrial manufactured products, it is to be regarded as unfortunate in the case of exhaustible mineral resources. Production and export of mineral resource and fuel material should be controlled by the level of capital needed for planned capital development programme and considered feasible having regards to local technical and executive manpower. Any production beyond this level is inimical to the long term economic interest of the country.

It must always be appreciated that rapid development for a country like Nigeria means a steepening increase in our demand for energy. The extent to which we can be self-sufficient in energy not only in immediate but also in the distant future is the measure of the soundness of our present policy. We must always appreciate that like the United States, our energy requirement in future may lead us to import petroleum products in future. It will then be under conditions far less favourable than that under which we allow other countries to take out our own crude oil at the moment.

The establishment of a National Oil Corporation and the Government transfer to it of the reserved blocks of potential oil fields and all future relinquishment by present exploration companies is a sound policy. The decision to allow it to exploit those reserved block now is however a doubtful policy for two reasons. Firstly, and most importantly, it will further increase already excessive export of crude oil. Secondly, it will not lead to the desirable objective of increasing income by active participation nor will it bring about any more rapid rate of transferring technological know-how to indigenous persons. Petroleum is such a strategic mineral that it has become a matter of complex international politics and diplomacy. Neither the political nor the economic apparatus of a petroleum producing underdeveloped country is fully protected from the manipulations of external forces much more powerful than they can altogether resist and far more complex than they can understand. We are in the grip of a complex "that-we-do-not-know". In the face of all these, no National Oil Corporation can

succeed in any of its objectives beyond what it is allowed by the very forces it is striving to compete against and by which it is likely to be misunderstood as a danger.

Perhaps, it would have been sufficient for the moment that the National Oil Corporation be essentially a holding company with participating, and desirably, controlling shares in existing established companies. It may then be possible for it to use its influence to bring about an effective transfer of technological and management control, in all aspects of the industry, to indigenous persons. The objective would have been achieved without further increasing production and without opening the reserved blocks to further exploitation.

The question of what is the optimum level of production that should be allowed, and indeed whether any ceiling ought to be set at all is, perhaps, a question for the economist. What is undisputable is the crucial necessity for a country to tie production level to a realistic development plan which takes account of our present and projected executive capacity and technological manpower. The present policy of allowing production to soar well in excess of what the present development plan envisages is clearly undesirable.

Income from a commodity like oil is large, and so easy to make, but it is finite as this source of wealth is an exhaustible one. The sheer size of the income and the relative ease with which it is made predisposes a developing country to an economy excessively dependent on petroleum earning. We should be conscious of this danger and guard against it not only by a careful control of production, but also through a rigid restraint on the spending of the income from this exhaustible source.

Export of raw mineral or petroleum resources is justifiable only on the ground of need for funds for capital development. To finance other projects and government recurrent expenditure not related to capital investment from such income, is therefore an unjustifiably bad policy. This underscores the importance of relating production level to a national development plan.

In the case of a country such as ours with a rich reserve of petroleum deposit, our development plan should incorporate a statutory allocation of all income from petroleum sales to capital projects. Over 60 per cent should be clearly allotted to income

generating and labour demanding capital development projects and machinery. Of the balance of 40 per cent well defined fraction should be allotted, also statutorily, to the important development sectors such as :

1. Training of technological manpower for the mining industries
2. Development of less profitable mineral resources by research
3. Development of local capital in mining
4. Development of agricultural resources and food
5. Provision of geological, mining and land survey services
6. Provision, extension and maintenance of economic infra-structures such as roads, rails, shipping and inland water ways, hospitals and schools.

Governments, no doubt, have allocated a lot of funds to these sectors in recent years, but the percentage bears no relation to income from petroleum resources and woefully inadequate.

One obvious danger of uncontrolled spending of funds from petroleum is in fact that the less spectacular but more enduring type of income like agriculture and forest resources suffer neglect as witnessed by the dwindling income from these sources and worsening balance of trade. In this regard published trade surplus is totally misleading because it hides the real sad position of our trading gains. Exporting a commodity such as petroleum, which the buyer has to buy, should mean that our trade surplus in any year should be at least the value of the exported item. Negative departure from this amount should ideally be accounted for only by importation of machinery and essential industrial raw material. Other negative departures represent undesirable expenditure of income from sale of exhaustible resources on luxury items. Only income from export of renewable resources and manufactured goods should be set against the value of our import for a realistic assessment of our trading position. The present approach is luring us towards a position of excessive dependence on petroleum income.

Ownership of important strategic raw material like petroleum gives Nigeria a new political advantage. We have not only assumed

new stature in Africa, but in the world generally and our friendship is very much sought after. Notwithstanding, we have been most ineffective in making our weight felt. For example, the French, in total disregard of our feelings and indeed of all Africa, continue to assist South Africa to build its arms, not only supplying to her fighter planes but also selling patents to South Africa to assemble one of France's most respected fighter planes. Yet our oil continues to find its way to France and helps to boost up her economy with no restriction. To take another instance, we have been unable to bring about a change in the British Government attitude towards the white minority government in South Rhodesia.

Certain as we are, that the oil well will run dry in a relatively short while, we must not only invest the income from export of oil wisely to put our economy on a secure and permanent footing and to reserve enough against our anticipated need in future, but we must also take maximum political advantage of our strong position to assume leadership of the African people in reality and deed.

While we permit ourselves to make an income several times larger than our capital national development plan, dissipating the excess in luxury—indulging ourselves in the glory of a "lovely light", excessively brilliant, we must remind ourselves of the poem of Edna St Vincent Millay:

My candle burns at both ends
It will not last the night—