

The Scientific N. Dryakhlov
and Technological
Revolution:
Its Role
in Today's World



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N. Dryakhlov

**The Scientific
and Technological
Revolution:
Its Role
in Today's World**

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**НАУЧНО-ТЕХНИЧЕСКАЯ РЕВОЛЮЦИЯ.
ЕЕ РОЛЬ В СОВРЕМЕННОМ МИРЕ**

На английском языке

What is the role of the scientific and technological revolution in today's world? How does it influence international relations? How is it possible to combine the achievements of this revolution with the advantages of socialism? These and many other questions are discussed by the author, Professor Nikolai Dryakhlov, D. Sc. (Philos.).

He lays down the methodological principles of approaching the STR as a specific social phenomenon and gives an in-depth critical analysis of bourgeois and revisionist concepts of the role of the STR in today's world.

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FOREWORD

Today's scientific and technological revolution has had as great an impact on society and international relations as the discovery of fire, the use of metal tools, the invention of machinery, the transition to large-scale machine industry, the scientific revolution at the end of the last and beginning of the present century, etc.

It is only in the past 15-20 years that scientists have really begun to study the scientific and technological revolution and explain the historical role it is bound to play in the coming decades. Its extensive impact and dynamics have meant that man can no longer rely on "tradition" in advancing science, technology and material production. Fundamentally new solutions to use social labour to its utmost potential have to be found which will correspond to the essence and character of the scientific and technological revolution.

Leonid Brezhnev said that "the revolution in science and technology requires radical changes in the style and methods of economic work, a determined struggle against sluggishness and red tape; it requires true respect for science and the ability and desire to take advice from and reckon with science".¹

¹ *Documents and Resolutions, XXVth Congress of the CPSU*, Novosti Press Agency Publishing House, Moscow, 1976, p. 58.

This is due to the fact that the volume of scientific knowledge doubles every 10-12 years, and the renewal period of facilities and technology in the industries that determine technological progress (chemical, electronics, certain areas of engineering, etc.) is 2-5 years. Each generation of workers is 5 or 6 times in their lifetime witnessing qualitative changes in professions and a sharp growth in their number, unprecedented revisions of college and university education and basic changes in the very character of work and in material production as a whole. In the industrially developed countries, from 70 to 90 per cent of the growth in the national product is the result of achievements in science and technology. What this does is emphasize the urgency and theoretical and practical significance of the socio-philosophical study of the scientific and technological revolution, and the necessity of revealing its influence on social development and international relations.

Marxist theory which explains the laws of scientific and technical progress and its social functions, is especially significant today when the social impact of this ongoing revolution is felt in every aspect of social life, and when this revolution is occurring in two opposite socio-economic systems—socialism and capitalism.

The development of science and technology is a very important theme in Marxist literature. There have appeared many books, pamphlets and articles aptly criticizing bourgeois "technical determinism", "technicism", "technocratic theory" and other idealistic, unscientific theories of technical progress from a Marxist viewpoint. A large contribution to the further elaboration of the Marxist theory of the development of

science and technology and their social functions has been made. Since the mid-1960s there have been three to five large scientific conferences and symposiums every year in the Soviet Union where views are exchanged on certain aspects of Marxist-Leninist theory of the scientific and technological revolution. These forums have helped to combine the efforts of Marxist scholars in the study of important questions and determining the long-term research problems connected with the specifics of the scientific and technological revolution* today. The widespread unfolding of this revolution is now one of the most important areas of competition between capitalism and socialism. The 15th World Congress of Philosophy, "Man, Science, Technology" (Varna, 1973) and the 8th and 9th World Congresses of Sociology (Toronto, Canada, 1974 and Uppsala, Sweden, 1978, respectively) dealt with the problems of the STR.

The theme is of special concern to scholars in the Soviet Union and other socialist countries. Good results have been achieved in the GDR, Czechoslovakia, Poland, Romania, Hungary, Bulgaria and Yugoslavia, while studies have begun in the People's Democratic Republic of Korea, the Socialist Republic of Vietnam and Cuba.

This indicates that a significant scientific potential has been accumulated in the elaboration of the Marxist-Leninist approach to the STR. In recent years, Marxist scholars have been most concerned with the complex analysis of the STR.

This book focuses on important problems like the beginning and preconditions of the

* Hereafter, we will use the abbreviation STR to denote the scientific and technological revolution.

STR, its essence and characteristics and its role in the activities of man and society. Especially important themes will be the principal directions and methods of dealing with the question of the organic unity of the achievements in science and technology with the advantages of the socialist economic system, and criticism of the bourgeois and anti-communist concepts of the role of science and technology in the contemporary world and in international relations.

The Marxist-Leninist theory of the STR and the problems of how to practically use its achievements necessitate a deeper study of some categories of the Marxist science of society, including technology, science, material production, the productive forces, the character and content of human labour, the worker, the aggregate worker, etc. The STR has enriched the definitions of these categories in accordance with the principles of Marxist-Leninist methodology. *end [index]*

One of the most important fields of endeavour *to 55* is the study of Marxist-Leninist concepts of the STR. The STR has influenced the modern social development, primarily because of its links with the world revolutionary movement, the activities of the working class, the transformation of the structure and dynamics of the productive forces, and the change in the content and character of human labour. This is also necessary because of the emergence of a whole range of problems connected with the transformation of science into a direct productive force and the radical changes in technology: the creation of automated production systems, the development and introduction of automated control systems at the factory and even in some instances, on the industry-wide level, and, finally, the

introduction of a unified automated system of gathering and processing information to deal with managerial problems on a national scale.

The study of the STR in its social and philosophical aspects is especially significant and necessary for dealing with the problems of man, and the particularities of his labour as a consequence of it.

The study of the ideological aspects of the STR is necessary in order to expose the attempts of bourgeois ideologues, anti-communists and revisionists to distort or falsify its significance for current social progress and its organic ties with the content of the present epoch, which is characterized by the transition from capitalism to socialism and communism.

Leonid Brezhnev pointed out: "We Communists proceed from the belief that the scientific and technological revolution acquires a true orientation consistent with the interests of man and society only under socialism. In turn, the end objectives of the social revolution, the building of a communist society, can only be attained on the basis of accelerated scientific and technical progress."¹

The Marxist-Leninist concept of the STR has had a decisive impact on the scientific study of the STR by progressive scholars everywhere. It affects the restructuring of international relations, on which the Peace Programme, adopted by the 24th Congress of the CPSU and further developed by the subsequent two CPSU congresses and supported by the other socialist countries, has had a direct impact.

¹ *Documents and Resolutions. XXVth Congress of the CPSU*, pp. 56-57.

HISTORICAL AND SOCIAL PRECONDITIONS OF THE SCIENTIFIC AND TECHNOLOGICAL REVOLUTION

The question of the historical preconditions of the STR involves the changes in the principles and structure of human activity resulting from the technological (18th century) and industrial (18-19th centuries) revolutions, which led to qualitative changes in the technological, organizational and scientific foundations of labour. Historically, these progressive changes were expressed in the transformation of social production from handicrafts to manufacture and from manufacture to large-scale machine industry.

Marx noted that the essential characteristics of these stages of social production were directly related to the level of socialization of labour, its technology, the degree to which the forces of nature were converted into forces of social labour, improvements in the organizational and managerial principles of production, etc. Each of these factors was complex, and in dialectical unity with the others. At a particular stage of the system's "maturity" the integral unity of these factors appeared in social qualities of historical importance like manufacture, large-scale machine production, and the restructuring of the system of social relations and interclass and interstate ties. The restructuring of social relations was stimulated by large-scale machine production.

When they studied the specifics of social transformations in the 18th and 19th centuries, the founders of Marxism-Leninism emphasized the continuity and organic connection between manufacture and large-scale machine production. Marx wrote: "By decomposition of handicrafts, by specialisation of the instruments of labour, by the formation of detail labourers and by grouping and combining the latter into a single mechanism, division of labour in manufacture creates a qualitative gradation, and a quantitative proportion in the social process of production; it consequently creates a definite organisation of the labour of society, and thereby develops at the same time new productive forces in the society."¹

However, manufacture was not able to totally encompass social production or to transform its essential characteristics. "It towered up as an economic work of art on the broad foundation of the town handicrafts, and of the rural domestic industries. At a given stage in its development, the narrow technical basis on which manufacture rested, came into conflict with requirements of production that were created by manufacture itself."²

Only capitalist production based on large-scale machine industry could overcome these contradictions. The technological revolution heralded a qualitatively new stage in the development of social production. The revolutionary change in the material, scientific, economic and organizational bases of human activities signified

¹ Karl Marx, *Capital*, Volume I, Progress Publishers, Moscow, 1974, p. 344.

² *Ibid.*, p. 347.

man's transition to the period of large-scale machine production. Basic changes in the social structure, the social mode of production, and in the natural scientific and social base of social development are an organic part of this period of industry.

Along with the development of the technical and scientific bases of social production, the character and scale of production ties and the universality of relations among people were changing. The activities of different classes and social groups became increasingly interdependent. Given this, the most advanced mode of production based on utilization of the latest achievements of science and technology of the time, and the activities of the most progressive social class in a given historical period, which constitutes a new system of international economic and political ties, becomes essential for the historical process.

The essential characteristics of a social-economic formation, as distinguished by the founders of Marxism-Leninism, made it possible to disclose the specificity and the qualitative determination of both human activity (class activity) itself and the connection between this activity and the establishment of new types of social classes, the character of interclass contradictions and of the special type of contradictions between nations and governments at the time the colonial empires emerged, thus heightening the struggle to divide the world into spheres of influence.

Disclosing these contradictory processes, the founders of Marxism-Leninism showed with scientific accuracy the formation of trends in the capitalist system towards crisis, and the role of large-scale machine production and science in

social progress. This gave the revolutionary struggle of the working class international significance.

These conclusions of Marxist theory are key in establishing the need for mankind's transition to communism, where the content of social life demands the fullest use of the latest achievements of production, technology and science to benefit man. The essence of these processes has to be understood in order to comprehend the laws and specifics of the past 200-250 years of social development and the objective conditionality of the qualitative transformations in important spheres of human activity like production, technology and science. At the same time, it is especially important to reveal the beginnings, causes and preconditions of the contemporary STR.

THE BEGINNINGS OF THE INDUSTRIAL REVOLUTION OF THE 18-19TH CENTURIES

Lenin often pointed out that the best way to acquire knowledge of a certain phenomenon was through its scientific definition, its concept. This made it possible for the essence and significance of the concept for the practical and theoretical activities of man to be singled out of the totality of surrounding phenomena. Lenin wrote that to be able to approach a problem scientifically and not to become entangled in trivial details one had to find a basic historical connection, "...to examine every question from the standpoint of how the given phenomenon arose in history and what were the principal stages in its development, and, from the standpoint of

its development, to examine what it has become today".¹

Three periods can be singled out in the history of technology: pre-machine or tool (implement) technology, machine technology and automated technology.² The historical continuity of these periods is based primarily on the common character of the function of technology in the process of human labour and on their common material basis, since, essentially, the same, natural, materials are used to produce both pre-machine and machine technology. It is only automated technology which uses synthetic materials, but even here the initial materials are natural.

These periods differ from each other by principles on whose basis the technology of each given period was created. Pre-machine technology is based on man's empirical experience and is developed by modelling a number of his labour functions. Instruments of labour are created on the basis of empirical knowledge of the properties of substances through the materialization in these instruments of man's experience in transforming natural substances, and on the basis of simulating certain functions of the human body. In other words, man's physical capability is the source of energy and motion; the labour process is humanized.

In analyzing the development of man's productive activity, Marx noted that, "As soon as one and the same type of labour, more specifically,

¹ V. I. Lenin, "The State", *Collected Works*, Vol. 29, Progress Publishers, Moscow, 1977, p. 473.

² See: G. N. Volkov, *The Sociology of Science. Third Essay*, Politizdat, Moscow, 1968; S. S. Tovmasyan, *Philosophical Problems in Labour and Technology*, Mysl Publishers, Moscow, 1972 (both in Russian).

various types of labour, which work together to produce a certain product or special commodity are distributed among different workers, it is found that facility in performing these various types of labour depended on certain modifications of the tools which had previously served a different function. The direction which a change must take is revealed by experience and those special difficulties arising from the invariability of form. This differentiation, specialization and simplification of the means of labour occurs, therefore, spontaneously with the division of labour itself, and still does not require preliminary knowledge of the laws of mechanics.”¹ So the role of scientific knowledge was insignificant in human production activity until the decline of feudalism. “... The limited volume of knowledge and experience was directly connected with labour itself; it did not develop as a separate or independent force and therefore, in general, never went beyond traditional reproduction and the very slow expansion of the collection of formulae. (The empirical mastering of the secrets of each handicraft). Hand and head were not separate from each other.”²

In this period, only technological revolutions, progress in social production as a result of these revolutions, changes in the forms of the division of labour and increases in the social level of labour productivity were of social significance. The most important feature of the technological revolutions of this period was the use of new materials in the making of tools (stone, bronze, iron). As is typical of any development in general, tech-

¹ K. Marx and F. Engels, *Collected Works*, Vol. 47, pp. 401-402 (in Russian).

² *Ibid.*, p. 554.

nical progress was the product of the unity of evolutionary and revolutionary types of development. Evolutionary development can be said to characterize those periods in which there are increasing quantitative changes in the prevalent tools (stone, bronze, etc.) of social production. When the “differentiation, specialization and simplification...”¹ of, for example, stone tools reaches its highest stage of development and further improvement stops, this begins to hamper the growth of social labour productivity. Thus, a social requirement for qualitatively new tools is felt. The possibility of meeting this social requirement is made feasible by man’s greater experience in productive activity gained by empirical knowledge of the physical properties of natural substances, experience in using fire, and its effect on natural materials.

The contradiction between the requirements of society and the possibilities of meeting these requirements makes a technological revolution imperative. As he accumulates experience and knowledge, man enters the revolutionary period of transition from stone to bronze tools. This process then repeats itself, and the next technological revolution is the transition from bronze to iron and steel tools. Each of these revolutions is accompanied by progressive changes in the character of the division of labour, the social structure of society and the mode of production,²

¹ K. Marx and F. Engels, *Collected Works*, Vol. 47, p. 402.

² Of course, social development, the development of instruments of labour and growth of labour productivity were extremely slow during this period. Academician Strumilin gives the following interesting figures: during the Stone Age, labour productivity increased by only 2-