

SOVIET ECONOMY

1. Soviet economic development is dominated by obsession with rapid growth of heavy industry. Large part of reason for this is desire for strong military posture.

a. For example, we estimate that 35% of its gross national product, equivalent to approximately 55 billions of dollars, goes directly into the military machine or into capital investment, which is base for expansion of future military capabilities.

b. In the U.S.A. 27% of our gross national product is for military or investment purposes.

2. Hence before discussing the economic, industrial and scientific position of the Soviet Union, I propose to discuss what we believe its military posture to be.

3. The Soviet Bloc implacably believes in eventual triumph of international communism. Expects and hopes to achieve this end without a global war but feels it must be prepared for war if other means fail or if attacked.

4. Soviet position due to their fear that global war, while it might destroy the capitalist system and eventually lead to a communist world, might also bring about their own destruction and quite different group of men would rise from ashes of a global struggle.

5. Therefore, estimate the Soviets will probably try to avoid global war for the immediate future for this and other reasons.

- a. At the present time and pending the development of an effective long-range bomber force, or long-range guided missiles, they are not assured of being able to destroy the American industrial base and our retaliatory power and hence win out in the long run.
- b. At the present time they are somewhat behind us in the nuclear race and probably do not have an adequate nuclear stockpile for global war purposes, although they do probably have a stockpile which,

if surprise were achieved, could effect devastating damage.

c. They seem to feel a general military inferiority to the United States except in ground forces and possibly in guided missile development.

d. The Soviet consider themselves as appreciably encircled by American overseas bases and that we have, unless they can neutralize these bases, a more effective jumping off point to attack them than they have to attack us.

6. I conclude that over the next decade they will continue to devote of their gross national product every ounce of strength which they think their people will stand to heavy industrial development--the basis for military strength in even more distant decades.

a. They will give lip service to the increase of consumer goods, although not so recklessly as during the Malenkov regime, but it is clear from

the new Sixth Five-Year Plan that the real  
priority of heavy industry will remain unchanged.

7. We will, therefore, probably have a situation during the next decade or a good part of it where the Soviet Union will continue to devote as they do today about 35% of their gross national product to military ends or to capital investment.

a. This means emphasis on heavy industry, atomic weapons, aviation, guided missiles, and related fields of electronics, etc.

b. Where do they stand in this situation today?

Have here chart showing their industrial production as compared in billions of dollars to the United States. (See chart)

8. During quarter of century since Stalin consolidated power position in 1928, USSR has risen from relatively undeveloped country to second largest economy in the world.

a. This growth particularly remarkable considering destructive effects World War II.

- b. It has involved transfer of millions of workers from agriculture to urban occupations paralleled by prodigious efforts to educate them in modern skills and technology.
- c. The Soviets have diverted an unusually large portion of total national product to investment--twice that of U.S.A. The result has been:
  - (1) While capital goods output was raised ten-fold, agricultural production failed to match growth in population.
  - (2) Planned goals for heavy industry have usually been reached or surpassed while modest goals for consumer goods have been chronically unfulfilled.

9. As indicated above, total output of USSR now is one - third of U.S.A. but about 1.75 that of U.K. However, USSR production of capital goods far larger proportion of total national product than for U.S.A.

a. For example, USSR production of coal almost equals that of U.S.A. while the number of machine tools produced exceeds slightly that of U.S.A.

Its output of automobiles less than 5% of ours.

10. Sixth five-year plan 1956-1960 follows traditional Soviet line of heavy industrial output which will bring Soviet industrial production in 1960 to nearly 2/5 of U.S.A. as against 1/5 in 1950. Electronic output--largely a military item particularly for guided missiles--will be tripled or quadrupled. In field of special heat resistant alloys where Soviets have done much fundamental research a six-fold increase in production contemplated. (See attached sheet for comparison of present capital goods production in certain key fields.)

11. I have read with interest your publication Resources of the World. As applied to the Soviet Union, the problem of food availability appears to be more difficult of solution than those of raw material, energy resource, and technical manpower scarcities.

- a. Both historical review and current analysis of Soviet economic policy disclose greater success and determination in coping with the latter three problems than with that of adequacy and variety of diet.

12. The Soviets have inaugurated their "new lands" program to increase grain supplies but a big question remains as to the long run successes of this program.

- a. The difficulties encountered this year in the new lands tend to point up the fact that Soviet land resources are not unlimited.
- b. Increases in production through land expansion alone cannot be expected to solve the problem of feeding an ever-increasing population.

13. If the Soviets wish to fulfill their promises of a more varied and higher quality diet for their people, a heavy investment program providing for greatly increased production of fertilizer and special purpose machinery for meat, dairy

and vegetable output will be required.

SCIENCE AND TECHNOLOGY

14. Kaganovich in a recent public speech said:



Capital Goods Production, 1955

<u>Commodity</u>	<u>US</u>	<u>USSR</u>	<u>US as multiple of USSR</u>
Coal (million metric tons)	443	390	1.1
Crude Oil & Natural Gas Liquids (million metric tons)	366	70	5.2
Electric Power (billion Kwh)	623	170	3.7
Steel (million metric tons)	106	45	2.4
Primary Aluminum (million metric tons)	1.4	0.5	2.8
Synthetic Rubber (million metric tons)	0.9	0.23	3.9
Cement (million metric tons)	50	22	2.3
Mineral Fertilizers (million metric tons)	25	9.6	2.6

Consumer Goods Production, 1955

Cotton Fabrics (billion linear meters)	9.0	5.9	1.5
Automobiles and Trucks (million units)	9.2	0.45	20.4
Washing Machines (million units)	4.4	.087	50.6
Radio and TV Sets (million units)	20.3	4.0	5.1
Meat (million metric tons)	12.2	4.5	2.7

SCIENTIFIC RESOURCES OF THE USSR

1. SOVIET SCIENTIFIC AIMS.

KAGANOVICH, MEMBER OF PRESIDUM OF THE PARTY AND ONE OF FIVE FIRST DEPUTY CHAIRMEN OF THE COUNCIL OF MINISTERS, IN 1955 STATED THAT, "ONLY THROUGH THE WIDE AND RAPID INTRODUCTION OF THE NEWEST ACHIEVEMENTS OF OUR OWN AND WORLD WIDE SCIENCE AND TECHNOLOGY CAN WE REACH A LEVEL OF PRODUCTIVITY HIGHER THAN THAT OF CAPITALISM, WHICH IS NECESSARY FOR THE VICTORY OF COMMUNISM." WHAT DO THE SOVIETS HAVE WITH WHICH TO MEET THIS AMBITIOUS OBJECTIVE?

2. MANPOWER RESOURCES.

THE FIGURES USED HEREIN MUST BE TAKEN AS INDICATIONS OF MAGNITUDE ONLY. THEIR ACCURACY CAN NOT BE GUARANTEED.

A. HOW SOVIET SCIENTISTS ARE TRAINED.

ELEMENTARY SCHOOLS STRESS SCIENCE TRAINING AND THERE ARE NO ELECTIVES. SOVIET HIGH SCHOOL GRADUATES HAVE FIVE YEARS OF PHYSICS, FIVE YEARS OF BIOLOGY, FOUR YEARS CHEMISTRY, TEN YEARS MATHEMATICS AND A YEAR OF ASTRONOMY. RECENTLY, MORE PRACTICAL TECHNICAL SUBJECTS SUCH AS MACHINE OPERATION WERE INTRODUCED AT EXPENSE OF HUMANITIES.

FACTORY AND TRADE SCHOOLS CONDUCT  
SPECIALIZED EDUCATION TO SUPPLY SKILLED LABOR.  
AT THE NEXT LEVEL ARE TECHNICUMS, ROUGHLY  
COMPARABLE TO OUR TECHNICAL HIGH SCHOOLS,  
WHICH CONDUCT THREE TO FOUR YEARS OF SPECIALIZED  
TRAINING. MORE TECHNICUMS ARE BEING ESTABLISHED.  
TO ACCOMMODATE THE INCREASING DEMAND FOR  
SKILLED TECHNICIANS WHO CAN NOT BE ADMITTED TO  
UNIVERSITIES OR COLLEGES.

AT THE HIGHEST LEVEL ARE THREE TYPES OF  
INSTITUTIONS:

(1) SPECIALIZED ENGINEERING AND TECHNICAL  
COLLEGES (ABOUT 180 IN THE PHYSICAL SCIENCES)  
WHICH OFFER FOUR-FIVE YEAR COURSES IN SUCH  
SPECIALIZED FIELDS AS MACHINE BUILDING AND  
CONSTRUCTION TO SUPPLY ENGINEERS AND  
SPECIALISTS TO PARTICULAR INDUSTRIES.

(2) POLYTECHNICAL INSTITUTES (ABOUT 24)  
OFFERING FOUR-SIX YEAR COURSES IN BROAD  
FIELDS, AND

(3) UNIVERSITIES (33) EMPHASIZING  
FUNDAMENTAL SCIENCE AND OFFERING COURSES

5-5 1/2 YEARS IN LENGTH, GRADUATES OF WHICH  
ENTER TEACHING OR RESEARCH. THE BETTER  
STUDENTS ARE FUNNELED INTO RESEARCH.

THE THREE HIGHEST TYPES OF INSTITUTIONS AWARD THE  
CANDIDATE DEGREE, COMPARABLE TO OUR PHD. IN  
ADDITION, 4-500 DOCTOR'S DEGREES, AN ADVANCED ACADEMIC  
DEGREE, ARE GRANTED EACH YEAR. ABOUT 75% OF ALL  
ADVANCED DEGREES ARE AWARDED IN THE NATURAL AND  
PHYSICAL SCIENCES.

B. NUMBERS OF TECHNICALLY TRAINED INDIVIDUALS.

THE USSR HAS NOW ABOUT 2/3 RDS THE NUMBER  
OF SCIENTISTS THAT THE UNITED STATES HAS IN THE RESEARCH  
AND TEACHING ASPECTS OF PHYSICAL AND BIOLOGICAL  
SCIENCES (175,000 VERSUS 265,000).

THE USSR HAS ABOUT HALF THE NUMBER THAT U.S.  
HAS IN RESEARCH ALONE (120,000 VERSUS PERHAPS 210,000).

SOVIET COLLEGES RECEIVE ABOUT 500,000 STUDENTS  
AND GRADUATE ABOUT 250,000 EACH YEAR. US ENTRANTS  
AND GRADUATES ARE ABOUT 10% HIGHER, BUT SOVIETS  
<sup>FAR</sup> EDUCATE MORE IN THE SCIENCES THAN WE DO.

THIS IS KEY TO OUTLOOK FOR THE FUTURE. IN 1955  
MORE THAN HALF (ABOUT 60%) OF SOVIET GRADUATIONS WERE  
IN SCIENTIFIC AND TECHNICAL FIELDS VERSUS ABOUT 25%

IN THE US. THE SOVIETS GRADUATED NEARLY TWICE AS MANY ENGINEERS AS DID THE US IN 1955. AT AN INCREASING RATE OF GRADUATION IN THE USSR (ABOUT 80,000 IN PHYSICAL SCIENCES AND ENGINEERING AND ABOUT 50,000 IN THE LIFE SCIENCES), THE SOVIETS WILL ATTAIN AN IMPOSING ADVANTAGE IN NUMBER OF SCIENTISTS AND ENGINEERS IN A FEW YEARS' TIME IF THEY AND WE CONTINUE AT OUR PRESENT RATES.

C. HOW CANDIDATES FOR SCIENTIFIC TRAINING ARE SELECTED.

THE DOMINANT FEATURE IN THE SOVIET SELECTION PROCESS IS THE USEFULNESS TO THE STATE OF THE POTENTIAL SCIENTIST. THE STATE THUS CONTROLS BY ADMISSIONS TO ADVANCED TRAINING THE NUMBERS OF PHYSICISTS, CHEMISTS, AND SO ON. SIMILARLY, UPON COMPLETION OF HIS EDUCATION, THE FLEDGLING SOVIET SCIENTIST IS OFFERED POSITIONS ACCORDING TO STATE NEEDS. ALL ATTEMPTS TO FAVOR SELECTION OF "PROLETARIANS" WERE ABANDONED AT THE END OF 1935.

D. WOMEN SCIENTISTS. (*Men, money*)

THE USSR EDUCATES A MUCH HIGHER PROPORTION OF WOMEN IN SCIENTIFIC FIELDS. OVER-ALL FIGURE IN USSR WAS ABOUT 50% IN 1954 WITH GREATER NUMBERS OF WOMEN IN ENGINEERING AND MEDICINE, AGRICULTURAL AND

OTHER SPECIALIZED PROFESSIONAL FIELDS THAN IN THE US. WOMEN ARE EMPLOYED LARGELY IN INDUSTRY AND TEACHING (ABOUT 35% OF ALL TEACHERS IN HIGHER EDUCATIONAL ESTABLISHMENTS ARE WOMEN).

E. INCENTIVES

FOR PROMISING STUDENTS, A STATE-FINANCED EDUCATION IN SCIENCE IS A LIKELY PROSPECT. AS ULTIMATE GOALS, THE ASPIRING SCIENTIST CAN LOOK FORWARD TO HIGH RANK EXPRESSED IN TERMS OF PREFERENTIAL TREATMENT IN SALARY, HOUSING AND PERQUISITES. STATE PRIZES WORTH SEVERAL THOUSANDS OF DOLLARS AWAIT MANY KINDS OF OUTSTANDING SCIENTIFIC ACCOMPLISHMENTS.

F. SUPPORTING TECHNICIANS.

SHORT TERM FACTORY AND TRADE SCHOOLS, AS WELL AS TECHNICUMS, PROVIDE AN ACADEMIC OUTLET FOR THE INCREASING NUMBERS OF STUDENTS NOT ADMITTED TO COLLEGES AND UNIVERSITIES. SOVIETS ARE MORE APT TO OBTAIN THEIR SKILLED FOREMEN FROM THEIR EDUCATIONAL SYSTEM THAN FROM PRACTICAL EXPERIENCE IN INDUSTRY. BETWEEN 1914 AND 1954 ABOUT 1.2 MILLION SKILLED LABORERS OF THIS CLASS HAD BEEN TRAINED IN SPECIALIZED SEMI-PROFESSIONAL SCHOOLS AND AN ADDITIONAL 600,000 SINCE ✓

1949 HAVE BEEN TRAINED IN EXTENSION COURSES. THIS REPRESENTS A DRAMATIC EFFORT ON THE PART OF THE USSR TO OVERCOME A DEFICIENCY IN SKILLED SUPPORTING MANPOWER.

3. UTILIZATION OF TECHNOLOGICAL RESOURCES.

A. ORGANIZATION OF THE SCIENTIFIC EFFORT.

ROUGHLY COMPARABLE TO THAT OF THE US FOLLOWING THREE GENERAL LINES:

(1) BOTH FUNDAMENTAL AND APPLIED RESEARCH ARE PLANNED AND SUPERVISED BY A SYSTEM OF ACADEMIES OF SCIENCES WHICH ACCOUNT FOR ABOUT 1/10TH OF THE TOTAL SCIENTIFIC MANPOWER.

(2) INSTITUTES OF INDUSTRIAL AND OTHER ECONOMIC MINISTRIES EMPLOY ABOUT 2/5THS OF ALL SCIENTISTS. A NOTABLE EXAMPLE IS THE CENTRAL AEROHYDRODYNAMICS INSTITUTE (TSAGI) WHICH DOES WORK COMPARABLE TO THAT OF OUR NATIONAL ADVISORY COMMITTEE FOR AERONAUTICAL LABORATORIES.

3. (3) HIGHER EDUCATIONAL INSTITUTIONS EMPLOY THE ~~REMAINING~~ REMAINING HALF OF THE SOVIET SCIENTISTS AS TEACHERS. THIS SEGMENT HAS

BEEN CRITICIZED FOR FAILING TO PROVIDE ITS SHARE OF RESEARCH IN THE WAY THAT AMERICAN UNIVERSITY SCIENTISTS DO.

B. RESEARCH IS NOT AS CAREFULLY PLANNED AND COORDINATED AS MIGHT BE EXPECTED IN A TOTALITARIAN ECONOMY.

THERE IS MUCH PARALLELISM SINCE EACH MINISTRY PLANS ITS OWN RESEARCH PROGRAM. THERE IS THE HEAVY HAND OF BUREAUCRACY AS SHOWN BY THE COMMENT OF THE VICE PRESIDENT OF THE SOVIET ACADEMY OF MEDICAL SCIENCES, "WE NOT ONLY ORGANIZE BADLY, BUT WE CONSTANTLY REORGANIZE." THE ACADEMY OF SCIENCES IS ATTEMPTING BY A COMMUNITY STRUCTURE TO COORDINATE ACTIVITIES ON A PROJECT BASIS.

C. ROLE OF THE COMMUNIST PARTY.

THE PARTY HAS, OF COURSE, GREAT POWER AND IS AN EFFECTIVE MEANS OF INSURING COORDINATION IN AREAS OF HIGH PRIORITY. WE CAN SEE THE EFFECT OF PARTY DISCIPLINE IN PROGRAMS, SUCH AS ATOMIC ENERGY, GUIDED MISSILES, AIRCRAFT AND ELECTRONICS. FOR EXAMPLE, THE SOVIET FIVE YEAR PLAN RECENTLY ANNOUNCED PLANS FOR CONSTRUCTION IN THE PERIOD 1956-1960 OF 2,000 TO 2,500 MEGAWATTS OF ELECTRICAL POWER GENERATING CAPACITY USING NUCLEAR ENERGY. (AS COMPARED WITH



PRESENT U.S. PLANS FOR APPROXIMATELY 800 MEGAWATTS IN THE SAME PERIOD). EVEN GRANTING AN ECONOMIC BASIS FOR THIS FORMIDABLE SOVIET GOAL, WE CAN ALSO SEE THE POLITICAL EXPEDIENCY AND THE DRAMATIC SUPPORT TO SOVIET PROPAGANDA LINES.

ON THE OTHER SIDE OF THE LEGER, PARTY INTERFERENCE IN GENETICS DURING THE LYSENKO CONTROVERSY CERTAINLY CONTRIBUTED TO THE SOVIETS' SIZEABLE AGRICULTURAL PROBLEMS. GENERALLY SPEAKING, HOWEVER, PARTY INTERFERENCE HAS NOT PRESENTED A MAJOR OBSTACLE TO PROGRESSIVE RESEARCH.

D. FUNDS.

ANNOUNCED EXPENDITURES FOR RESEARCH ARE COMPARABLE TO (PERHAPS GREATER THAN) THOSE OF THE U.S. IN TERMS OF PER CENT OF GNP (ABOUT ~~1X~~ 1%). HOWEVER, THE SOVIET GNP IS ONLY ABOUT 1/3 THAT OF THE U.S.

E. DISSEMINATION OF SCIENTIFIC KNOWLEDGE.

THE SOVIETS HAVE A COMPREHENSIVE SYSTEM OF ABSTRACTING OF THE WORLD'S SCIENTIFIC LITERATURE WHICH PUTS THEM IN AN ENVIABLE POSITION TO EXPLOIT FOREIGN DEVELOPMENTS. WE HAVE EXAMPLES OF AMERICAN CHEMICAL JOURNALS BEING ABSTRACTED AND TRANSLATED IN PART OR

IN TOTO SO AS TO BE IN THE HANDS OF SOVIET RECIPIENTS  
WITHIN TWO MONTHS OF THE AMERICAL PUBLICATION DATE.  
OUR CHEMICAL ABSTRACTS ON THE AVERAGE RUNS ABOUT  
EIGHT MONTHS BEHIND ORIGINAL PUBLICATION DATE.

#### 4. ACHIEVEMENTS.

THE ACHIEVEMENTS OF SOVIET RESEARCH VARY ACCORDING  
TO THE NATURE OF THE RESEARCH ITSELF AND THE FIELD OF PROBABLE  
APPLICATION. GENERALLY, SOVIET SCIENTISTS ARE QUITE GOOD IN  
THEORY; IN THE THEORETICAL ASPECTS OF PHYSICS, FOR EXAMPLE,  
THE SOVIETS ARE PERHAPS ON A PAR WITH ANY COUNTRY IN THE  
WORLD, THEIR THEORETICAL METALLURGY IS OUTSTANDING, AND SOME  
OF THEIR RESEARCH INTO THE HUMAN NERVOUS SYSTEM, FOLLOWING  
THE PAVLOVIAN SCHOOL, IS QUALITATIVELY UNIQUE. THEY MAY TEND  
TO LAG A BIT IN EXPERIMENTAL WORK, BUT THERE ARE ENOUGH  
EXCEPTIONS HERE TO MAKE SURE <sup>CH</sup> A GENERALIZATION PRECARIOUS.  
CERTAINLY WE HAVE TO GIVE FULL CREDIT TO THEIR DEVELOPMENT OF  
THEIR TEN BILLION ELECTRON VOLTED PROTON SYNCHROTRON, THE  
LARGEST PARTICLE ACCELERATOR IN THE WORLD.

#### 5. SCIENTIFIC RESEARCH AND TECHNOLOGICAL DEVELOPMENT.

SOVIET RESEARCH ACHIEVEMENTS AFFECT SOVIET TECHNOLOGY  
BY A SYSTEM OF PRIORITIES. THE SOVIET ECONOMY DOES NOT HAVE  
THE CAPACITY TO ABSORB RESEARCH RESULTS IN ALL FIELDS AS DOES

OURS. GREATEST USE OF RESEARCH RESULTS THEREFORE IS MADE IN AREAS ESSENTIAL TO NATIONAL POWER AND MILITARY STRENGTH AS OPPOSED TO THE CONSUMPTION SECTOR OF THE CIVIL ECONOMY. THE LATTER HAS BEEN LITTLE AFFECTED BY SCIENTIFIC RESEARCH AND DEVELOPMENT.

SUMMARY

THESE ARE HIGHPOINTS OF THIS REVIEW OF SOVIET SCIENTIFIC RESOURCES:

A. THEIR POOL OF HIGHLY TRAINED SCIENTISTS AND ENGINEERS, NOW APPROXIMATELY EQUAL TO THAT OF USA, IS BEING INCREASED AT A PROPORTIONATELY GREATER RATE THAN OURS -- IN A FEW YEARS WE MAY SEE THEM ATTAIN A DECISIVE ADVANTAGE IN TOTAL NUMBERS.

B. A VIGOROUS PROGRAM OF TRAINING OF SPECIALIZED TECHNICIANS WILL IMPROVE THEIR RELATIVE STANDING IN THIS IMPORTANT CATEGORY.

C. BY THE FUNCTIONING OF STATE CONTROL THE SOVIETS ARE ABLE TO DIRECT THE STREAM OF TRAINED SCIENTISTS IN PROPER CHANNELS ACCORDING TO NEED.

D. THERE IS NO SPARING OF FUNDS FOR SCIENTIFIC RESEARCH .

E. IT IS THE ANNOUNCED SOVIET INTENTION TO UTILIZE THE BEST OF AVAILABLE FOREIGN SCIENTIFIC KNOWLEDGE AND THEY HAVE INSTITUTED A LARGE-SCALE

SYSTEM FOR SUCH EXPLOITATION.

F. SCIENTIFIC ACHIEVEMENT IS ENCOURAGED BY  
A SYSTEM OF AWARDS AND SPECIAL PRIVILEGES WHICH  
ELEVATES SCIENTISTS TO THE TOP RUNG IN THE COMMUNIST  
VERSION OF THE SOCIO-ECONOMIC LADDER.

G. THE USSR MAKES FULL USE OF THE CONTRIBUTION  
WHICH WOMEN CAN MAKE TO ITS SCIENTIFIC EFFORT.

THESE ARE STATEMENTS WORTH PONDERING.