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Economic Intelligence Report

COMPARISON OF THE TIME REQUIRED FOR CONSTRUCTION OF SELECTED US AND SOVIET AID PROJECTS IN LESS DEVELOPED COUNTRIES OF THE FREE WORLD

CIA/RR ER 64-30

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CENTRAL INTELLIGENCE AGENCY

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FOREWORD

Comparative performance in construction of selected Soviet and US nonmilitary aid projects is evaluated in this report. Primary attention has been given to projects in the industrial and transportation sectors of construction. Although some comparisons of cost efficiency have been made, it has proved most feasible, in terms of the availability of data, to base comparisons on the time of construction.

Poor performance in the time required for construction of a given Soviet or US aid project does not necessarily indicate poor performance on the part of either the USSR or the US. In this report, Soviet aid projects are compared with US aid projects from the point of view of the end results in construction time, although in some instances the recipient country may have been largely responsible for delays in construction. Also considered are certain differences in the Soviet and US administration of construction aid and the effects that the two kinds of administration have had on construction performance. Because of the small size of the sample, care should be taken in generalizing about construction at Soviet and US aid projects as a whole.

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COMPARISON OF THE TIME REQUIRED FOR CONSTRUCTION OF SELECTED SOVIET AND US AID PROJECTS IN LESS DEVELOPED COUNTRIES OF THE FREE WORLD*

Summary and Conclusions

An examination of the few comparable Soviet and US aid projects indicates that, as measured by time of construction, the US industrial projects may have been markedly superior to comparable Soviet industrial projects. On the other hand, performance at the Soviet transportation projects appears to have been substantially better in terms of time of construction than the comparable US transportation projects.

Of the 40 Soviet and US projects that were surveyed, 7 pairs were of sufficient comparability in size to permit some direct comparisons of the time required for construction. For example, construction of the Soviet fertilizer project in Indonesia, when completed, probably will have taken nearly 3 years longer than the counterpart US project. Similarly, if the present schedules are met at the Soviet projects in oil refining and in thermal electric power, construction will take about 26 and 14 months longer, respectively, than the counterpart US projects. On the other hand, in airport construction in Afghanistan, construction time of the Soviet project was 28 months shorter than the US project.

The pattern of over-all US superiority at the various construction projects also is found in the rate of implementation of foreign aid capital (the period of time during which foreign aid capital is tied up in unfinished projects that are not yet yielding a return or service to the recipient country). Thus for five pairs of industrial aid projects of the USSR and the US the average period of implementation for the Soviet projects was planned to be some 34 percent longer than at the counterpart US projects. In addition, because of the lagging performance at the Soviet projects, the average period actually will be 72 percent longer. In contrast, the pattern is reversed for the two pairs of transportation projects. Thus the average planned period of implementation at the Soviet projects was little more than one-half that of the US transportation projects, and the average actual period was only one-third. For the seven matched pairs of aid projects taken together, the average period of implementation, planned and actual, was less for the US projects, but the margin of advantage does not appear to be substantial.

A comparison of actual time required for construction of aid projects of the industrial and transportation types indicates that the construction

* The estimates and conclusions in this report represent the best judgment of this Office as of 1 September 1964. The conclusions on construction are based on uncompleted projects as well as on completed projects (see I, p. 3, below).

schedules established for both US and Soviet projects generally are optimistic, but particularly so for the Soviet projects. Thus at a sample of 15 US industrial projects actual construction time averaged 14 percent more than planned, whereas at 8 Soviet industrial projects the average was 35 percent more than planned. In the transportation category, both the US and the Soviet projects generally have been optimistically scheduled, with five US projects averaging 25 percent longer than planned and six Soviet projects 37 percent longer than planned. For the combined sample of industrial and transportation projects, however, the 20 US projects averaged 17 percent more than planned, whereas the 14 Soviet projects averaged 36 percent more than planned.* Moreover, the sampling of projects probably has imparted a bias favorable for the Soviet projects because of the much higher proportion of uncompleted projects in the Soviet sample.

The USSR usually does not assume local currency obligations, and, as a result, Soviet projects in Indonesia and Afghanistan were delayed when these obligations were not met. The US generally has avoided this problem through the use of counterpart funds** and PL 480 funds,*** which has permitted some US control of the financing of local currency obligations.

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* In contrast, performance at four Soviet projects of the institutional type was considerably better, with an average of actual time of only 4 percent more than planned.

** Funds of foreign currency received by the US from local sales of commodities exported to aid-receiving countries.

*** Funds of foreign currency received by the US from sales of agricultural surpluses under PL 480. These funds can be retained by the US in the recipient country and can be used to finance local construction costs if necessary.

I. Introduction

In many respects the types of involvement by the USSR and the US in aid projects are similar. Both countries provide construction equipment, production machinery, construction materials not produced locally, and technical assistance in the form of supervision, training, and design work. US projects examined for this report include projects performed by US contractors and financed either from US aid funds or from the countries' own funds. For US aid projects, over-all coordination and financial arrangements have been handled by the Agency for International Development (AID) or by its predecessors in the administration of foreign aid funds, with the requirement that a competent US engineering firm be retained. The recipient country usually is permitted to award the construction contract to the lowest bidder. Some US projects, however, are undertaken without US government financing and coordination -- that is, US construction companies deal directly with the government of the less developed country or with a firm in that country. In terms of the construction supervision, training, and design work provided by the US company or companies, both the privately financed and the AID types of projects are similar.

Whereas US construction is worldwide, Soviet construction aid has been concentrated in the Middle East and Asia. For this report, 40 Soviet and US aid projects in these areas were surveyed, and information sufficient for an analysis of construction time was developed for 38 aid projects -- 20 US projects and 18 Soviet projects. (Two projects were excluded from the sample of 40. One, the Aswan Dam, was excluded because of its uniqueness among aid projects. The other, the Kabul - Tor Kham road in Afghanistan, was excluded from the US sample because it originally was intended to serve only as a training project.)

Attention on all projects has been concentrated on the time aspect of construction performance because of the lack of precise data on cost. Complete information on construction schedules of aid projects is rare. Therefore, the basic determinants of time as used in this report were the official estimate of the number of months or years that would be required for construction, the month in which construction was started, and the month in which it was completed. The completion date was defined as the month in which the project was turned over to the owner for operation or use. For those projects that are uncompleted, the latest available construction schedules have been used to determine the completion dates.

II. Seven Pairs of Soviet and US Aid Projects

In the data presented below, a Soviet project has been paired with a US project for seven different types of industrial and transportation construction. Where possible, similar projects in the same country have been paired. As a group these projects provide a good but small sample of the pattern of successes and shortcomings in construction at the 38 Soviet and US projects examined.

A. Thermal Powerplants

Although both the Cambay and Neyveli Thermal Powerplant projects in India (see the following tabulation) have been delayed, the US performance at Cambay is distinctly superior to the Soviet effort at Neyveli.

	Soviet Aid 1/*	US Aid 2/
Project	First stage of the Neyveli Thermal Powerplant	Cambay Thermal Powerplant
Contract	250,000 kilowatts (kw) of installed capacity; five generating units of 50,000 kw each; the fuel is to be lignite coal.	250,000 kw of installed capacity; four generating units of 62,500 kw each; the fuel is to be pulverized coal, residual oil, or natural gas, either singly or in combination.
Time period		
Planned	36 months (August 1959 to August 1962)	36 months (January 1961 to January 1964)
Actual	57 months (August 1959 to May 1964)	Uncompleted; estimated time required for completion, 43 months (January 1961 to August 1964)
Cost (million $**)		
Planned		
Foreign exchange	29.5	29.7
Local currency	17.9	15.1
Total	47.4	44.8
Actual		
Foreign exchange	29.5	31.1
Local currency	29.4	14.9
Total	58.9	46.0

* For serially numbered source references, see Appendix B.

** The data on planned and actual costs are given in current US dollars throughout this report. Dollar values have been derived from current official rates of exchange and do not necessarily reflect the value of the dollar in respect to construction costs in the countries involved.

If the schedule at Cambay is met, construction time at the US project will total 43 months compared with an actual time of 57 months at Neyveli. Although a second stage expansion to 400,000 kw is now planned at Neyveli, it is doubtful whether additional work necessitated by the expansion has accounted for a significant portion of the Soviet timelag.

It is estimated that the cost of the Cambay plant will exceed the original estimate by less than 3 percent. On the other hand, the last available official estimate (June 1962) of the Neyveli project predicted that the final cost would exceed the original estimate by 24 percent.

Factors behind the delays on the projects are not entirely clear. The only reason found for delay at Cambay was a prolonged labor strike in the spring of 1963, which lasted for about 40 days -- not long enough to account for the entire delay. At Neyveli, no specific reasons were found, only that construction has been delayed by "errors" committed by both Soviet and Indian engineers and that Indian bureaucracy contributed to the slowness of construction.

B. Steel Plants

Soviet construction time at the Bhilai Steel Plant in India (see the following tabulation) lasted about 18 percent longer than

	Soviet Aid 3/	US Aid 4/
Project	First stage of Bhilai Steel Plant	Expansion of the Tata Steel Plant
Contract	Initial construction for a capacity of 1 million tons* per year in ingot steel	Expansion of existing capacity from 1.3 million to 2 million tons per year in ingot steel
Time period		
Planned	51 months (March 1956 to June 1960)	30 months (December 1955 to June 1958)
Actual	60 months (March 1956 to March 1961)	36 months (December 1955 to December 1958)
Cost (million $)		
Planned		
Foreign exchange	135.2**	130.7
Local currency	176.2***	27.3
Total	311.4	158.0
Actual		
Foreign exchange	135.2	133.7
Local currency	238.6	32.8
Total	373.8	166.5

* Tonnages are given in metric tons throughout this report.

** Although the first Soviet loan was for $118.4 million, a loan of $16.8 million for structural steel was made soon after the start of construction.

*** Cost of the town, airstrip, and powerplant is not included.

planned, a performance almost identical with the US effort at the Tata Steel Plant in India, where construction time exceeded the plan by 20 percent. The Tata project was an expansion of an existing facility, whereas the Bhilai project was an entirely new facility that was designed and built with provision for subsequent expansion. All things considered, the greater size, complexity, and capacity of the Bhilai project appear to be reflected in the differences in the planned and actual times of the two projects. The actual cost of the Tata project is estimated to have been only about 5 percent greater than planned, whereas the Bhilai project exceeded the planned cost by nearly 20 percent, probably reflecting a greater effort at Bhilai to speed completion.

The two major causes of delay at Tata were labor difficulties and problems concerning the supply of plant machinery. The delay at Bhilai was caused by the cumulative effect of several factors. Some of the more important were a lack of coordination between Soviet technicians and private Indian contractors, shortages of both skilled and unskilled native construction workers, an inefficient Soviet system of inventory of the equipment delivered to the site, and the indifferent attitude of Indian contractors toward construction schedules.

C. Roads

Soviet construction on the Kushka-Herat-Kandahar Road in Afghanistan (see the following tabulation) has averaged 7.7 miles per month

	Soviet Aid 5/	US Aid 6/
Project	Kushka-Herat-Kandahar Road	Kabul-Kandahar Road (Segments I and II)
Contract	424 miles of two lanes, concrete paving with asphalt seal, base course, and drainage and bridges	103 miles of two lanes, asphalt paving, base course, and drainage and bridges
Time period		
Planned	48 months (January 1961 to January 1965)	24 months (August 1961 to August 1963)
Actual	Uncompleted; estimated time required for completion, 55 months (January 1961 to August 1965)	Uncompleted; estimated time required for completion, 40 months (August 1961 to December 1964)
Cost (million $)		
Planned		
Foreign exchange	80.0	40.0
Local currency	14.7	8.7
Total	94.7	48.7
Actual		
Foreign exchange	119.0	N.A.
Local currency	23.2	N.A.
Total	142.2	N.A.

in comparison with a plan of 8.8 miles. Insufficient compaction of the subgrade and inadequate drainage systems have resulted in washouts in the roadway, causing significant delays.

Actual US construction on the Kabul-Kandahar Road in Afghanistan has averaged approximately 2.6 miles per month in comparison with a plan of 4.3 miles. A change of supply routes has been the major cause of delay. Construction began 1 month before closing of the Pakistan-Afghan border; thus most of the materials and construction equipment had to be shipped via a more costly route through Iran.

D. Airports

Around-the-clock construction by the USSR allowed operational use of the Kabul Civil Airport runway in Afghanistan (see the following tabulation) for large aircraft after 17 months. The major share

	Soviet Aid 7/	US Aid 8/
Project	Kabul Civil Airport	Kandahar International Airport
Contract	Concrete runway designed for large jets; taxiway, modern passenger terminal, and necessary support facilities	Asphalt runway designed for large jets; taxiway, hangars, modern passenger terminal, and necessary support facilities
Time period		
Planned	33 months (July 1959 to April 1962)	62 months (September 1955 to July 1956, November 1957 to May 1959, July 1959 to May 1960, and July 1960 to July 1962)
Actual	41 months (July 1959 to December 1962)	69 months (September 1955 to June 1956, November 1957 to June 1959, July 1959 to July 1960, and July 1960 to December 1962)
Cost (million $)		
Planned		
Foreign exchange	6.2	8.34
Local currency	3.1	3.97
Total	9.3	12.31
Actual		
Foreign exchange	8.5	N.A.
Local currency	6.6	N.A.
Total	15.1	N.A.

of construction of the passenger terminal was completed by June 1961, but the lack of finishing materials for interior work delayed completion until the end of November 1962.

Although construction of the runway at Kandahar in Afghanistan was completed in 20 months, 11 additional months were required for installation of the transformer vault and the lighting system to permit operational use. The contract for design of the passenger terminal was signed in January 1958, but construction was not even started until October 1960, 6 months after the runway became operational. Closings of the Pakistan-Afghan border aggravated the late start by delaying supply of construction materials. In addition, delays were caused by closing of a local brick kiln for 2 months and by a shortage of local plumbers, electricians, and air-conditioning technicians.

E. Fertilizer Plants

In Indonesia, US completion of the Palembang Urea Plant for fertilizer (see the following tabulation) 2 months ahead of schedule

	Soviet Aid 9/	US Aid 10/
Project	Tjilatjap Superphosphate Plant	Palembang Urea Plant
Contract	Superphosphate fertilizer; capacity of 100,000 tons per year and the necessary ancillary facilities	Urea fertilizer; capacity of 100,000 tons per year and the necessary ancillary facilities
Time period		
Planned	48 months (November 1961 to November 1965)	27 months (August 1961 to November 1963)
Actual	Uncompleted; estimated time required for completion, 60 months (November 1961 to November 1966)	25 months (August 1961 to September 1963)
Cost (million $)		
Planned		
Foreign exchange	8.5	33.2
Local currency	14.7	N.A.
Total	23.2	N.A.
Actual		
Foreign exchange	N.A.	32.9
Local currency	N.A.	5.6
Total	N.A.	38.5

was an excellent performance. The contract (including all engineering, design, construction, and operational testing) required greater technical competence than construction of the superphosphate plant of the same capacity. In addition, the training of the local personnel for operation of the plant encountered no delays.

To date, approximately one-fourth of Soviet construction material and production equipment has arrived at the site of the Tjilatjap superphosphate plant in Indonesia. A shortage of trucks and a lack of material-handling equipment have delayed the delivery of Soviet equipment to the site. Soviet obligations also include training of the local personnel in plant operation, but construction is an Indonesian responsibility. Indonesian construction progress to date includes partly completed warehouses, housing, and foundations for plant structures. Inflation is continually devaluating funds previously earmarked for construction by Indonesia, thus undermining completion estimates. The limited extent of the Soviet commitment has been the major factor responsible for lack of progress. If Soviet involvement had included construction of plant structures, installation of equipment probably would not be suffering serious delays.

F. Oil Refineries

The US performance at the Ulsan Oil Refinery in South Korea (see the following tabulation) was substantially better than the Soviet

	Soviet Aid 11/	US Aid 12/
Project	Barauni Oil Refinery, India	Ulsan Oil Refinery, South Korea
Contract	Capacity of 2 million tons of crude oil per year; designed to produce a number of refined products	Capacity of 1.75 million tons of crude oil per year; designed to produce a number of refined products
Time period		
Planned	21 months (July 1961 to April 1963)	15 months (November 1962 to February 1964)
Actual	Uncompleted; estimated time required for completion, 40 months (July 1961 to November 1964)	14 months (November 1962 to January 1964)
Cost (million $)		
Planned		
Foreign exchange	25.0	18.7
Local currency	23.3	N.A.
Total	48.3	N.A.
Actual		
Foreign exchange	32.8	N.A.
Local currency	54.5	N.A.
Total	87.3	N.A.

effort at the Barauni Oil Refinery in India. The Ulsan refinery was constructed in 14 months, a month ahead of schedule. The present estimate is that construction of the first stage of the Barauni refinery will be completed in July 1964, some 36 months after the start of construction. According to the original contract, the second stage was to be completed 4 months after completion of the first stage. Construction of the Barauni refinery, therefore, probably will require 40 months or more compared with the planned time of 21 months. The last available estimate (in July 1963) of the final total cost of the Barauni project was about 81 percent greater than the original estimate.

Delays at Barauni have resulted from several factors. Heavy rains caused flooding of the construction site on two different occasions, and in each instance the flooding was prolonged by inadequate drainage, and the site remained waterlogged for about a month each time. Reports indicate that delays totaling 6 months were a result of late deliveries of machinery from the USSR. Delays also have been attributed to labor difficulties.

G. Dams and Hydroelectric Powerplants

Although the US performance at the Karaj Dam project in Iran (see the following tabulation) was not outstanding, it was superior to

	Soviet Aid 13/	US Aid 14/
Project	Naghlu Dam, Afghanistan	Karaj Dam, Iran
Contract	270-foot (ft) high concrete dam; powerplant with an installed capacity of 67,500 kw and provision for a fourth turbine of 22,500 kw	590-ft high concrete arch dam; powerplant with an installed capacity of 120,000 kw; downstream regulating dam; 40 miles of transmission lines
Time period		
Planned	60 months (August 1960 to August 1965)	90 months (January 1954 to July 1961)
Actual	Uncompleted; estimated time required for completion, 88 months (August 1960 to December 1967)	98 months (January 1954 to July 1962)
Cost (million $)		
Planned		
Foreign exchange	19.0	54
Local currency	21.6	N.A.
Total	40.6	N.A.
Actual		
Foreign exchange	N.A.	56
Local currency	N.A.	N.A.
Total	N.A.	N.A.

performance at the smaller Naghlu Dam project in Afghanistan, under Soviet aid. The Karaj project was built in 98 months, whereas the Naghlu project currently is scheduled for completion in December 1967, a total construction time of 88 months. Although construction time at Karaj was 11 percent greater than that scheduled at present for Naghlu, the Karaj project clearly is on the order of more than one-half again as large as Naghlu. Actual costs at Karaj were 4 percent higher than the original estimate, whereas at Naghlu about 70 percent of the original estimate had been spent by March 1964, with much of the major construction still to be done.

Delays at Karaj were caused by landslides in the main quarry, which interfered with the supply of aggregate for concrete. A number of the personnel were killed or injured in accidents, resulting in numerous work stoppages and several investigations of the contractor's safety practices. At Naghlu the Soviet engineers did not test the rock formations sufficiently. As a result, additional survey work was necessary after a considerable amount of work had already been done. This brought about major changes in design of the dam and resulted in the relocation of the diversion tunnel.

H. Comparative Performance

The Soviet and US projects paired above are sufficiently comparable in terms of size and complexity of construction to permit some direct comparisons of the time required for construction. The road projects, in fact, provide a common unit of measure for comparing the mileage of road paved per month. In these terms, performance at the Soviet project was noticeably better than at the US project. Moreover, this was achieved with concrete paving over terrain that was generally more difficult than at the US project. In airport construction also, performance at the Soviet project was distinctly better, with the US project taking 28 months longer to build.

On the other hand, performance at the US projects in fertilizer, oil refining, thermal electric power, and dam construction has been distinctly better than at the counterpart Soviet projects. Thus if the present schedule of the Tjilatjap fertilizer project in Indonesia is met, construction of this Soviet project will have taken nearly 3 years more than the counterpart US project. Similarly, if the present schedule of the Barauni oil refinery in India is met, construction will have taken 26 months longer than the counterpart US project.* If the present schedules of the thermal electric power projects are met, as appears likely, construction of the Soviet project will have taken 14 months longer than the US project.

* The two projects are comparable in size, even though the rated capacity of the US project is less than the Soviet project.

Although less clearly definable than at the projects mentioned above, the work at the US dam project at Karaj in Iran was substantially better than can be expected at the Soviet dam project at Naghlu in Afghanistan. On the surface the opposite would appear to be the case. The present schedule for the Naghlu project, with 3 years of construction remaining, implies completion in 10 percent less time than was required for the Karaj project.* Because of the much smaller size of the Naghlu project, however, the US project actually was built in substantially better time than the Soviet project will be.

Finally, in respect to the time required for construction of steel plants, no clear judgment of superiority for either aid project seems warranted. Performance at the Bhilai Steel Plant in India undoubtedly was good; the project obviously was given top priority by the USSR. In comparing the greater size of the construction job at Bhilai with the shorter construction time at Tata, however, performance at the Soviet project cannot be said to have been substantially better than at the US project.

In summary, at four of the five pairs of industrial aid projects compared above, actual construction time of the US projects was or will be substantially better than that of the Soviet projects. At the other pair of industrial projects, there was no clear margin of superiority in construction time, given the difference in size of the projects. On the other hand, at both pairs of transportation projects, the actual construction time of the Soviet projects has been substantially better than the US projects.

To the recipient country, aid projects are an important means of obtaining productive capital from foreign countries. Other things being equal, therefore, it is to the advantage of the recipient country to get foreign aid projects into operation as early as possible. In the case of loans (the form of most Soviet aid), it is particularly advantageous to minimize the period during which unfinished projects (1) tie up foreign capital and require payment of interest on credit already used and (2) yield no return from the capital obtained. In this respect also, in what may be called the rate of implementation of foreign aid capital, the Soviet projects in transportation show an advantage over the counterpart US projects, whereas the advantage falls to the US projects in the industrial field.

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* Completion of the Naghlu project substantially ahead of the present schedule as established by the USSR appears to be unlikely at this time.

Average rates of implementation of foreign aid capital are estimated to be as follows (in months per $10 million of cost in foreign exchange)*:

Average Rate of Implementation	Soviet Aid	US Aid
The five pairs of industrial projects		
Planned	9.9	7.4
Actual	13.6	7.9
The two pairs of transportation projects		
Planned	9.4	17.8
Actual	7.5	22.5
All seven pairs of aid projects		
Planned	9.8	9.0
Actual	11.4	10.1

Thus the average period of implementation (that is, the average time required for construction before the foreign aid capital can begin yielding a productive return or use) for the Soviet transportation projects was planned to be little more than one-half that of the US transportation projects. In fact, because of the poor performance at the US transportation projects, the actual average period of implementation for the Soviet transportation projects was only one-third that of the US projects. For the industrial projects, however, the average period of implementation for the Soviet projects was planned to be some 34 percent longer than at the counterpart US projects and actually will be 72 percent longer. For the seven different types of aid projects taken together, the average period of implementation, planned and actual, was less for the US projects, but the margin of advantage does not appear to be substantial.**

* The planned average rates of implementation were obtained from the total number of months of planned time for the respective projects divided by the total of planned costs in foreign exchange, expressed in units of $10 million. The actual average rates of implementation were calculated in a similar manner, using the total number of months of actual time and the total actual costs in foreign exchange (planned costs in foreign exchange were used where actual costs were not available). Strictly speaking, of course, foreign aid capital is not all that is provided by the foreign exchange part of an aid contract.

** The margin of the US advantage may well be understated. The implicit weight of the transportation projects in the sample probably is higher than in either the Soviet or the US aid programs as a whole.

Information on costs of construction of aid projects is not usually available. Moreover, direct, international comparisons of the cost of Soviet projects with the cost of US projects are precluded by substantial differences in the proportion of cost financed by foreign exchange. Some indirect comparisons of costs, however, can be made by relating actual total (foreign exchange plus local currency) cost to that planned for a given project. Thus actual cost averaged 4 percent above plan at four US projects compared with 33 percent above plan at five Soviet projects.*

III. Optimism in Scheduling

In addition to the paired projects discussed above,** data are available for determining the planned and actual times required for construction at a total of 24 other Soviet and US projects. Although these projects are not amenable to specific pairings of the time required for construction, a general comparison of actual and planned time can be made for each kind of project. The sample of 24 projects can be subdivided by the following categories of construction (in numbers of projects)***:

	Soviet Aid	US Aid
Industrial	3	10
Transportation	4	3
Institutional (such as hospitals)	4	0

In combination with the 5 pairs of Soviet and US projects in the industrial category discussed above,** the actual construction time of 15 US industrial projects averaged 14 percent more than planned, whereas the 8 Soviet industrial projects averaged 35 percent more than planned. In the transportation category (including the two pairs of Soviet and US projects), the actual construction time of five US transportation projects averaged 25 percent more than planned, whereas the six Soviet transportation projects averaged 37 percent more than planned. For the combined sample of industrial and transportation projects, the 20 US projects averaged 17 percent more than planned, whereas the 14 Soviet projects averaged 36 percent more than planned.

* At two of the four US projects, costs are available only in the foreign exchange category. By and large, the increases in actual costs above plan reflect increases in costs of construction engendered by the lags and delays in construction. Other factors, however, also may be reflected, such as inflation in the recipient country or provision of additional facilities not in the original plans.

** See II, p. 3, above.

*** For a short commentary on each of these projects, see Appendix A.

The comparative performance in respect to planned construction time probably is even more favorable for the US than is indicated by the calculated averages, because the sample of industrial and transportation projects imparts a favorable bias to the Soviet projects. Of the 20 US projects, only 3 are uncompleted, whereas 9 of the 18 Soviet projects are uncompleted. Completion dates for all of the uncompleted projects were determined from the latest available construction schedules. It seems likely, however, that the much higher proportion of uncompleted Soviet projects results in a significantly greater underestimation of time for the sample of Soviet projects than for the sample of US projects.

In contrast to industrial and transportation construction, however, performance at four Soviet projects of the institutional type was considerably better. The actual time for these projects averaged only 4 percent more than planned. If these four Soviet projects of the institutional type are included in the total sample, the actual time for a total of 18 Soviet aid projects averaged only 30 percent more than planned compared with 20 US projects at which actual time averaged 17 percent more than planned.

Finally, it is significant that only 2 of the 18 Soviet projects were completed ahead of schedule, and both of these were of the institutional type. None of the Soviet projects in industrial and transportation construction can be reasonably expected to be completed on or ahead of schedule. On the other hand, 5 of the 20 US projects were completed ahead of schedule (3 thermal electric powerplants, an oil refinery, and a urea fertilizer plant), and 1 was completed on schedule (the section of the East-West Highway from Pitsanulok to Lom Sak in Thailand).

IV. Some Problems in Administration

In the Soviet and US aid programs the type of construction contract concluded with the recipient country reflects a basic difference between administration of Soviet projects and administration of US projects. Both the USSR and the US perform initial project surveys in most cases under a contract separate from that for the construction of the project, but the similarity ends there. In Soviet projects, provision for the important phases of the work is usually incorporated into a single contract. Thus the Soviet contract with Afghanistan for construction of the Kabul airport included design, engineering, supply of construction materials and construction equipment, installation of the airport equipment, technical assistance, and actual construction of all the airport facilities. Although problems in coordination with recipient countries have been encountered at many Soviet projects, resolution of administrative problems is facilitated by the single-contract approach, which concentrates rather than disperses responsibility.

Under the US aid program, multiple construction contracts rather than a single contract are the rule. Thus, for a given US project,

separate contracts may be concluded with various US organizations for design and engineering, for procurement of materials and equipment, and for actual construction of the project. For example, the US construction contractor for the Kandahar airport project in Afghanistan also handled the design of the various facilities except the design of the terminal. The award of the contract for design of the terminal was delayed for some 9 months after Afghanistan had approved construction of the terminal. The designer further delayed construction of the terminal by failing to provide the bill of materials for the engineering estimate until after completion of the runway. The separate contracts thus accounted for a considerable portion of the lag in construction of the Kandahar airport. Separate contracts for procurement of materials and equipment also have hindered US efforts in construction aid. Estimates of time and cost made by a construction contractor can be unrealistic when procurement contracts are awarded to another organization.

The fragmentation of contracting at many of the US projects results in fragmentation of responsibility in the absence of a general contractor charged with all-phase implementation of an aid project. Thus a US construction contractor may have to operate as merely another interested party in working out his problems with one or more engineering-design firms, with other construction contractors, with AID, and with organizations of the recipient country.

The policy on most of the 18 Soviet aid projects examined was to require a heavy commitment in local resources from the recipient country. The effect of this policy is most clearly seen in Indonesia, where the failure of the Indonesians to fulfill local financing obligations has resulted in significant delays in construction at major Soviet aid projects. Construction of a road in southeast Kalimantan in Indonesia, with more than 100 Soviet technicians and considerable quantities of roadbuilding equipment committed to the project, remains incomplete because Indonesia has supplied only one-half of the required local work force. Inadequate local financing of construction work also has forced delays at the fertilizer plant at Tjilatjap in Indonesia and the Salang Pass Road in Afghanistan. An attempt to solve this problem in Afghanistan has been made through a program designed to provide local currency for aid projects through the sale of Soviet commodities on the local market, but this program has remained small and not totally effective. On the other hand, at many of the 20 US projects examined, counterpart funds and those funds provided through PL 480 were used to overcome such problems in local financing.

Other factors accounting for delays at the projects examined include inadequate engineering surveys, inadequate transportation systems within the recipient country, shortages of skilled local labor, and adverse climatic conditions. These factors have affected both the US and the USSR. Their impact can be reduced by careful planning, but they cannot be avoided entirely if construction aid programs are to be carried on in less developed areas.

APPENDIX A

UNPAIRED SOVIET AND US AID PROJECTS

Actual Time as a Percent of Planned Time	Project
	Soviet aid
	Industrial and transportation
	Completed
133	Pul-i-khumri Powerplant, Afghanistan 15/
	Construction was started in February 1959, with completion expected in August 1961. The plant was completed in June 1962, about 10 months behind schedule.
161	Hudaydah Port, Yemen 16/
	Construction was started in October 1958, with completion expected in April 1960. The port was completed in March 1961, about 11 months behind schedule.
	Uncompleted
152	Salang Pass Road, Afghanistan 17/
	Construction was started in May 1959, with completion expected in November 1962. Completion is now officially set for September 1964, about 22 months behind schedule.
123	Heavy Machinery Plant at Ranchi, India 18/
	Construction was started in January 1960, with trial production slated to begin by January 1963 and completion of the first stage scheduled for January 1964. Trial production began during December 1963, and completion is now set for December 1964, about 11 months behind schedule for the first stage.

Actual Time as a Percent of Planned Time	Project
	Soviet aid
	Industrial and transportation
	Uncompleted (Continued)
123	Coal Machinery Plant at Durgapur, India 19/
	Construction was started in January 1960, with trial production slated to begin by January 1963 and completion of the first stage scheduled for January 1964. Trial production began during December 1963, and completion is now set for December 1964, about 11 months behind schedule for the first stage.
150	Southeast Kalimantan Road, Indonesia 20/
	Construction was started in April 1960, with completion expected in April 1964. An official Soviet estimate in March 1963 gave a completion date of April 1966, about 2 years behind schedule.
133	Baghdad-Basrah Railroad Line, Iraq 21/
	Construction was started in January 1961, with completion expected in January 1964. In March 1964, conversion of the rails was reported to be complete but the line was not expected to go into full operation until early 1965, about 1 year behind schedule.
	Institutional
	Completed
115	Burma Institute of Technology, Burma 22/
	Construction was started in October 1957, with completion expected in January 1961. The institute was completed in July 1961, about 6 months behind schedule.

Actual Time as a Percent of Planned Time	Project
	Soviet aid
	Institutional
	Completed (Continued)
103	Khmer-Soviet Friendship Hospital, Cambodia 23/
	Construction was started in January 1958, with completion expected in July 1960. The hospital was completed in August 1960, about 1 month behind schedule.
97	Djakarta Sports Stadium, Indonesia 24/
	Construction was started in November 1959, with completion expected in August 1962. The stadium was completed in July 1962, about 1 month ahead of schedule.
96	Soviet Gift Hospital in Djakarta, Indonesia 25/
	Construction was started in January 1962, with completion expected in January 1964. The hospital was completed in December 1963, about 1 month ahead of schedule.
	US aid
	Industrial and transportation
	Completed
129	Khmer-American Friendship Highway, Cambodia 26/
	Construction was started in January 1957, with completion expected in January 1959. The road was completed in August 1959, about 7 months behind schedule.
128	Delhi Thermal Powerplant, India 27/
	Construction was started in May 1960, with completion expected in January 1963. The plant was completed in October 1963, about 9 months behind schedule.

Actual Time as a Percent of Planned Time	Project
	US aid
	Industrial and transportation
	Completed (Continued)
108	Ballabgarh Tire Plant, India 28/
	Construction was started in July 1960, with completion expected in July 1961. The plant was was completed in August 1961, about 1 month behind schedule.
124	Hindustan Aluminum Plant, India 29/
	Construction was started in March 1960, with completion expected in April 1962. The plant was completed in October 1962, about 6 months behind schedule.
192	Djakarta Bypass Highway, Indonesia 30/
	Construction was started in November 1961, with completion expected in November 1962. The road was completed in October 1963, about 11 months behind schedule.
117	Karnaphuli Dam and Powerplant, Pakistan 31/
	Construction was started in February 1957, with completion expected in August 1961. Work on the project was completed in May 1962, about 9 months behind schedule.
90	Tangin Ri Thermal Powerplant, South Korea 32/
	Construction was started in September 1954, with completion expected in June 1956. The plant was completed in April 1956, about 2 months ahead of schedule.
83	Masan Thermal Powerplant, South Korea 33/
	Construction was started in October 1954, with completion expected in September 1956. The plant was completed in May 1956, about 4 months ahead of schedule.

Actual Time as a Percent of Planned Time	Project
	US aid
	Industrial and transportation
	Completed (Continued)
79	Samchok Thermal Powerplant, South Korea 34/
	Construction was started in March 1955, with completion expected in October 1956. The plant was completed in June 1956, about 4 months ahead of schedule.
210	Chung-Ju Urea Fertilizer Plant, South Korea 35/
	Construction was started in November 1955, with completion expected in May 1958. The plant was completed in February 1961, about 33 months behind schedule.
100	East-West Highway, section from Pitsanulok to Lom Sak, Thailand 36/
	Construction was started in July 1957, with completion expected in December 1960. The road was completed on time.
105	Yanhee Dam and Powerplant, Thailand 37/
	Construction was started in November 1958, with completion expected in August 1963. The project was completed in November 1963, about 3 months behind schedule.
	Uncompleted
110	Eregli Steel Plant, Turkey 38/
	Construction was started in July 1961, with completion expected in January 1965. Completion is now officially set for May 1965, about 4 months behind schedule.

APPENDIX B

SOURCE REFERENCES

1. EIC. EIC-WGR-1/86, Sino-Soviet Bloc Economic Activities in Underdeveloped Areas, 25 May 59. C/
State, Madras. Dsp 179, 23 Nov 60. U.
Ibid., Airgram A-52, 29 Nov 62. OFF USE.
Indian Industries, Apr-May 63, p. 40. U.
2. State, AID. Country Assistance Program: India, Nov 63, p. AC-57. U.
State, Bombay. Dsp 193, 20 Sep 60. C.
3. State, Bombay. Dsp 27, 9 Jul 57. OFF USE.
Ibid., Airgram A-112, 17 Oct 62. OFF USE.
State, New Delhi. Dsp 1274, 23 Apr 58. U.
Ibid., Airgram A-154, 16 Aug 62. U.
4. Engineering News-Record, 1 Dec 55, p. 26. U.
The Times of India, 26 Jan 60, p. 1. U.
Ibid., 20 Jun 58, p. 1. U.
State, Calcutta. Dsp 147, 28 Oct 57. OFF USE.
5. State, Kabul. Airgram A-38, 17 Aug 62. OFF USE.
Ibid., T-1048, 17 Jun 59. C.
CIA. CS, 14 Jun 62. S/
CIA. CS, 24 Feb 60. S/
CIA. CS, 23 Mar 64. S/
6. State, AID. Country Assistance Program: Afghanistan, Oct 63, p. 6-24. U.
State, Kabul. Airgram A-260, 2 Jan 63. S.
Ibid., Dsp 38, 29 Aug 61. U.
7. FBIS. Daily Report (Middle East, Africa and West Europe), 19 Nov 62, p. P-1. OFF USE.
JPRS. 8858, 12 Sep 61. U.
CIA. CS, 30 Jan 61. S/
State, Kabul. Dsp 80, 29 Jul 59. OFF USE.
8. State, Kabul. Dsp 9511, 17 Jan 58. C.
Ibid., Airgram A-102, 2 Dec 61. U.
Ibid., Airgram A-221, 7 Dec 62. U.
Ibid., T-15,414, 27 Dec 57. C.
9. CIA. CS, 24 Mar 64. C.
State, Djakarta. Airgram A-636, 15 Jan 64. C.

10. State, Djakarta. Dsp 350, 3 Mar 61. OFF USE.
EM-Kayan, Nov 63, p. 3. U.
11. State, New Delhi. Dsp 1308, 29 Jun 61. U.
The Eastern Economist, 20 Jan 61, p. 350. U.
Far Eastern Economic Review, 18 Jul 63, p. 183. U.
FBIS. Daily Report (Middle East, Africa and West Europe), 2 Jan 62, p. 3. OFF USE.
CIA. OO, 31 Oct 62. C/

[p. 22 blank]

12. State, Seoul. Airgram A-883, 29 Apr 64. U.
South Korea, Ulsan Development Planning Authority. Ulsan Industrial Area in Prospect, 15 May 62, p. 14-15. U.

13. CIA. CS, 22 Mar 60. S/
Soviet News, 15 Aug 60, p. 131. U.
State, Kabul. Airgram A-399, 14 Mar 64. C.
Ibid., Dsp 178, 2 Apr 62. OFF USE.
CIA. CS, 23 Mar 64. S/
14. Engineering News-Record, 19 Dec 57, p. 56. U.
State, Tehran. Airgram A-19, 14 Jul 60. C.
Ibid., Airgram A-704, 5 May 60. C.
CIA. OO, 30 Mar 61. C.
CIA. OO, 28 Mar 62. C.
15. FBIS. Daily Report (USSR and East Europe), 8 Jan 63, p. BB 45. OFF USE.
CIA. CS, 26 Jan 59. S/
16. Middle East Business Digest, 16 Apr 61. U.
CIA. CS, 15 Jun 59. S.
17. State, Kabul. Airgram A-188, 13 Oct 63. C.
CIA. CS, 1 Apr 59. S/

18. State, Calcutta. Dsp 519, 3 Feb 60. OFF USE.
Ibid., Dsp 480, 19 Jan 60. U.
State, New Delhi. Airgram A-457, 29 Nov 63. OFF USE.
19. Ibid.
20. State, Djakarta. Dsp 577, 6 Jan 60. C.

21. Gt Brit, BBC. Summary of World Broadcasts, series no 543, 19 Jan 61. U.

JPRS. 23,878, 26 Mar 64, p. 11. U.
State, Baghdad. Dsp 508, 25 Oct 60. U.
22. State, Rangoon. Dsp 46, 25 Jul 61. OFF USE.
Ibid., Dsp 242, 22 Oct 59. S.
23. JPRS. 6708, 9 Feb 61. OFF USE.
24. Army, 500th Intelligence Corps. 9664160, 3 Jan 62. OFF USE.
State, Djakarta. Airgram A-521, 16 Nov 62. S.
25. Pravda, 16 Nov 63, p. 3. U.
Army, Djakarta. ID 2190937, 3 Jan 62. U.
26. Engineering News-Record, 29 Jun 61, p. 20. U.
27. State, AID. Country Assistance Program: India, Nov 63, p. AC-35. U.
State, New Delhi. Airgram A-115, 13 Jul 62. U.
28. State, New Delhi. Dsp 465, 17 Nov 60. OFF USE.
Ibid., Dsp 389, 24 Nov 61. U.
29. CIA. OO, 8 Jul 60. C.
CIA. OO, 1 Nov 62. C.

30. EM-Kayan, Oct 63. U.
CIA. OO, 26 Sep 63. C.
Brown Engineers. Reconnaissance Report: Djakarta By-Pass Highway, New York, Oct 59. U.
31. CIA. OO, 20 Jul 62. C.
Air, Karachi. 1148518, 19 Nov 57. U.
State, Dacca. Dsp 80, 28 Aug 59. OFF USE.
32. CIA. OO, 10 Feb 55. C.
Pacific Bechtel Corporation. Steam Power Plants for the Republic of Korea, San Francisco, Feb 57. U.
33. Ibid.
34. Ibid.
35. Air, Fifth Air Force. Fifth Air Force General Intelligence Selected Topics, no 60-55, 7 Nov 55. U.
F.H. McGraw & Co. and Hydrocarbon Research, Inc. Final Report, Engineering and Construction Contract, Urea Fertilizer Plant at Chung-ju, Korea, New York, Feb 61. U.
36. Sverdrup and Parcel Engineering Co. Thailand Road Program, East-West Highway Project, Final Report, Bangkok, Thailand, and St. Louis, Missouri, 14 Feb 61. U.
CIA. OO. 6 Apr 59. S.
37.
Water Power, Sep 60, p. 354. U.
38. State, Ankara. Airgram A-314, 15 Oct 63. OFF USE.
Ibid., Airgram A-304, 6 Oct 61. U.