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COMPARATIVE LEVELS OF LABOR PRODUCTIVITY IN THE US AND THE USSR 1951

CIA/RR PR-88

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COMPARATIVE LEVELS OF LABOR PRODUCTIVITY IN THE US AND THE USSR*
1951

Summary

For those industries for which comparisons could be made, increases in productivity since 1939 have been somewhat more rapid in the US than in the USSR. The depressing effects of World War II on Soviet productivity account to some extent for the lower Soviet rate. In both the US and the USSR the rates of change in productivity have been wide in range. The greatest increases in the USSR have been in those industries where investment was concentrated.

In the mining industries, the considerable Soviet lag behind US productivity levels results, to a large extent, from natural factors which cannot easily be overcome.

In the producer goods industries, where the rate of investment has been high, Soviet data indicate rapid advances toward US levels, although few direct comparisons could be made.

In consumer goods industries, the greater lag in Soviet productivity could be overcome in a relatively short period of time with investment in more productive equipment.

I. Introduction.

This report undertakes to compare the levels of productivity in those US and Soviet industries for which information could be obtained. It should be noted that for several reasons the estimates

* The estimates and conclusions contained in this report represent the best judgment of the responsible analyst as of 15 September 1954.

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for the USSR and the US are not strictly comparable.

The US man-year is approximately 2,000 hours, the Soviet man-year approximately 2,400 hours. Although "production workers" are nearly the same categories in both countries, the data are not detailed enough to permit determination of the degree of difference. If it is true that the USSR is still overstaffed with nonproduction workers compared with the US, "all workers" would be a more revealing basis for comparison, but current Soviet data are lacking for this. In any event, there has been a significant increase in the proportion of nonproduction personnel in many US industries.

On a man-year basis, the above factors tend to make the 1951 comparison appear more favorable to the USSR. To the extent that no increase was assumed between the 1937 output-per-worker figures and the 1940 base of the indexes used for projection, the Soviet current output-per-worker estimates are understatements.

Those industries in which the USSR claims that is has made the greatest strides in increasing productivity cannot be presented for comparison. US data for steel works cannot be separated from data for rolling mills which would be necessary to match Soviet categories. In the metal-fabricating and machinery industries, either Soviet data or US data are not available, or estimates can be made only in monetary terms, the comparability of which is most uncertain.

The date of information used was determined by availability. Discrepancies from lack of comparability in dates are not believed to be large.

II. Comparative Levels of Labor Productivity in the US and the USSR in the Prewar Period.

By 1937, the USSR had made considerable advances in labor productivity, but output per worker still lagged far behind levels attained in the US. Soviet output per worker as a percent of US output per worker is shown in Table 1.*

* Table 1 follows on p. 3.

Table 1

Relative Labor Productivity in Individual Industries in the US and the USSR 1/*
Selected Years, 1936-39

Industry	Unit of Measure	Years	USSR as a Percent of US
Coal Mining	Metric tons per year per wage earner	USSR 1937 US 1936	38.8
Petroleum and Gas Extraction	Metric tons per year per wage earner	USSR 1938 US 1937	50.6
Iron Ore Mining	Metric tons per year per wage earner	1937	25.8
Iron and Steel	Metric tons of pig iron per year per wage earner	1937	46.7
Machinery	Annual value per wage earner	1936	55.7
Chemicals	Metric tons of sulfuric acid per wage earner per year	1937	40.0
Cotton Textiles	Metric tons of yarn per wage earner per year	USSR 1939 US 1937	48.6
	Meters of cloth per wage earner per year	USSR 1939 US 1937	38.0

It will be observed that the relatively new, high-investment machinery industry was closest to US levels. From 1928 to 1937, those Soviet industries which had the greatest increases in equipment per worker showed the greatest increases in labor productivity.2/

* Footnote references in arabic numerals are to sources listed in Appendix B.

In the period since 1937-39, the rates of change in productivity levels have been wide in both countries. Selected rates of increase are shown in Table 2. Because of changes in Soviet statistical practices as well as in Soviet boundaries, a continuous series including the years 1937 through 1939 could not be constructed. In those industries for which indexes for both countries were available, the rates of increase were generally more rapid in the US than in the USSR. The primary exception was pig iron smelting.

Table 2

Comparison of Indexes of Labor Productivity
in the US and USSR
1950

Industry	US Output per Man-Year 1939 = 100	Soviet Output per Man-Year 3/ 1940 = 100
Coal Mining		98.2
Bituminous	123.3 a/ 4/	
Anthracite	87.2 a/ 5/	
Pig Iron Smelting	92.0 b/ c/ 6/	149.0
Crude Petroleum and Natural Gasoline	173.0 b/ c/ 7/	103.6
Railroad Transportation	149.9 a/ 8/	

a. Per man-hour.
b. Per man-year.
c. 1951.

Although the effects of World War II retarded improvement in the Soviet extractive industries and in transportation, this may not have been true of various branches of heavy manufacturing. Some of the productivity increases attained under wartime pressure in Soviet engineering industries probably were maintained and contributed to the rapidity with which prewar levels of productivity in the machine

industry as a whole were regained and surpassed in the postwar period. 9/

In the exception noted above, pig iron smelting, much of the productivity increase resulted from the installation of more productive equipment to replace that damaged by the war. Similar improvements were probably made in other war-damaged installations, with consequent increments in productivity.

III. Comparative Levels of Labor Productivity in the US and the USSR in 1951.*

In those economic sectors for which estimates of output per worker could be made in terms of physical units, Soviet productivity in 1951 ranged from about 15 to about 73 percent of US productivity levels. Comparisons of output per worker in the US and the USSR in 1951 are shown in Table 3.** Those industries for which reasonably valid and comparable estimates could not be made, especially the metal-fabricating and machinery industries, are those in which the USSR has probably made the greatest productivity advances, and would probably be closer to US levels.

The factors which condition the sizable variation of Soviet levels of labor productivity compared with US levels are described in general terms in the following sections of this report. Available information does not permit more precise evaluation of the relative influence of the various factors. In the mining industries, where Soviet productivity in relatively low, the nature of the resources exerts considerable limitations on the possibility of increase in productivity. In most other sectors of the Soviet economy, the level of productivity as well as the increases in productivity appear to be conditioned primarily by technology and investment. It will be observed that the industry in which Soviet productivity is lowest in comparison with the US level is the textile industry, in which the rate of investment has been relatively low. In 1951, productivity in Soviet industries varied from US levels in much the same pattern as in 1937-39.

* 1951 is the latest year for which US information was available.
** Table 3 follows on p. 6.

Table 3

Comparison of Output per Worker in the US and USSR
1951

Industry	USSR	US	USSR as Percent of US a/
Coal Mining, Metric Tons per Annum b/	323.0 10/ 371.9 12/	1,297.8 11/	25 28
Petroleum Extraction, per Annum Metric Tons of Crude Oil per Annum	820.0 13/	2,504.7 14/	33
Iron Ore Mining, Metric Tons per Annum	1,000.0 15/	2,920.3 16/	34
Blast Furnaces, Metric Tons per Annum	1,217.0 17/	1,674.9 18/	73
Cotton Textiles Spinning, Kilograms per Hour Weaving, Meters per hour	2.36 19/ 11.4 21/	15.38 20/ 62.4 22/	15 18
Logging, Cubic Meters Hauled per Day	1.03 23/	2.36 24/	42
Rail Transportation Thousand Cumulative Ton-Kilometers per Annum (1953)	473.0 25/	948.1 26/	50

a. Rounded.
b. CIA estimate is 323.0; RAND estimate, 371.9.

A. Coal Mining.

Output per worker in Soviet coal mining in 1951 was 323 or 371.9 metric tons, or only about 25 to 28 percent of that in the US.

Much of the difference between US and Soviet productivity

in coal mining results from natural factors. The thin seams and deep shafts of Soviet mines and the lower proportion of strip mining in the USSR limit the possibilities of mechanization and therefore limit Soviet productivity. Nevertheless, increases above present Soviet levels of productivity can be made through improved mechanization and technology. 27/

B. Petroleum Extraction.

Output per worker in the Soviet petroleum extraction industry in 1951 was about 820 metric tons of crude oil extracted, or 33 percent of the US level.

Natural factors, such as the depth of wells, are generally more favorable in the USSR. Soviet drilling technology is good, but there may be much idle time. Another reason for the disparity between Soviet and US productivity is the high degree of mechanization and automatization of operations in the production and field gathering phases of the petroleum industry in the US. 28/ Better management practices may also be a factor.

C. Iron Ore Mining.

Output per worker in Soviet iron-ore mining is little more than one-third that in the US, or about 1,000 metric tons per year. The difference results from the operation of several factors. Only about 30 percent of Soviet iron ore comes from open-pit mines, compared with about 65 percent of US output. Open pits lend themselves to a greater degree of mechanization, and their productivity is usually several times higher than that of underground mines. Increases in Soviet productivity in terms of usable ore are also limited by decreasing yields of usable ore from crude. 29/

It has been estimated that these natural factors cause Soviet productivity to lag 30 percent behind that of the US. 30/ The remainder of the Soviet lag behind US levels results from differences in technology and the utilization of equipment.

D. Blast Furnace Operations.

Output per worker in 1951 in Soviet blast furnaces was 73 percent of the US level of productivity, or 1,217 metric tons per year.

This level is above previous Soviet attainments and has resulted largely from investment in high-productivity equipment, especially since World War II. It has been estimated that the productivity of modern Soviet blast furnaces is comparable to that of US operating equipment, but that Soviet staffing patterns result in lower output per worker. 31/

E. Timber Industry.

Soviet output per worker in logging camps is approximately 1 cubic meter per day, or about 42 percent of that in the US. Much of this difference results from low levels of mechanization and the utilization of equipment. Further important reasons for the relatively low Soviet level of output are the isolation and the adverse climate of Soviet logging areas, both of which cause transportation and labor problems. 32/

F. Cotton Textile Manufacturing.

The output per worker in the Soviet textile industry is considerably below that in the US textile industry. In spinning, Soviet productivity was in 1951 about 2.36 kilograms per hour, or 15 percent of the US level; and in weaving, 11.4 meters per hour, or about 18 percent of the US level.

This lag in Soviet productivity is largely the result of technological differences which can be overcome. The number of spindles per spinner in the USSR approximates 170, while in the US, the number ranges from 6 to 18 times as high. 33/ In weaving, in the USSR, each weaver handles about 3 looms, while in the US weavers average from 17 to 100 looms each. 34/

It is clear that conversion in the Soviet textile industry to power equipment of a higher productivity could contribute to a considerable increase in output per worker.

G. Metal-Fabricating and Machinery Industries.

The information available on this sector of Soviet industry is not sufficient to permit detailed comparisons with US levels of productivity. The productivity indexes available for both countries,

as shown in Table 4 and Table 5, however, suggest that the USSR is making rapid advances toward US levels. Other information on the output and techniques of individual Soviet plants also indicates increasing productivity. 35/

Table 4

Indexes of Output per Man-Hour of Direct Labor in the US, Selected Types of Equipment and Selected Years 1947-50

Types of Equipment	Year	Index 1939 = 100
General Industrial Equipment	1950	134.9 36/
Including:		
Ball Bearings	1950	200.4 37/
Lift Trucks	1950	238.6 38/
Freight Cars	1948	115.9 39/
Metal-Forming Machinery	1949	112.2 40/
Electrical Equipment and Supplies	1947	126.4 41/
Machine Tools	1950	109.7 42/

Table 5*

Indexes of Annual Output per Worker in the USSR a/ 43/ 1950 and 1953

Types of Equipment	Year	Index 1940 = 100
Ministry of Machine and Instrument Construction	1950	188.8
	1953	255.6
Antifriction Bearings	1950	170.7
Automotive and Tractor Industry	1950	145.0
Oil Machinery Production	1950	200.0
Transportation Equipment	1950	200.0 b/

* Footnotes for Table 5 follow on p. 10.

Table 5

Indexes of Annual Output per Worker in the USSR a/ 43/
1950 and 1953

a. The indexes of annual output per worker in the USSR for the metal-fabricating and machinery industries were developed on the assumption that Soviet productivity in 1950 and 1953 was still only 66 percent of US levels of 1947.
b. Planned, probably not achieved.

H. Railroad Transportation.

Soviet output per worker in rail transport in terms of cumulative revenue ton-kilometers is about 50 percent of that in the US, or about 473 thousand ton-kilometers per year.

The differential is almost, if not entirely, the result of the much greater degree of mechanization of antomatization of transport in the US, as well as better traffic control.

Kaganovich pointed out in his recent speech that dispatch centralization would make it possible to establish control from a single center over an area of 150 or more kilometers, and thereby reduce the operations staff by 50 percent. 44/

The difference in the average net weight of freight trains also contributes to the gap between Soviet and US levels of productivity.

APPENDIX A

GAPS IN INTELLIGENCE

Information is lacking for comparison of labor productivity in the Soviet chemicals industry, consumer goods industries other than cotton textiles, nonferrous metallurgy, transportation, and construction.

More detailed analysis of changes in US productivity in relation to changes in technology and equipment would make it easier to estimate the changes which might have occurred in Soviet productivity in response to similar changes in equipment and technology.

APPENDIX B

SOURCES AND EVALUATION OF SOURCES

1. Evaluation of Sources.

The primary sources of information on the USSR were Soviet publications and broadcasts. Information concerning factors affecting productivity was found conveniently summarized in various CIA and other US Government publications. Soviet Economic Growth, edited by A. Bergson, and containing a very useful chapter by Walter Galenson ("Industrial Labor Productivity"), was also valuable. Galenson's later work, A Comparison of Labor Productivity in Soviet and American Industry, published under the auspices of RAND in January 1954, contains detailed breakdowns of Soviet productivity data for the period from 1928 through 1939.

Information on US output per worker was taken primarily from US government publications.

2. Sources.

Evaluations, following the classification entry and designated "Eval.," have the following significance:

Source of Information	Information
Doc. - Documentary	1 - Confirmed by other sources
A - Completely reliable	2 - Probably true
B - Usually reliable	3 - Possibly true
C - Fairly reliable	4 - Doubtful
D - Not usually reliable	5 - Probably false
E - Not reliable	6 - Cannot be judged
F - Cannot be judged	

"Documentary" refers to original documents of foreign governments and organizations; copies or translations of such documents by a staff officer; or information extracted from such documents by a staff officer, all of which may carry the field evaluation "Documentary."

Evaluations not otherwise designated are those appearing on the cited document; those designated "RR" are by the author of this report. No "RR" evaluation is given when the author agrees with the evaluation on the cited document.

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