

~~SECRET~~

Nº 159

ECONOMIC INTELLIGENCE REPORT

GROWTH OF TRANSPORTATION IN THE USSR  
1948-56 AND PROSPECTS THROUGH 1961



CIA/RR 89

25 February 1957

CENTRAL INTELLIGENCE AGENCY

OFFICE OF RESEARCH AND REPORTS

~~SECRET~~

**W A R N I N G**

This material contains information affecting the National Defense of the United States within the meaning of the espionage laws, Title 18, USC, Secs. 793 and 794, the transmission or revelation of which in any manner to an unauthorized person is prohibited by law.

S-E-C-R-E-T

ECONOMIC INTELLIGENCE REPORT

GROWTH OF TRANSPORTATION IN THE USSR  
1948-56 AND PROSPECTS THROUGH 1961

CIA/RR 89

(ORR Project 43.760)

CENTRAL INTELLIGENCE AGENCY

Office of Research and Reports

S-E-C-R-E-T

S-E-C-R-E-T

FOREWORD

The purpose of this report is to analyze and evaluate the performance of various branches of the transport sector of the Soviet economy from 1948 to 1956 and to investigate some of the forces which have been responsible for the annual and long-term rates of growth. A yardstick was developed for measuring the levels of efficiency attained by the various carriers, and a preliminary exploration of the relationships existing between industrial output and freight ton-kilometers was undertaken. Finally, an investigation was made into the volume of investment and the effectiveness with which transport capital has been utilized.

During the first half of 1956 the USSR released more transport statistics than at any time since before World War II. Absolute values, which so far have withstood checks for consistency, have continued to be announced almost daily, and it is no longer necessary to depend on vague percentage announcements for many of the performance and operating estimates. This report is being published during a transitional period in Soviet policy; consequently, many of the estimates contained in it may be refined as more data are released. This situation is particularly true in the field of investment, where data are limited in quantity and subject to misinterpretation.

This report has been coordinated within ORR but not with other IAC agencies.

- iii -

S-E-C-R-E-T

S-E-C-R-E-T

CONTENTS

	<u>Page</u>
Summary and Conclusions . . . . .	1
I. Introduction . . . . .	3
II. Transport Network . . . . .	5
A. Railroads . . . . .	6
B. Highways . . . . .	10
C. Inland Waterways . . . . .	12
D. Maritime Service . . . . .	13
E. Civil Aviation . . . . .	15
III. Performance . . . . .	17
A. Freight Traffic . . . . .	24
1. Railroads . . . . .	24
2. Highways . . . . .	25
3. Inland Waterways . . . . .	27
4. Maritime Service . . . . .	28
5. Civil Aviation . . . . .	30
B. Regional Distribution of Freight Traffic . . . . .	31
C. Passenger Traffic . . . . .	32
1. Railroads . . . . .	32
2. Highways . . . . .	34
3. Inland Waterways . . . . .	34
4. Maritime Service . . . . .	35
5. Civil Aviation . . . . .	35
IV. Levels of Operating Efficiency and Labor Productivity . .	36
A. Operating Efficiency . . . . .	36
1. Railroads . . . . .	37
2. Highways . . . . .	40

S-E-C-R-E-T

	<u>Page</u>
3. Inland Waterways . . . . .	41
4. Maritime Service . . . . .	44
5. Civil Aviation . . . . .	46
B. Employment and Labor Productivity . . . . .	47
V. Demand for Transport Services . . . . .	50
A. Total National Requirements . . . . .	50
B. Per Capita Volume of Transport . . . . .	57
VI. Transport Investment and Capital-Output Ratios . . . . .	59
A. Sources of Transport Investment and Working Capital . . . . .	59
B. Capital Investment . . . . .	61
C. Trends in Fixed Assets . . . . .	62
D. Capital-Output Ratios . . . . .	63

Appendixes

Appendix A. Methodology . . . . .	71
-----------------------------------	----



50X1

Tables

1. Estimated Distribution of Freight Traffic in the USSR, by Type of Carrier, 1950, 1955, and 1961 . . . . .	2
2. Rail Construction Scheduled for the Sixth Five Year Plan in the USSR, 1956-60 . . . . .	9
3. Estimated Ton-Kilometer Performance of Transport in the USSR, by Type of Carrier, 1948-61 . . . . .	18

## S-E-C-R-E-T

	<u>Page</u>
4. Estimated Passenger-Kilometer Performance of Transport in the USSR, by Type of Carrier, 1948-61 . . . . .	21
5. Ton-Kilometer Performance of Transport in the US, by Type of Carrier, 1948-55 . . . . .	23
6. Estimated Distribution of Tons-Originated and Ton-Kilometers of Rail Freight Traffic in the USSR, by Commodity, 1955 . . . . .	26
7. Estimated Distribution of Tons-Originated of Maritime Freight Traffic in the USSR, by Commodity, 1950 . . . . .	29
8. Estimated Distribution of Ton-Kilometers on Railroads and Inland Waterways in the USSR, by Region, 1954 . . . . .	33
9. Selected Measures of Operating Efficiency for Railroads in the USSR, Selected Years, 1939-55 . . . . .	39
10. Estimated Performance of Motor Trucks in the USSR, Selected Years, 1939-55 . . . . .	41
11. Estimated Performance of Inland Waterways in the USSR, Selected Years, 1940-55 . . . . .	43
12. Estimated Index of Performance of the Maritime Service in the USSR, Selected Years, 1940-55 . . . . .	45
13. Estimated Number of Employees in the Transport Sector in the USSR, 1948-55 . . . . .	48
14. Index of Growth Patterns of Employment, Traffic, and Labor Productivity in the Transport Sector in the USSR, 1948-55 . . . . .	48
15. Labor Productivity of Railroads in the USSR, Selected Years, 1928-55 . . . . .	49

## S-E-C-R-E-T

	<u>Page</u>
16. Indexes of Industrial Production and of Aggregate Freight Ton-Kilometers in the USSR, 1928-40, 1948-55, and 1960 . . . . .	52
17. Estimated Rate of Growth of Freight Traffic and of Length of Rail Freight Haul in the USSR, 1949-55 . . . . .	55
18. Estimated Per Capita Volume of Freight and Passenger Transport in the USSR, by Type of Carrier, 1950, 1955, and 1961 . . . . .	58
19. Estimated Budget and Nonbudget Allocations for Transport and Communications in the USSR, 1948-56 . . . . .	60
20. Estimated Outlays for Capital Investment in Transport and Communications in the USSR, 1948-56 . . . . .	62
21. Estimated Fixed Assets, Investment, Output, and Capital-Output Ratios for Railroads in the USSR, 1924-40 and 1945-55 . . . . .	64

Illustrations

	<u>Following Page</u>
Figure 1. USSR: New Lands Transportation System, 1956 (Map) . . . . .	6
Figure 2. USSR: Railroad Systems, 1956 (Map) . . . . .	Inside Back Cover
Figure 3. USSR: Principal Road Network, 1955 (Map) . . . . .	10

- viii -

S-E-C-R-E-T



S-E-C-R-E-T

Following Page

Figure 4.	USSR: Principal Inland Waterways, 1956 (Map) . . . . .	12
Figure 5.	USSR: Scheduled Civil Air Routes, Winter 1954-55 (Map) . . . . .	Inside Back Cover
Figure 6.	USSR: Indexes of Industrial Production and Aggregate Freight Ton-Kilometers, 1928-40, 1948-55, and 1960 (Chart) . . .	52
Figure 7.	USSR: Fixed Assets and Output of Railroads, 1924-40 and 1945-52 (Chart) .	66
Figure 8.	USSR: Capital-Output Ratio of Railroads, 1924-40 and 1945-52 (Chart) . . . . .	68
Figure 9.	USSR: Annual Investment and Output of Railroads, 1924-40 and 1945-55 (Chart) . . . . .	68

S-E-C-R-E-T

CIA/RR 89  
(ORR Project 43.760)

GROWTH OF TRANSPORTATION IN THE USSR  
1948-56 AND PROSPECTS THROUGH 1961\*

Summary and Conclusions

By 1948 the transportation system of the USSR had recovered from the devastation of World War II and was ready to embark upon an expansion program consistent with the needs of the growing economy. Since 1948, most branches of the transport sector have experienced high annual growth rates; however, the railroads, with their high percentage of the traffic load, are primarily responsible for the over-all success of the sector.

The physical expansion of the transport network, although not static by any means, is not receiving the emphasis given to factors which directly influence the volume of the transport product. A greater concentration of effort and expenditure is currently being placed upon better maintenance of existing facilities and upon efforts to improve operating efficiency. Planned programs for physical expansion of the network are generally confined to the "new lands" (northern Kazakhstan and adjacent areas) and other outlying or marginal areas.

In 1955 the transportation system of the USSR hauled approximately 1,184 billion ton-kilometers (tkm) (excluding pipelines), compared with only 550 billion tkm in 1948. Total passenger-kilometers jumped from 82 billion in 1948 to more than 170 billion in 1955. By 1961 it is estimated that the economy will require approximately 1,897 billion tkm and 305 billion passenger-kilometers. The estimated distribution of freight traffic in the USSR, by type of carrier, in 1950, 1955, and 1961 is shown in Table 1.\*\*

The transport sector has supported rapid advances in Soviet economic growth and, except for temporary dislocations, has not inhibited the industrial and agricultural growth of the economy. The transport plan and statements by transport officials indicate, however, that planned

---

\* The estimates and conclusions contained in this report represent the best judgment of ORR as of 15 November 1956.

\*\* Table 1 follows on p. 2.

S-E-C-R-E-T

## S-E-C-R-E-T

economic growth in all sectors of the economy during the Sixth Five Year Plan (1956-60) will require a substantial rate of growth in the transport sector. Although there has been some talk of strain and bottlenecks in recent years, it is estimated that planned investments will be sufficient to enable transport to keep pace with growing traffic demands.

Table 1

Estimated Distribution of Freight Traffic in the USSR  
by Type of Carrier a/  
1950, 1955, and 1961

<u>Percent of Total Freight Ton-Kilometers</u>			
<u>Type of Carrier</u>	<u>1950</u>	<u>1955</u>	<u>1961</u>
Railroads	85.2	84.9	80.1
Highways	2.8	3.5	4.8
Inland waterways	6.4	5.7	6.9
Maritime service <u>b/</u>	5.5	5.8	8.1
Other <u>c/</u>	0.1	0.1	0.1
Total	<u>100.0</u>	<u>100.0</u>	<u>100.0</u>

a. Excluding pipelines and animal and human carriage.

b. Including Caspian Sea, domestic, and international traffic in Soviet-flag vessels.

c. Including civil aviation and the statistical errors caused by rounding the percentages for the four principal carriers.

Soviet transport made great progress in operating efficiency in 1948-56. The railroads, for example, almost doubled their gross ton-kilometers per freight-train hour during that time. In terms of ton-kilometer performance per unit of transport capacity, maritime shipping increased about 67 percent in 1948-56, and highway transport increased about 21 percent. Inland waterways during the same period recorded a substantial loss. In the field of labor productivity the index for total transport increased from a base of 100 in 1948 to 165 in 1955.

## S-E-C-R-E-T

In all branches of the Soviet transport sector, investment inputs have been maintained at a low level by squeezing the maximum output from existing plant and equipment, with minimum additions to both. It now appears that Soviet transport has reached a near-maximum operating efficiency within existing technology and that in the near future large-scale additions to plant and equipment will have to be made, particularly to railroads. An analysis of the Sixth Five Year Plan indicates that transport officials are aware of this situation. The Plan provides for large-scale capital equipment inputs in the form of diesel and electric motive power, extensive double tracking and electrification, and an increase in automatic block signaling and centralized traffic control, all of which will greatly increase the traffic capacity of the rail lines. Comparable investments are planned for the other carriers.

The possibility of a traffic crisis in the transport sector like that of the early 1930's seems remote. The Sixth Five Year Plan appears to provide for adequate additional traffic capacity. Any substantial decrease in the relative role of the transport sector also seems remote. Soviet objectives would, however, be furthered if a reduction in the amount of transportation per unit of industrial and agricultural output could be effected. In spite of these objectives, the USSR has failed to reduce transportation's share of total Soviet investment -- principally because of a failure to reduce the average length of haul.

---

I. Introduction.

Major factors which have shaped the transport policy of the USSR include the following: (1) A large part of the USSR is relatively flat plain offering few serious obstacles to the building of railroads. (2) Most inland waterways are frozen and unusable from 3 to 9 months of the year, and many of the navigable rivers flow through sparsely populated areas or into the Arctic Zone, which is frozen for the greater part of the year. Railroads, on the other hand, can be built where needed and can be operated in most climates. (3) Because the bulk of intercity traffic is carried by railroads, there has been little need for paved highways other than those of local importance. (4) The bulk of the population and resources is located inland; hence coastal maritime traffic is of minor significance except in the Far North and the Soviet Far East. Air transport operations, although an insignificant

## S-E-C-R-E-T

part of total transport, are important because they can speed key personnel and high-priority cargo to areas where no other form of transport is available.

The uneven distribution of population and resources has created a transport pattern that can be worked out at least expense by large-volume land transport capable of performing fast, efficient carriage throughout the year. The railroads can therefore be expected to perform the greater share of transport services in the USSR, which is one of the leading railroad powers of the world. Stalin said in 1935: "The USSR as a country would be impossible without first-class railroad transport to bind its numerous oblasts and regions into one unified whole. In this lies the great significance of railroad transportation to the USSR." 1/\* The Soviet railroad system provides dependable and economical communications between the industrial areas and the sources of raw materials in the country; the rail lines are currently penetrating new regions and are making available new and greater resources.

The primary function of motor transport is the movement of freight to and from rail stations and water depots. It also carries a considerable volume of local freight traffic, mostly intracity and short-haul carriage for the industrial and agricultural ministries. Some long-haul traffic is carried by motor vehicles, but generally such movements are confined to remote areas which are served by no other means of transport.

The USSR also has an enormous network of inland waterways, surpassing the railroads in length by some 11,000 route-kilometers. The greatest hindrance to water transport is that navigation is interrupted for several months each year by freezing. Furthermore, it is limited to the natural flow of rivers and the natural distribution of lakes and inland seas. Some of these drawbacks have been corrected, however, by the construction of many canals and canalized routes, noteworthy among which are the Volga-Don Canal, the Moscow-Volga Canal, and the Mariinskiy Canal system. These and other projects have given the European USSR a well-unified water system, linking the White, Baltic, Black, Caspian, and Azov Seas. In spite of ambitious plans for the eastern part of the USSR, little has actually been done to improve inland water transport in that area.



50X1

- 4 -

S-E-C-R-E-T

S-E-C-R-E-T

III. Performance.

In 1955 the transport sector of the Soviet economy produced approximately 1,184 billion tkm of freight haulage (excluding pipelines) and about 170 billion passenger-kilometers (including urban transit). The corresponding volumes for 1948 were about 550 billion tkm and about 82 billion passenger-kilometers. If pipeline movements and auxiliary traffic such as rail, highway, and water transport supply movements (company freight) are disregarded, these amounts can be said to represent the total national requirements for transport. The estimated ton-kilometer performance of transport in the USSR, by type of carrier, in 1948-61 is shown in Table 3\* and the estimated passenger-kilometer performance of transport in the USSR, by type of carrier, in 1948-61 is shown in Table 4.\*\*

To the extent that US experience affords an appropriate standard, the relative volume of Soviet transport cannot be considered large. The ton-kilometer performance of transport in the US, by type of carrier, in 1948-55 is shown in Table 5.\*\*\* The USSR has been able to run its economy with relatively less transport than has been required by the US at similar stages of economic development. At the same time, Soviet planners have generally regarded the amount of transport services demanded by the economy as excessive. Recently, however, Party leaders have recognized the need for a well-coordinated transportation system, consistent with the needs of the growing Soviet economy. Kaganovich stated at the XXth Party Congress that "The growth of the national economy of our country, the increased mighty development of heavy industry, the carrying out of important measures adopted by the Party and the government for the raising of agriculture, the increase in the production of consumer goods, and the entire upsurge in socialist economy are indissolubly connected with and depend to a considerable extent on a new upsurge in transport." 46/ \*\*\*\*

---

\* Table 3 follows on p. 18.

\*\* Table 4 follows on p. 21.

\*\*\* Table 5 follows on p. 23. Caution should be used in comparing Tables 3, 4, and 5 for the following reasons: US statistics exclude Maritime Service. Pipelines in the US account for 16 percent of total freight ton-kilometers in 1954, but pipelines in the USSR account for only 1.2 percent of the total. US highway statistics exclude intracity traffic, but Soviet statistics include both intercity and intracity traffic. Private haulage and travel, which are virtually nonexistent in the USSR, are increasing in the US.

\*\*\*\* Continued on p. 23.

S-E-C-R-E-T

Table 3  
Estimated Ton-Kilometer Performance of Transport in the USSR  
by Type of Carrier  
1948-61

Year	Railroads <sup>a/</sup>		Highways <sup>b/</sup>	Inland Waterways <sup>c/</sup>	Maritime Service <sup>d/</sup>	Civil Aviation <sup>e/</sup>	Total <sup>f/</sup>
	Tariff	Operating					
1948	450 <sup>g/</sup>	468 <sup>h/</sup>	13.6 <sup>i/</sup>	34.1 <sup>j/</sup>	34.5 <sup>k/</sup>	0.052 <sup>l/</sup>	550
1949	528 <sup>g/</sup>	541 <sup>h/</sup>	17.4 <sup>i/</sup>	41.2 <sup>j/</sup>	37.3 <sup>k/</sup>	0.065 <sup>l/</sup>	637
1950	602 <sup>g/</sup>	612 <sup>h/</sup>	20.1 <sup>i/</sup>	45.9 <sup>j/</sup>	39.7 <sup>k/</sup>	0.159 <sup>l/</sup>	718
1951	677 <sup>g/</sup>	685 <sup>h/</sup>	22.5 <sup>i/</sup>	51.0 <sup>j/</sup>	40.4 <sup>k/</sup>	0.190 <sup>l/</sup>	799
1952	740 <sup>g/</sup>	747 <sup>h/</sup>	27.0 <sup>i/</sup>	57.0 <sup>j/</sup>	44.0 <sup>k/</sup>	0.222 <sup>l/</sup>	875
1953	795 <sup>g/</sup>	827 <sup>h/</sup>	32.0 <sup>i/</sup>	58.9 <sup>j/</sup>	48.0 <sup>k/</sup>	0.254 <sup>l/</sup>	966
1954	857 <sup>g/</sup>	887 <sup>h/</sup>	37.5 <sup>i/</sup>	62.4 <sup>j/</sup>	56.6 <sup>k/</sup>	0.285 <sup>l/</sup>	1,044
1955	971 <sup>g/</sup>	1,005 <sup>h/</sup>	42.5 <sup>i/</sup>	67.4 <sup>j/</sup>	68.9 <sup>k/</sup>	0.294 <sup>l/</sup>	1,184
1956	1,050 <sup>g/</sup>	1,082 <sup>h/</sup>	50.0 <sup>i/</sup>	78.0 <sup>j/</sup>	83.3 <sup>k/</sup>	0.353 <sup>l/</sup>	1,294
1957	1,130 <sup>g/</sup>	1,164 <sup>h/</sup>	58.0 <sup>i/</sup>	89.0 <sup>j/</sup>	98.3 <sup>k/</sup>	0.412 <sup>l/</sup>	1,410
1958	1,210 <sup>g/</sup>	1,246 <sup>h/</sup>	67.0 <sup>i/</sup>	100.0 <sup>j/</sup>	113.0 <sup>k/</sup>	0.470 <sup>l/</sup>	1,527
1959	1,290 <sup>g/</sup>	1,329 <sup>h/</sup>	76.0 <sup>i/</sup>	110.5 <sup>j/</sup>	128.0 <sup>k/</sup>	0.529 <sup>l/</sup>	1,644
1960 (Plan)	1,374 <sup>g/</sup>	1,415 <sup>h/</sup>	85.0 <sup>i/</sup>	121.3 <sup>j/</sup>	142.9 <sup>k/</sup>	0.588 <sup>l/</sup>	1,765
1961	1,470 <sup>g/</sup>	1,514 <sup>h/</sup>	93.0 <sup>i/</sup>	132.0 <sup>j/</sup>	157.5 <sup>k/</sup>	0.647 <sup>l/</sup>	1,897

a. Tariff ton-kilometers represent tons-originated multiplied by the average distance which freight would move if it went by the shortest route. This factor is used in computing the freight rate. Operating ton-kilometers are the product of tons-originated multiplied by the average distance actually traveled by freight. These figures are believed to exclude a significant part of the ton-kilometers moved by the railroads for their own consumption (such as fuel, ballast, and the like) and also exclude freight hauled on lines not operated by the Ministry of Transportation (such as lines operated by the Ministries of the Timber Industry, the Coal Industry, Ferrous Metallurgy, and Nonferrous Metallurgy).

b. These figures are believed to include traffic handled by all ministries.

c. Including activities of the former Ministry of the Maritime and River Fleet and the present Ministry of the River Fleet.

d. Including Caspian Sea traffic.

e. These figures cover the scheduled operations of Aeroflot, the civil carrier of the Main Administration of the Civil Air Fleet, but do not include Polar Aviation, regional carriers, or special services. Ton-kilometer estimates cover both air freight and air mail.

f. These totals, which are rounded, include operating ton-kilometers for railroads, not tariff ton-kilometers.

g. <sup>47/</sup>

h. <sup>48/</sup>

i. <sup>49/</sup>

j. <sup>50/</sup>

k. <sup>51/</sup>

l. <sup>52/</sup>

m. This figure is estimated on the basis of a Soviet statement that ton-kilometer performance in 1949 was 15 percent above that of 1940. <sup>53/</sup> Ton-kilometer performance in 1940 was estimated <sup>54/</sup> to be 35.9 billion tkm. <sup>55/</sup>

n. <sup>56/</sup>

o. Highway ton-kilometer performance for 1950 through 1961 is based on statements <sup>57/</sup> as follows:  
The first <sup>58/</sup> gives the results of the Fifth Five Year Plan (1951-55), states that during the period of this Plan the number of freight ton-kilometers moved by "all-purpose" motor transport increased 10 times and that in 1955 "all-purpose" highway transport made up 22 percent of the total freight moved by highway <sup>59/</sup> compared with 5 percent in 1950.

S-E-C-R-E-T

50X1  
50X1  
50X1

S-E-C-R-E-T

Table 3  
Estimated Ton-Kilometer Performance of Transport in the USSR  
by Type of Carrier  
1948-61  
(Continued)

the Sixth Five Year Plan (1956-60) provided that "automobile transport is to double approximately the freight turnover in 1960 as compared to 1955" and is to increase "transport for general use, raise its freight turnover to 40 billion ton-kilometers ... or by 4.3 times as compared to 1955." <sup>57/</sup> The terms all-purpose and general use are used synonymously. The method used to estimate the performance of total highway transport in 1950 and 1955 is as follows:

General use in 1960	--	40 billion tkm (4.3 times 1955)
General use in 1955	--	$\frac{40.0}{4.3} = 9.3$ billion tkm
General use in 1950	--	$\frac{9.3}{10} = 0.93$ billion tkm
Total in 1950	--	$\frac{0.93}{5} \times 100 = 18.6$ billion tkm
Total in 1955	--	$\frac{9.3}{22} \times 100 = 42.3$ billion tkm

The third  gives an absolute figure of 42.5 billion tkm for 1955. <sup>58/</sup> Assuming that this figure is correct,

Total in 1960	--	$42.5 \times 2 = 85$ billion tkm
---------------	----	----------------------------------

The estimates for other years between 1950 and 1959 and for 1961 are graphic projections.

- p. <sup>59/</sup>
- q. Absolute figures for 1950, 1954, and 1955  Ton-kilometer performance for 1951 has not been announced by the USSR. Announcements for other years state that ton-kilometer performance for 1952 was 109 percent of that in 1951; 1953, 109 percent of 1952; 1954, 118 percent of 1953; and 1955, 122 percent of 1954. By interpolating these percentages for the years before 1955, an estimate of 40.36 billion tkm was obtained for 1951. <sup>61/</sup>
- r. <sup>62/</sup>
- s. An increase of 12 percent above the level of 1950. <sup>63/</sup>
- t. <sup>64/</sup>
- u. <sup>65/</sup>
- v. <sup>66/</sup>
- w. An increase of 191 percent above the level of 1940, <sup>67/</sup> which was 433 tkm.
- x. <sup>68/</sup>
- y. <sup>69/</sup>
- z. <sup>70/</sup> This figure is based on an increase in tariff ton-kilometers of 42 percent in 1954 above the level of 1950. On the basis of Soviet indications that there was considerable circuitous hauling in 1954, however, it is estimated that the excess of operating ton-kilometers above tariff ton-kilometers was 3.5 percent in 1954, compared with approximately 2 percent in 1950.
- aa. Ton-kilometer performance rose 6 percent above that of 1953. <sup>71/</sup> This statement is supported by a Soviet press statement that the 1954 cargo turnover was 36.7 percent above the level of 1950. <sup>72/</sup>
- bb. <sup>73/</sup>
- cc. This figure is based on a 3.5-percent excess of operating above tariff ton-kilometers.
- dd. <sup>74/</sup>
- ee. Figures for 1956-59 and 1961 are graphic projections based on past performance and the 1960 Plan.
- ff. This figure is based on a 3-percent excess of operating ton-kilometers above tariff ton-kilometers. There is every indication that the USSR is concerned about the percentage spread between tariff and operating ton-kilometers. It is believed that during the Sixth Five Year Plan some progress will be made toward decreasing the spread from the currently estimated 3.5 percent to 3 percent.



S-E-C-R-E-T

Table 3  
Estimated Ton-Kilometer Performance of Transport in the USSR  
by Type of Carrier  
1948-61  
(Continued)

gg. This figure is based on the Sixth Five Year Plan, which provides for an increase of about 80 percent in 1960 above the level of 1955. Figures for the intervening years and 1961 are graphic projections based on Plan forecasts and past performance. 75/  
hh. This figure is based on a "cargo turnover /in 1960/ of approximately 2.1 times" the level of 1955. Figures for the intervening years and 1961 are graphic projections based on past trends and the 1960 Plan. 76/  
ii. The Sixth Five Year Plan provides for a 100-percent increase in freight ton-kilometers in 1960 above the level of 1955. 77/ Figures for the intervening years and 1961 are graphic projections.  
jj. The Sixth Five Year Plan gives ton-kilometer performance in 1960 as approximately 1,374 billion, an increase of 42 percent above the level of 1955. 78/

S-E-C-R-E-T

Table 4  
Estimated Passenger-Kilometer Performance of Transport in the USSR  
by Type of Carrier  
1948-61

Year	Billion Passenger-Kilometers					
	Railroads <sup>a/</sup>	Highways <sup>b/</sup>	Inland Waterways <sup>c/</sup>	Maritime Service <sup>d/</sup>	Civil Aviation <sup>e/</sup>	Total
1948	75.0 <sup>f/</sup>	3.4 <sup>g/</sup>	2.3 <sup>h/</sup>	1.10 <sup>i/</sup>	0.55	82.35
1949	81.3 <sup>j/</sup>	4.3 <sup>k/</sup>	2.5 <sup>l/</sup>	1.15 <sup>m/</sup>	0.88	90.13
1950	88.0 <sup>n/</sup>	5.2 <sup>o/</sup>	2.7 <sup>p/</sup>	1.20 <sup>q/</sup>	1.18	98.28
1951	98.5 <sup>r/</sup>	6.7 <sup>s/</sup>	2.9 <sup>t/</sup>	1.25 <sup>u/</sup>	1.49	110.84
1952	107.4 <sup>v/</sup>	9.0 <sup>w/</sup>	3.1 <sup>x/</sup>	1.30 <sup>y/</sup>	1.80	122.60
1953	115.0 <sup>z/</sup>	12.0 <sup>aa/</sup>	3.3 <sup>ab/</sup>	1.35 <sup>ac/</sup>	2.11	133.76
1954	129.1 <sup>ad/</sup>	14.1 <sup>ae/</sup>	3.5 <sup>af/</sup>	1.40 <sup>ag/</sup>	2.81	150.51
1955	141.4 <sup>ah/</sup>	20.9 <sup>ai/</sup>	3.6 <sup>aj/</sup>	1.50 <sup>ak/</sup>	2.72	170.12
1956	158.0 <sup>al/</sup>	30.0 <sup>am/</sup>	3.7 <sup>an/</sup>	1.55 <sup>ao/</sup>	3.50	196.75
1957	169.0 <sup>ap/</sup>	38.0 <sup>aq/</sup>	3.8 <sup>ar/</sup>	1.60 <sup>as/</sup>	4.50	216.90
1958	180.0 <sup>at/</sup>	46.0 <sup>au/</sup>	3.9 <sup>av/</sup>	1.65 <sup>aw/</sup>	6.00	237.55
1959	191.0 <sup>ax/</sup>	55.0 <sup>ay/</sup>	4.0 <sup>az/</sup>	1.70 <sup>ba/</sup>	8.00	259.70
1960	205.0 <sup>bb/</sup>	62.7 <sup>bc/</sup>	4.1 <sup>bd/</sup>	1.75 <sup>be/</sup>	10.34	283.89
1961	215.0 <sup>bf/</sup>	71.0 <sup>bg/</sup>	4.2 <sup>bh/</sup>	1.80 <sup>bi/</sup>	12.60	304.60

a. Including all paying passengers in local, suburban, and long-distance rail movement.  
b. These figures are believed to include all highway passenger movements performed by all ministries, but exclude private automobiles.  
c. Including activities of the former Ministry of the Maritime and River Fleet and the present Ministry of the River Fleet.  
d. Including Caspian Sea traffic.  
e. These figures cover the scheduled operation of Aeroflot, the civil carrier of the Main Administration of the Civil Air Fleet, and do not include Polar Aviation, regional carriers, or special services. These estimates are based on data [redacted]. The projection to 1961 is based on the Sixth Five Year Plan. <sup>80/</sup>  
f. No announcement of either the Plan or Plan fulfillment has ever been made for 1948. The estimate of 75 billion passenger-kilometers is made arbitrarily on the basis of pre-1948 performance.  
g. This estimate is based on prewar and postwar performance. <sup>81/</sup>  
h. This estimate is based on a straight-line trend from the passenger-kilometer performance of 1.66 billion reported for 1945 to the Plan figure of 2.7 billion for 1950. <sup>82/</sup>  
i. This estimate is based on the assumption that performance was not quite at the prewar level. In 1939, passenger-kilometer performance was 800 million. The highest prewar performance, in 1932, was 1 billion passenger-kilometers. <sup>83/</sup>  
j. <sup>84/</sup>  
k. <sup>85/</sup>  
l. <sup>86/</sup>  
m. Figures for 1950 and 1954 [redacted] Figures for the intervening years are estimates which are consistent with these data.  
n. <sup>88/</sup>  
o. <sup>89/</sup>  
p. <sup>90/</sup>  
q. <sup>91/</sup> This figure represents an increase of 22 percent above the level of 1950.  
r. Figures for 1954 and 1955 [redacted] The estimates for other years were projected graphically from past trends and from fragmentary data concerning future expectations for motor transport. The estimate for 1960 is three times the 1955 figure. <sup>93/</sup>  
s. <sup>94/</sup>

50X1

50X1

50X1

S-E-C-R-E-T

Table 4  
Estimated Passenger-Kilometer Performance of Transport in the USSR  
by Type of Carrier  
1948-61  
(Continued)

---

t. This figure represents an increase of 47 percent above the level of 1950. 95/  
u. This figure represents an increase of 61 percent above the level of 1950. 96/  
v. 97/  
w. This figure is a projection based on past trends; no Plan announcements have been made. There were comparable increases (61 percent) in freight and passenger traffic during the period of the Fifth Five Year Plan (1951-55). Because freight is to increase 42 percent in the Sixth Five Year Plan (1955-60), an increase of 42 percent is also assumed for passenger-kilometers.  
x. This figure is estimated on the assumption of slight increases in performance because of more emphasis on vacation trips, worker rewards in the form of Black Sea and Caspian Sea excursions, and similar civilian traffic. Such traffic accounts for a large part -- perhaps the greater part -- of seaborne passenger transport in the USSR.

S-E-C-R-E-T

## S-E-C-R-E-T

Table 5

Ton-Kilometer Performance of Transport in the US by Type of Carrier a/  
1948-55

Billion Ton-Kilometers					
Year	Railroads <u>b/</u>	Inland Waterways <u>c/</u>	Highways <u>d/</u>	Domestic Commer- cial Air- lines <u>e/</u>	Total
1948	931	236	166	0.203	1,333.2
1949	769	203	182	0.240	1,154.2
1950	859	238	248	0.290	1,345.3
1951	944	266	266	0.303	1,476.3
1952	898	246	269	0.336	1,413.3
1953	884	295	317	0.366	1,496.4
1954	802	254	313	0.394	1,369.4
1955	905	292	357	0.592	1,554.6

a. No entry is made for Maritime Service, because these statistics are not available. Inland Waterways excludes all intercoastal movements and all coastwise movements outside the intracoastal canal system.

b. 98/

c. 99/

d. 100/

e. 101/. The figure for 1955 is a preliminary estimate.

An analysis of the Sixth Five Year Plan and a projection of the past relationship between industrial output and freight traffic indicate that the USSR will demand approximately 1,897 billion tkm (excluding pipe-lines) of freight traffic in 1961. Passenger traffic at the end of 1961 will approach 305 billion passenger-kilometers, counting all means of passenger transport.

## S-E-C-R-E-T

A. Freight Traffic.1. Railroads.

The volume of rail freight turnover in the USSR, measured in operating ton-kilometers, grew from 468 billion tkm in 1948 to approximately 1,005 billion in 1955, or an increase of about 114 percent (see Table 3\*). During the period 1948-55 the Soviet railroads' share of total traffic remained rather constant at about 85 percent of total ton-kilometer movements, thus reflecting a failure on the part of Soviet transport officials to shift a greater share of the transport burden to other carriers.

Although direct comparisons of railroads in the USSR with those in the US must be made with some caution because of the increasing volume of traffic handled by the other US carriers, it is noteworthy that the US Class I railroads produced only 802 billion tkm in 1954 compared with 931 billion in 1948 (see Table 5\*\*). The US railroads, therefore, have been recording substantial losses in ton-kilometers since 1948, but Soviet rail performance has more than doubled during the 1948-55 period. This is not a reflection of a reduction in total transport performance in the US but rather of its distribution among the various carriers. Accordingly, the US railroads have shown a decline in their share of total traffic; in 1954 they moved 49.5 percent of the total ton-kilometers compared with 64.4 percent in 1948. 102/

A review of the planned development for railroads indicates that the Soviet economy will require the production of approximately 1,415 billion operating tkm (1,374 billion tariff tkm) of rail traffic in 1960, the last year of the Sixth Five Year Plan. By the end of 1961, rail traffic probably will reach about 1,514 billion operating tkm (see Table 3\*). Such increases mean that the Soviet rail system will be hauling 42 percent more traffic in 1960 than in 1955. An increase in performance of this magnitude might seem to be optimistic planning; however, in view of the 64-percent increase achieved in the Fifth Five Year Plan, it would appear reasonable to expect the railroads to accomplish the planned goal by 1960. If the total industrial output of the USSR is to increase by about 65 percent during the forthcoming plan period, the railroads can do no less than the planned 1,415 billion

---

\* P. 18, above.

\*\* P. 23, above.

## S-E-C-R-E-T

operating tkm (1,374 billion tariff tkm) in 1960. An expansion of this magnitude, however, would seem to depend upon large capital outlays during the period. In order to cope better with such increases, the Plan provides for the widespread use of diesel and electric traction, so that by 1960 such motive power will account for 40 to 45 percent of the total freight performance compared with 14 percent in 1955. 103/ Furthermore, large-capacity cars, more automatic block signaling, some centralized traffic control, and an increase in the system's route kilometrage -- all of which are provided for in the Plan -- should greatly increase the traffic capacity of the railroads.

Soviet rail operations consist largely of the movement of a few bulk commodities. The estimated distribution of tons-originated and ton-kilometers of rail freight traffic in the USSR, by commodity, in 1955 is shown in Table 6.\* Coal, the largest single item shipped, comprises about 31 percent of total tons-originated, although its relative share of ton-kilometers (27 percent) is somewhat lower because of an average length of haul of approximately 686 km compared with an average of 766 km for all commodities. 104/ The locational factors tending to raise the average distance over which coal is shipped do not appear to be changing; consequently, coal is expected to continue to account for no less than 25 percent of total rail ton-kilometers through 1961. Trends for most commodities since the 1930's indicate that the percentages given in Table 6 should remain fairly constant through 1961.

## 2. Highways.

Considerable achievements have been made in Soviet motor transport during the postwar years. During 1948-56, performance rose at an average annual rate of approximately 17 percent (see Table 3\*\*). This relatively constant growth rate can be attributed mainly to the increase in truck inventory, because the road net has not been improved significantly and utilization of equipment has remained rather constant.

During the period of the Sixth Five Year Plan the USSR intends to double the volume of highway transport, which will bring performance to approximately 85 billion tkm in 1960. This increase is comparable to growth rates of recent years -- during the Fifth Five Year Plan, actual performance was estimated to have increased about

---

\* Table 6 follows on p. 26.

\*\* P. 18, above.

## S-E-C-R-E-T

111 percent. Of particular interest is the fact that the Plan provides for the share of highways in total traffic to increase from 3.6 percent in 1955 to 4.8 percent in 1960. The increase in the share of motor traffic should produce a corresponding reduction in the share of rail traffic.

Table 6

Estimated Distribution of Tons-Originated and Ton-Kilometers of Rail Freight Traffic in the USSR, by Commodity a/ 1955

Commodity	Percent	
	Tons-Originated	Ton-Kilometers
Coal	31	27
Petroleum	6	10
Ores	7	5
Ferrous metals	6	8
Timber	7	12
Firewood	1	1
Grain	5	6
Mineral construction materials	19	8
All others	18	23
Total	<u>100</u>	<u>100</u>

a. 105/

The Sixth Five Year Plan provides that motor vehicle production by 1960 will be at an annual rate of 650,000 units, or 146 percent of the 1955 rate. Much consideration will also be given to the production and use of large tonnage trailers and more efficient motor vehicle engines. Of equal importance is the plan to place about 50 percent of the highway haulage under general or central pools, thus eliminating much of the activity now being administered by the agricultural, extractive, and industrial ministries. All of these innovations, aimed at increasing vehicle and highway utilization, will be major factors in increasing the role of motor transport in the Soviet economy.

## S-E-C-R-E-T

3. Inland Waterways.

In 1955, inland water transport performance in the USSR in terms of ton-kilometers was about 47 percent above the 1950 level (see Table 3\*). Tons-originated during these years grew at a slightly lesser rate because of progressively increasing average lengths of haul. 106/ In spite of these steady improvements in the postwar era, inland water traffic has consistently fallen short of performance plans. These trends are significant because inland water freight traffic did not substantially exceed the pre-Revolutionary level until about 1948. As early as 1913 the waterways handled about 29 billion tkm. 107/ By contrast, the railroads in 1954 were producing some 13 times as many ton-kilometers of freight traffic as in 1913. 108/ Continued emphasis, however, on inland water transport should bring performance close to the level forecast by the Sixth Five Year Plan for 1960, when it is estimated that about 121.3 billion tkm of inland water freight traffic will be required to support the Soviet economy. This upward trend is expected to continue through 1961, when performance should reach 132 billion tkm. An important factor in raising the performance to the 1960 Plan goal will be the increase in fleet capacity planned for the waterways. The opening up of new river ports, the deepening of many channels, and an increase in labor productivity by 35 percent in 1960 above the level of 1955 should also contribute toward increasing the ton-kilometer performance.

As stated above, rail freight traffic is dominated by coal. By contrast, inland water freight traffic is composed largely of two basic commodities, timber and petroleum. In 1950, of the total waterway movements planned, timber accounted for 45 percent, petroleum 27 percent, and all other traffic only 28 percent. 109/ As measured in tons-originated, timber has consistently made up well over half the total tonnage, but the distance it is carried on the average is below that for petroleum and other freight. 110/ Its position, therefore, in total ton-kilometers is somewhat smaller than 50 percent.

The average composition of traffic is expected to remain rather constant throughout the 1955-61 period, although in certain areas there may be relative shifts in the commodity makeup of traffic. In the Volga-Don area, for example, there could be a diversion of more coal traffic to the water carriers. The emphasis on the new lands in Central

\* P. 18, above.



## S-E-C-R-E-T

Asia will no doubt increase the volume of grain traffic on rivers in that area. Any buildup of economic strength in the Far East, moreover, will increase the volume of shipping on the Amur River system.

4. Maritime Service.

Maritime traffic during the Soviet era in the USSR, like that of the inland waterways, has grown relatively slowly compared with the railroads. There have been impressive gains from time to time, but the total traffic moved remains a minor portion of the total. Expansion, however, has been considerable during the recovery period following World War II. Traffic during 1955 amounted to 68.9 billion tkm, representing an increase of 74 percent over 1950 (see Table 3\*). Part of this significant increase, which is 12.3 billion tkm above the level of 1954, results from the USSR's having placed in service 115,000 dwt of tankers during the year. 111/ These new vessels for the most part were placed in the long-haul Black Sea - Far East petroleum trade and consequently contributed materially to increased ton-kilometer performance in 1955.

Even though vast areas in the Polar regions and the Far East depend almost entirely upon ocean shipping for economic and military support, the Caspian Sea traffic, which is composed largely of petroleum, has accounted for virtually one-third of all maritime ton-kilometer movements. Recently, however, there appears to have been a shift in the distribution of traffic among seas contiguous to the USSR, with the share of the Far East increasing. Kaganovich reported in 1954 that some 26 percent of all maritime freight shipments took place in the Far Eastern basin. 112/

Petroleum accounts for approximately 65 percent of total maritime traffic, but only 6 percent of total rail traffic. The estimated distribution of tons-originated of maritime freight traffic in the USSR, by commodity, in 1950 is shown in Table 7.\*\*

Performance by the maritime fleet in 1960 is planned to increase 2.1 times above the level of 1955. Projections to 1961 indicate approximately 157.5 billion tkm for that year. The fleet, however, must receive the capital investment planned during the Sixth Five Year Plan period in order to realize Plan fulfillment in 1960. During the

\* P. 18, above.

\*\* Table 7 follows on p. 29.

S-E-C-R-E-T

forthcoming Five Year Plan, the fleet is to receive an increase of 1.14 million dwt of dry-cargo capacity and an increase of 460,000 dwt of tanker tonnage, thus increasing present fleet tonnage by approximately 35 percent.

Table 7

Estimated Distribution of Tons-Originated  
of Maritime Freight Traffic in the USSR  
by Commodity a/  
1950

<u>Commodity</u>	<u>Percent</u> <u>Tons-Originated</u>
Petroleum	65.0
Timber	5.6
Coal	4.9
Ores	4.7
Mineral building materials	2.3
Iron and steel	0.9
All others	16.6
Total	<u>100.0</u>

a. 113/

At the XXth Party Congress, Kaganovich pointed out some of the deficiencies of water transport, as follows:

The relative proportion of shipment by cheaper kinds of transport, such as water ... remains too low. Particularly unsatisfactory use is being made ... of the so-called small rivers. In spite of radical reconstruction ... our waterways are still being used in an extremely inadequate manner. It cannot be tolerated that tens of millions of tons of freight ... are carried by rail parallel to the ... rivers. Great possibilities for reducing excessively distant shipment of freight by rail to the Far East will be effected by greater use of the Arctic waterway and by increased transport of freight by long-distance coastal traffic from Black Sea ports. 114/

## S-E-C-R-E-T

Thus it appears that the water carriers will be under more pressure in the future to meet Plan goals than in the past.

5. Civil Aviation.

Data on the postwar volume of air freight traffic in the USSR are scarce and conflicting and give rise to widely divergent estimates, depending on the assumptions employed. Estimates of air freight ton-kilometers are subject to a wide range of error. The volume of freight moved by air transport is negligible relative to other carriers (see Table 1\*), however, and the discrepancies thus are not significant in a comprehensive index of all freight transport media.

[redacted] an 85-percent gain was registered in air freight traffic for 1955 above the level of 1950 (see Table 3\*\*). Although the estimated 294 million tkm moved in 1955 represent substantial progress in recent years, the relative gains are not appreciable because of the small initial base. The substantial increases achieved can be attributed, however, in large degree to new route acquisitions. Aeroflot has taken over the Magadan area as well as additional routes in the Arctic which were formerly flown by Polar Aviation. 115/ Increases in the number of flights on many routes and interchange agreements with several foreign carriers have also contributed toward significantly increasing ton-kilometer performance.

50X1

Air transport in the USSR has been of primary importance in speeding key personnel and high-priority cargo to areas in which no other form of transport is available. There is no doubt, however, that the strategic importance of air power has reinforced economic considerations in fostering the postwar rise of air transport. The limiting factor of expansion has been Aeroflot's dependence on obsolete two-engine transport aircraft.

The Sixth Five Year Plan provides for doubling the civil air ton-kilometer performance in 1960 compared with 1955. Any increase of this magnitude is dependent, first, upon the receipt of modern transport aircraft, and, second, upon the successful introduction of such aircraft into regular commercial service over domestic and international routes.

---

\* P. 2, above.

\*\* P. 18, above.

## S-E-C-R-E-T

In addition, the ton-kilometer estimates for the period 1956-61 depend upon the progressive absorption by Aeroflot of Polar Aviation and regional routes.

Introduction of the TU-104 into regular commercial service over the civil air routes was inaugurated in 1956. The use of this aircraft with its increased speed (800 km per hour) and its capacity of 50 to 70 passengers would greatly augment the potential of Aeroflot, hitherto limited to 2-engine, 18- to 21-passenger aircraft. 116/ Additional high-performance aircraft -- a 4-engine jet, the TU-114, and a 4-engine turboprop, the IL-18 -- probably will be in operation by 1961.

B. Regional Distribution of Freight Traffic.

The Moscow (Region VII\*) and Leningrad (Region I) areas generate the greater portion of the freight traffic of the USSR. The eastern Ukraine (Region III) is a substantial exporter of primary commodities and fabricated goods to other regions of the USSR. The Urals (Region VII) and the Kuzbas (Region IX) are not yet equal in industrial growth to the old eastern Ukrainian industrial complex. There has been a significantly higher rate of growth in this second industrial base, however, than in the Ukraine.

The Volga basin (Region VI), which tended to lag during the 1930's, has been the scene of especially rapid industrial growth during and since World War II. Consequently, whereas the freight traffic of this area used to consist primarily of through traffic to or from Central Asia (Region Xb) and Kazakhstan (Region Xa) and the southern Urals, such traffic is now combined with a large volume of local freight traffic.

In East Siberia (Region XI) there appears to be less evidence of rapid industrial development. On the other hand, since the late 1940's an increasing volume of trade with Communist China moves overland on the Trans-Siberian Railroad.

\* The term region in this report refers to the economic regions

50X1  
50X1

S-E-C-R-E-T

The estimated distribution of ton-kilometers on railroads and inland waterways in the USSR, by region, in 1954 is shown in Table 8.\* [redacted] these percentages probably did not change appreciably during 1955. Current data will not permit a breakdown of the maritime and highway traffic.

50X1

C. Passenger Traffic.1. Railroads.

Rail passenger traffic is of considerable economic importance in the USSR because of the great extent of Soviet territory and the virtual absence of private automobile traffic. Its significance as a transport activity in comparison with freight traffic, however, is secondary. Restrictions on the freedom of individual movement, moreover, have seriously affected the absolute volume of Soviet rail passenger traffic.

Since 1948 there has been a steady growth in passenger-kilometers performed by the railroads -- the 1940 level of 95.4 billion passenger-kilometers was reached again in 1951, when 98.5 billion tkm were performed (see Table 4\*\*). 117/ Passenger-kilometers in 1955 had reached a level only 48 percent higher than in 1940; however, freight-kilometers during the same period showed a 142-percent gain. The gap between the rates of growth of passenger and freight operations probably will be narrowed during 1956-61 because personal travel is expected to increase as a result of continued economic development, an expanding population, further urbanization, and relaxation of controls on personal movement.

The statistics given on rail passenger traffic (see Table 4) include both so-called long-distance passenger movements and commuting (intercity and urban, including Moscow subway) traffic. Because of the method of reporting, it appears impossible to isolate urban passenger movements from the total with any degree of accuracy. [redacted]

[redacted] however, urban movements inflate the total passenger-kilometer figure for any given year no more than 25 to 30 percent because of the short length of the average urban passenger trip. 118/ The Sixth Five Year Plan announced no statistics for rail passenger traffic.

50X1  
30A1

\* Table 8 follows on p. 33.

\*\* P. 21, above.

S-E-C-R-E-T

S-E-C-R-E-T

Table 8  
 Estimated Distribution of Ton-Kilometers on Railroads and Inland Waterways  
 in the USSR, by Region <sup>a/</sup>  
 1954

Transport Sector	Region												Percent
	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	Total
	(North and Northwest)	(West)	(South)	(South-east)	(Trans-Caucasus)	(Volga)	(Central)	(Urals)	(West Siberia)	(Kazakhstan and Central Asia)	(East Siberia)	(Far East)	
Railroads	5	1	25	5	3	6	19	10	8	9	5	4	100
Inland waterways	20	3	6	3	Negligible	17	27	7	6	3	4	4	100

a. 119/

## S-E-C-R-E-T

2. Highways.

Available data concerning the volume of highway passenger traffic in the USSR are in most instances divided into three categories -- urban, suburban, and intercity. Reported statistics overlap in most cases, and total passenger-kilometer figures cannot be derived from them with any degree of accuracy. Except for 1950, 1954, and 1955, the estimates recorded in Table 4\* are not very reliable for individual years, because they are based entirely upon a straight line projection, although they do reflect the Soviet planned rate of growth and appear to be in the proper magnitude.

Bus service is becoming increasingly available throughout the USSR. Intercity bus service has shown an appreciable rate of growth, especially in the Soviet Far East, during recent years. Highway passenger transport has not been substantial, because of the lack of automobiles for private travel. It is anticipated that private Soviet citizens will not be able to own automobiles for some years to come; thus a constant expansion of the public means of passenger transport by highway will be necessary.

The Sixth Five Year Plan, however, provides for a threefold increase in the movement of passengers by automobile in 1960 above the level of 1955. This increase obviously refers to passenger transport by "for hire" vehicles such as taxicabs and does not include private automobile traffic. During the same period, passenger-kilometers by motor bus are to increase 3.5 times above the level of 1955. Such plans imply that the passenger vehicle and bus inventory will greatly increase in size and utilization. Judging from past performance records, it appears likely that passenger traffic will fall short of its projected goal for 1960.

3. Inland Waterways.

Inland waterways play a minor role in the field of passenger transport in the USSR (see Table 4\*). The coverage of passenger transport for inland water, like that of the other carriers, is considerably less extensive than that for freight traffic. Absolute values are reported for 1950, 1954, and 1955, but Plan announcements are virtually the only sources for the other years.

---

\* P. 21, above.

## S-E-C-R-E-T

During the First Five Year Plan the waterways accounted for about 5.3 percent of total passenger-kilometers, but by 1938 their share of the total had fallen to 2.5 percent. <sup>120/</sup> It is estimated that inland waterway traffic in 1950-56 increased about 33 percent and rail traffic about 61 percent -- thus the waterways' share of the total has continued to decline. <sup>121/</sup>

new passenger launches, ferries, and similar craft are being added to the inland water fleet, but it is believed that such additions will have little, if any, influence upon elevating the relative role of the water carriers in passenger transport. Because water transport is inherently slow, it has generally been employed in local short-haul ferry service and for pleasure cruises; very little long-haul traffic has been reported. It is estimated that the passenger traffic trend through 1961 will be toward a leveling off in water transport, with the greater percentage increases going to highway and air transport. Performance for 1961 is estimated to be 4.2 billion passenger-kilometers, an estimated increase of only 17 percent in the 6-year period preceding (see Table 4\*).

50X1

#### 4. Maritime Service.

The performance of the Soviet merchant fleet in 1955 is estimated to be 1.5 billion passenger-kilometers, less than 1 percent of total passenger-kilometers for all means of transport (see Table 4\*). Although maritime passenger transport performance increased by approximately 36 percent in 1955 above the level of 1948, it probably will increase by only 20 percent in 1961 above the level of 1955 (see Table 4\*). The small increase appears plausible because of the nature of domestic maritime passenger traffic in the USSR, which generally is limited to regions not served by other modes of transport and to short-haul service or pleasure cruises on Soviet-controlled seas.

#### 5. Civil Aviation.

Civil aviation passenger traffic increased fivefold between 1948 and 1955, principally because of the expansion of operations to Communist China and the addition of routes in the Far Eastern USSR. The movement of priority traffic in both passengers and property has always been emphasized in the USSR, and property traffic has been relatively

\* P. 21, above.



S-E-C-R-E-T

more important than in Western airline operations. <sup>122/</sup> Recently, however, there has been a trend to a more conventional type of air operation which gives greater consideration to passenger traffic.

Several factors have hindered the growth of the volume of passengers carried by air. The USSR has relied on the DC-3 type of twin-engine aircraft, which is capable of carrying only 14 to 21 passengers. <sup>123/</sup> As a consequence, the cost of air passenger traffic is considerably higher than the other passenger services. Also, air passenger traffic is rigidly controlled in the USSR, and a system of priorities limits passenger travel to members of the bureaucracy and various civil military missions. <sup>124/</sup>

Passenger-kilometer estimates for 1948-61 are given in Table 4.\* The Sixth Five Year Plan stated that the volume of air passenger transport in 1960 will be roughly 3.8 times the 1955 volume. An increase of this magnitude, like that planned for air freight, is dependent upon Plan fulfillment for the production and delivery to Aeroflot of fast, efficient, high-capacity aircraft. Receipt of the TU-104 by Aeroflot will vastly increase passenger traffic potential over all Soviet civil air routes. The increased capacity of 50 to 70 passengers, together with the high speed of the aircraft, probably will facilitate the accomplishment of the Plan. By 1961 a 4-engine turboprop, the IL-18, and a 4-engine jet, the TU-114, probably will be in operation and will give additional impetus to the growth of passenger traffic volume.

#### IV. Levels of Operating Efficiency and Labor Productivity.

##### A. Operating Efficiency.

There are indications that the general level of operating efficiency in the transport sector of the Soviet economy has not risen significantly since the end of 1954. The railroads were able to increase their operating efficiency in 1955, as in other recent years. Highways showed a small increase, but inland water transport registered a net loss in efficiency measured in annual ton-kilometer performance per unit of transport equipment. The extensive efforts of transport officials to raise levels of efficiency through the optimum use of transport facilities and equipment are indicative of the pressures under which the transport system is operating in order to meet requirements.

\* P. 21, above.

S-E-C-R-E-T

S-E-C-R-E-T

This is particularly true of the railroads, whose burden is to be relieved by increasing the proportionate share of the other forms of transport.

1. Railroads.

Soviet railroads have recorded significant annual rates of growth in operating efficiency compared with the US in recent years. This achievement, carried out with a much smaller total of route-kilometers, motive power, and freight cars, means that locomotives and freight cars are kept on the line more continuously than in the US. At the same time, however, ton-kilometer productivity of trains measured in gross ton-kilometers per freight-train hour is substantially below US levels because of the slower speeds and lighter loads of Soviet trains.

In the US the use of fast, heavy freight trains is a means of economizing on the labor cost of train crews, and the use of advanced modern maintenance equipment is a means of economizing on labor crews. US practice is thus relatively labor saving and capital using. In the USSR, although skilled labor has been in short supply, capital equipment has been even scarcer. Consequently, Soviet railroads have had to make intensive use of roadways, motive power, and freight cars while at the same time employing relatively large quantities of labor. The trend in recent years in the USSR, however, has been toward the introduction of increasing quantities of modern equipment.

Selected measures of operating efficiency for railroads in the USSR in selected years, 1939-55, are shown in Table 9.\* The trends shown here are consistent with a rational allocation of the Soviet means of production. It will be noted, for example, that although the average length of haul in the USSR jumped from 722 km in 1950 to 766 km in 1955, freight car turnaround time showed a rather sharp drop from 7.5 days in 1950 to 6.2 days in 1955, thus indicating a substantial increase in car utilization. The average length of haul of 696 km for the US in 1955 compares favorably with that of the USSR; however, because of the intensive utilization of equipment in the USSR compared with the US, turnaround time in the USSR is only about one-third of the 13.3-day

\* Table 9 follows on p. 39.

S-E-C-R-E-T

## S-E-C-R-E-T

figure for the US in 1954.\* 125/ The current trend in turnaround time in the USSR, however, is expected to continue to level off as more modern efficient rolling stock is made available.

Both average freight train speeds and average train weights on Soviet railroads have risen sharply during the past few years. In gross ton-kilometers per freight-train hour, however, Soviet performance in the past few years has generally been about one-half the US level, although the annual rate of growth in gross ton-kilometers per freight-train hour of the USSR in 1954 more than doubled that of the US during the past 5 years. This change has been introduced primarily by discontinuing the manufacture of 2-axle cars and placing emphasis on higher capacity 4-axle cars, with a resultant increase in the general level of operating efficiency.

The Sixth Five Year Plan includes a number of improvements which will result in increased efficiency, as follows: double tracking many lines which are currently single track; installing automatic block signaling on double-track lines and centralized traffic control on many single-track lines; constructing additional mechanized hump classification yards; installing radio communications on the line and in yards; electrifying lines formerly operated with steam locomotives, particularly on double-track lines; introducing diesel locomotives on lines previously operated with steam locomotives; and increasing the number of four-axle cars, all equipped with automatic couplers and air brakes. 126/ The effect of these improvements is to speed train movements and to increase the tonnage hauled per train and the tonnage loaded per car. When combined, these improvements will no doubt continue to push gross ton-kilometers per freight-train hour upward at a fairly constant annual rate of growth through 1961.

In summary, it may be expected that the operating efficiency of Soviet railroads compared with US railroads will continue to improve as it has in the past. With additional inputs, an already effective

\* It should be stressed that these turnaround figures are not entirely comparable, because the US includes reserve cars in its operating park and the USSR excludes them. Furthermore, the USSR appears to drop a car temporarily from the operating park when it is under demurrage, but the US does not. Hence when turnaround time is calculated by dividing operating car park by average daily carloadings, the Soviet figure is lower than it would be if the US method of calculating operating park were utilized. The difference may be as high as 30 percent.

## S-E-C-R-E-T

Table 9

Selected Measures of Operating Efficiency for Railroads in the USSR  
Selected Years, 1939-55

Years	Freight Car Turnaround Time (Days)	Average Operating Length of Freight Haul (Kilometers)	Average Freight Train Weight (Metric Tons)		Average Freight Train Speed Including Stops (Kilometers per Hour)	Gross Ton- Kilometers per Freight-Train Hour <sup>a/</sup>
			Gross	Net		
1939	7.25 <sup>b/</sup>	708 <sup>c/</sup>	1,296 <sup>d/</sup>	711 <sup>d/</sup>	19.3 <sup>e/</sup>	25,013
1945	10.92 <sup>b/</sup>	794 <sup>c/</sup>	1,247 <sup>d/</sup>	698 <sup>d/</sup>	17.2 <sup>e/</sup>	21,448
1948	8.68 <sup>b/</sup>	729 <sup>c/</sup>	1,340 <sup>d/</sup>	758 <sup>d/</sup>	17.3 <sup>e/</sup>	23,182
1950	7.5 <sup>f/</sup>	722 <sup>c/</sup>	1,427 <sup>d/</sup>	813 <sup>d/</sup>	20.1 <sup>e/</sup>	28,683
1954	6.7 <sup>g/</sup>	757 <sup>h/</sup>	1,640 <sup>d/</sup>	951 <sup>d/</sup>	22.9 <sup>i/</sup>	37,556
1955	6.2 <sup>j/</sup>	766 <sup>h/</sup>	1,753 <sup>j/</sup>	1,020 <sup>j/</sup>	24.7 <sup>i/</sup>	43,299

a. Gross train weight multiplied by train speed. The following are the gross ton-kilometers of performance per freight-train hour for US railroads: 1939, 35,571; 1945, 53,583; 1948, 57,869; 1950, 64,310; and 1954, 78,150. <sup>127/</sup>

- b. <sup>128/</sup>
- c. <sup>129/</sup>
- d. <sup>130/</sup>
- e. <sup>131/</sup>
- f. <sup>132/</sup>
- g. <sup>133/</sup>
- h. <sup>134/</sup>
- i. <sup>135/</sup>
- j. <sup>136/</sup>

## S-E-C-R-E-T

system should be expected to evolve into a more modern system characterized by labor-saving, capital-using equipment which will compare more favorably with the rail system of the US.

2. Highways.

The efficient utilization of highway transport in the USSR is hampered to a large extent by the lack of a network of all-weather modern roads throughout the country. Motor transport has continued in its role as an intracity carrier and as a short-haul tributary carrier for rail and water transport; this is indicated by its average length of haul, which has remained rather constant at about 11 km. 137/ The average load per loaded truck also has remained static at approximately 2.2 tons, 138/ and the coefficient of use\* of the central park has shown little variation from the 62 percent shown in 1953. Truck pools belonging to the various industrial and agricultural ministries have been especially inefficient, with a coefficient of use of about 47 percent in recent years. 139/

Motor truck utilization in terms of annual ton-kilometers per vehicle unit for 1955 was about 124 percent of 1948, but the annual increases have been relatively small since 1953, primarily because of a change in operational practices. It has been normal Soviet policy to assign the available truck park according to specific industrial or agricultural demands. Trucks used by the Ministry of Agriculture, for example, may be shifted to support construction or some other economic activity during the agricultural off seasons. As additions are made to the inventory it becomes less necessary to shift the park. Unit utilization is therefore lowered, because many vehicles are idle during the off season. The estimated performance of motor trucks in the USSR in selected years, 1939-55, is shown in Table 10.\*\*

There are indications that the general use of motor transport is rapidly being brought under central control, leaving less in the hands of the industrial and agricultural ministries. The Sixth Five Year Plan provides for a radical improvement in the use of automobile pools, which is planned to increase the productivity of trucks in 1960 by 36 percent above the level of 1955. 140/ A more favorable level of productivity will depend upon the success achieved in promoting centralized control of highway transport. If a significant volume of the motor transport now conducted independently by the various industrial and agricultural ministries can be concentrated in

\* The ratio of the number of days worked to the number of business days in a year.

\*\* Table 10 follows on p. 41.

## S-E-C-R-E-T

centralized motor pools, greater utilization will result. Furthermore, the Plan specifically provided for the production and delivery of more and larger trucks and trailers and emphasized the expansion of paved highways. Such improvements will increase both speed and pay load and will greatly improve the current level of operating efficiency.

Table 10

Estimated Performance of Motor Trucks in the USSR  
Selected Years, 1939-55

Year	Truck Inventory	Performance per Truck	
		Ton-Kilometers <sup>a/</sup>	Index (1939 = 100)
1939	771,600 <sup>b/</sup>	11,500	100
1945	1,011,800 <sup>b/</sup>	4,300	38
1948	828,800 <sup>b/</sup>	15,952	139
1950	1,260,000 <sup>c/</sup>	14,800	129
1953	1,770,400 <sup>c/</sup>	18,100	157
1954	1,946,500 <sup>c/</sup>	19,265	168
1955	2,137,500 <sup>c/</sup>	19,883	173

a. These figures are calculated from estimates of ton-kilometer data given in Table 3 (p. 18, above), except for 1939 and 1945 [redacted]

b. 142/

c. These estimates are based upon annual production, military allocation, and rate of retirement. The estimates of vehicle production are based upon analyses of individual plant production, graphic projections of planned increases, and chassis serial number data. [redacted]

[redacted] Retirement rates are calculated at 5 percent per year.

50X1

50X1

50X1

### 3. Inland Waterways.

The failure of inland water transport in the USSR to raise the level of operating efficiency is considered to be serious by Soviet planners, in view of the potential capacity of the system. It is estimated that river transport in 1954 could have originated 30 million tons of cargo more than the 128.2 million tons actually handled. 144/ If the

## S-E-C-R-E-T

surplus tonnage capacity available in 1954 had been fully utilized in the same traffic pattern, ton-kilometer performance would have amounted to 75 billion tkm, or about 20 percent more than the estimated actual ton-kilometer performance of 62.4 billion. The available surplus capacity in 1955 probably was in the same proportion to ton-kilometer performance as that in 1954, so that utilization of the maximum capacity available in 1955 would have resulted in about 81 billion tkm instead of the 67.4 billion estimated for 1955. This would have been a sizable contribution toward diverting from the railroads traffic which could move more economically by water.

Efforts to raise the efficiency of inland water transport in the USSR are hampered by three inherent difficulties, as follows: (a) the reluctance of many shippers to use such a slow form of transport, (b) the seasonal nature of cargo availability, and (c) the lack of a continuous shipping season. Although there has been some improvement in overcoming these obstacles, there is still much dissatisfaction with the level of efficiency. Soviet planners are constantly emphasizing the need for more efficient operations through a reduction of demurrage time in ports, a reduction of cargo-handling cost, and a reduction in the accident rate. 145/

Although inland water officials claim marked improvements in many areas of efficiency, evidence indicates that the over-all level of efficiency has declined. The estimated performance of inland waterways in the USSR in selected years, 1940-55, is shown in Table 11.\* This analysis indicates that ton-kilometer performance per deadweight ton of available carrying capacity has declined substantially since 1950. The increase in ton-kilometer performance has been accomplished through additional tonnage and not through increased operating efficiency. Additions to the fleet of 70 percent in deadweight tons resulted in a ton-kilometer performance increase in 1955 of only 47 percent above the level of 1950.

The Sixth Five Year Plan provides for a substantial increase in the efficiency of the river fleet. Labor productivity is scheduled to increase 35 percent; productivity of dry cargo tugs, 30 percent; performance of self-propelled cargo ships, 36 percent; and non-self-propelled ships, 33 percent above the level of 1955. 146/ The addition of many

\* Table 11 follows on p. 43.

S-E-C-R-E-T

Table 11

Estimated Performance of Inland Waterways in the USSR  
Selected Years, 1940-55

Year	Cargo Fleet (Million Dead- weight Tons)	Cargo Performance					
		Freight Ton-Kilometer Performance (Billion Ton-Kilometers)			Thousand Ton-Kilo- meters per Dead- weight Ton of Barge Capacity Available		Index (1940 = 100)
		Total	Excluding Rafted Timber	Total	Excluding Rafted Timber	Total	Excluding Rafted Timber
1940	8.1 <u>a/</u>	35.9 <u>b/</u>	24.2	4.4	3.0	100	100
1945	3.8 <u>c/</u>	18.2 <u>d/</u>	13.2	4.8	3.5	109	117
1950	7.1 <u>c/</u>	45.9 <u>b/</u>	24.9	6.5	3.5	148	117
1954	10.8 <u>c/</u>	62.4 <u>b/</u>	34.3	5.8	3.2	132	107
1955	12.0 <u>c/</u>	67.4 <u>b/</u>	37.9	5.6	3.2	127	107

- a. 147/
- b. 148/
- c. 149/
- d. 150/



## S-E-C-R-E-T

higher speed vessels and the mechanization of port operations will be instrumental in achieving these optimistic goals. Judging from past trends, however, the goals probably will be unfulfilled by 1960.

#### 4. Maritime Service.

The Soviet merchant fleet historically has been characterized by a low level of operating efficiency. Vessels are poorly maintained, cargoes are handled inefficiently and badly stowed, and the productivity of ships' crews is generally below European standards. In spite of all efforts by Soviet planners, these conditions still prevailed to a serious degree through 1955.

There have been some improvements in recent years. The plan to increase freight turnover in 1955 by 55 to 60 percent above the level of 1950 was exceeded by a wide margin. It is estimated that ton-kilometer performance in 1955 exceeded the 1950 performance by approximately 74 percent (see Table 3\*). Dry cargo vessels were to increase their cargo-carrying performance (in terms of tons hauled per ton of freight-carrying capacity) by 19 percent in 1955 above that of 1950, and tankers were to increase their performance by 21 percent above that of 1950. 151/ Although precise data on all aspects of performance are not available, it appears that all these targets were overfulfilled, thus reflecting substantial progress toward raising the level of operating efficiency.

Operating conditions in the maritime fleet are far from satisfactory, especially in regard to idle time in port. Although current over-all data for 1955 operations are fragmentary, the extent of idle time in port in 1954 is known to have been serious, particularly in the Far East. 152/ In a 9-month period, nonproductive time spent by Soviet ships in port accounted for 27 percent of all port time. There is little reason to believe that this percentage dropped substantially in 1955.

The estimated index of performance of the maritime service of the USSR in selected years, 1940-55, is shown in Table 12.\*\* This index, which is in terms of ton-kilometer performance per deadweight

\* P. 18, above.

\*\* Table 12 follows on p. 45.

## S-E-C-R-E-T

ton of shipping available, indicates a substantial gain in efficiency during the period of the Fifth Five Year Plan, especially in 1954 and 1955, although 1955 was slightly lower than 1954.

Table 12

Estimated Index of Performance of the Maritime Service  
in the USSR <sup>a/</sup>  
Selected Years, 1940-55  
(In Terms of Ton-Kilometer Performance  
Per Deadweight Ton of Shipping Available)

	1940 = 100	
<u>Year</u>	<u>Dry Cargo</u>	<u>Petroleum Tankers</u>
1940	100	100
1950	175	97
1954	210	113
1955	206	137

a. 153/

There are indications that continued emphasis will be placed upon improvement in operating efficiency in 1956-61. It is planned to increase the productivity of the dry cargo fleet by 34 percent and that of tankers by at least 25 percent in 1960 above that in 1955. 154/ Although these increases appear high, there is much unused fleet capacity, principally because of excessive idle port time.

It is believed that the level of operating efficiency in the maritime fleet for the next 5 years will be raised principally by the addition of new modern vessels. Tankers which will be much more efficient than those now in the fleet are reported to be in the design stage -- ships of 20,000 to 25,000 dwt, 155/ which is about double the tonnage of tankers now in serial production. New designs for dry cargo vessels will also help to increase efficiency. Furthermore, the Plan has provided for a program whereby 65 percent of all cargo handling in ports will be mechanized by 1960. Such a program would vastly raise efficiency by decreasing port time and thus reducing vessel turnaround time, which in turn will increase vessel utilization.

## S-E-C-R-E-T

5. Civil Aviation.

The present level of utilization of aircraft of Aeroflot, the Soviet civil air carrier, is slightly lower than that of large Western air carriers. [redacted]

[redacted] Aeroflot's utilization approximates US domestic airline experience with twin-engine aircraft. 156/ Applying the Soviet formula, it is estimated that available Li-2's and IL-12's had to fly daily 5.5 hours and 5.2 hours, respectively, in order to meet the 1954-55 winter schedules. This is to be compared with about 6 hours per day for major trunk lines operating twin-engine aircraft (DC-3's) in the US. 157/

50X1  
50X1

Operating efficiency is affected by several factors which are considered adverse by Western standards, including a lack of uniform proficiency among operating personnel and a lack of proper maintenance of aircraft. The continued dependence on two-engine aircraft such as the Li-2 and the IL-12 is a major obstacle to increasing air transport performance. The slow speed and low payload of these aircraft would make it impossible for Aeroflot to compete with modern commercial air operations of the West in terms of present operational equipment.

The current pattern of development of Aeroflot probably will lead toward some over-all improvement in its level of operating efficiency. It probably will continue to share in the technological advances, administrative improvements, and educational progress of Soviet military aviation. Improvements in airfield lighting, navigational aids, and pilot training probably will result in more all-weather and night flying. Further development of the current route network is indicated by the improvement of civil air facilities and by the addition of new routes. It is also to be expected that by 1961 at least one type of modern high-performance transport aircraft will be operational on long-range domestic and international routes. The TU-104 was put into scheduled domestic service during 1956. 158/ The TU-114, a 4-engine jet, and the IL-18, a turboprop capable of carrying 70 passengers, are under development; the latter, which is in prototype, is said to be ready for use.

In conclusion, future improvements in the level of efficiency will depend largely upon the availability of aircraft capable of a greater payload and upon the standardization of operating practices in accordance with generally accepted standards of international commercial air transport.

- 46 -

S-E-C-R-E-T

## S-E-C-R-E-T

B. Employment and Labor Productivity.

The plan for transport labor in the USSR deals with the question of labor productivity and the level of employment required to sustain the prescribed volume of traffic. The labor plan, therefore, is closely linked with the plan for traffic, the aim being to increase the productive capacity or efficiency of labor so that the number of workers increases at a rate less than that of the increase in traffic. The estimated number of employees in the transport sector in the USSR in 1948-55 is shown in Table 13.\* A comparison of the growth patterns of employment, traffic, and labor productivity in the transport sector in the USSR in 1948-55 is shown in Table 14.\*\*

The rate of growth in labor productivity for total transport in the US in the same period is somewhat above that in the USSR. The relatively high annual rate of growth of labor productivity estimated for total Soviet transport is to be expected, especially in view of the emphasis placed upon labor-saving capital equipment inputs into the Soviet system in recent years. In 1955 there was an 11-percent gain above the level of 1954 but only a 4-percent gain for 1954 above the level of 1953, clearly indicating that the USSR is relying on technology more and more.

Rail labor productivity has shown a constant annual rate of growth in the USSR. An analysis of labor productivity for US railroads indicates a current level of about 952,000 cumulated tkm\*\*\* per operating employee, which is 70 percent above the Soviet level. Further analysis discloses, however, that the current annual rate of growth in rail cumulated ton-kilometers in the USSR is considerably above that in the US. The labor productivity of railroads in the USSR in selected years, 1928-55, is shown in Table 15.\*\*\*\* Rail labor productivity since 1948 has increased 78 percent, but labor productivity for total transport has increased only 65 percent.

Although skilled labor has been in short supply for some 20 years in the USSR, the supply of capital equipment has been even scarcer. This situation has been especially pronounced in the transport sector, where an investment program large enough to enable the railroads to

---

\* Table 13 follows on p. 48.

\*\* Table 14 follows on p. 48.

\*\*\* Freight ton-kilometers plus passenger-kilometers.

\*\*\*\* Table 15 follows on p. 49.

Table 13

Estimated Number of Employees in the Transport Sector in the USSR a/  
1948-55

	Thousand Employees							
Transport Sector	1948	1949	1950	1951	1952	1953	1954	1955
Railroads	1,636	1,681	1,712	1,760	1,842	1,915	1,968	1,980
All others	2,265	2,327	2,370	2,567	2,710	2,861	3,012	3,067
Total	3,901	4,008	4,082	4,327	4,552	4,776	4,980	5,047

a. 159/

Table 14

Index of Growth Patterns of Employment,  
Traffic, and Labor Productivity  
in the Transport Sector in the USSR a/  
1948-55

	1948 = 100							
	1948	1949	1950	1951	1952	1953	1954	1955
Employment	100	103	107	111	117	122	128	129
Traffic (cumulated ton-kilometers)	100	115	129	151	158	174	189	214
Labor productivity	100	112	123	130	135	142	148	165

a. Employment data are from Table 13; traffic volume data are from Tables 3 and 4 (pp. 18 and 21, respectively, above).

## S-E-C-R-E-T

Table 15

Labor Productivity of Railroads in the USSR a/  
Selected Years, 1928-55

<u>Year</u>	<u>Thousand Cumulated Ton-Kilometers <u>b/</u> per Operating Employee</u>
1928	137
1938	367
1940	364
1945	275
1948	315
1950	403
1954	501
1955	561

b. Freight ton-kilometers plus passenger-kilometers.

50X1

keep pace with traffic demands would have been too large to be approved by the Soviet leaders. Consequently, the hard-pressed transport officials have been driven to make intensive use of their routes, facilities, and equipment while employing relatively large quantities of labor compared with the US. The observed characteristics of Soviet transport operations are therefore consistent with what could be expected under rational allocation of resources. With additional inputs of capital equipment, the labor productivity index will no doubt approach a position which will compare more favorably with that of the US.

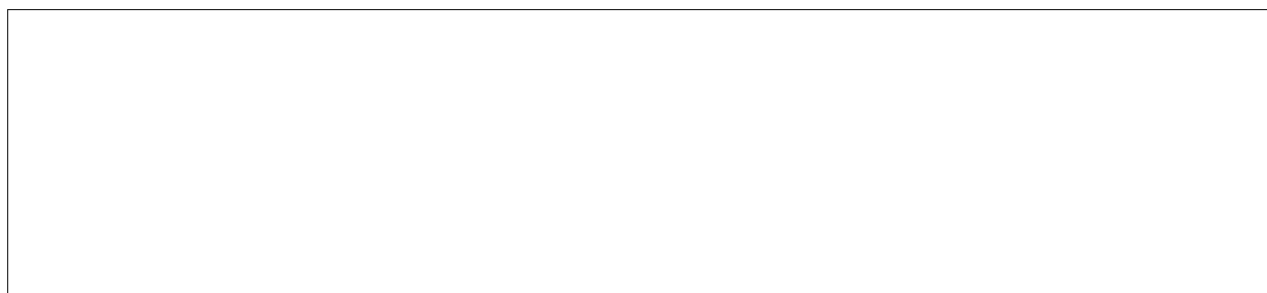
The planned increase in labor productivity for transport in 1960 appears to be consistent with the planned capital investment for the sector. During the Sixth Five Year Plan, railroads are to increase their level of labor productivity by 34 percent, inland waterways by 35 percent, and the maritime service by 40 percent. 161/ Actual performance attained between 1950 and 1955 for total transport is estimated to be 34 percent (see Table 14\*). During the next 5 years, any increases in labor

\* P. 48, above.

## S-E-C-R-E-T

productivity of the magnitude outlined in the plan are dependent, however, upon the plan fulfillment in other parts of the transport sector. The increase in rail labor productivity, for example, is predicated upon many planned technological innovations, such as an increase in the production and delivery of more and better electric and diesel-electric locomotives; an increase in average car capacity; and the improvement of many other technical phases of the industry, such as double tracking, automatic block signaling, and centralized traffic control which will permit higher train densities. 162/ The increase for the water carriers is to be achieved through the addition of more powerful and modern vessels, mechanized loading and unloading facilities, and a general reduction in turnaround time.

Although the announced plan for 1960 said nothing about the planned increase in labor productivity for highway and air transport, the same general optimism is implied in the plan for traffic performance. The labor productivity of motor vehicles will no doubt increase significantly by 1960 through the use of larger and faster units operating over more and better surfaced highways. 163/ Air transport will show a comparable increase through the introduction of faster, higher capacity aircraft. Given these inputs, it is highly likely that labor productivity will reach its planned goal.

V. Demand for Transport Services.A. Total National Requirements.

50X1

The tonnage index of production  includes six basic raw materials: coal, petroleum, steel, timber, grain, and cement.  If data had been available, it is probable that these forecasts could have been improved by the inclusion of such items as ores, mineral construction

50X1

50X1

## S-E-C-R-E-T

materials (other than cement), consumer goods, and agricultural commodities other than grain. [REDACTED]

50X1  
50X1

These studies show that Soviet coal production, for example, has been closely associated with coal and coke rail ton-kilometers in a well-defined and stable relationship from 1923 through 1951 in such a way that a straight line will predict actual observations with an average error of plus or minus 4 percent. 165/ For the other four indicators [REDACTED] traffic proved to be somewhat less stable and more complex. Generally, however, there is a strong tendency to raise the amount of transport associated with given additional output for each selected commodity. This relationship is to be expected because, as the production of raw materials is expanded, it becomes necessary to draw upon progressively lower grade materials or upon material located at greater distances from the principal markets.

50X1

[REDACTED] find a significant correlation between aggregate freight traffic and total industrial output.

50X1  
50X1

The degree of parallelism in trends of industrial output and aggregate freight ton-kilometers is brought out clearly through the use of a scatter diagram. The Hodgeman industrial production index is used as a reliable indicator for over-all industrial output for the prewar series, and the ORR industrial production index is used as the most reliable for the 1948-55 period. 166/ These indexes of industrial production and aggregate freight ton-kilometers for 1928-40, 1948-55, and 1960 are shown in Table 16.\* The accompanying chart (Figure 6\*\*), which shows these relationships for the two periods, has been produced by linking the two series and plotting them with aggregate ton-kilometers of freight carried by all carriers.

If regression lines are fitted to the series (one for the over-all period 1928-54 and one each for the 1928-40 and the 1948-55 series), it is apparent that there is a close correlation between production and ton-kilometers. It is also apparent, however, that the 1948-55 trend lies only slightly below the 1928-40 line, which is quite close to the 1928-55 long-run trend. This would seem to indicate that Soviet

\* Table 16 follows on p. 52.

\*\* Following p. 52.



## S-E-C-R-E-T

industrial production is now associated with slightly lower levels of freight ton-kilometers than was the case in 1928-40. Nevertheless, the postwar trend is not very different from the 1928-40 trend.

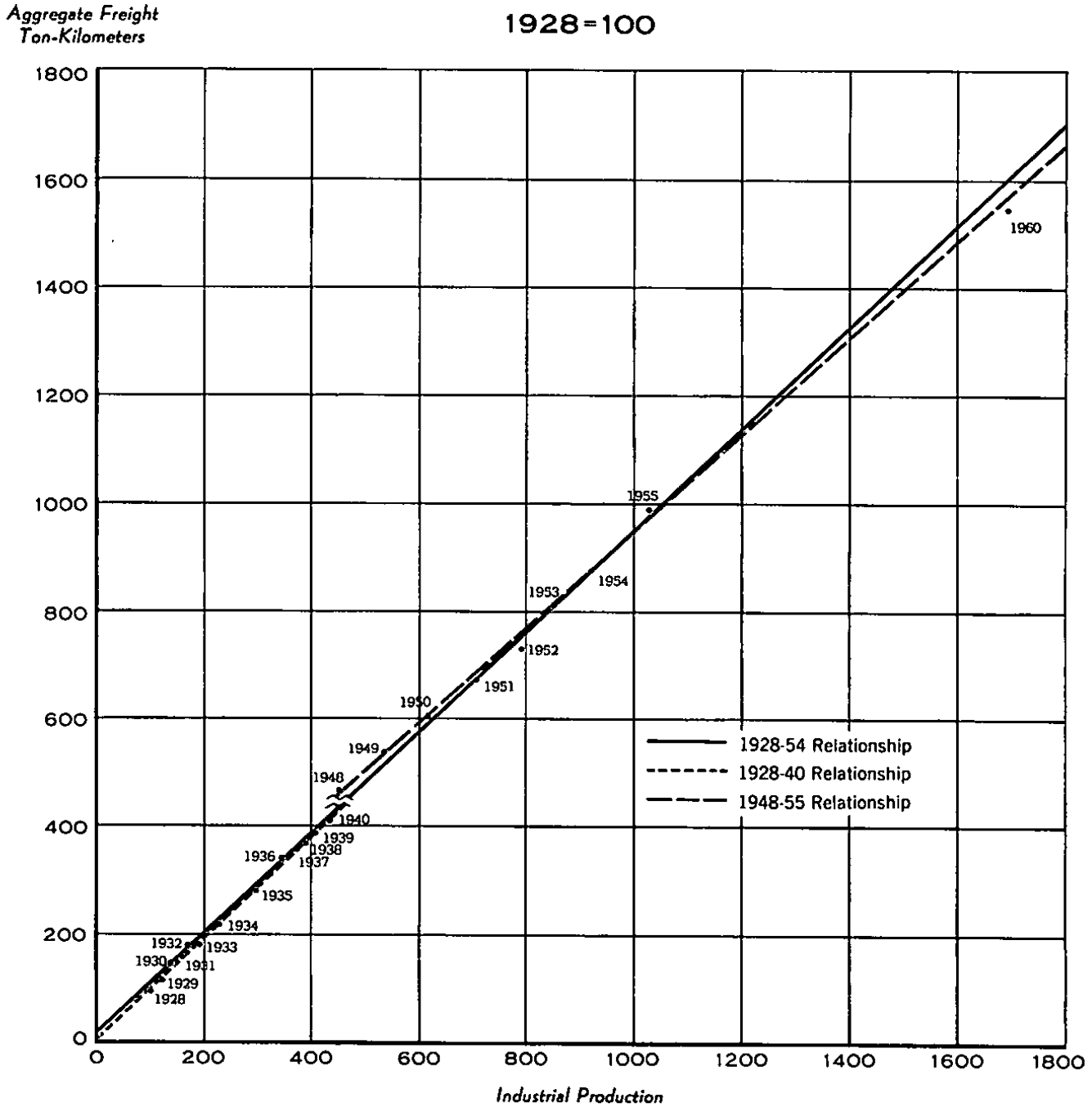
Table 16

Indexes of Industrial Production  
and of Aggregate Freight Ton-Kilometers in the USSR  
1928-40, 1948-55, and 1960

1928 = 100

Year	Index of Industrial Production (X)	Index of Aggregate Freight Ton-Kilometers (Y)
1928	100	100
1929	120	120
1930	139	145
1931	164	167
1932	172	183
1933	192	188
1934	229	226
1935	295	280
1936	344	343
1937	371	367
1938	388	378
1939	407	393
1940	430	410
1948	450	466
1949	535	539
1950	612	604
1951	706	675
1952	787	732
1953	846	814
1954	927	880
1955	1,026	998
1960	1,693	1,546

# USSR INDEXES OF INDUSTRIAL PRODUCTION AND AGGREGATE FREIGHT TON-KILOMETERS 1928-40, 1948-55, and 1960



25732 1-57

S-E-C-R-E-T

In view of the difficulties of long-range prediction, such studies are not considered to be bases for output-traffic ratio estimates, but rather attempts to show where present trends, if continued, would lead. Some weight, however, must be given to such analysis, because all studies have shown an unusually close relationship in recent years between aggregate freight ton-kilometers and industrial output in the USSR, and the closeness of this relationship is explainable.

The implied growth rates of transport calculated by this technique appear high for a sustained period in terms of Western experience. When these results are combined, however, with past Soviet achievement, with the Kaganovich forecasts of 8 May 1954, and with the Sixth Five Year Plan, transport performance through 1960 may be estimated with some degree of confidence to be approaching, if not reaching, the level suggested by the output-traffic ratios.

[redacted] an abatement of freight traffic growth during the early years of the Sixth Five Year Plan, it is now clear that such an abatement is not probable in the near future, because Kaganovich's predictions and the Sixth Five Year Plan combine with the 1948-55 record to indicate a continued rise in freight traffic along with the growth in industrial output. Kaganovich stated in his speech of May 1954:

50X1  
50X1

If the railroads are already working under a strain at the moment, then in view of the prospects for a large increase in the coming years, and especially in view of its geography, this strain may turn, if serious measures are not taken, into a failure to meet the economy's shipping needs. It is necessary to anticipate this. It is necessary to foresee that railroad freight shipments will grow by 1960 [by] no less than 50 to 60 percent [above 1953]. Transport must handle a growth in heavy industrial freight combined with continuously growing agricultural and consumer-goods freight. 167/

Kaganovich's prediction of a high growth rate in Soviet transport was further expanded in a forecast that on the railroads in 1960 coal traffic would increase no less than 60 percent; petroleum by 70 percent; iron, steel, and ores by 60 percent; cement by 100 percent; and consumer goods shipments by at least 300 percent above the level of 1953.

## S-E-C-R-E-T

Although Kaganovich definitely referred to rail traffic when predicting growth rates for the three basic commodities and consumer goods, it is clear that Soviet planning has been altered since May 1954. Consumer goods traffic by rail in 1960 was predicted to be three times the 1953 volume. Such a demand for transport of consumer goods hardly seems feasible now in view of the 60-percent increase forecast for light industry during 1955-60.

The calculations underlying the traffic forecasts through 1961 (as presented in Table 3\*) are based on the Sixth Five Year Plan; however, the total traffic volume envisaged by Kaganovich is only slightly below the plan forecast. These forecasts increase the volume of total traffic planned for 1961 at an average annual rate of growth of approximately 8 percent. This growth rate is significant in the light of trends in the average length of rail haul and the expected growth in the volume of freight carried by water and highways relative to the railroads. The estimated rate of growth of freight traffic and length of rail freight haul in the USSR in 1949-55 are shown in Table 17.\*\* (See also Table 1.\*\*\*) Increases in rail ton-kilometers are calculated to grow at an average annual rate of 7 percent through 1961. Clearly, such trends indicate that a declining share of the total traffic is planned for the railroads.

Kaganovich pointed out in his address of May 1954 that great success had been accomplished in keeping the average length of haul from being higher than it is, although Soviet authorities preferred a downward trend. He later stated in his speech to the XXth Party Congress: "It is necessary to utilize more extensively ... , to develop individual areas in a complex manner, to intensify the processing of goods on the spot which, parallel with improved planning of transport and marketing, will make possible the elimination of irrational kinds of transport like two-way transport, repetitive transport, excessively long-distance transport, and so forth. This is an important and serious task of the Sixth Five Year Plan." It appears evident, therefore, that the railroads have had little success in reducing this operating factor to the level desired by the planning officials. It is significant that the average length of haul has shown annual increases each year since 1949, when it was reported as 712 km. In 1953 it was 752 km and then rose to an estimated 757 km

---

\* P. 18, above.

\*\* Table 17 follows on p. 55.

\*\*\* P. 2, above.

S-E-C-R-E-T

Table 17

Estimated Rate of Growth of Freight Traffic  
and of Length of Rail Freight Haul  
in the USSR  
1949-55

Year	Percentage Increase of Ton-Kilometers Above Preceding Year <sup>a/</sup>					Average Length of Rail Freight Haul (Kilometers)
	Railroads	Highways	Inland Waterways	Maritime Service	Total	
1949	15.6	27.9	20.8	8.1	15.8	712
1950	13.1	15.5	11.4	6.4	12.7	722
1951	11.9	11.9	11.11	1.8	11.2	746
1952	9.0	20.0	11.8	8.9	9.5	749
1953	10.7	18.5	3.3	9.1	10.4	752
1954	7.2	17.2	5.9	17.9	8.1	757
1955	13.3	13.3	8.0	21.7	13.4	766

a. Calculations are based on data in Table 3, p. 18, above.

S-E-C-R-E-T

## S-E-C-R-E-T

in 1954. In 1955, still unable to arrest the climb, it was reported to be 766 km. The war period of 1942-45 is the only one in Soviet history in which this important factor of railroad operations has exceeded its present length. During that time, however, a large part of the territory which has historically generated much of the short-haul traffic was overrun by the Germans, thus invalidating any direct comparisons between the two periods.

It appears evident that the length of haul cannot be reduced greatly, if at all, because (1) any transfer of short-haul traffic to the highways would result in an increase in the average length of rail movement, and (2) lateral growth (development of the outlying marginal areas) at a rapid rate will also tend to raise this index. Both of these programs were given an added impetus by the Sixth Five Year Plan -- that is, by the completion of the new lands program and by the emphasis upon the development of eastern Siberia. Both of these programs are inconsistent with the plans for reducing the average length of haul.

Prospects for growth in freight traffic moved by carriers other than railroads depend on the performance of each type of carrier individually, although it is emphasized that even as a group the role of the nonrail carriers is a minor one compared with that of the railroads. Kaganovich told transport officials that water shipments (inland water and maritime combined) would have to increase their 1953 performance 2-1/2 to 3 times by 1960. He challenged the water carriers to try to achieve by 1960 a performance figure that is at least 18 to 20 percent of the sum of rail and water traffic. The lower goals set in the Sixth Five Year Plan demonstrate that this figure was too optimistic -- inland waterways in 1960 are to increase performance 80 percent above that of 1955, and maritime traffic is to increase its performance approximately 2.1 times above that of 1955. Such plans, if fulfilled, will increase water transport's share of total traffic to 15 percent in 1960 from an estimated 11.5 percent in 1955.

Kaganovich said nothing about highway and air prospects, but the Five Year Plan reflects the same optimism that is evident in the rail and water targets. Both highway and air carriers are to double the 1955 performance in 1960.

In conclusion, it is significant that the growth rates which emerge from the Kaganovich forecasts of May 1954 and from the Sixth Five Year Plan announced in January 1956 have the same order of

## S-E-C-R-E-T

magnitude as those predicted by a 1948-55 transport-output analysis. The uniformity exhibited by the various freight traffic estimates is perhaps sufficient to emphasize the reliability which may be attached to the estimates through 1961. If the Soviet economy is to increase industrial production during the Sixth Five Year Plan by approximately 65 percent, the transport sector of the economy will have to accomplish the planned increase of at least 50 percent above the level of 1955. Some relief, however, is expected by increasing pipeline haulage to about 83 billion tkm, which is six times the level of 1955. Reductions in the average length of haul for all carriers are contemplated, but success is doubtful for the reasons stated above. It therefore appears that during the Sixth Five Year Plan transport will fulfill -- probably overfulfill -- the task set forth in the plan.

B. Per Capita Volume of Transport.

Per capita analysis gives a yardstick for appraising the magnitude of Soviet transport performance. The estimated per capita volume of freight and passenger transport in the USSR, by type of carrier, in 1950, 1955, and 1961 is shown in Table 18.\* Calculations in this table, based on ton-kilometer performance data given in Table 3,\*\* show that the Soviet national product in 1955 entailed a haulage of goods of about 5,940 tkm per person, based on an estimated population of 198.5 million in 1955. The corresponding total for the US was 8,580 tkm, based on a population of 162 million persons.\*\*\*

Although examination of passenger traffic shows somewhat similar disparities between the USSR and the US, such differences may be more apparent than real because they are based on conventional statistical comparisons of commercial traffic. Allowances for US private travel -- which is negligible in the USSR -- cannot be accurately measured, thus invalidating conventional comparison between the two. Statistics reported by the US common carriers show that the US per capita volume of passenger traffic currently amounts to about 500 passenger-kilometers. If the statistics for private automobile travel, which are estimated by the Interstate Commerce Commission to account for 92 percent of US travel, are included, then the US performed 6,170

---

\* Table 18 follows on p. 58.

\*\* P. 18, above.

\*\*\* See Table 5, footnote a (p. 23, above), for ton-kilometer performance not included in the per capita consumption in the US.

## S-E-C-R-E-T

passenger-kilometers per capita in 1954. 168/ Calculations in Table 18, based on passenger-kilometer estimates in Table 4,\* show the per capita demand for passenger transport in the USSR.

Table 18

Estimated Per Capita Volume of Freight and Passenger Transport  
in the USSR, by Type of Carrier  
1950, 1955, and 1961

Type of Carrier	Ton-Kilometers per Person		
	1950 <u>a/</u>	1955 <u>b/</u>	1961 <u>c/</u>
Railroads	3,355.0	5,063.0	6,879.0
Highways	110.0	189.0	423.0
Inland waterways	252.0	340.0	600.0
Maritime service	218.0	347.0	716.0
Civil aviation	0.8	1.5	2.9
<b>Total</b>	<b><u>3,935.8</u></b>	<b><u>5,940.5</u></b>	<b><u>8,620.9</u></b>
Passenger-Kilometers per Person			
Railroads	482	712	977
Highways	29	105	323
Inland waterways	15	18	19
Maritime service	7	8	8
Civil aviation	7	14	57
<b>Total</b>	<b><u>540</u></b>	<b><u>857</u></b>	<b><u>1,384</u></b>

a. Based on midyear population of 182.4 million and data in Tables 3 and 4, pp. 18 and 21, respectively, above.

b. Based on midyear population of 198.5 million and data in Tables 3 and 4.

c. Based on midyear population of 220.1 million and data in Tables 3 and 4.

\* P. 21, above.



S-E-C-R-E-T

VI. Transport Investment and Capital-Output Ratios.

In all branches of the Soviet transport sector, investment inputs in the past have been maintained at a minimum by squeezing the maximum output from the existing plant and equipment, with minimum additions to both. It appears that this reluctance to increase the absolute volume of capital inputs has had some effect upon the growth and performance of the sector. An analysis of the Sixth Five Year Plan and the XXth Party Congress speeches clearly indicates that Soviet policymakers are now aware of the economic pitfalls which can result from minimizing transport investment. Large volumes of funds will have to be directed to transport at the expense of other sectors of the Soviet economy. A burden on Soviet capital resources in the next several years probably will be the development of a modern highway system, which is so far virtually nonexistent. To some extent the expansion of the road net is an alternative to increasing the capacity of the rail system, but in many respects the two are complementary rather than competitive. Much investment especially will be needed to expand the net of secondary roads if they are to cope with the demands placed upon them by an expanding agricultural program. The opening of more outlying areas and the burden imposed on transport by the ambitious production goals of the Sixth Five Year Plan should give impetus to investment in transport during the next 5 years.

A. Sources of Transport Investment and Working Capital.

The flow of funds into the transport sector, both for fixed and working capital expenditures, is from two sources in the USSR -- budget allocations from the Soviet state budget and retained profits from the transport sector itself. The estimated budget and nonbudget allocations for transport and communications in the USSR in 1948-56 are shown in Table 19.\*

The share of transport in total budget allocations since World War II appears to have remained rather constant, claiming about 9 to 10 percent each year except for 1951 and 1952, when it was given 6.7

\* Table 19 follows on p. 60.

S-E-C-R-E-T

S-E-C-R-E-T

Table 19

Estimated Budget and Nonbudget Allocations  
for Transport and Communications in the USSR a/  
1948-56

Year	State Budget Allocations		Nonbudget Allocations		Total Allocations	
	Billion Current Rubles	Percent of Total	Billion Current Rubles	Percent of Total	Billion Current Rubles	Percent of Total
1948	14.3 <u>b/</u>	9.9	2.2 <u>b/</u>	14.3	16.5	10.2
1949	14.7 <u>b/</u>	9.6	6.7 <u>b/</u>	17.9	21.4	11.2
1950	15.0 <u>b/</u>	9.1	17.5 <u>b/</u>	43.0	32.5	18.3
1951	11.9 <u>c/</u>	6.7	20.2 <u>b/</u>	23.3	32.1	11.8
1952	14.3 <u>b/</u>	8.0	19.7 <u>b/</u>	22.7	34.0	12.8
1953	17.4 <u>b/</u>	9.0	20.0 <u>b/</u>	20.4	37.4	12.8
1954	21.5 <u>b/</u>	10.0	17.3 <u>d/</u>	15.6	38.8	10.0
1955	23.0 <u>e/</u>	10.5	17.5 <u>e/</u>	14.6	40.5	12.1
1956	21.8 <u>f/</u>	9.2	18.8 <u>f/</u>	17.1	40.6	11.7

a. Communications have generally taken 3 to 5 percent of the total allocated to transport and communications.

- b. 169/
- c. 170/
- d. 171/
- e. 172/
- f. 173/

## S-E-C-R-E-T

percent and 8 percent, respectively.\* 174/ Budget outlays for transport in 1955 were estimated at 23 billion rubles, an increase of 61 percent above the 1948 expenditure of 14.3 billion rubles.

When nonbudget expenditures -- that is, appropriated outlays financed by the sector itself -- are added to the state budget allocations, it is apparent that transport and communications have consistently claimed approximately 12 percent of total expenditures. In one year, 1950, their share jumped to a high of 18.3 percent, but this probably was an effort to offset 1948 and 1949, when the sector was allocated only 10.2 and 11.2 percent, respectively, of total expenditures of the national economy.

B. Capital Investment.

Total allocations to investments in fixed capital and expansion of working capital in the USSR are outlined in the state budget, which gives the amounts that will come from the budget and the amounts that will come from transport's internal funds. In recent years this breakdown of allocations for transport has not been published; however, the total state budget allocations amounted to 120 percent of the total capital investment for 1955. In 1956, budget allocations were only 300 million rubles more than total planned capital investment. That portion of the investment program which is not financed by the state budget is covered from transport's internal funds, derived principally from amortization deductions and profits set aside for investment purposes.

Investments in transport and communications have been about 12 percent of total state investments during recent years. 175/ The plan for 1956 provided for slight increases, however, both absolutely and as a percent of total investments. 176/ These increases probably are the result of greater demands for transport services in the new lands and of underfulfillment of investment goals of the Fifth Five Year Plan.

---

\* These percentages are for both transport and communications because, beginning with the 1938 Plan, the Soviet budget has combined the two. Generally, the share of communications has been only about 3 to 5 percent of the total allocation for the sector.

## S-E-C-R-E-T

The estimated outlays for capital investment in transport and communications in the USSR in 1948-56 are shown in Table 20. The amount for rail investment has been isolated from the total and is also shown in the table. The difference between total investment and rail investment went to all other forms of transport plus communications. Although the percent of the total claimed by railroads has fluctuated greatly during the period, their share dropped from 82 percent in 1948 to 63 percent in 1955, thus indicating the emphasis which is currently given to increasing the role of the other carriers.

Table 20

Estimated Outlays for Capital Investment  
in Transport and Communications in the USSR a/  
1948-56

<u>Billion Current Rubles</u>		
<u>Year</u>	<u>Total Transport Investment</u>	<u>Rail Investment</u>
1948	7.9	6.5
1949	10.5	8.3
1950	15.8	9.9
1951	16.3	11.0
1952	15.5	9.7
1953	17.7	11.1
1954	18.6	11.6
1955	19.5	11.9
1956	21.5	N.A.

a. 177/. Communications have generally taken 3 to 5 percent of total capital investment for transport and communications.

C. Trends in Fixed Assets.

The position of fixed assets (capital stock) of Soviet transport as related to the total assets of the economy does not seem to have changed radically during the postwar years compared with the decade preceding the war. In 1924 the transport plant and equipment accounted for 19.5 percent of the total assets of the economy, and railroads alone accounted for 17.3 percent. 178/ The share of transport fell somewhat during the next 4 years, but in 1928 it was still

## S-E-C-R-E-T

17.7 percent of the total, with railroads claiming 15.4 percent of the total. By 1933 the railroads' share had increased only 0.3 percent. At the beginning of the Third Five Year Plan in 1938 the value of all rail property had increased to one-sixth of the country's fixed capital stock. 179/

Evidence indicates that postwar trends have maintained the same general pattern as those for the prewar period. T.S. Khachaturov stated that in 1942 transport accounted for 20 percent of the country's fixed assets and that railroads alone made up about 15 percent of the total. 180/ In 1955, Gudok, the trade publication of the railroad industry, reported that rail fixed assets were one-sixth of the total for the country. 181/

The estimated fixed assets as well as investment, output, and capital-output ratios for railroads in the USSR in 1924-40 and 1945-55 are shown in Table 21.\*

50X1  
50X1

#### D. Capital-Output Ratios.

The effectiveness with which Soviet transport capital has been used may be investigated by combining data on the total value of the transport plant and equipment (assets) and data on the output of the system (value of the transport product). If a precise annual series could be built up, increments in fixed assets could be brought into direct correspondence with data on annual investment. Unfortunately, Soviet asset and investment statistics for total transport are full of obscurities, and the available data cannot be used with full confidence. Some data are available on railroad assets and investment, however, and these can be employed with some confidence. Thus the analysis in this report must necessarily be confined solely to the railroad branch of the transport sector.

The series of data in Table 21 indicate that during 1924-27 fixed assets remained fairly constant while output doubled. It is evident that the system was operating below capacity in 1924. From 1927 through 1939, assets doubled, but output more than quadrupled. The industrialization period clearly brought with it a sharp rise in

\* Table 21 follows on p. 64.

S-E-C-R-E-T

Table 21  
 Estimated Fixed Assets, Investment, Output, and Capital-Output Ratios  
 for Railroads in the USSR <sup>a/</sup>  
 1924-40 and 1945-55

Year	(1) Fixed Assets b/ (Billion 1933 Rubles)	(2) Investment c/ (Billion 1933 Rubles)	(3) Cumulated Ton- Kilometers d/ (Billion Ton- Kilometers)	(4) Output e/ (Billion 1934 Rubles)	(5) Capital-Output Ratio (1) ÷ (4)
1924	11.1	N.A.	49	0.9	12.3
1925	11.0	0.30	66	1.2	9.2
1926	11.1	0.54	92	1.7	6.5
1927	11.2	0.93	104	2.0	5.6
1928	11.5	0.97	118	2.2	5.2
1929	11.9	1.21	145	2.7	4.4
1930	12.5	1.54	186	3.5	3.6
1931	13.3	2.20	214	4.0	3.3
1932	14.2	2.40	253	4.8	3.0
1933	15.5	2.11	245	4.6	3.1
1934	16.6	2.48	277	5.2	3.2
1935	17.4	4.34	326	6.1	2.9
1936	18.8	3.90	401	7.5	2.5
1937	20.4	4.26	446	8.4	2.4
1938	21.3	4.65	462	8.7	2.5
1939	22.1	4.95	486	9.1	2.4
1940	26.9	5.55	513	9.6	2.8
1945	25.8	4.50	414	7.8	3.3
1946	27.8	5.00	465	8.7	3.2
1947	32.7	5.20	473	8.9	3.7
1948	34.5	5.75	543	10.2	3.4
1949	36.1	5.50	622	11.7	3.1
1950	40.2	7.80	700	13.2	3.0
1951	43.0	9.40	783	14.7	2.9
1952	46.0	8.90	854	16.1	2.9
1953	N.A.	10.00	942	17.7	N.A.
1954	N.A.	10.70	1,016	19.1	N.A.
1955	N.A.	11.00	1,146	21.5	N.A.

b. 183/

See Table 20 (p. 62, above) for 1948-55.

d. Freight ton-kilometers plus passenger-kilometers. Figures for 1954 and 1955 were calculated from Tables 3 and 4 (pp. 18 and 21, respectively, above).

S-E-C-R-E-T

50X1  
 50X1  
 50X1

## S-E-C-R-E-T

the intensity with which plant and equipment were employed. The capital-output trend in the postwar period shows a close relationship to that in the prewar series.

The changing relationships among the series can be made more apparent through the use of a scatter diagram relating output to fixed assets. The accompanying chart (Figure 7\*) presents data drawn from Table 21. The output attained during 1924-27 gave way to a smoothly declining productivity of capital during 1928-39. Except for 3 years -- 1933, 1934, and 1935 -- the observations lie close to a hypothetical curve convex toward the X-axis. During these years, even though the railroads were receiving additions to their capital plant and equipment, operating difficulties prevented them from producing the large increments in transport service which were required by the economy. After the 1935 reorganization under Kaganovich, capital productivity immediately sprang back to the long-run trend.

In 1945-47 the annual relationships between fixed assets and output clearly show that postwar reconversion and the effects of wartime disorganization hampered the effectiveness of the railroads' performance. In 1948-49 the recovery process generated rapid gains, and the 1950-52 relationship is similar to that in the prewar period.

In the opening years of forced industrialization (1928-32), assets rose from 11.5 billion to 14.2 billion rubles at 1933 prices, for an increment of 2.7 billion. Using cumulated ton-kilometers as a measure of output, the 1932 level was 135 billion cumulated tkm above that of 1928. An increase of 100 billion cumulated tkm in output was associated, therefore, with an asset increment of 2 billion rubles. In 1936-39, assets rose by 3.3 billion rubles, while output increased by 85 billion cumulated tkm. In this period the additional assets associated with 100 billion cumulated tkm of output rose to 3.9 billion rubles compared with 2 for the earlier period. There was, therefore, almost a doubling in the amount of capital necessary to obtain a given increment in output.

During the rapid postwar recovery period (1947-49) an increment of 3.4 billion rubles in assets was associated with 149 billion cumulated tkm of output. In this period an increase of 100 billion cumulated tkm of output was associated with an asset increment of 2.3 billion rubles, not very different from the situation in 1928-32.

\* Following p. 66.

## S-E-C-R-E-T

Growth between 1949 and 1952, on the other hand, involved a 9.9-billion-ruble addition to assets and a 232-billion cumulated tkm output. An increase of 100 billion cumulated tkm in this period was associated, therefore, with an asset increment of 4.3 billion rubles. Hence this recent period shows a close likeness to 1936-39, when the asset increment was 3.9 for each 100 billion cumulated tkm. The crude evidence seems to indicate, therefore, that Soviet railroads in the early 1950's faced approximately the same capital-output relationship that they faced in the late 1930's.

Such a comparison with output in physical terms has limited applications; consequently, an analysis utilizing money valuations for output should be undertaken. The value of transport output is not easily determined, but analysis of unit revenue per cumulated ton-kilometers shows that 1.88 kopeks, estimated for the value of the service in 1934, is a fairly representative measure of the gross value of railroad output during the prewar years. <sup>186/</sup> Output during the postwar series is valued at the composite unit revenue of 1934 in order to obtain a comparable series for both periods. The 1934 value also allows for a 1-year timelag between output and investment, which was given in 1933 prices.

Multiplying the cumulated ton-kilometers of output in each prewar period by 1.88 kopeks produces gross value increments of 2.6 billion rubles for 1928-32 and 1.6 billion rubles for 1936-39. These increments were associated with increments in assets which amounted to 2.7 and 3.3 billion rubles, respectively. Dividing the asset increments by the output values gives incremental capital-output ratios of 1.04 for 1928-32 and 2.06 for 1936-39. Thus the prewar trend calculated from the physical data is confirmed by these value comparisons.

For the postwar years an increment of 3.4 billion rubles in assets for 1947-49 is associated with an increment of 2.8 billion rubles in output, producing an incremental capital-output ratio of 1.21, which is quite close to that of 1928-32. Growth between 1949 and 1952, on the other hand, involved a 9.9-billion-ruble addition to assets and a 4.4-billion-ruble increment in output values. The incremental capital-output ratio for this period, therefore, was 2.25, not far different from the values estimated for 1936-39. Once again the evidence, as calculated by the physical data, is confirmed by the value comparison. Approximately twice as much additional capital was required for additions to output in 1936-39 and 1949-52 as was required during 1928-32 and 1947-49.

- 66 -

S-E-C-R-E-T

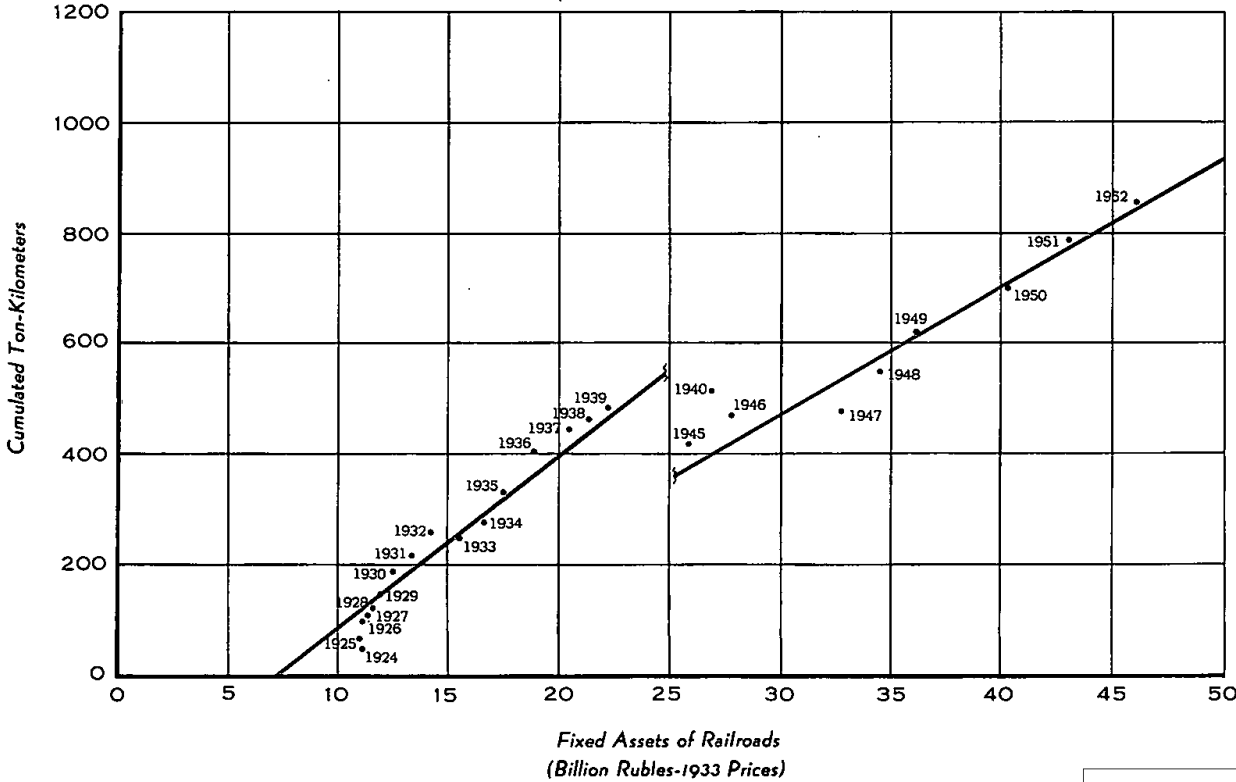


Figure 7

50X1

USSR

## FIXED ASSETS AND OUTPUT OF RAILROADS 1924-40 AND 1945-52



25723 1.57

50X1

## S-E-C-R-E-T

Another aspect of the underlying forces can be shown by an analysis of average capital-output ratios -- that is, of trends in the relationship between assets available in a given year and the output which they produced during that year. Employing the annual asset series at 1933 prices and converting the physical output series to 1934 values leads to the capital-output ratios presented in column 5 of Table 21\* and graphically shown in the accompanying chart (Figure 8\*\*).

Once again it is clearly evident that the trend is toward intensive use of rail plant and equipment. The average productivity in 1927 was more than twice that in 1924. The downward trend continued unabated through 1932 but was reversed somewhat in 1933 and 1934. Thereafter the ratio decreased slightly and toward the close of the decade seemed established at a level only one-half that of 1928. It is also evident that the average capital-output ratio continued its decline through the postwar years. Starting from a level of 3.3 in 1945, it fell to 2.9 in 1952, a level again which is not very different, although slightly higher, than that of the late 1930's.

One other analysis may be made to show the relationship between the functions of capital and output. Using the annual capital investment data and the production data in Table 21, another chart (Figure 9\*\*) was constructed which indicates the general trend from 1924 through 1955, minus the war years. It is evident that in 1930-35 rail investment increments were associated with more modest additions to output than in 1925-30. The year 1935 showed slow progress, although investments were increased substantially. The year 1936, however, showed significant additions to output even though investment that year was cut back. Reference to the postwar series shows that the general relationship between investment and output appears to have been maintained except for 1950-51, when increments in investment were greatly increased. The next year, 1952, was involved in investment cutbacks which seemed to average the trend back to the hypothetical 1949-55 curve, concave toward the X-axis.

All of the foregoing calculations clearly indicate that an alteration in the ratio reflects nothing more than the results of changes in output and in the related flow of capital. Even so, the behavior of the average capital-output ratio warrants some attention, for the pattern of

---

\* P. 64, above.

\*\* Following p. 68.

## S-E-C-R-E-T

its trend is suggestive of a number of underlying factors. Table 21\* shows that the ratio in 1924 was 12.3, meaning that for every ruble's worth of annual output there were 12.3 rubles of accumulated investment in road, facilities, and equipment. The ratio fell rapidly to 3 in 1932, then rose to 3.2 in 1934 and again descended to a low of 2.4 in 1939. The postwar series assumed the same general trend, with a high of 3.7 in 1947. Some implications of this trend in connection with the volume of capital follow.

An outstanding characteristic of the railroad industry is the indivisibility of many of its units of capital investment. In order to provide for any service at all between two given points, a minimum investment is required in grading lines, laying tracks, and installing structures and equipment. The capacity of this minimum may exceed many times the actual demands of business during a road's early period of operation. Furthermore, once the initial huge investment is made in the building of a road, capacity may be extended manyfold through relatively small additional investments.

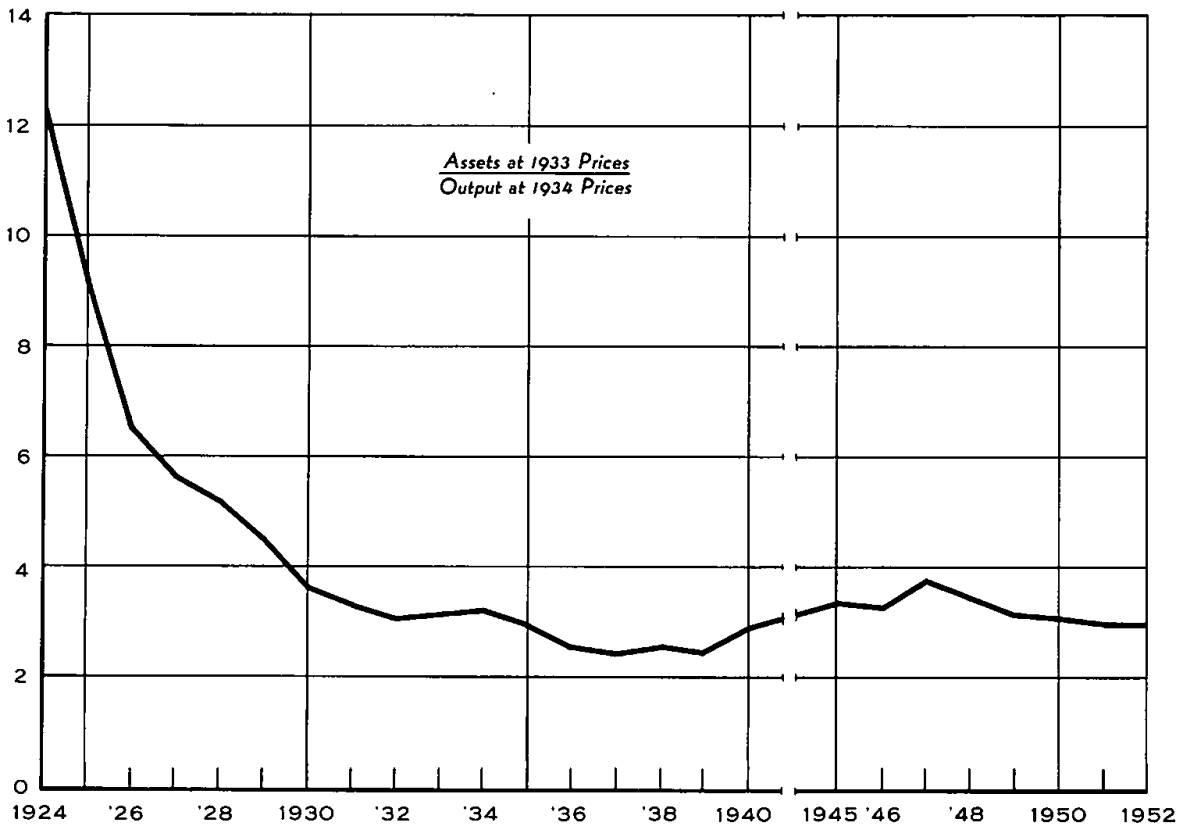
The indivisibility of capital alone cannot explain the average capital-output ratio trend shown on the charts. Two other factors have had a strong influence upon the declining efficiency of capital in the Soviet railroad industry.

First, there was the transport crisis of the early 1930's which was caused by the forced industrialization drive. This brought about a situation in which the railroads were unable to cope with the heavy increase in traffic, necessitating substantial inputs of capital beginning in 1935. It is clear, too, that the rail system lagged in effectiveness during the immediate postwar years mainly because of the lack of investments during the war and the disorganization associated with the reestablishment of an effective system to prewar levels.

Coupled with these changes was a succession of technological innovations to increase the work capacity of cars, locomotives, track, and facilities. Such changes are substantial but are not always reflected in prices, although their net effect is to lower the capital-output ratio. It is doubtful, however, that many such forces were actually at work in the Soviet rail industry. Railroading in the USSR to date has been overwhelmingly based on steam traction, outdated signaling, and relatively weak roadbeds compared with that in the US. There is every indication, however, that the USSR is beginning to

\* P. 64, above.

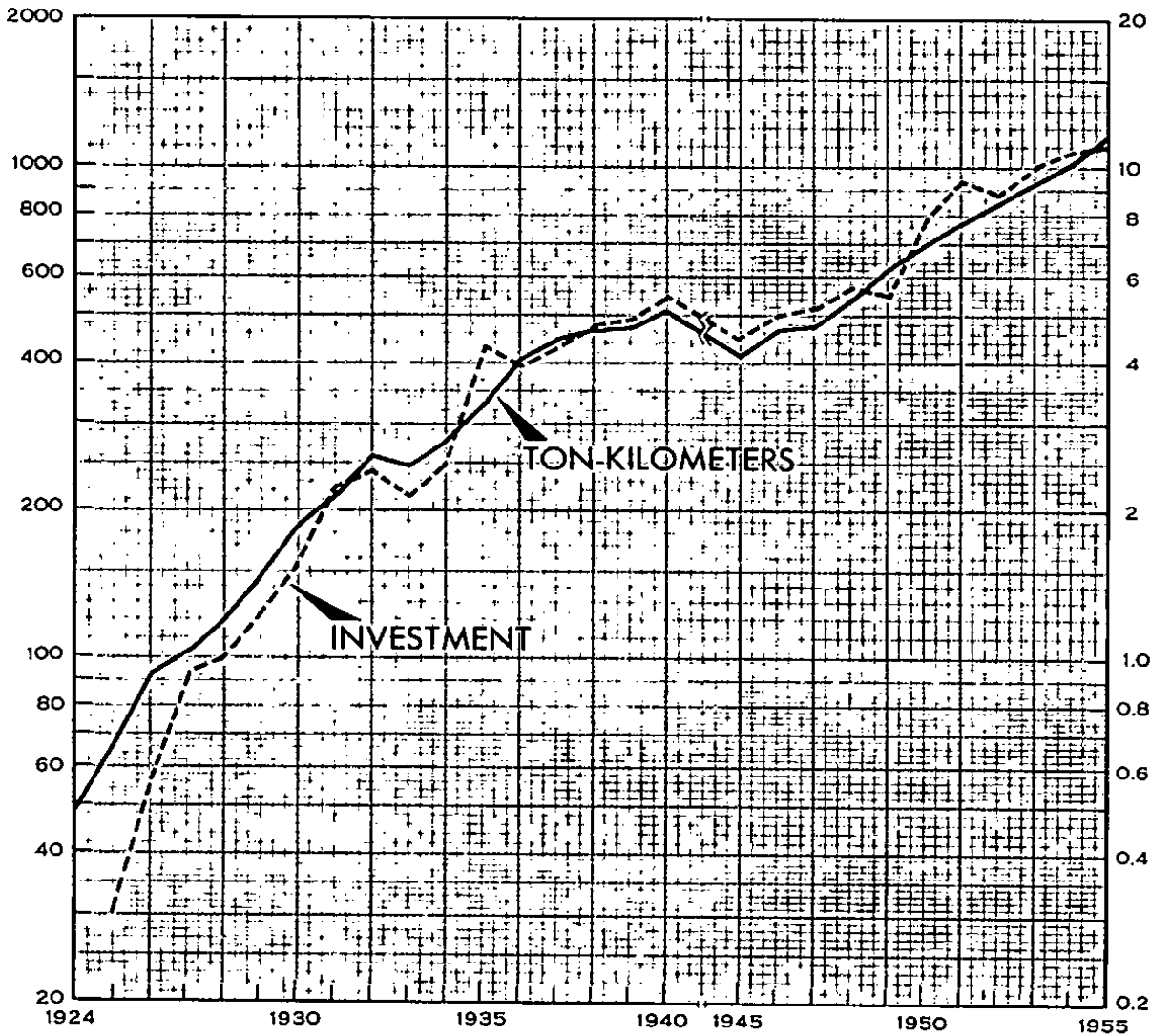
### CAPITAL-OUTPUT RATIO OF RAILROADS 1924-40 AND 1945-52



# USSR ANNUAL INVESTMENT AND OUTPUT OF RAILROADS 1924-40 AND 1945-55

Cumulated Ton-Kilometers  
(Billions)

Investment  
(Billion Rubles-1933 Prices)



25735 1-57

50X1

S-E-C-R-E-T

revolutionize its motive power, following the US change to electrification -- it expects to produce its last steam locomotive in 1957. 187/ Similarly, important innovations in signaling, communications, and other aspects of railroading offer the prospect of radical improvement. Although these developments will require large absolute investments, it seems likely that a given stock of rail assets in the future will be associated with a larger volume of output than would have been possible using the old technology.

- 69 -

S-E-C-R-E-T

S-E-C-R-E-T

APPENDIX A

METHODOLOGY

The methodology employed for estimating transport performance in the USSR was to accept the absolute values announced by the USSR for some base year, generally a prewar year, and add to these the announced percentage increase. Where data were not available for any given year, estimates were derived based upon past and present trends. For some branches of the transport sector, absolute values were given for 1960, and the intervening years, 1956-59, were graphically projected, using past performance and the Sixth Five Year Plan as a basis.

Investment and asset data have been taken directly from Soviet announcements, which have generally been quoted in current absolute values.

50X1  
50X1



The techniques for estimating the levels of operating efficiency, labor productivity, and the demand for transport services are given in some detail in their respective sections of this report.

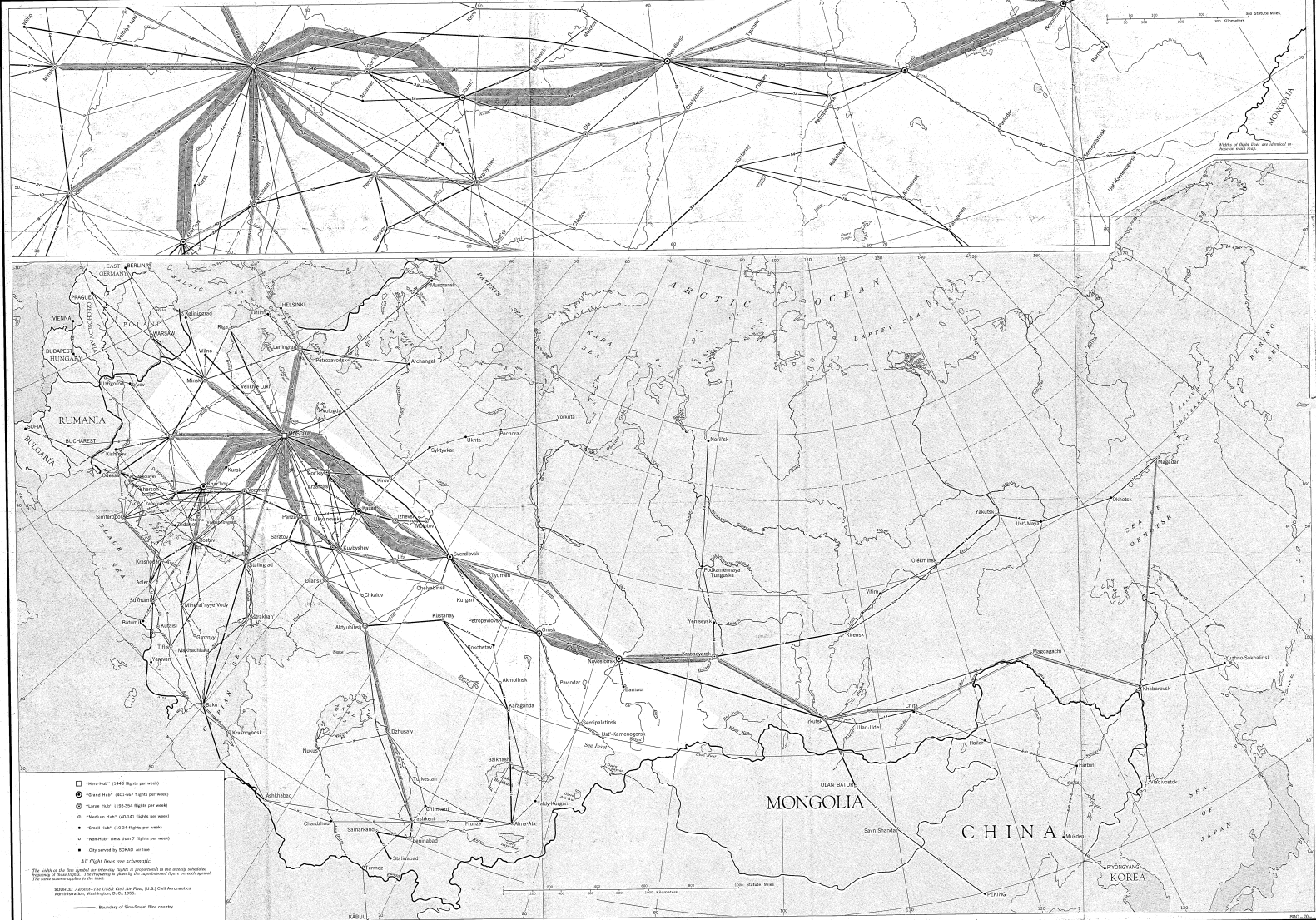
S-E-C-R-E-T

**Page Denied**

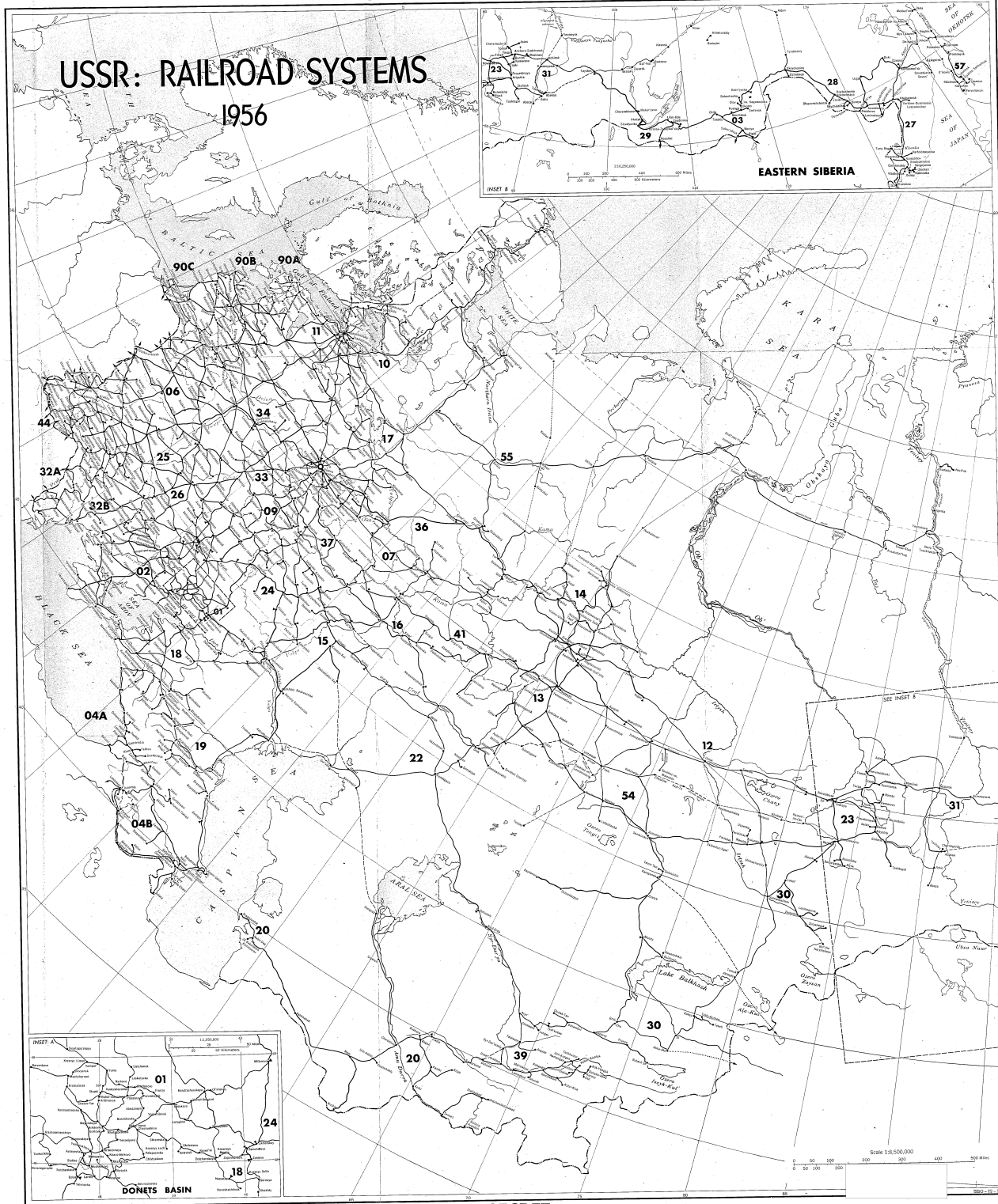
Next 10 Page(s) In Document Denied



# USSR: Scheduled Civil Air Routes - Winter 1954-55



# USSR: RAILROAD SYSTEMS 1956



### RAILROAD SYSTEMS

Number	Name	*Transliterated Russian Name
01	Donets	Donetskaya
02	Stalin	Stalinskaya
03	Transbaikal	Zabaykalskaya
04A	Transcaucasus	.....
04B	Azembaydhan	.....
05	Balkanscan	.....
07	Kazan'	Beluruskaya
09	Moscow-Kursk Donbass	Moskovsko-Kursko-Donbasskaya
10	Kiev	Kievskaya
11	October	Oktyabr'skaya
12	Omisk	Omiskaya
13	South Ural	Yuzhno-Ural'skaya
14	Sverdlovsk	Sverdlovskaya
15	Volga	Privolzhskaya
16	Kuybyshev	Kuybyshevskaya
17	Northern	Severnaya
18	North Caucasus	Severo-Kavkazskaya
19	Orchhonnkizze	Orchhonnkizhevskaya
20	Ashtkhabad	Ashtkhabadskaya
22	Orenburg	Orenburgskaya
23	Tomska	Tomskaaya
24	Southwestern	Yugo-Zapadnaya
25	Southwestern	Yugo-Zapadnaya
26	Southwestern	Yuzhnyaya
27	Far Eastern	Dal'ne-Vostochnaya
28	Amur	Amurskaya
29	East Siberian	Vostochno-Sibirskaya
30	Turkistan-Siberia	Turkistan-Sibirskaya
31	Krasnoyarsk	Krasnoyarskaya
32A	Kislovodsk	.....
32B	Odesa	Moskovsko-Kiyevskaya
33	Moscow-Kiev	Moskovsko-Kiyevskaya
34	Kalining	Kalinskaya
36	Gorky	Gorkovskaya
37	Moscow-Ryazan'	Moskovsko-Ryazanskaya
39	Tashkent	Tashkentnaya
41	Ufa	Ufinskaya
44	L'vov	L'vovskaya
54	Karaganda	Karagandinskaya
55	Pechora	Pechorskaya
57	South Sakhalin	Yuzhno-Sakhalinskaya
90A	Edson	.....
90B	Lahlan	.....
90C	Lithuanian	.....

\*The system numbers follow the listing in TARIPOVE RUKOVODSTVO, N. 4 (Traffic Handbook) Translated/Russian, Moscow, 1956, with the exception of systems 04 (Transcaucasus), 32 (Odesa-Kiev), and 90 (Baltic). These three systems have reverted to their previous status of seven separate systems. Since the current system numbers for those three systems are not known, the 1954 system number has been retained, but with arbitrary letter designation added.

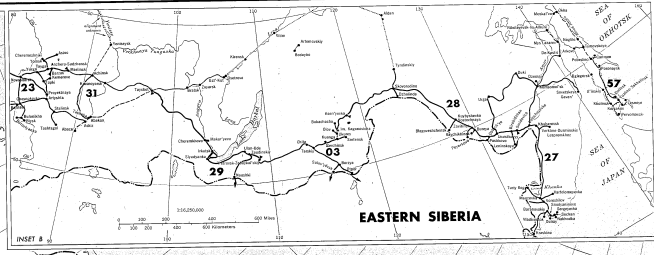
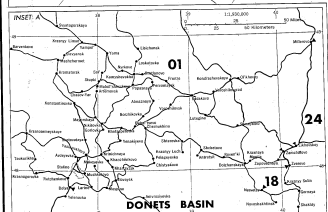
RAILROAD SYSTEM DATA

- Railroad (OTD group)
- Railroad (various group)
- 25 Railroad system number (See explanation above)
- Railroad system location

OTHER RAILROADS

- Proposed (OTD group)
- Proposed (various group)
- Under construction
- Planned or projected

NOTE: The numbers shown in black are not clearly available with any existing copies.



SECRET

13739 7-55 (First revision 12-56)

**SECRET**

**SECRET**