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ECONOMIC INTELLIGENCE REPORT

CONSTRUCTION AND IMPORTS OF VESSELS FOR THE SOVIET MARITIME FLEET 1946-60

CIA/RR 125
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S-E-C-R-E-T

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(ORR Project 35.1743)

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FOREWORD

The purpose of this report is to show the volume and the value both of maritime vessels constructed by the USSR during 1950-56 and of newly constructed maritime vessels imported from the European Satellites, Communist China, and countries outside the Sino-Soviet Bloc during 1946-56. Construction in the USSR is measured in 1955 US dollars, calculated on the basis of the estimated cost of construction of similar vessels in the US.

This report is part of the program of ORR to estimate the magnitude of the shipbuilding effort in the USSR. Parallel reports will deal with construction of naval, fishing, and inland waterway vessels; the total gross value of this construction; and the value added by the shipbuilding industry in the USSR during 1950-56.

The estimates contained in this report of construction during 1956-60 are based on the announced goals for the original Soviet Sixth Five Year Plan (1956-60) and the capability of the shipbuilding industry of the USSR. Recently the USSR announced that a new long-term economic plan would be instituted covering 1959-65. No attempt has been made to adjust the estimates in this report or to anticipate probable new goals that may be set forth in the forthcoming plan.

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CONSTRUCTION AND IMPORTS OF VESSELS FOR THE SOVIET MARITIME FLEET* 1946-60

Summary and Conclusions

Construction of maritime vessels in the USSR since World War II, with the exception of the Kazbek-class** tanker, apparently has been on the basis of availability of shipyard capacity rather than on the

* The estimates and conclusions contained in this report represent the best judgment of ORR as of 1 November 1957.

** The Kazbek-class tanker is a medium-size tanker having the following characteristics: cargo capacity of 10,000 deadweight tons, full load displacement of 16,250 metric tons, diesel propulsion of 4,000 horsepower (hp), speed of 13 knots, and internal cubic capacity of 7,961 and 8,229 gross register tons (GRT). An average of 8,100 GRT is used in this report. The deadweight tons cargo capacity (dwtcc) is the total weight of cargo in tons which the vessel can carry in the full load condition. The deadweight tons cargo capacity is equal to the deadweight tonnage minus the full load allowance weight of crew, passengers, provisions, fuel, water, and other items necessary for use on a voyage. The deadweight tonnage of a vessel is the carrying capacity of the vessel, in tons of 2,240 pounds -- tonnages are given in tons of 2,240 pounds throughout this report unless otherwise indicated. It includes the crew and their effects and all items of consumable or variable load such as stores, fuel, and cargo. The deadweight tonnage is the difference in tons between full load displacement and light ship displacement (LSD). Full load displacement of a surface vessel is the number of tons of water displaced by the vessel afloat, fully loaded, including all equipment, outfit, crew and their effects, fresh water, provisions, fuel, and all other items necessary for the operation of the vessel. Light ship displacement is the weight of the vessel complete, ready for service in every respect, including permanent ballast and liquids in the machinery at operating levels but excluding the crew and their effects and any items of consumable or variable load such as stores, fuel, and cargo.

Gross register tonnage is a measure wherein the entire internal cubic capacity of the vessel is expressed in register tons -- 100 cubic feet to the ton. Not included in the measurement are certain spaces such as peak tanks and other tanks of water ballast, open forecastle, bridge and poop, hatchway excess, certain light and air spaces, anchor gear, steering gear, wheelhouse, galley, cabins for passengers, and other minor spaces specified by law.

basis of a program of priorities for shipbuilding, because of the high priority assigned to construction of naval vessels in the USSR.

Western international controls forced the USSR in 1951 to undertake construction of Kazbek-class tankers in its own shipyards. By the end of 1956, 36 vessels of this class had been delivered. Until mid-1955, no other major Soviet program for the construction of maritime vessels was evident. In mid-1955 the Ministry of Shipbuilding undertook construction of a series of refrigerated vessels (5,217 GRT) for the Ministry of the Fish Industry and a series of dry cargo* vessels (5,494 GRT) for the Ministry of the Maritime Fleet. In 1954 a shipyard of the Volga River basin began a small program of constructing tankers (3,000 GRT) for the Caspian Sea - Volga River service and by the end of 1956 had constructed six vessels.

The USSR attached more importance to building up the maritime fleet, however, than is indicated by the apparently low priority assigned to construction of maritime vessels. During 1946-56 the USSR added to its maritime fleet 1.7 million GRT of new vessels valued at almost 1955 US $1 billion.** Of these amounts, 1.1 million GRT valued at $644 million were in oceangoing*** self-propelled dry cargo vessels, tankers, and refrigerated vessels. The remaining 0.6 million GRT valued at $346 million were in tugs, schooners, self-propelled and non-self-propelled lighters, barges, passenger ships, and miscellaneous auxiliary vessels. Countries outside the Sino-Soviet Bloc constructed for the USSR maritime vessels valued at $395 million, or 40 percent of the total; the European Satellites and Communist China produced $349 million, or 35 percent of the total; and the USSR constructed $245 million, or 25 percent of the total. With the exception of the Kazbek-class tankers, the USSR constructed mostly low-cost, non-self-propelled types; the European Satellites and Communist China, mostly simple self-propelled types; and the non-Bloc countries, the more complex and therefore the more costly types.

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* For a discussion of dry cargo in relation to the original Sixth Five Year Plan (1956-60), see the footnote on p. 15.

** Dollar values are given in 1955 US dollars throughout this report unless otherwise indicated.

*** The term oceangoing as used in this report refers to the principal types of vessels of the maritime fleet operating more than 20 miles off shore. These vessels are engaged in transporting freight and passengers in ocean or coastal voyages as opposed to secondary types such as schooners, lighters, passenger cutters, auxiliary vessels, and harbor craft.

The USSR constructed a negligible amount of tonnage for the maritime fleet during 1946-49. Construction during 1950-56, however, valued at $245 million, was only 2 percent of the total value of all vessels, naval and merchant, constructed during the same period in the USSR. The order of vessels constructed in the USSR during 1950-56 is as follows: first, naval vessels (92 percent of the total value); second, inland* vessels (4.8 percent of the total); third, maritime vessels (2 percent of the total); and, fourth, fishing vessels (1.2 percent of the total).

The original Sixth Five Year Plan (1956-60) indicates that the value of maritime vessels to be constructed by the USSR during 1956-60 will more than double the value of vessels constructed during the Fifth Five Year Plan (1951-55). There are no indications of possible nonfulfillment of the plan. A changeover of idle facilities, formerly used for construction of naval surface vessels, to construction of maritime vessels, together with the appraisal that the projected plan could be fulfilled without the use of these idle facilities, strongly indicates that plans for construction of maritime vessels will be met.

The USSR announced on 25 September 1957 that a new long-term economic plan would be drafted by 1 July 1958 to cover 1959-65. This action would imply setting aside the goals of the original Sixth Five Year Plan and the institution of new ones. Because there have been no announced or implied adjustments during 1956-57 of the goals originally announced for the Sixth Five Year Plan for maritime shipbuilding, it is believed that the shipbuilding industry will continue at its present rate of construction or at a slightly increased rate through 1958 and possibly through the period of the new plan.

I. Introduction.

In the shipbuilding industry of the USSR the sector which constructs oceangoing vessels was developed largely to implement the Soviet decision to become a world naval power. Because construction of naval vessels carried top priority, construction of maritime vessels apparently

* The term inland as used in the report refers to inland waterways, which include rivers, lakes, and canals. The term inland fleet comprises all self-propelled and non-self-propelled vessels using the inland waterways and does not include harbor craft in maritime ports and vessels in or for the Caspian Fleet.

has been on the basis of availability of shipyard capacity. Therefore, the USSR has had to depend extensively on imports to supply the maritime fleet.

A. Historical Background, 1920-45. 1/*

After the Communist Revolution in Russia the major Russian shipyards were in a state of disrepair and required almost 8 years for reconstruction to a level where a limited program for the construction of maritime vessels could be undertaken.

The first major program for construction of large maritime vessels was instituted in 1924. This program called for construction of 170 vessels totaling 401,000 GRT. These vessels were chiefly cargo-carrying types such as lumber carriers, oil tankers, and general cargo vessels. Of the total program for 1924, 9 lumber carriers and 1 refrigerator vessel totaling 23,000 GRT were completed by the beginning of the First Five Year Plan (1928-32).

With the institution in 1928 of the First Five Year Plan, the 1924 program was revised. The first 5-year program for construction of maritime vessels, largely including the same types as the 1924 program, called for construction of 117 vessels totaling 306,000 GRT. During the same period, 95 vessels totaling 185,000 GRT were to be procured from foreign countries. The fulfillment of the first 5-year program fell far short of the goal, and only 63 vessels totaling 141,000 GRT were constructed. Fourteen vessels were in varying stages of completion at the end of the period.

The beginning of the Second Five Year Plan (1933-37) was marked by the intensification of the program for construction of naval vessels. Although a number of maritime vessels were constructed during the period, no specific goals were included in the announced plan.

In spite of the achievements made by the shipbuilding industry up to 1939, construction of oceangoing vessels fell short of the goals set by the USSR. Between 1924 and the end of the Second Five Year Plan, 193 vessels totaling 325,000 GRT were built by the USSR, and it is estimated that about 413,000 GRT were procured from foreign countries, principally the Netherlands, France, Sweden, England, Denmark, and Japan.

The beginning of the Third Five Year Plan (1938-42) saw no lessening by the USSR of the intensity of construction of naval vessels. This plan noted that the tasks of the USSR were as follows 2/:

* For serially numbered source references, see Appendix E.

> To provide sea and ocean fleets with all types of modern ships and to create production capacity for shipbuilding sufficient to meet the growing demands of Soviet ocean and river transportation with domestic production facilities.

Few maritime vessels were constructed in the USSR between the beginning of the Third Five Year Plan and the outbreak of World War II.

Construction of maritime vessels in the USSR practically ceased during World War II. During World War II, major shipyards of the USSR suffered varying amounts of damage from total destruction, as in the case of the Nosenko (formerly Marti) shipyard in Nikolayev, to slight damage, as in the case of the shipyards in Leningrad.

B. Postwar Developments Through 1956.

The Soviet shipbuilding industry during 1945-56 experienced the greatest expansion in its history. Construction of vessels for the Soviet Navy was assigned an even higher priority than in the prewar years.

The Fourth Five Year Plan (1946-50) included the following statements 3/:

> By 1950, seagoing freight carriage shall be increased to 2.2 times that of prewar.
>
> Domestic building of deep-sea merchantmen shall be increased in 1946-50 by building 2 shipyards, 1 on the Black Sea to build seagoing freighters and 1 on the Baltic Sea to build trawlers and seagoing tugs.*
>
> Soviet shipbuilding shall be greatly developed. In 1950 the tonnage of ships built shall be double the 1940 figure. The building of a strong and powerful navy for the USSR shall be ensured. New vessels and bases shall be built for the Soviet Navy.

The major effort made by the shipbuilding industry during the Fourth Five Year Plan was in the rehabilitation and expansion of its shipyards and its plants for building ship components. No large cargo, tanker, or passenger vessels were constructed in the USSR during the Fourth Five Year Plan. A negligible number of tugs, barges, small coastal vessels, and small miscellaneous types, however, were constructed.

* The Black Sea shipyard referred to may be the new shipyard at Kherson, although this shipyard was not capable of constructing vessels until 1953. The Baltic shipyard referred to may be the new Baltic shipyard in Klaipeda, Lithuanian SSR.

The directives for the Fifth Five Year Plan (1951-55) disclosed little information about the proposed buildup of the maritime fleet beyond the stated increase in domestic construction of 2.9 times the 1950 rate of construction by 1955 and an increase in sea transportation of 55 to 60 percent compared with that in 1950.

By 1950, most major shipyards had been rebuilt to the extent that construction of new vessels could be undertaken. Construction of all classes of vessels (naval, maritime, fishing, and inland) during the Fifth Five Year Plan far exceeded construction during any other 5-year period in Russian or Soviet history.

II. Types and Sizes of Vessels Added, 1946-56.

A. General.

At the end of World War II the Soviet maritime fleet was in a state of imbalance with respect to its own needs as well as to trade with the newly acquired Satellites. Vessels acquired through lend-lease from the US during the war and vessels obtained through reparations and salvage immediately following the war failed to provide the necessary balance in freighters and tankers for oceangoing and coastal service. The greatest gaps were in the categories of large tankers, small freighters, and tugs and, to a lesser extent, refrigerator vessels, passenger ships, and miscellaneous types. The immediate need for the latter types was not so pressing as that for the cargo and tanker types.

During 1946-56, more than 1.7 million GRT of maritime vessels, valued at almost $1 billion, were added to the Soviet maritime fleet. Of these vessels, more than 400 were new oceangoing self-propelled cargo, tanker, and refrigerated types, aggregating 1,088,000 GRT. The volume and value of new maritime vessels added to the Soviet fleet during 1946-56 are shown in Table 1,* and a detailed breakdown of gross register tonnage by type of principal addition is shown in Table 2.**

To implement industrial development in the USSR, the planners for Soviet transportation set out to provide a balanced maritime fleet. Because of the need for shallow draft vessels for coastal traffic, emphasis first was placed on the procurement of vessels in the range of 1,000 to 2,500 GRT.*** Nearly 52 percent of the total number of

* Table 1 follows on p. 7.

** Appendix A, p. 22 , below.

*** For a detailed listing of vessels by range of gross register tons, see Table 2 (Appendix A, p. 22, below).

Table 1

Volume and Value of Maritime Vessels Added to the Soviet Fleet 1946-56

Type of Vessel	Gross Register Tonnage a/	Value (Million 1955 US $) b/
Cargo vessel c/	612,400	386.4
Tanker c/	385,300	165.6
Refrigerated vessel c/	90,200	92.0
Tug	91,700	99.9
Schooner, lighter, barge, and other miscellaneous types of freight-carrying vessels	462,700	169.9
Passenger vessel, crane, dredger, icebreaker, and other types of non-freight-carrying vessels	71,700	75.8
Total	1,714,000	989.6

a. Taken from Tables 3, 5, and 7 (Appendix A, pp. 23, 25, and 27, below).
b. Taken from Tables 4, 6, and 8 (Appendix A, pp. 24, 26, and 28, below). For methodology used in valuing construction, see Appendix B.
c. Principal oceangoing types only, as compiled in Table 2 (Appendix A, p. 22, below).

vessels added to the fleet during 1946-56 were in the range of 1,000 to 2,500 GRT, a range which comprised about 40 percent of the cargo gross register tonnage added and almost 30 percent of the total gross register tonnage added. Because of the lack of railroads and highways in the coastal areas of the Soviet Far East, a large number of these vessels was assigned to coastal service to implement industrial development. These shallow draft vessels were useful in these areas because of the low level of development of harbor facilities. It is estimated that more than 50 percent of the current dry cargo fleet of the Caspian Sea also is composed of new vessels in the range of 1,000 to 2,500 GRT. No new vessels larger than those of 9,050 GRT were added to the fleet. Most of the vessels added to the fleet were in the speed range of 9 to 13 knots and were powered with low-horsepower diesel or steam reciprocating engines. Some steam turbine vessels were built for the USSR by countries outside the Sino-Soviet Bloc.

B. Dry Cargo Vessels.

Of the principal vessels added, 68 percent of the total number and 56 percent of the total gross register tonnage were dry cargo types. The dry cargo types averaged 2,210 GRT per vessel principally because of the large number constructed in the range of 1,000 to 2,500 GRT.

C. Tankers.

Tankers made up 23 percent of the oceangoing vessels added but constituted 35 percent of the total gross register tonnage. Tankers averaged 4,140 GRT each, almost twice the average of the dry cargo types. This higher average was caused principally by the addition of 36 Kazbek-class (8,100-GRT average) tankers during 1951-56. These 36 tankers constituted the only major program evident by mid-1955 for construction of maritime vessels. The Kazbek-class tankers largely were put into Black Sea - Soviet Far East service to augment the facilities for transportation of oil on the Trans-Siberian Railroad. The Caspian Sea tanker fleet was augmented by the addition of 6 new tankers of approximately 3,000 GRT each. These tankers were designed to operate in the Caspian Sea as well as on the Volga River, thus obviating the necessity of transloading to shallow draft vessels to transit the Astrakhan and Krasnovodsk roadsteads and the Volga River.

D. Refrigerated Vessels.

The 38 refrigerated vessels constructed during 1946-56 largely have been assigned to the Soviet Ministry of the Fish Industry for the transportation of fish from the fishing fleets to the mainland.

III. Volume and Value of Vessels Added, 1946-56.

A. General.

Because of the high priority assigned since World War II to construction of naval vessels in Soviet shipyards, it became necessary for the USSR to look to other countries for new maritime vessels. Resuming its prewar practice of purchasing vessels from foreign countries, the USSR entered into trade agreements with Finland, Sweden, France, Denmark, Belgium, and the Netherlands and purchased new ships from Great Britain, Japan, Italy, and West Germany. Additional and more important sources of supply of maritime vessels for the USSR were the European Satellites and Communist China. An examination of the percentage of total construction of maritime vessels exported to the USSR by these countries shows the extent of exploitation by the USSR of their shipbuilding industries.

The estimated value of new vessels added to the Soviet Maritime Fleet during 1946-56 is almost $1 billion, with $395 million (40 percent) originating in countries outside the Sino-Soviet Bloc, $349 million (35 percent) in the European Satellites and Communist China, and $245 million (25 percent) in the USSR. Comparisons of the volume and the value of annual imports from the European Satellites, Communist China and countries outside the Sino-Soviet Bloc with Soviet construction are shown in the accompanying charts, Figures 1 and 2,* respectively.

It is evident that in planning both construction and procurement of vessels from other countries the USSR placed orders according to the industrial capability of the individual countries to supply maritime vessels. With the exception of the Kazbek-class tankers, the USSR constructed mostly low-cost, non-self-propelled types; the European Satellites, mostly simple self-propelled types; and the countries outside the Sino-Soviet Bloc, the more complex and therefore the more costly types. The following tabulation shows the average price per gross register ton for each of the three principal sources of supply:

Source of Supply	Average Price (1955 US $ per GRT)
European Satellites and Communist China	652
Countries Outside the Sino-Soviet Bloc	747
USSR	378

B. Vessels Imported from the European Satellites and Communist China.

Immediately following World War II the USSR gave technical assistance and presumably some material aid to those European Satellites developing shipbuilding facilities. Similar assistance later was given to Communist China. After the European Satellites had begun construction of maritime vessels, it became evident that the types under construction were of Soviet design and that almost all the construction was being exported to the USSR. For the most part these vessels were

* Following p. 10. Because of the small, erratic production during 1946-49, estimates of volume and value for these years are omitted in Figures 1 and 2. Estimates for construction, by country, for these years, are shown in Tables 3 through 6 (Appendix A, pp. 23 through 26, below). The estimates for value are based on prices shown in Table 12 (Appendix C, p. 39, below).

simple cargo types that were being serially produced. Imports from Communist China largely were barges and tugs also of Soviet design.*

During 1946-56 the European Satellites and Communist China constructed 535,900 GRT,** about 31 percent of the total new tonnage added to the Soviet maritime fleet. These additions are valued at $349 million, or 35 percent of the total value of all vessels added to the Soviet maritime fleet during 1946-56. Of this tonnage, approximately 391,000 GRT, or 63 percent of all cargo types added during this period, were oceangoing, self-propelled vessels. These vessels were generally small types that were in short supply in the Soviet maritime fleet at the beginning of the Fifth Five Year Plan (1951-55).

1. Poland.

Construction in Poland fell behind the Polish Six Year Plan (1950-55) by 40 percent, but exports to the USSR lagged behind the plan by only 11 percent. The Six Year Plan called for Poland to export to the USSR 57 percent of total planned construction of oceangoing cargo vessels. Actually the USSR received approximately 85 percent of these vessels, totaling about 247,000 GRT, or 40 percent of the cargo vessels added to the Soviet fleet during 1946-56. These vessels are valued at about $144 million. A classification of vessels constructed for the USSR in Poland is given in Table 9.***

2. Hungary.

Hungary constructed about 93,000 GRT, or 15 percent of the principal oceangoing self-propelled cargo types added to the Soviet maritime fleet. For the most part these vessels were of the Tisza-class of 1,194 GRT, of diesel propulsion, and with a speed of about 9 knots. Other types of cargo vessels constructed before 1950 consisted of a series of 1,050-GRT vessels and a few vessels in the range of 500 to 600 GRT. Oceangoing vessels exported by Hungary to the USSR during 1946-56 had a total value of approximately $54.5 million. During these years, Hungary exported more than 95 percent of its construction of oceangoing cargo vessels to the USSR. During the same period, Hungary constructed a number of 100-ton and 5-ton floating cranes for the USSR, valued at $28.8 million.

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* Detailed estimates of maritime vessels constructed in the European Satellites and Communist China and imported by the USSR during 1946-56 are shown in Tables 3 and 4 (Appendix A, pp. 23 and 24, below).

** Including 144,900 GRT of floating cranes, barges, tugs, and miscellaneous auxiliary vessels.

*** Appendix A, p. 29, below.

FIGURE 1

USSR

VOLUME OF ADDITIONS TO THE MARITIME FLEET, 1950-56

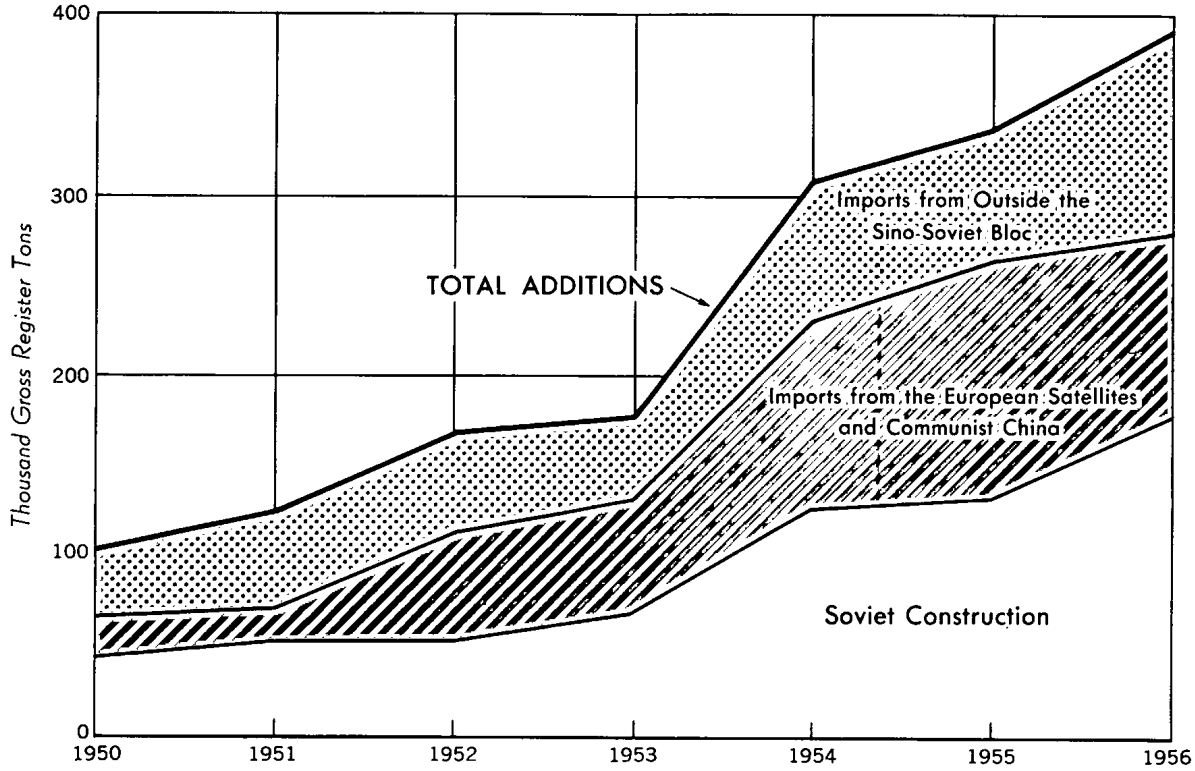
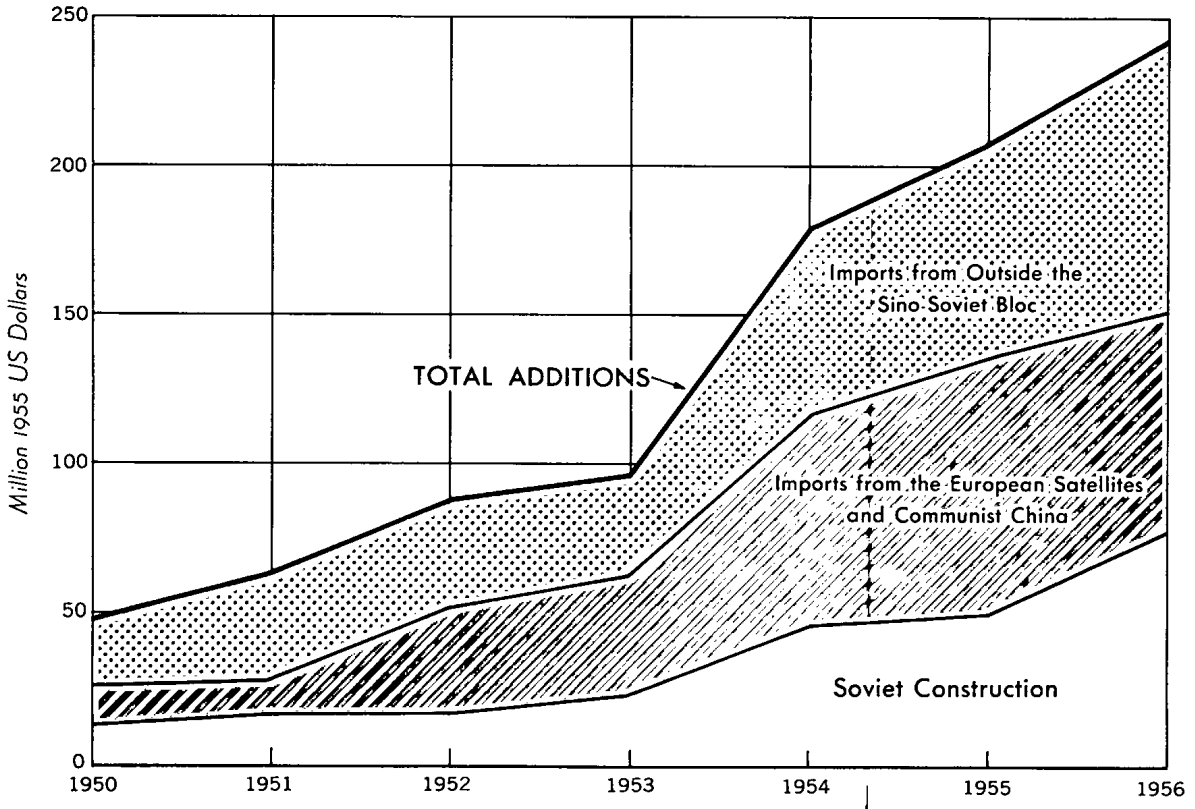


FIGURE 2

USSR

VALUE OF ADDITIONS TO THE MARITIME FLEET, 1950-56



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3. East Germany.

East Germany constructed 15 oceangoing cargo vessels, aggregating 49,000 GRT, or 8 percent of the total oceangoing self-propelled cargo types added to the Soviet maritime fleet. These vessels were of the Kolomna-class of 3,258 GRT, of propulsion by a steam reciprocating engine with exhaust steam turbine, fueled by coal, and with a speed of 12 knots. East Germany also produced 54,600 GRT of auxiliary types of vessels such as tugs, small self-propelled and non-self-propelled vessels for dry and liquid cargos, and miscellaneous non-cargo-carrying types.

Of a total value of $81 million worth of maritime vessels exported to the USSR by East Germany, the Kolomna-class vessels accounted for $32 million and the auxiliary types of vessels for $49 million.

4. Communist China.

Communist China did not produce any major vessels for oceangoing service in the Soviet maritime fleet, with the possible exception of tugs. China did produce, however, approximately 57,000 GRT of tugs, barges, passenger cutters, and the like, all of which were assigned by the USSR to maritime service. These vessels were valued at $41 million.

C. Vessels Imported from Countries Outside the Sino-Soviet Bloc.

During the years of the rehabilitation and growth of shipbuilding in the Soviet Bloc and Communist China, the simpler standard cargo types were assigned for construction by the European Satellites. The more complex and also more costly types of vessels, such as cargo ships with steam-turbine propulsion, large icebreakers, large dredgers, refrigerated vessels, and the like, were contracted for in countries outside the Sino-Soviet Bloc.*

During 1946-56, countries outside the Sino-Soviet Bloc constructed 529,000 GRT** of vessels for the Soviet maritime fleet. This construction is valued at $395 million, or 40 percent of the total value of all vessels added to the maritime fleet during 1946-56.

* Detailed estimates of maritime vessels constructed by non-Bloc countries and imported by the USSR during 1946-56 are shown in Tables 5 and 6 (Appendix A, pp. 25 and 26, below).
** Including 191,200 GRT of passenger vessels, tugs, dredgers, schooners, lighters, icebreakers, and cranes.

Countries outside the Sino-Soviet Bloc have contributed to the value of these vessels, in order, by percent, as follows:

Country	Percent
Finland	58.8
Netherlands	10.5
Denmark	8.1
Sweden	6.1
Belgium	5.6
West Germany	5.0
France	3.3
Italy	1.3
UK	1.1
Japan	0.2

Of the maritime vessels added to the Soviet fleet during 1946-56, countries outside the Sino-Soviet Bloc produced 34 percent of the gross register tonnage of the principal oceangoing cargo types, 15 percent of the tanker vessels, and 83 percent of the refrigerated vessels.

D. Vessels Constructed in the USSR.

By integrating construction of maritime vessels in the European Satellites and Communist China with Soviet construction and by procuring from countries outside the Sino-Soviet Bloc various categories of these vessels -- except for medium-size tankers -- the USSR succeeded in building up its maritime fleet without undertaking a major maritime shipbuilding program.

Because of the state of disrepair and war damage the shipyards of the USSR produced a negligible amount of tonnage during 1946-49. During 1950-56 the USSR built 648,700 GRT,* or about 38 percent of the total new gross register tonnage added to the maritime fleet. These additions were valued at $245 million, or 25 percent of the value of the total additions to the Soviet maritime fleet.** The value of maritime vessels is estimated at 2 percent of the total value of all vessels, naval and merchant, constructed in the USSR during 1950-56. The value of maritime vessels ranked third in the order of value of vessels

* Including 290,000 GRT of tugs, schooners, lighters, barges, passenger cutters, and other miscellaneous auxiliary types.

** Detailed estimates of maritime vessels constructed in the USSR during 1946-56 are shown in Tables 7 and 8 (Appendix A, pp. 27 and 28, below), which are based on Tables 10 and 11 (Appendix B, pp. 32 and 34, below).

constructed, being preceded first by naval construction (92 percent of the total) and second by construction of inland vessels (4.8 percent of the total). Construction of fishing vessels was last in the order of value (1.2 percent of the total).

Of the principal oceangoing vessels added to the Soviet maritime fleet during 1946-56, as shown in Table 2,* the USSR produced 3 percent of the gross register tonnage of cargo types, 85 percent of that of tanker types, and 17 percent of that of refrigerated types.

1. Tankers.

Of the 347,000 GRT of tankers constructed by the USSR during 1946-56, 291,600 GRT were in the Kazbek class, 18,000 GRT in the Oleg Koshevoy class,** 17,000 GRT in the Zhdanov class,*** and the remainder in small miscellaneous self-propelled barges and coastal types.

The actual inauguration and subsequent acceleration of the Soviet program for construction of tankers appears to have been timed largely to offset international controls by the West. Further impetus to the acceleration of this program was the increasing need for tanker tonnage occasioned by the Korean War and the Chinese Communist trade and supply problems arising from it. During the Soviet Fifth Five Year Plan (1951-55) the USSR was forced to allocate two major shipbuilding yards and a part of a third for construction of the medium-size Kazbek-class tankers. The Nosenko Shipyard No. 444 in Nikolayev began construction of Kazbek-class tankers with construction of the tanker Kazbek in 1951. By the end of 1956 this shipyard had produced 11 tankers. A new shipyard, completed in late 1952 at Kherson, delivered its first Kazbek-class tanker, the Kherson, in 1953. This shipyard has been devoted exclusively to construction of this class of tanker and by the end of 1956 had delivered 14 tankers. The Krylov Shipyard No. 194 in Leningrad shifted from construction of cruisers to construction of Kazbek-class tankers in 1953. By the end of 1956 this shipyard had produced 11 tankers, 1 of which, the Volkhov, was delivered to the Soviet Navy.

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* Appendix A, p. 22, below.

** The Oleg Koshevoy class of tanker was designed for service on the Caspian Sea and the Volga River. The vessels in this class have a cargo-carrying capacity of about 4,000 tons at full load draft and are estimated at about 3,000 GRT. 4/

*** Little is known about the Zhdanov class. It has been observed under construction in the Zhdanov Shipyard in Leningrad since 1953. Most of these vessels, it is believed, are being assigned to the Soviet Navy. The vessels in this class are estimated at 1,000 GRT.

The Oleg Koshevoy-class tanker, constructed for service on the Caspian Sea - Volga River system, was the second most important series of tankers to be undertaken in the USSR during 1946-56. The first tanker in this series, the Oleg Koshevoy, was delivered in late 1954, 2 more were delivered in 1955, and 3 in 1956. These vessels were constructed at one of the shipyards of the Volga River basin. 5/ Aside from several small foreign-built tankers transferred to the Caspian Sea, the Oleg Koshevoy-class represented the first new tankers added to the Caspian Sea tanker fleet since World War II. A series of small (possibly 1,000-GRT) tankers, designated as the Zhdanov-class, has been constructed since 1953 by the Zhdanov Shipyard in Leningrad.

2. Refrigerated and Dry Cargo Vessels.

In mid-1955, after completion of the program for construction of cruisers at the Baltic Shipyard [redacted] the Soviet Ministry of Shipbuilding began construction of a series of 5,217-GRT refrigerated vessels for the Soviet Ministry of the Fish Industry. The first three vessels in this series were delivered in 1956. At about the same time, the Ministry of Shipbuilding began construction of a series of dry cargo vessels of 5,494 GRT in the Nosenko Shipyard in Nikolayev. The first three vessels in this class were delivered in the latter half of 1956. These refrigerated and dry cargo vessels are the first vessels of significant size in these classes to be built in the USSR since World War II. The general characteristics of these vessels are essentially the same. It is believed that these two classes of vessels have the same hull form and the same propulsion plant.* 50X1

* Both classes have an over-all length of about 130.85 meters, a width of 16.8 meters, a height at midship of 9.5 meters, and a draft of about 7.63 meters. The full load displacement of these vessels is about 10,400 tons. The diesel electric propulsion system consists of 4 generators driven by ZD-100-mark diesel engines. The ZD-100 is a vertical, 10-cylinder, 2-stroke, opposed-piston type of engine which develops 1,800 hp at 810 revolutions per minute (rpm). Each generator produces about 1,375 kilowatts at 500 volts. These diesel-generator units were built by the Kharkov Transport Machine Building Plant and are identical to the diesel-generator sets being built for the TE-3 locomotives. The designed speed of these vessels is reported to be about 18 knots under full power with the 4 main generators operating both armatures of the main driving (propulsion) motor, 16 knots with any 3-generator units on both armatures, and 14 knots with 2 generators on 1 armature of half-full power. 6/

The selection by the Ministry of Shipbuilding of a diesel-electric propulsion plant for these vessels in preference to a steam turbine, a large single 6,000- to 7,000-hp diesel with a low number of revolutions per minute, or a steam reciprocating engine may be accounted for in part by (a) the greater maneuverability through ice in northern waters with a diesel electric propulsion plant than would be possible under other systems; (b) the lack of a domestically produced satisfactory large diesel; (c) the higher efficiency compared with a steam-reciprocating engine; (d) a hesitancy to undertake the necessary research and development to produce a steam turbine for these vessels, particularly in view of the current requirements for the design and construction of turbines for naval vessels, for land power plants, for nuclear-powered plants, and for the 25,000 dwtcc tanker and the 10,000 dwtcc cargo vessel; and (e) the ready availability of the ZD-100 diesel generator sets.

3. Other Vessels.

Until 1956, construction of other maritime vessels in the USSR was of little importance. This construction consisted chiefly of a few schooners, coastal vessels, tugs, self-propelled lighters, passenger cutters, and barges.

IV. Projected Estimate of Volume and Value of Construction, 1956-60.

An analysis of the directives for the original Sixth Five Year Plan (1956-60)* 7/ indicates a continuance of policies in effect at the end of 1955 -- that is, that the USSR will continue to increase its domestic construction of maritime vessels and at the same time import maritime vessels from the European Satellites, Communist China, and countries outside the Sino-Soviet Bloc. The original plan indicates that the value of maritime vessels to be constructed by the USSR during 1956-60 will more than double the value of vessels constructed during the Fifth Five Year Plan (1951-55).

* Because of the indefinite terminology used by the USSR in announcing the goals for the original Sixth Five Year Plan, it is not possible to make an exact estimate of the several classes of ships referred to. It is believed that the term dry cargo vessel refers only to self-propelled freight-carrying vessels and does not include refrigerated vessels. Refrigerated vessels generally have been mentioned in connection with the transportation of fish between the fishing fleets and the mainland and, therefore, would be a part of the Ministry of the Fish Industry. The large refrigerated vessels (Aktyubinsk class, 5,217 GRT) currently under construction at the Baltic Shipyard in Leningrad are for the Ministry of the Fish Industry.

The original Sixth Five Year Plan calls for an increase of more than 30 percent in construction of oceangoing dry cargo vessels and tankers in 1960 compared with 1955. This increase is believed to refer solely to domestic construction, because a 30-percent increase in Soviet construction in itself will not meet the goal for planned additions to the maritime fleet. The plan also called for the addition to the Soviet maritime fleet of modern dry cargo diesel vessels of 3,900 to 7,800 GRT and tankers of 15,100 to 18,800 GRT, refrigerated vessels for the transportation of fish, reinforced concrete vessels, and lumber carriers. These requirements are believed to have been directed at the planning organizations for execution in the USSR, in other countries of the Sino-Soviet Bloc, or in non-Bloc countries as required. This directive gives an indication that vessels of a larger size will be added to the cargo and tanker fleets than were added during 1950-55. The plan required additions* to the Ministry of the Maritime Fleet of 885,000 GRT of dry cargo ships, 346,000 GRT of tankers (an increase of 105 percent in dry cargo ships and 21 percent in tankers, resulting in a total increase of 71 percent more than the additions during the Fifth Five Year Plan -- 1951-55), 198,000 hp of passenger vessels, and 230,000 hp of tugs.

A. Dry Cargo Vessels and Tankers.

The USSR in 1955 constructed approximately 98,000 GRT of cargo vessels and tankers. An increase of 30 percent by 1960 would mean construction of 127,400 GRT of these vessels. Such construction easily could be accomplished without additional facilities for construction or without curtailing the 1955 rate of Soviet naval construction. On the assumption that the USSR will increase construction at an average annual rate of 5.4 percent,** total construction for 1956-60 will be 575,000 GRT valued at $276 million. Because this tonnage is 656,000 GRT less than the planned additions of 1,231,000 GRT, it is evident that the remainder of the additions is to be obtained from the European Satellites and from countries outside the Sino-Soviet Bloc.

Available data on contracts and trade agreements with countries outside the Sino-Soviet Bloc and on the construction plans of the Bloc indicate that the USSR will construct most of the tanker tonnage, 346,000 GRT, planned to be added to the Soviet maritime fleet and will construct about 229,000 GRT of maritime cargo vessels. Current contracts between the USSR and countries outside the Sino-Soviet Bloc, including permissive

* Additions included not only construction in the USSR but also imports from the European Satellites, Communist China, and even non-Bloc countries.

** At an annual increase of 5.4 percent, production in 1960 would be 30 percent more than the 1955 rate.

construction through 1960 by Finland, indicate that 206,000 GRT of cargo vessels valued at $124 million and 37,000 GRT of tankers valued at $18 million will be constructed for the USSR during 1956-60.

If the gross register tonnage of cargo vessels to be constructed by the USSR and countries outside the Sino-Soviet Bloc is subtracted from the total tonnage to be added to the Soviet maritime fleet, 450,000 GRT valued at $225 million remain to be constructed for the USSR by other Bloc countries. From the data available this amount of cargo tonnage is estimated to be about two-thirds the total amount planned for export by other Bloc countries to the USSR.

In the last half of 1955 the Nosenko Shipyard in Nikolayev undertook to construct a series of 5,400-GRT dry cargo vessels.* These vessels represent the first series of major maritime cargo vessels to be built in the USSR since World War II.

B. Passenger Vessels.

There is little information on the source or size of passenger vessels and on whether or not these vessels will be new construction. There is no evidence of contracts for construction of passenger vessels in countries outside the Sino-Soviet Bloc. East German plans call for construction for the USSR of 13 passenger vessels totaling approximately 100,000 hp, or 64,000 GRT. Polish shipbuilding plans do not include construction of passenger vessels for the USSR. The greater part of the remaining 100,000 hp to be added by the USSR probably will be small vessels, mostly produced by the USSR with some imports from Hungary and Communist China.

C. Tugs.

Present indications are that countries outside the Sino-Soviet Bloc, principally Finland, will construct for the USSR approximately 77,000 hp of tugs valued at $52 million. East German plans call for construction for the USSR of about 54,000 hp, leaving about 100,000 hp to be constructed by the USSR and the remaining European Satellites. It is estimated that during 1956-60 the USSR will construct tugs totaling between 40,000 and 50,000 hp.

D. Refrigerated and Miscellaneous Types of Vessels.

The original Sixth Five Year Plan did not specify any fixed quantity of refrigerated and miscellaneous vessels to be constructed. Commitments by countries outside the Sino-Soviet Bloc indicate construction

* For a description of these vessels, see III, D, 2, above.

for the USSR of 54,000 GRT of refrigerated vessels valued at $57 million and 2 icebreakers valued at $59 million. During the last half of 1955 the Baltic Shipyard in Leningrad undertook to construct a series of refrigerated vessels* for the Ministry of the Fish Industry.

With the European Satellites and Communist China, as well as the USSR, having developed considerable shipbuilding capability, it is to be expected that these countries will construct additional vessels which may not have been indicated in the original Sixth Five Year Plan. These vessels would include miscellaneous types for the maritime fleet and, probably of more importance, auxiliary vessels for the Soviet Navy.

There are no indications of a lessening in the shipbuilding effort in the European Satellites and in Communist China. Construction in excess of the demands of the USSR probably will be allocated to the maritime fleets of the respective countries or possibly used in trade with underdeveloped countries outside the Sino-Soviet Bloc.

V. Capability and Limitations.

The shipbuilding industry of the USSR has been developed to a relatively high level of capability for construction of all classes of naval and merchant vessels. According to the original Sixth Five Year Plan (1956-60), the goal for construction of maritime vessels is a small portion of the total capability of the industry.

During 1955 the shipbuilding industry of the USSR constructed approximately 200,000 standard displacement** tons (SDT) of naval vessels and 100,000 GRT of maritime dry cargo vessels and tankers. Studies of the capability for construction of several Soviet shipyards disclose that approximately 2 GRT of a maritime vessel can be produced by the same facilities in the same amount of time that is required to produce 1 SDT of a naval vessel. 8/ On this basis and on the assumption that all facilities devoted to naval construction in 1955 were devoted to construction of maritime vessels, the annual capability for construction of maritime vessels would be about 500,000 GRT.

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* For a description of these vessels, see III, D, 2, above.

** Standard displacement of a surface vessel is the displacement (in tons of 2,240 pounds) of the vessel complete, fully manned, engined, and equipped ready for sea, including all armament and ammunition, equipment, outfit, provisions and fresh water for crew, miscellaneous stores, and implements of every description that are intended to be carried in war but excluding fuel or reserve boiler-feed water on board.

Currently there is no evidence that suggests any reason for underfulfillment of planned goals by the USSR. Although unrest in the European Satellites may interfere with orderly construction for the USSR, an analysis of Soviet plans indicates that planned fulfillment of additions to the Soviet maritime fleet would be possible with only two-thirds of fulfillment of European Satellite plans for export of maritime ships to the USSR. The expansion of the program for naval shipbuilding or the diversion of established shipbuilding facilities to some use other than that of construction of maritime vessels, however, undoubtedly would cause underfulfillment of the planned construction of maritime vessels.

VI. Intentions.

A course of action for the USSR in procurement of maritime vessels, which seems possible from a study of Soviet practice since World War II and is indicated by the directives for the original Sixth Five Year Plan (1956-60), is to continue to integrate shipbuilding in other countries of the Sino-Soviet Bloc into the Soviet long-range program and to procure vessels from non-Bloc countries. On the basis of the volume of maritime vessels planned to be constructed within the USSR, it is evident that the USSR intends to reserve the greater part of shipbuilding capacity -- possibly for construction of naval vessels.

The utilization of currently idle naval shipbuilding capacity for construction of merchant types of vessels is believed to be an interim measure designed to keep a portion of shipyard labor active in continuous shipbuilding in order to prevent a dispersion of this labor to other industries and to implement the building up of the Soviet merchant fleets.

The USSR announced on 25 September 1957 that a new long-term economic plan would be drafted by 1 July 1958 to cover 1959-65. This action would imply the setting aside of the goals of the original Sixth Five Year Plan (1956-60) and the institution of new ones. Because there have been no announced or implied adjustments during 1956-57 of the goals originally announced for the Sixth Five Year Plan for maritime shipbuilding, it is believed that the shipbuilding industry will continue at its present rate of construction, or at a slightly increased rate, through 1958 and possibly through the period of the new plan.

APPENDIX A

STATISTICAL TABLES

Table 2

Classification of the Principal Vessels Added to the Soviet Maritime Fleet a/
1946-56

	Groups According to Gross Register Tonnage												
	Under 1,000 GRT		1,000 to 2,500 GRT		2,500 to 5,000 GRT		5,000 to 7,500 GRT		7,500 to 10,000 GRT		Total		
Type of Vessel	Number	GRT	Number	GRT	Number	GRT	Number	GRT	Number	GRT	Number	GRT	Average GRT per Vessel
Cargo vessel	43	31,000	149	242,400	68	240,200	14	76,300	3	22,500	277	612,400	2,210
Tanker			43	45,600	12	30,000			38	309,700	93	385,300	4,140
Refrigerated vessel	6	5,700	19	32,200	10	36,600	3	15,700			38	90,200	2,370
Total	49	36,700	211	320,200	90	306,800	17	92,000	41	332,200	408	1,087,900 a/	2,670

a. Excluding 626,100 gross register tons (GRT) of tugs, schooners, self-propelled and non-self-propelled lighters, barges, and small miscellaneous auxiliary types.

Table 3

Estimated Volume of Soviet Imports of Maritime Vessels from the European Satellites and Communist China 1946-56

Thousand Gross Register Tons

Country and Type of Vessel	1946-49	1950	1951	1952	1953	1954	1955	1956	Total
Poland									
Cargo vessel	0	1.9	2.0	21.0	28.0	67.0	70.0	57.0	246.9
Hungary									
Cargo vessel	25.2	11.8	8.4	10.7	9.6	10.7	6.0	10.8	93.2
Floating crane	3.6	0.7	2.5	3.2	7.7	5.6	4.8	7.0	35.1
East Germany									
Cargo vessel a/	0	0	0.2	4.1	0	19.2	28.2	6.1	57.8
Tanker	N.A.	N.A.	N.A.	N.A.	4.0	2.4	0	1.2	7.6
Tug	N.A.	N.A.	N.A.	2.2	1.8	0.6	0.9	1.3	6.8
Other vessel	N.A.	5.0	1.1	14.1	3.8	0.2	5.0	2.2	31.4
Communist China									
Cargo vessel a/	0	0	0	0	0	0.2	1.0	1.2	2.4
Tug	0	0	0	0	0	1.0	2.0	2.0	5.0
Other vessel	0	3.1	4.6	4.6	7.7	3.5	13.1	13.1	49.7
Total	28.8	22.5	18.8	59.9	62.6	110.4	131.0	101.9	535.9

a. Including other self-propelled vessels.

Table 4

Estimated Value of Soviet Imports of Maritime Vessels
from the European Satellites and Communist China
1946-56

Million 1955 US $

Country and Type of Vessel	1946-49	1950	1951	1952	1953	1954	1955	1956	Total
Poland									
Cargo vessel	0	1.1	1.1	11.8	15.7	37.5	39.2	37.5	143.9
Hungary									
Cargo vessel	14.7	6.9	4.9	6.3	5.6	6.3	3.5	6.3	54.5
Floating crane	3.3	0.7	2.0	2.7	6.7	4.7	4.0	4.7	28.8
East Germany									
Cargo vessel a/	0	0	0.1	3.5	0	16.4	24.1	11.3	55.4
Tanker	N.A.	N.A.	N.A.	N.A.	1.8	1.1	0	1.5	4.4
Tug	N.A.	N.A.	N.A.	2.7	2.2	0.7	1.0	1.0	7.6
Other vessel	N.A.	1.8	0.4	5.0	1.4	0.1	4.4	0.5	13.6
Communist China									
Cargo vessel a/	0	0	0	0	0	0.3	1.2	1.5	3.0
Tug	0	0	0	0	0	1.0	2.1	2.1	5.2
Other vessel	0	2.5	3.8	3.8	6.4	2.9	6.7	6.7	32.8
Total	18.0	13.0	12.3	35.8	39.8	71.0	86.2	73.1	349.2

a. Including other self-propelled vessels.

Table 5

Estimated Volume of Soviet Imports of Maritime Vessels from Countries Outside the Sino-Soviet Bloc 1946-56

Thousand Gross Register Tons

Country and Type of Vessel	1946-49	1950	1951	1952	1953	1954	1955	1956	Total
UK									
Cargo vessel	0	3.2	0	0	0	7.4	0	0	10.6
Belgium									
Cargo vessel	0	3.4	5.1	3.4	0	9.2	3.8	10.2	35.1
Italy									
Tug	0	0	0.9	0.9	0	0	0	0	1.8
Passenger vessel	0	0	3.5	3.5	0	0	0	0	7.0
Denmark									
Tanker	0	0	0	9.0	9.0	0	0	0	18.0
Refrigerated vessel	0	0	0	5.0	3.4	0	6.7	8.4	23.5
Netherlands									
Cargo vessel	0	0	0	0	0	22.5	0	0	22.5
Refrigerated vessel	0	0	0	0	0	0	14.2	3.6	17.8
Dredger	0	0	0	1.1	2.1	3.2	1.4	0	7.8
West Germany									
Refrigerated vessel	0	0	0	0	0	0	3.8	15.1	18.9
France									
Cargo vessel	0	0	0	0	0	0	0	30.0	30.0
Sweden									
Cargo vessel	0	0	0	0	0	5.5	0	0	5.5
Tanker	0	0	2.2	3.3	1.1	0	0	0	6.6
Refrigerated vessel	0	1.0	1.9	1.0	1.0	1.0	1.7	7.0	14.6
Finland									
Cargo vessel	14.4	7.1	11.8	9.5	13.7	10.8	18.3	15.5	101.1
Tanker	0	0	2.2	3.3	5.5	5.5	11.5	6.0	34.0
Tug	14.6	3.8	4.3	3.3	6.5	3.8	4.3	8.7	49.3
Schooner	13.2	4.2	9.3	3.3	4.5	4.5	4.5	0	43.5
Lighter	29.7	12.7	12.7	10.6	0	0	0	0	65.7
Floating crane	0	0	0	0	0	1.4	0.4	2.2	4.0
Icebreaker	0	0	0	0	0	3.8	3.8	3.8	11.4
Japan									
Tug	0	0	0	0	0	0	0.3	0.4	0.7
Total	71.9	35.4	53.9	57.2	46.8	78.6	74.7	110.9	529.4

Table 6

Estimated Value of Soviet Imports of Maritime Vessels from Countries Outside the Sino-Soviet Bloc 1946-56

Million 1955 US $

Country and Type of Vessel	1946-49	1950	1951	1952	1953	1954	1955	1956	Total
UK									
Cargo vessel	0	2.1	0	0	0	2.3	0	0	4.4
Belgium									
Cargo vessel	0	2.2	3.4	2.2	0	6.0	2.5	5.9	22.2
Italy									
Tug	0	0	0.7	0.7	0	0	0	0	1.4
Passenger vessel	0	0	1.9	1.9	0	0	0	0	3.8
Denmark									
Tanker	0	0	0	3.6	3.6	0	0	0	7.2
Refrigerated vessel	0	0	0	5.2	3.6	0	7.0	8.8	24.6
Netherlands									
Cargo vessel	0	0	0	0	0	14.8	0	0	14.8
Refrigerated vessel	0	0	0	0	0	0	14.9	3.7	18.6
Dredger	0	0	0	1.1	2.1	3.6	1.4	0	8.2
West Germany									
Refrigerated vessel	0	0	0	0	0	0	4.0	15.9	19.9
France									
Cargo vessel	0	0	0	0	0	0	0	12.9	12.9
Sweden									
Cargo vessel	0	0	0	0	0	2.5	0	0	2.5
Tanker	0	0	1.2	1.8	0.6	0	0	0	3.6
Refrigerated vessel	0	1.4	2.7	1.4	1.3	1.4	2.4	7.4	18.0
Finland									
Cargo vessel	9.4	4.7	7.8	6.2	8.0	7.8	11.9	8.8	64.6
Tanker	0	0	1.2	1.8	3.0	3.0	6.2	3.2	18.4
Tug	16.4	4.4	5.3	3.8	7.6	4.0	4.6	9.2	55.3
Schooner	10.2	3.2	7.1	2.6	3.5	3.5	3.4	0	33.5
Lighter	10.5	4.5	4.5	3.7	0	0	0	0	23.2
Floating crane	0	0	0	0	0	0.4	0.1	0.6	1.1
Icebreaker	0	0	0	0	0	12.1	12.1	12.1	36.3
Japan									
Tug	0	0	0	0	0	0	0.4	0.5	0.9
Total	46.5	22.5	35.8	36.0	33.3	61.4	70.9	89.0	395.4

Table 7

Estimated Volume of Soviet Construction of Maritime Vessels
1950-56

Thousand Gross Register Tons

Type of Vessel	1950	1951	1952	1953	1954	1955	1956	Total
Tanker	5.0	13.1	13.1	29.3	87.0	93.0	106.1	346.6
Cargo vessel a/	5.0	5.0	5.0	5.0	5.0	5.0	37.1	67.1
Tug	3.0	3.2	3.4	3.6	3.8	4.0	4.0	25.0
Barge b/	30.0	30.0	30.0	30.0	30.0	30.0	30.0	210.0
Total	43.0	51.3	51.5	67.9	125.8	132.0	177.2	648.7

a. Including other self-propelled vessels.
b. Including other non-self-propelled vessels.

Table 8

Estimated Value of Soviet Construction of Maritime Vessels
1950-56

Million 1955 US $

Type of Vessel	1950	1951	1952	1953	1954	1955	1956	Total
Tanker	2.7	6.0	6.0	12.5	35.8	39.0	45.1	147.1
Cargo vessel a/	3.3	3.3	3.3	3.3	3.3	3.3	26.2	46.0
Tug	3.6	3.8	4.0	4.2	4.5	4.7	4.7	29.5
Barge b/	3.2	3.2	3.2	3.2	3.2	3.2	3.2	22.4
Total	12.8	16.3	16.5	23.2	46.8	50.2	79.2	245.0

a. Including other self-propelled vessels.
b. Including other non-self-propelled vessels.

Table 9

Classification of Vessels Constructed in Poland and Imported by the USSR 1946-56

Class	Gross Register Tons	Type of Propulsion	Fuel	Speed (Knots)	Number of Vessels
Donbas	3,816	Steam reciprocating with exhaust steam turbine	Coal	11	35
Pervomaysk (Soldek)	1,989	Steam reciprocating	Coal	11	25
Melitopol'	674	Diesel	Oil	10	24
Chulym (Kolno)	2,686	Steam reciprocating	Coal	12	16
Lewant	2,735	Diesel	Oil	14	2

APPENDIX B

INPUT REQUIREMENTS FOR SOVIET CONSTRUCTION OF MARITIME VESSELS, 1955

There has been no indication of short supply of any resources of materials allocated to construction of maritime vessels in the USSR. On a few occasions since the inception of the tanker program, delays were observed in construction of the tankers. It is believed, however, that these delays were caused by technological difficulties rather than by shortages of materials. The percentage of steel required in construction of maritime vessels in 1955 was 40 percent of the total required for construction of merchant vessels and 16 percent of that required for all classes of construction of vessels.

The estimated input requirements for construction of maritime vessels in the USSR during 1955 are shown in Table 10.* These estimates were obtained by applying to Soviet construction input factors which were derived from a study of requirements to construct similar vessels in the US. The input factors used are shown in Table 11.**

* Table 10 follows on p. 32.
** Table 11 follows on p. 34.

Table 10

Estimated Input Requirements for Soviet Construction of Maritime Vessels a/*
1955

Item	Tanker	Cargo Vessel b/	Tug	Barge c/	Total
	Metric Tons				
Carbon steel	49,000	2,900	3,100	15,000	70,000
Alloy steel	1,500	62	1,300	Negligible	2,800
Total	50,000	3,000	4,400	15,000	73,000
Cast iron	300	16	60	Negligible	380
Copper and copper-base alloys	1,200	65	97	Negligible	1,400
Aluminum	60	3	48	Negligible	110
Lead	8	Negligible	18	Negligible	26
Tin	25	1	4	Negligible	30
Zinc	84	4	20	Negligible	110
Rubber	79	4	3	Negligible	86
Nickel and miscellaneous metals	68	4	15	Negligible	87
Lumber	2,200	120	250	Negligible	2,600
	Thousand Kilowatt-Hours				
Power d/	66,000	3,900	3,100	20,000	93,000
	Man-Years				
Labor shipyards	4,200	370	1,100	1,400	7,100

* Footnotes for Table 10 follow on p. 33.

Table 10

Estimated Input Requirements for Soviet Construction of Maritime Vessels a/
1955
(Continued)

a. The data used in this table were derived from requirements for construction of similar vessels in the US. With the possible exception of steel, all requirements for materials probably could be modified by substitute materials. All data have been rounded to two significant digits after computation.
b. Including other self-propelled vessels.
c. Including other non-self-propelled vessels.
d. Equivalent of all inputs of power and fuel.

Table 11

Input Factors for US Construction of Maritime Vessels a/*
1955

Item	Tanker	Cargo Vessel b/	Tug	Barge c/
	Metric Tons per Thousand Gross Register Tons			
Carbon steel	527	586	773	512
Alloy steel	15.8	12.4	323	Negligible
Total	543	598	1,096	512
Cast iron	3.21	3.21	15.0	0.08
Copper and copper-base alloys	13.2	13.2	24.2	Negligible
Aluminum	0.66	0.66	12.1	Negligible
Lead	0.09	0.09	4.38	Negligible
Tin	0.27	0.27	1.11	Negligible
Zinc	0.90	0.90	4.90	Negligible
Rubber	0.85	0.85	0.76	Negligible
Nickel and miscellaneous metals	0.74	0.74	3.76	Negligible
Lumber	24.2	24.2	62	Negligible
	Kilowatt-Hours per Gross Register Ton			
Power	710	780	1,440	670
	Man-Years per Gross Register Ton			
Labor in shipyards	0.05	0.07	0.27	0.05

* Footnotes for Table 11 follow on p. 35.

Table 11

Input Factors for US Construction of Maritime Vessels a/
1955
(Continued)

a. All input factors reflect US practice. Figures shown are rounded to not more than two decimal places. Factors include all inputs within the shipyard and within the component plants but do not include inputs for the production of raw materials.
b. Including other self-propelled vessels.
c. Including other non-self-propelled vessels.
d. Equivalent of all inputs of power and fuel.

APPENDIX C

METHODOLOGY

50X1

1. Range of Error.

The range of error varies with the type and size of vessel and with the country involved. Most of the oceangoing cargo vessels and tankers, regardless of where they were constructed, were sighted in actual service, exceptions being coastal types operating in northern coastal waters, in coastal waters of the Pacific Ocean, and in the Black Sea. Few vessels are observed in Caspian Sea service, and the Soviet press, therefore, provides the greater part of the data on additions to the Caspian Sea fleet. The range of error for oceangoing vessels is possibly plus or minus 10 percent.

Tugs, barges, lighters, schooners, and miscellaneous types of vessels are subject to a much higher range of error because of a lack of data on which to base estimates. Although the quantity of construction by countries outside the Sino-Soviet Bloc is fairly well known, construction by the European Satellites and Communist China is subject to a wider range of error and construction in the USSR to a range of error of as much as 50 percent because of a lack of reports on construction.

The nature of the data on which the estimates were made precluded a mathematical determination of the range of error. The range of error for aggregate estimates is believed, on the basis of experience, to be no greater than plus 15 to minus 15 percent. A test check, made by comparing the announced fulfillment of the Fifth Five Year Plan (1951-55) with estimates of Soviet construction of maritime vessels, showed the estimates to be within 3 percent of the reported plan fulfillment.

2. Valuation of Construction.

Construction was valued by using the costs* per unit of constructing similar vessels in the US in 1955 dollars, as determined from US cost data, and by adjusting certain costs of foreign shipbuilding by data secured from the Maritime Administration of the US Department of Commerce. The costs used to value maritime vessels are shown in Table 12.**

The 5,400-GRT cargo vessel was priced by analogy with a US vessel. The costs of the 2,000-GRT cargo vessel and the 10,000-GRT tanker are based on West German costs. 9/ These costs were assumed to be 61 percent of the US cost, which is the estimated cost differential determined by the US Maritime Administration. 10/

The cost of the 2,000-GRT tanker was calculated by the equation

$$\frac{493}{657} = \frac{403}{x}$$

where

493 = US cost in dollars per gross register ton of a 6,750-GRT vessel

657 = US cost in dollars per gross register ton of a 2,093-GRT vessel

403 = US cost in dollars per gross register ton of a 10,000-GRT tanker

and

x = Cost in dollars per gross register ton of a 2,000-GRT tanker

* The term cost as used in this report means cost to the purchaser, whether an individual or a government, and should not be confused with the term cost as used in the accounting sense, where it implies the exclusion of profit.

** Table 12 follows on p. 39.

Table 12

Costs of Selected Merchant Vessels

Type of Vessel	Size of Vessel	Cost per Unit (US $ 1955)	Remarks
Cargo vessel	5,400 GRT a/	550 per GRT	
Cargo vessel	2,000 GRT	657 per GRT	
Cargo	1,194 GRT	600 per GRT	Constructed in Hungary
Tanker	10,000 GRT	403 per GRT	
Tanker	2,000 GRT	540 per GRT	
Refrigerated vessel	2,500 GRT	1,049 per GRT	
Refrigerated vessel	5,200 GRT	880 per GRT	
Tug	150 hp b/	1,121 per hp or 1,601 per GRT	Steam propulsion
Tug	350 hp	830 per hp or 1,186 per GRT	Steam propulsion
Tug	800 hp	745 per hp or 1,064 per GRT	Steam propulsion
Wooden seagoing schooner	300 GRT	900 per GRT	250-hp diesel motor for auxiliary propulsion
Lighter	2,000 GRT	352 per GRT	
Self-propelled barge	300 to 800 hp	750 per hp	
Steel non-self-propelled barge	1,000 to 2,000 dwtcc c/	105 per dwtcc	
Wooden non-self-propelled barge	1,000 to 2,000 dwtcc	75 per dwtcc	
Passenger vessel	2,000 GRT	985 per GRT or 1,630 per hp	
Floating crane	100 long tons d/	668,462 per unit	Constructed in Hungary
Dredge	500 GRT	1,018 per GRT	
Icebreaker		2,240 per full load displacement ton	

a. Gross register tons.
b. Horsepower.
c. Deadweight tons cargo capacity.
d. Lift capacity.

The costs of the refrigerated vessels were estimated by analogy with cargo vessels of about the same size, with allowance for the difference in equipment, based on information from the US Maritime Administration. The costs for 150- and 800-hp tugs are from the Soviet-Finnish reparations agreement of 1946, and for the 350-hp tug the cost is from the Swedish-Polish trade agreement of 1950. The figures were brought up to 1955 by the Index of Shipbuilding Costs supplied by the US Maritime Administration, and they were converted more closely to US costs by estimates of the relationship of US prices to Finnish and Swedish costs. Swedish costs were assumed to be 70 percent of US costs, and Finnish costs were assumed to be 100 percent of US costs, as suggested in information from the US Maritime Administration.

The costs for dredgers and passenger vessels are based on East German prices. 11/ These costs were converted to dollars by a ratio of 5.5 Deutsche Mark East (DME) to US $1. The ratio of 5.5 to 1 was calculated on the basis of the ratio of costs of a cargo vessel of approximately the same size valued in East Germany and in the US. The ratio, based on a 3,000-GRT vessel, was calculated as follows: 3,500 DME per GRT divided by $633 per GRT equals 5.5.

Lighters are estimated to cost, on a basis of gross register tonnage, 54 percent of the cost of cargo vessels. This estimate is based on the assumption that propulsion machinery in a self-propelled cargo vessel is 25 percent of the total cost and 17 percent of the light ship displacement. The gross register tonnage of a lighter is 2.5 times the light ship displacement. A 2,000-GRT self-propelled cargo ship is valued at $657 per GRT, or $965 per LSD. If 25 percent is deducted from the cost of the cargo vessel and 17 percent from its light ship displacement, it is found that a non-self-propelled vessel would be valued at $880 per LSD. If a weight relationship of 2.5 to 1* is applied, the cost of 1 GRT of lighter is $352.

Icebreakers were estimated to cost $2,240 per full load displacement ton. This estimate is based on information from the Coast Guard of the US Department of the Treasury. The costs of the 1,194-GRT Hungarian cargo vessel and the 100-ton floating crane used for this report are based on the lists of official Hungarian planning costs for 1954, converted to 1955 dollars. 12/

The cost of schooners is based on the cost quoted in the Soviet-Finnish reparations agreement of 1946. The index of shipbuilding costs of the US Maritime Administration was used to convert the 1946 price to 1955. Prices of self-propelled and non-self-propelled barges are based on information from US builders. Prices of non-self-propelled wooden barges were estimated from the cost of steel barges from information from US Army engineers.

* The light ship displacement multiplied by 2.5 gives the gross register tonnage. Thus the cost of 1 LSD multiplied by 0.4 gives the cost of 1 GRT.

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