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Iron and Steel: Soviet Aid
to Less Developed Countries

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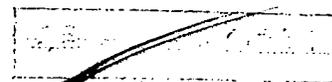
The Soviet Union has extended nearly \$2.5 billion of economic aid to help develop the steel industries of 8 less developed countries. Included among the recipients are Algeria, Egypt, India, Indonesia, Iran, Sri Lanka, and Turkey with preliminary surveys underway in Peru. Soviet aid may include design work, supply of equipment and some construction materials, training, and sometimes raw material supplies. In addition to the steel plants themselves, Moscow may help develop raw material supplies and help construct ancillary facilities such as power and cement plants. The value of Moscow's contribution varies from 20% to 40% of total costs depending on the recipient's ability to supply equipment and cover local construction costs.

Possibly Moscow's greatest contribution is in the fields of training and employment. Average domestic employment at the plants is 7,800 most of whom have received training at Soviet run centers in the recipient country or have been sent to Soviet Union for training. Local construction employment averages about 50,000 -- although the number varies as construction proceeds.

Soviet Steel Industry Technology

The Soviet Union, which now rivals the United States as the world's largest steel producer, has developed an essentially modern steel industry although the level of technology is not uniformly high in all sectors of the industry. Soviet technology

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is most advanced in the primary sector -- that it, in the treatment of iron ore (benefication), preparation of the charge for the blast furnace (sintering), and in the operation of blast furnaces. However, the Soviets employ oxygen converter steelmaking and continuous casting processes less than in the West although it should be noted that these processes are steadily gaining acceptance in the USSR. The Soviets are the least advanced in the rolling and finishing sector. The Soviets have relied mainly on their own efforts to equip their steel industry but they are increasing purchases of equipment from abroad for selective types of equipment.

Export of Equipment

The Soviets have had considerable experience in building steel plants abroad. Most of the work has been for other Communist countries but developing countries have also received large amounts of equipment. As of 1 January 1973, the Soviets' record for construction of steel industry facilities abroad in the period since World War II was as follows (in terms of millions of tons of productive capacity):

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<u>Type</u>	<u>Capacity</u>		
	<u>Total</u>	<u>Communist</u>	<u>Developing</u>
Pig Iron			
Contracts	42.9	28.1	13.6
Completed	21.1	15.8	4.9
Crude Steel			
Contracts	51.8	35.3	16.0
Completed	21.3	11.3	3.5
Rolled Steel			
Contracts	39.1	26.8	12.3
Completed	19.6	17.4	2.2
Iron Ore			
Contracts	33.4	22.2	11.2
Completed	11.0	6.1	4.9

The Soviet record is a mixed one in terms of results attained. Among the developing countries the principal recipients of Soviet aid have been India, the UAR, Algeria, Iran, and Turkey. The Bhilai plant in India has generally been regarded as a well constructed plant although there were lags in construction (due in part to tardy Soviet deliveries and planning mix-ups but also Indian insistence on handling as much of job as possible by local machine builders). The product mix of the Bhilai plant consists mainly of rails and structural steel, or relatively simple products. The record in the case of another major Indian project -- the Bokaro steel mill -- is less satisfactory. The plant is considerably

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behind schedule and has yet to produce its first steel although blast furnace operations have begun. The plant is scheduled to produce 1.7 million tons in the first stage and may eventually become a mammoth 10 million ton plant although many years will be required and Soviet competence has yet to be demonstrated insofar as the necessary rolling and finishing equipment is concerned. Hot and cold strip mills and tinning and galvanizing lines are to be installed. The Soviets have lagged in meeting their own needs for those types of equipment and have imported some types of finishing equipment.

Briefly it may be stated that Soviet competence as a supplier of basic production equipment and equipment needed for manufacture of the less sophisticated products (such as those needed by a developing country) is well demonstrated. However, Soviet performance in meeting delivery dates has not been impressive. Soviet domestic machine building plants are heavily-burdened and plans for expanding capacity have not been carried out. As a result there have frequently been delays in meeting overseas delivery dates. Delays have also been encountered in the planning and designing stages and probably exacerbated in coordinating and gaining final approval from the client government. Probably slow progress in getting some facilities into operation and up to rated capacity can be attributed to difficulties in technical training programs for indigenous personnel but the evidence base is not sufficient to warrant a strong conclusion.

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Soviet Imports of Equipment

Although by far the largest share of the vast equipment park developed by the Soviets in their own steel industry is of domestic origin, a significant share has been imported. Most of the imports traditionally have come from other Communist countries -- mainly rolling mill equipment from Czechoslovakia and East Germany. In recent years, however, the Soviets have been turning to Western suppliers for a wide variety of equipment of the types needed to improve the quality of their steel (specialized melting facilities, control equipment, instrumentation, etc.) and to widen the assortment of steel products (special coating lines, stainless steel processing lines, etc.). In aggregate the value of these imports, although growing, represents only a small share of actual investment in the Soviet steel industry but they are important for helping correct deficiencies and bottlenecks in the industry.

Proposed USSR Steel Plant for Nigeria

If the plant is to be a large integrated steel complex with a substantial product -- mix of finished rolled steel products, any plant built by the USSR would lag considerably behind one built by the USA, Japan, or West Germany in the technology of the rolling mills, particularly if there are to be any cold rolling mills. If the plant is to employ the basic oxygen furnace (LD or BOF) process of steelmaking, which is the most modern and

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economical methods used today, the Russians have not achieved technology in this field comparable to the three countries mentioned above. Also, if the plant was to employ a direct reduction process for the manufacture of steel furnace feed material instead of the conventional blast furnace, again it is believed that the USSR lags considerably behind Western technology. With Nigeria's available oil and natural gas, however, the direct reduction process may be the most economical route to go.

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Petroleum: Soviet Aid
to Less Developed Countries

Since 1956, the Soviet Union has extended some \$1 billion in petroleum development aid to 22 less developed countries. Major recipients of Soviet aid have been India, Iraq, Afghanistan, Egypt, Iran, and Syria. Soviet aid has encompassed exploration, production, transportation, and supply of refining facilities. India, which has relied heavily on the USSR to help it establish a national oil industry, has received \$320 million in Soviet credits since the inception of Soviet aid. In Iraq, Soviet aid of nearly \$200 million has included planning, exploration, development of new oil fields, construction of refineries and other facilities and the training of Iraqi technicians. The USSR also is constructing pipelines in Iraq, including a major line that will connect the North Rumaylah fields to a refinery the USSR is building in Mosul. Moscow has small programs in other less developed countries. Among the small producers, Moscow has been active in Syria, where Soviet-developed fields account for all of Syria's production of six million tons a year. However, the USSR reportedly is withdrawing from its 15-year unsuccessful search for oil in Egypt's Western Desert.

Petroleum Training Standards

Soviet aid in establishing a petroleum training institute may be adequate for basic and intermediate level training purposes. Beyond this point, Nigerians will gain more from observing Western

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operations where they are more apt to see modern technology being applied in all phases of exploration drilling, production, and pipeline operation. The Soviets are excellent theoreticians, with great mathematical capabilities in the geological and engineering fields. However, their inability to apply the latest techniques and methods is evident in most petroleum industry operations.

Oil Exploration

Soviet assistance in oil exploration onshore probably would be of some value to Nigeria, but they have no expertise or experience worth considering in offshore exploration. Mathematical capabilities of Soviet geophysicists are acknowledged throughout the world. However, their use of digital recording seismic equipment and related computer hardware and software has been very limited and is at least 10-20 years behind that of the US. Well-logging and core analysis techniques are not as well developed as in the West. Drilling technology and drilling fluid composition is poor by Western standards. Production testing and formation evaluation methods are inferior and very time consuming. Reservoir engineering methods can be excellent, but exploitation and the application of different production methods could prove to be inefficient.

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Comparison of Soviet Western Equipment

Soviet equipment is generally bulky and less reliable than Western equipment and maintenance is complicated by a lack of spare parts and skilled service personnel. Soviet drilling equipment is not as efficient as Western equipment, and failures of Soviet drill pipe are common. Most equipment lacks portability and would be unsuited for undeveloped wilderness use. More efficient seismic equipment, rotary drilling equipment, tungsten steel and diamond bits, blowout preventors and drilling fluid technology can be supplied only by the West.

Soviet Technology in Oil Refining

Soviet technology and equipment for oil refining is adequate for most of its own needs but lags behind that in the West. Most of the secondary processes, such as catalytic cracking, catalytic reforming, ^{and} hydrogen treating, used to improve quality and vary the mix of product are available in Soviet refineries. However, the size of the units is much smaller than employed in the West and the efficiency of operation is lower, primarily because of lower quality of catalysts and poor design.

US refinery experts observed these deficiencies in Soviet-built units in Eastern Europe, when the East European countries sought Western, rather than Soviet, assistance in modernizing and expanding their refineries. The USSR has conducted research for

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commercial unit of its own. A French firm recently has built the only commercial hydrocracker in the Soviet Union.

Soviet Technology in Petrochemical Industries

A similar situation exists in the Soviet petrochemical industry. Much of modern expansion in the Soviet petrochemical industry is based on Western technology. The USSR has had difficulty in designing and operating large units for more efficient output. In recent years a large number of Soviet orders have been placed in Western Europe, Japan, and the US for large plants, including ethylene, ethylene oxide, polyethylene, ammonia and acrylonitrile.

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