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Largely unnoticed by Western commentators, a fundamental change has taken place in Soviet ideology in the last quarter-century which has a profound significance for the perception by Soviet leaders of their own society and of its place in the world. The new outlook goes under the name of "the scientific-technological revolution" -- nauchno-tekhnicheskaia revoliutsiia, or NTR for short.

The NTR in Theory and Policy. The NTR may be seen both as a general theory of social change, and as a transformation of the Marxist-Leninist ideology that serves as a guide to policy.

As a general theory of social change, the basic premise of the NTR is that by the middle of the twentieth century the application of advanced science and technology to production in the forms especially of nuclear power, automation, and computers, has come to represent a revolutionary change in the possibilities for transforming the human condition. The NTR is affecting the processes of production; per capita productivity; the need for highly trained technicians; and a reduction in the differences between mental and manual labor and between urban and rural life. It is also leading to a great expansion in the availability and use of data in the economic and social sphere; the application of the social sciences to the solution of complex problems; and the increased internationalization of human activity. In brief, the advancement

of knowledge is seen as the principal source of societal transformation, and the production, distribution, and application of science and technology as the central challenge to the Soviet system.

Much of the above will seem commonplace to Western readers, since it is derived primarily from the findings of Western social science during the past generation or two, and in many respects resembles contemporary modernization theory. It represents a marked change, however, from the dogmatic Marxism-Leninism of the 1930's to 1960's, which emphasized labor as the principal productive force and class conflict as the motor of social change. This earlier emphasis implied that the USSR was the most advanced country simply because public ownership of the means of production had first been established there. It tended to assume that by the very fact of being "socialist" in this sense, the USSR would by definition overtake and surpass the more advanced countries of the West.

The new outlook based on the NTR takes nothing for granted, and suggests that the USSR must prove itself by making effective use of science and technology. NTR theorists at the same time remain within the framework of Marxism-Leninism by maintaining that "socialist" societies are better able than "capitalist" to take advantage of the opportunities for human betterment offered by the revolution in science and technology, and that in due course all societies will progress from "capitalism" to "socialism." This competition and ultimate victory is seen, not in terms of class conflict or military victory, but rather of superior ability to develop and apply advanced science and technology.

Bibliography. Accounts in English which discuss this development include Cyril E. Black, "New Soviet Thinking," New York Times (November 24, 1978), p. A27; Julian M. Cooper, "The Scientific and Technological Revolution in Soviet Theory," Technology and Communist Culture, ed. by Frederic J. Fleron, Jr. (New York 1977), 146-179; and Erik P. Hoffman, "Soviet Views of the 'Scientific-Technological Revolution,'" World Politics, XXX (July 1978), 615-644.

An authoritative brief Soviet account is D. M. Gvishiani and S. R. Mikulinskii, "Nauchno-tekhnicheskaia revoliutsiia," Bolshaia Sovietskaia Entsiklopediia, 3rd. ed. (1974), XVII, 341-343. Man-Science-Technology: A Marxist Analysis of the Scientific-Technological Revolution (Moscow-Prague 1973), written by members of the Institute of Philosophy and the Institute of the History of Natural Sciences and Technology of the USSR Academy of Sciences, and the Institute of Philosophy and Sociology of the Czechoslovak Academy of Sciences, presents the Soviet view in some detail.

There is also an interesting international debate sponsored by the International Sociological Association on Scientific-Technological Revolution: Social Aspects (1977) presenting a variety of points of view.

Background. While this emphasis on the need to master and apply science and technology is now the dominant theme in the official Soviet ideology, it is not new in Soviet or in Russian thought. D. I. Mendeleev and other Russian scientists in the nineteenth and early twentieth centuries held similar views in regard to the significance of the science and technology of their day, as did most Westerners who concerned themselves with these issues, and the application of science and technology also

played a central role in the 1920's in the thinking of V. I. Lenin and of such colleagues as A. A. Bogdanov, N. I. Bukharin, and others.

Beginning with the First Five-Year Plan, however, the main emphasis of Marxism-Leninism became dogmatic, nationalistic, and political, concerned primarily with mobilizing resources and skills for rapid industrialization. Some aspects of science were subordinated to ideology, and conformity and loyalty tended to take precedence over theoretical research and innovation. While it is doubtless an oversimplification to contrast too sharply the dogmatism of the Stalin and Khrushchev eras with the pragmatism of the Brezhnev era, in a very general sense these two terms nevertheless seem to reflect the essence of the matter.

It may be assumed that in academic and scientific circles there was a continuing interest throughout the period after the 1930's in the economic and social consequences of a rapidly developing science and technology, but it had to be discussed with caution. Perhaps the effort of Eugene Varga in 1946 to provide an objective and non-doctrinaire description of Western economic development was an effort to reassert a pragmatic approach, but it proved to be premature and he was purged.

While a dogmatic approach to ideology predominated throughout the Khrushchev era, it is significant that public discussion of the revolution in science and technology began to gain influence in the late 1950's and early 1960's. The beginnings of an objective social science that provided the background for the NTR appeared first in Poland, Czechoslovakia, and East Germany, and translations of works written in these countries were among the first signs of the official acceptance of the NTR in the Soviet Union.

In 1969 a Russian translation appeared of Jan Sczcepanski's Elementary Principles of Sociology, originally published in Warsaw in 1965. This was in effect a primer of contemporary sociology, predominantly American and West European, and drawing extensively on Polish work since the 1950's. It contained few references to Marx and none to Lenin. Of more direct concern to the NTR was Civilization at the Crossroads: Social and Human Implications of the Scientific and Technological Revolution, published in Prague in 1966 (with an English edition in 1969), by Radovan Richta and his colleagues at the Institute of Philosophy and Sociology of the Czechoslovak Academy of Sciences. This volume cites primarily Western work dating from the 1940's, and places no particular emphasis on Marxism-Leninism. It played, incidentally, an important role in the Czechoslovak events of 1968. Althoughthe Prague reform movement was suppressed by the Soviet Union for reasons of national security, the Soviet and Czechoslovak academies of science collaborated five years later in publishing Man-Science Technology (noted in the bibliography), which was in effect a revised and extended version of Civilization at the Crossroads.

An important role in the Soviet receptivity to these East European interpretations of contemporary social science was played by A. M. Rumiantsev. As editor of Kommunist (1955-58), of Problems of Peace and Socialism (1958-64), and as vice-president of the USSR Academy of Sciences (1967-71), he was one of the principal authority figures under whose protection modern social science was revived in the Soviet Union. Rumiantsev wrote the introduction to the Soviet edition of Sczcepanski's Elementary Principles of Sociology, and he was primarily responsible for the Soviet-Czechoslovak cooperative effort that produced Man-Science Technology.

In the meantime, Soviet theorists had since the 1950's been devoting increasing attention to the economic and social significance of the new developments in nuclear power, automation, and computers, and a reference to this subject appeared in the Communist Party Program of 1961 that was in the main a repetition of dogmatic Marxism-Leninism. Throughout the 1960's the advocates of the NTR appeared to be in a minority among policy-makers, however, and in 1970 Andrei Zakharov, Roy Medvedev, and V. F. Turchin wrote a letter to the Party leaders warning that the USSR was "dropping further and further behind" the United States in the application of science and technology. The NTR finally became a dominant official theme when Brezhnev in his report to the 24th Congress of the CPSU in 1971 stated that "the task we face, comrades, is one of historical importance: to fuse the achievements of the scientific and technological revolution with the advantages of the socialist economic system."

In the course of the 1970's a wide range of views has been expressed in Soviet publications regarding the NTR, and there are few areas of activity that have not been challenged to demonstrate that they are achieving the efficiency and productivity made possible by modern techniques. This literature includes a wide range of competing views, as well as much abstract theorizing that does not seem to represent a very efficient or productive use of newsprint. It is not uncommon to hear the more practical-minded among Party members complain that theorizing about the NTR has become a fad or a religion that is not much help in the immediate tasks of making the Soviet system work.

The literature on the NTR is also limited to the period since the mid-20th century. In this sense it represents a Soviet version of Western views of what is variously

called high modernization, advanced industrial society, or "post-industrial" society. This is a convenient accomodation to earlier dogmatic views of Marxism-Leninism, since it avoids the controversies that would be involved in reinterpreting the earlier periods of Soviet history.

Domestic Policy Implications. The principal domestic consequences of the NTR are an intensive effort to bring innovations in science and technology directly to bear on production, a new emphasis on the importance of management and decentralized organization, and a move toward greater institutional pluralism in the political sphere.

Innovation for production embraces a wide range of measures designed to increase productivity through improvements in quality and techniques. In agriculture, this involves an emphasis on artificial fertilizer and improved machinery, in contrast to Khrushchev's efforts to increase output by extending cultivation to new lands. In industry, this trend has emphasized the importation of whole factories and mass-production systems from the West as well as the upgrading of existing installations through the introduction of automation and labor-saving devices. Of particular significance has been a major effort to give the USSR an independent capacity in the production of computers, rather than relying as Japan and the West European countries have done on American technology.

Of greater consequence than the more narrowly technical innovations, are the introduction of over a hundred "science-production associations." These new institutions are designed to by-pass the slow clearance procedures in the central bureaucracy that have inhibited change, and to bring technology, design, and production into closer association. This organizational device has proved useful not only in high-technology machine-building industries, but also in agriculture, chemistry, and medicine.

Extensive consideration is also being given to improving the management of enterprises and of societal organization generally. The new emphasis on modern management techniques, which stresses efficiency and productivity at the expense of centralized controls, brings into question the primacy of Party controls and the overlapping of party and government structures that has long characterized Soviet organizational methods. This trend of reform has been accompanied by a variety of experiments with the decentralization of the administration of Soviet enterprises.

Foreign Policy Implications. In contrast to the official self-confidence of the Khrushchev era, as reflected in the prediction that in 1980 the USSR would exceed the US national income per-capita by at least 50 per cent, the implications of Soviet theories and policies relating to the NTR is that the USSR was falling behind the West in the 1950's and 1960's and had a long way to go if it wished to catch up. The new outlook also recognizes that the East European countries are more advanced, and the USSR in fact followed their lead in moving from dogmatism to pragmatism.

Detente plays a central role in the new emphasis on the NTR, since normal relations with the Western countries and with Japan are essential for the long-term policy of technology transfer and of integrating the USSR into the world economy. The new Soviet outlook is in substance not essentially different from the pragmatic approach to modernization that has long provided the (largely unstated) ideological basis for policy in Western Europe, the United States, and Japan, It also resembles the policy of Four Modernizations (agriculture, industry, science and technology, defense) announced by Chou En-lai in 1975 and currently being implemented by Teng Hsiao-ping and his colleagues.

It is significant that, for the first time since World War I, all the major societies of the world are now operating under essentially the same value system. While all the old problems of national security, balance of power, and arms control remain unchanged, there is now an unprecedented common denominator of agreement as to the universal validity of modern knowledge and the desirability of applying it to human problems. Soviet theories of the NTR, no less than the relatively non-theoretical approach in the Western countries, recognize the global character of contemporary problems and the ineluctable trend toward international integration.

At the same time, Soviet views of the NTR remain within the framework of Marxism-Leninism and proclaim the inevitability of the victory of "socialism" over "capitalism." The emphasis is no longer on class struggle or world revolution, but on the belief that the planned economies of the Marxist-Leninist societies are better suited than market economies and their characteristic political and social institutions to take advantage of the opportunities for human betterment offered by the revolution in science and technology. The process of societal transformation is seen as taking place within two "systems": the "socialist" (the 14 countries under Communist Party rule, including Yugoslavia), and the "non-socialist" (all others). The "non-socialist" countries are expected to be transformed into "socialist" in due course by domestic processes of change as the requirements of the NTR exert irresistable pressure on their institutions. The revolution in science and technology is expected to undermine market economies ("capitalism") just as the earlier industrial revolution undermined feudalism by stimulating the development of a middle class of enterpreneurs.

This fusion of the NTR with Marxism-Leninism thus gives Soviet ideologists the best of both worlds - they both present the USSR as less developed than the Western countries and seeking to catch up with them through borrowing and adaptation, and at the same time proclaim that the Soviet system is the most advanced and the toward which all other are tending. It seems likely that this combination of incompatible views is due less to schizophrenia on the part of Soviet ideologists than to a compromise between pragmatic and dogmatic elements of the governing coalition.

The NTR and Soviet Society. An evaluation of the significance of the NTR in Soviet society depends in part on one's view of the role of ideology generally, and in part on one's understanding of the Soviet political structure and policy process.

The following three views, while not mutually exclusive, reflect alternative approaches to an evaluation of the significance of the NTR for the development of Soviet society.

1. Generational change. At the most general level, the NTR may be seen as the ideology of the generation of Soviet men and women with higher education - a group that has grown from 5 million in 1939 to 8 million in 1959 and to some 15 million in 1970. They are much better educated than their parents in the fundamentals of modern knowledge, they take the Soviet system for granted and are not constrained by memories of Stalinism or of the Second World War, and they are much more aware of the realities of the outside world.

This view would see Soviet ideology as being "secularized" - less sacred, more worldly; more a matter of proof than of faith. A contemporary Turgenev might write of this generation, as of the "sons" of the 1860's, that they regard everything "from the critical point of view."

To the extent that this is the case, one may anticipate a development like the "silent revolution" in Western Europe - a change in values and world outlook that will gradually permeate all institutions as the younger and better educated gradually replace their elders in the normal course of personnel turnover.

2. The Brezhnev Coalition. The dominant prevailing interpretation of Soviet politics is that the Brezhnev administration represents a coalition of factions, predominantly conservative and centrist, within the CPSU. These factions in turn are responsive in some degree to the many competing interest groups that comprise Soviet society. These interests are articulated by the apparatus of the Central Committee of the CPSU, and at the highest level by the Politburo where the necessary compromises are ultimately hammered out.

The main interest groups are not hard to identify, but not a great deal is known in detail as to how they line up on specific issues or how they form coalitions to gain influence in the competition for the allocation of resources. On the dogmatic side, one would expect to find the military-industrial complex, the central planning organs, the ministries concerned with heavy industry in particular, the Party organs concerned with security and propaganda, and the regional and local Party secretaries.

Those with a pragmatic orientation would probably include the Academy of Sciences, the universities, the managers of enterprises, the bureaucracies concerned with agriculture, consumer goods, and domestic and foreign trade, specialists concerned with computers, space sciences, and other forms of high technology, and probably also large elements of the central bureaucracy of the Party. Within these groups, the more technically trained may be more pragmatic (in the sense that we are using the term) than those concerned with bureaucracy and administration.

Apart from these institutional and professional interest groups, there are also the non-Russian minorities that represent some half of the population, the regional and local interests that seek to promote their concerns at the expense of those of their neighbors, and the adherents of the Orthodox, Catholic, Protestant, Jewish, and Moslem faiths. It is difficult to know how these groups, and their various subdivisions, would stand on the questions of value and organization raised by the NTR.

This view, in short, sees the emergence of support for the NTR in the 1970's as a victory of the more pragmatic elements among and within these various interest groups over their rivals. This would appear to be a compromise victory, which depends for its stability on foreign as well as domestic developments. Challenges to Soviet security from abroad would tend to weaken the pragmatic tendencies and to strengthen those favoring greater centralization, nationalism, and self-sufficiency.

Whereas these who see the transformation of values in terms of generational change would be inclined to see the pragmatic outlook as gaining ineluctably, though slowly, with time, this second view would see the dominance of pragmatism as more dependent on the contingencies of domestic and foreign affairs.

3. The Ruling Oligarchy. The third view sees Soviet society as dominated by a ruling oligarchy concerned primarily with staying in office and keeping its power and privileges. This view sees the party-government as fearful of radical changes in policy, and tolerating new initiatives in ideology and policy only as cautious concessions to pressures from Soviet society as a means of keeping the system in balance. Ideologists and scholars are permitted to write freely about the NTR, but practical reforms meet with resistance at all levels by the party and state bureaucracies.

From this point of view Marxism-Leninism is a tool of the ruling oligarchy, much as Marx saw religion as the tool of capitalist oppressors. Ideology is used by the oligarchy as a means of manipulating public opinion and of holding out the prospect for each succeeding generation that the sacrifices and hardships of today will bring benefits in the future.

In this view the Soviet system has not changed since the Stalin era, and remains a government under the Party and not under law. The oligarchy has made no concessions that it cannot take away, and in this sense there has been no devolution of authority, no political development. This view is widely held among dissident writers, and is similar to the "totalitarian" approach to the Soviet system that was widely held in the Ewst in the 1940's and 1950's.