

THE SCIENTIFIC & Radovan TECHNOLOGICAL Richta REVOLUTION

Recently the Communist Party and Academy of Science of Czechoslovakia sponsored the formation of a large research team to compile a study "Social and Human Relations in the Context of the Scientific and Technological Revolution". The following article by an eminent Czech philosopher is based on this study, and is republished, slightly abridged, from the journal Peace, Freedom and Socialism.

THE COMMON DENOMINATOR of the multiform processes presently under way in the developed industrial countries is the steady and ever more rapid advance of science and technology. The very profile of industry is undergoing change, so too are the actual forms of labor, the way of life; the dimensions of time and space are compressed, man-made environment is replacing the natural, opening to man new areas of both the microcosm and the macrocosm; in a word, man's place is changing in a world that he himself has changed. If we regard these material conditions of human life as the foundation of civilisation, it can be said that we have reached the frontier between two epochs.

The substance of the revolution under way is not easy to perceive at first glance; indeed, it often presents only a vague and deformed semblance.

A declaration issued by 26 scientists and other specialists, among them Linus Pauling, Ben. B. Seligman and Gunnar Myrdal, and headed "The Triple Revolution", says this of the present scientific and technological revolution: "Neither Americans nor their leaders are aware of the magnitude and acceleration of the changes going on around them . . . Mankind is at a historic conjuncture which demands a fundamental re-examination of existing values and institutions."

Marxism came into the debate on the new developments in the late fifties when John Bernal, S. G. Strumilin, Victor Perlo, K. Tessmann and others characterised the changes taking place in contemporary civilisation as a "scientific and technological revolution". The thesis contained in the programme of the CPSU that "man is entering upon a scientific and technological revolution" is, we believe, one of the cardinal precepts of modern Marxism.

Changes in the Structure and Dynamics of Productive Forces

The term "scientific and technological revolution" is now established usage in the vocabulary of modern science. It is used in the "forecast for 1985" by a group of French economists. And the US National Commission on Technology, Automation and Economic Progress prefaces a report with the statement that the "world is experiencing a scientific and technological revolution."

The growth of civilisation over the last 150-200 years had its roots in the industrial system of production. Today, however, we can see in those countries where the industrial civilisation is at its peak new processes transcending the boundaries of this civilisation. The future belongs to the scientific and technological revolution, which is laying a new groundwork for civilisation. Although these two historical types of civilisation are interconnected and mutually interactive, they differ in the matter of intrinsic content and, in their social and human connotations, they are even contradictory.

Industrialisation, which was accompanied by structural changes in the production base and by corresponding changes in social relations, proceeded on the foundation of two independent, diametrically opposed social productive forces: increasingly more efficient and complex machines, on the one hand, and a steadily growing army of labor, on the other.

Although the production base of the industrial civilisation was dynamic, the changes affected mainly the instruments of labor—means of production. Mechanisation fragmented the labor process, making it the sum of simple abstract elements. But even if the technical forms of production changed, the essentially dual structure of the productive forces remained the basis of industrial civilisation.

What really distinguishes the modern processes from those of the industrial revolution is the much deeper changes which they bring into the structure and dynamics of the productive forces. Modern civilisation develops on the basis of a far wider range of social productive forces, among which science and its applications in technology, management, training of skilled personnel, and so on, are acquiring ever greater, and in the long run decisive, importance. True, the industrial revolution enabled science to make its entry into production, but it found only a limited application; it remained something brought in from without.

As science penetrates into the various spheres of production, technology tends, step by step, to replace the simple labor power of man, with his limited physical and emotional powers and mem-

ory in production proper. Production becomes an automatic process set in motion by man and, consequently, controlled by him. Man, as Marx foresaw, "takes his place alongside the production process" whereas formerly he was its "main agent." Not only the means of labor (technological revolutions) but also the objects of production (use of new types of raw materials) and not only the objective means of production but also the subjective, human factor change. When the scientific and technological revolution emerges from its initial stage its true purport will be revealed—a universal and unceasing changing of all the productive forces of human society. In other words, the scientific and technological revolution is not merely a matter of technical progress.

Marxism appeared on the scene in the nineteenth century, but it was only in the mid-twentieth that the full depth of its ideological content was revealed. It is the only contemporary theory of social development which, with its concept of the productive forces, and investigating the changes taking place in their structure and dynamics, affords a reliable picture of the scientific and technological revolution. It is not by chance that a number of students of modern civilisation (Fourastie, Diebold and others) admit that the Marxist thesis concerning the influence, as they put it, of technology on society has a greater bearing on present-day realities than was anticipated. But these authors interpret Marx incorrectly when they substitute the concept "technology" for "productive forces," thereby tending to obscure the revolutionary character of the changes now taking place. If these changes are examined solely from the standpoint of technology (or energetics), disregarding the qualitative changes in the structure and dynamics of the productive forces, and in particular in the position of the "subjective factor"—man—it would be difficult indeed to define and substantiate the revolutionary character of the present and future metamorphoses of civilisation.

The Technological Revolution and Models of Growth

The dynamics of industrial civilisation were in the final analysis determined by the increase in the number of the instruments of labor (machines) and of the people tending them (labor power). Hence, from the standpoint of the theory of growth, industrialisation represents extensive development. From the standpoint of economics the character of the two basic productive forces of the industrial system is determined by the fact that the sum-total of the useful product is by and large proportional to the quantity of labor, both living and materialised, expended. In other words, to obtain a greater quantity of use values more factories, machines

and workers are needed. Capital-intensity, the relationship between capital and output, remains basically unchanged or, when living labor is replaced with machinery, grows.

Industrialisation clearly is an essential transitional phase of extensive growth which alone creates the conditions for the crystallisation of the factors of intensive development associated primarily with the application of science in all areas of production—in technology, in training personnel and in the managerial sphere, alike. The significance of the intensive factors in the development of the productive forces is predetermined by their specifically economic character. "The product of mental labor—science—is always priced at far less than its value inasmuch as the labor time necessary for its reproduction is in no way comparable to the labor time needed for its initial production," Marx said. As soon as science begins to play the leading role in the development of society's productive forces, the proportions of economic development shift in the direction of intensive growth. And with Marx we might say that economic development now depends to a greater extent on the general state of science and technological progress than on the growth in numbers of the machines and men directly engaged in production. The output curve does not coincide with the curve of expenditure of living and materialised human labor in production. The capital-intensity index falls. At this stage of the development of the productive forces the growth of capital clearly ceases to be, even from the economic standpoint, a precondition for the advance of civilisation.

Despite the existence of capitalist social relations, the experience of the developed industrial countries has already confirmed this theoretical characterisation of growth during the initial stage of the scientific and technological revolution. A study made by M. Hajek and M. Toms on the basis of US data reveals the increased significance of intensive factors as a source of economic growth:

	Share of extensive factors (labor force and capital)	Share of intensive factors (technology, skill, organisation)
1899-1909	74.4 %	25.6 %
1909-1919	60.5 %	39.5 %
1919-1929	54.8 %	45.2 %
1948-1953	48.9 %	51.1 %
1953-1957	31.8 %	68.2 %

In the developed West European industrial countries intensive factors accounted for 60-70 per cent of the economic growth in the fifties. In the socialist countries, where the initial industrial poten-

tial was considerably less, economic development in the past decades has been marked by a rapid expansion of industry and by a simultaneous probing of the approaches to the scientific and technological revolution. Consequently, the considerable increase in the role of the intensive factors notwithstanding, changes in the proportions of economic growth could not assert themselves in full measure. Experience shows, however, that for a socialist country like Czechoslovakia, for instance, where industrialisation has been completed in the main, transition to intensive development is a vital necessity.

Marxist theory is now called upon to elucidate the perspectives of intensive growth in situations when the application of science to production technology (automation, chemical processes, etc.), necessitates big investments. Use of chemical processes is a form of technological rationalisation which economises capital. According to estimates by the Marxist economists C. Vincent, W. Grossin, Z. Chrupek and H. Flakierski, complex highly efficient automated units and the new technological methods (including nuclear) in the long run do not require heavier expenditure—in relation to output—than building of traditional-type industrial enterprises.

On the other hand, intensive development calls for research facilities and a backlog of scientific findings to facilitate effective technological solutions well in advance and thereby prevent the capital-intensity index from rising. This condition of intensive growth has been described by M. Keldysh, President of the USSR Academy of Sciences, as the antecedence of science to technology and of technology to industrial production—a correlation which, clearly, is an obligatory law of the scientific and technological revolution. The new ratios of economic growth naturally presuppose adjustments in the overall system of economic proportions established in the process of industrialisation.

Intensive growth, characteristic of the scientific and technological revolution, brings with it important social consequences because, as distinct from the earlier industrialisation, the accelerated economic growth does not necessitate increasing the share of accumulation in the national income or reducing the share of consumption; it can be achieved (due to the efficacy of the new productive forces) by channelling the same share, or perhaps even less, to accumulation. It is this type of economic growth that meets the intrinsic requirements of socialism.

Prospective Changes in the Character of Labor

A Marxist analysis of the changes in the structure and dynamics of the productive forces provides a sound basis for ascertaining the

impact of the scientific and technological revolution on the more deep-seated spheres of life, on the character, structure and division of labor.

Industrialisation brought human labor mostly under the factory roof. In the developed industrial countries the number engaged in industry and allied branches amounts to 30-45 per cent of the labor force. It was on this basis, more or less typical of both capitalist and socialist society, that one of the variants of the theory of the "industrial society" was evolved. In the world of today and tomorrow, according to Raymond Aron, industrial production is the typical form of production, but the onset of the scientific and technological revolution points to the relativity and limitations of this definition. The percentage of the labor force engaged in industry is as a rule, not increasing. At a certain stage the branch structure of employment tends to develop in the opposite direction.

The rapid fall in the percentage engaged in agriculture is accompanied also by a steady decline in the share of industrial workers. In the United States the share of those employed in industry and allied branches dropped from 37 per cent in 1950 to 34 per cent in 1964, and it is anticipated that by 1972 it will have dropped to 31 per cent.

The scientific and technological revolution excludes, so to say, man from direct participation in production. Inasmuch as this is accompanied by a relative increase in the service sphere, some theorists have advanced the concept of what they call the "post-industrial" (Clark) or "tertiary" (Fourastie) civilisation. These views proceed, however, from the assumption that in principle it is impossible to introduce technology in the service sphere. The scientific and technological revolution, however, is changing things in this area as well. Such spheres of the "tertiary" sector as trade and administration are being put on a technical footing. It can be assumed that after a time, when the sphere of elementary services has been saturated, there will be a steady redeployment of labor to the spheres of science, technology, computer operations, education and services in the full sense of the word. If at present the number engaged in scientific research in the USSR amounts to 2.2 per cent of the total engaged in the national economy (the percentage is 2.1 in the USA) while the share of those engaged in education and the service industries is 11 per cent, in the future the share of these groups will most likely equal or perhaps even exceed the share of those engaged in industry. If we take the trends evident in the branch structure of employment as the criterion, it will be seen that we are about to cross the frontier between the old industrial civilisation and a new era of development.

An extremely important part in the development of contemporary civilisation is played by changes in the materialised forms of labor. In the conditions of the industrial revolution simple labor became, in the words of Marx, the basis of industrial production. Mechanisation dissected labor into abstract elements. People, regarded as "things," played the role of an appendage to the machine (Friedmann). The very nature of wage labor determined its real, material forms, depriving the greater part of industrial labor of its anthropological value, "de-intellectualising" it and turning it, in effect, into a mere means of livelihood. The more productive and effective the factories became the more the role of the working man was debased.

The scientific and technological revolution opens altogether different perspectives. True, up to a point (as can be seen from the studies made by Tourain and Naville, for instance) the tendency will be for labor to be shallow in content inasmuch as its function will be to tend imperfect or insufficiently reliable automated production lines. But at the same time the "classical" labor of the machine minder will partly evolve into the labor of a highly skilled supervisor and job setter, or will be wholly excluded from the direct production cycle and become the job of technicians.

Many researchers studying employment trends have noted alarming symptoms of a decline in the demand for simple labor which threatens to assume "dramatic forms," that human labor is being squeezed out from industry and also to some extent from the service sphere. But the regressive aspects notwithstanding, the development is an ascending spiral towards a metamorphosis of the nature of man's labor. In the twenties in the USA semi-skilled workers engaged in simple operations showed the highest growth rate, while the share of skilled workers tended to decline. Today the opposite is the case. Needless to say, this process is slower and takes distorted forms where adequate social stimuli making for a higher structure of labor are lacking. Analysis of the more progressive forms of production shows that with all-round utilisation of science and technology labor tends towards more complex functions requiring the higher qualifications of skilled workers, technicians, engineers, economists, organisers of production, researchers, etc.

It is sometimes assumed, mistakenly in our view, that this trend contradicts the Marxist thesis on the historic role of the working class. At the root of this misconception is the fairly widespread belief that the working class consists solely of manual workers. For Marx the engineers and technicians were part of the aggregate worker. And if under capitalism economic factors separate men with education from the bulk of the labor force, under socialism

this is not the case. Researchers and technicians are an indivisible part of the working class, which, while growing in numbers, changes in character. Marxists, incidentally, point to analogous trends in the technologically developed capitalist countries as well (witness class differentiation among the intelligentsia). Whereas Marx could note that numerically speaking the educated part of the nineteenth century working class in the early phase of industrialisation was negligible, the current scientific revolution is changing the picture. In the USSR, for example, highly skilled workers, researchers and technicians, who registered a 6.7 per cent annual increase in 1940-60, are the most rapidly growing section of the working class. According to B. Levick and F. Kutta, the share of the different categories of workers in the economy of the USA changed in 1947-64 as follows:

Specialists	+5.6%
Managerial personnel	+2.8%
Workers in the services	+2.8%
Distributive workers	+0.4%
Manual workers	-4.4%
Agricultural workers	-7.9%

Whereas the diverse types of the traditional industrial production required 35 to 37 per cent unskilled and semi-skilled workers, 60 to 33 per cent skilled workers, 4 to 8 per cent workers with a secondary education, and 1 to 2 per cent engineers with higher education, fully automated enterprises, according to computations made by J. Auerhan, make different demands on skills. In these enterprises the employment structure is as follows: 40 per cent skilled workers at most, or none at all, 40 to 60 per cent with secondary education and 20 to 40 per cent with a higher specialised education. Comprehensive automation therefore presupposes the practical abolition of the educational difference between the worker and the engineer.

While the earlier industrial revolution necessitated universal literacy—the Three Rs—modern scientific and technological revolution needs polytechnical or scientific education and opportunities for further training throughout a man's working life. Only the long-term operation of all these factors can impart to the greater part of human labor a creative character, transform it into that spontaneous activity of which Marx spoke. However, for consummation of the revolution in labor brought about by the scientific and technological revolution a revolution in social relations is essential. Only with this social revolution will the transmutations undergone by labor lead to the most far-reaching changes in man's conditions in the history of civilisation.

Changes in the Role of Man

The scientific and technological revolution imparts added impetus to production and consumption and impinges on the sphere of working and living conditions, transport, communications, work and leisure, and the rational and emotional areas of man's life. In the technical and economic conditions of the industrial system created by capitalism man was used as a rule as simple labor power. He was expected to do what he was told, and could at any time be replaced by a machine. It can be said that the significance of the human element was reduced in proportion to the degree of mechanisation.

Industrialisation in the socialist countries was attended by a shortage of means which made it difficult, if not impossible, to ensure at once a rapid growth of both production and mass consumption. The scientific and technological revolution does away with this dilemma. At a certain stage in the development of the productive forces, as the economy goes over to intensive growth, rising consumption is not only compatible with growth of production, it is as much a prerequisite of this growth as was the restricted consumption during the earlier industrialisation. New aspects of this logic of development have become manifest with increasing clarity in the USSR ever since the Twentieth Congress of the CPSU. Mass consumption in the West is based (in addition to exploiting developing and dependent countries) on analogous aspects of the dynamics of the productive forces. Some Marxist economists maintain that the shattering crisis experienced by the capitalist economy in the thirties demonstrated the significance of the connection between consumption and the then incipient trend towards intensive development. Needless to say, Western "mass consumption," as is acknowledged by both its theorists and its critics, constantly comes up against its own internal contradictions: needs are artificially created and imposed on the public to create a demand governed by its own dynamics, with the result that production for the sake of production is, in effect, turned into consumption for the sake of consumption. The fact that the arms drive in the USA can be regarded as a kind of consumer impulse to economic growth is fairly striking demonstration of one of the aspects of "mass consumption."

The moment science and its practical applications become decisive factors of growth the release of man's creative powers acquires a new social and production connotation, for the release of these powers provides the basis for research and for the applications of its findings in production. To the extent that science makes his life dynamic, man's endeavors are the driving force of civilisation. The

human factor grows in proportion to the advance of technology and the improvement of working conditions. Hence the conclusion that a higher level of technology "will enable man for the first time in history to pay the attention to himself which he rightfully deserves" (V. A. Trapeznikov). In time the most effective way of expanding the productive forces of society will be the development of the human personality for its own sake. The equivalence of the maximum development of the productive forces of society and the all-round development of man is a fundamental point of Marx's communist humanism.

Here mention should be made of the emergence of the new areas of science, for instance, the economics of human resources. Even such expressions as "human capital" or "investment in man" are an inverted reflection of the growing importance of man's creative powers. Similarly, sociology of human relations reveals the significance of production of aspects of life which were formerly ignored. Ergonomics is making its debut, the principle of modern anthropology are being elaborated, and so on. This widening of the horizons of social science, in which a growing role is played by Marxists, affords an idea of the nature of the tasks posed before Marxism by the scientific and technological revolution.

This revolution lays bare some of the dramatic moments in the life of the modern man. In the conditions of contemporary civilisation men become prisoners of the creations of their brains, must bow to the forces they themselves have set in motion. The artificial environment of the era of industrialisation came about not as a result of man's planned activity, but rather as the product of his "industrial" utilisation. This environment is in every respect a long remove from the natural biological and psychological attributes of man. And if formerly man could still make his way together with Mephistopheles to the untouched and eternally green tree of life, in our days the circle of the artificial civilisation is constricting. There is nowhere to run away. Yet automation and modern means of communication, construction and so on enable man to transform a civilisation in which he is the slave to things into a civilisation which would serve his needs. A society that cannot cope with this can hardly avoid the tragic disruption of the biological and psychological conditions of human life. For the age of the scientific and technological revolution, in addition to giving people power over the conditions of their development, also puts them in possession of the means of their own self-destruction. "The development of technology has posed before man a problem engendered by his own power. Man's existence depends on his own decision" (R. Garaudy).

Scientific and Technological Revolution and Social System

As we have said, the consequences of the technological revolution for society and for the individual will probably be even more far-reaching than the changes it will bring about in the material and technological base of society. On the other hand, as was the case with the earlier industrial revolution, it cannot be carried to the end unless it finds adequate forms of production relations and in this way becomes a revolution in all areas of civilisation.

"In each instance people won themselves freedom in so far as they were constrained and permitted to do so not by their human ideals but by the existing productive forces," so wrote Marx and Engels in *The German Ideology*. The very onset of the scientific and technological revolution is intrinsically linked with the emergence and affirmation of the socialist trends in the modern world. It is proof of the deepening of the social revolution, that it is steadily reaching out to the mainsprings of historical development.

It is sometimes said that science, technology and the productive forces are socially neutral factors. This is so only at times when the changes in the productive forces have not gone far enough. Actually, fundamental changes in the structure of the productive forces always have profound social implications. The industrial civilisation arose as the realisation of capitalist production relations, and *vice versa*. Marx spoke of the mechanical system of production whose unity was based on a system of machines—this "subject" of production which subordinated the working community to its power—as the "technological realisation" of the capitalist relations of production, as a matter of the subordination of labor to the conditions of labor. In the era of industrialisation the growth of the productive forces was ensured by developing instruments of labor rather than labor itself. This was indeed the historical mission of capitalism as a transitional form of the development of the productive forces; at the same time it revealed its historical limitations as a form that promotes production at the cost of devaluating the creative abilities of generations of working people.

It goes without saying that in countries where capitalism did not play its historic role to the end as a form of development of the productive forces, the new socialist society had to complete the industrialisation. And history is the witness that it did this more rapidly and more consistently than capitalism. But for all that industrialisation is the precondition and the starting point rather than the goal of socialist progress. Socialism was able to suppress or neutralise some phenomena characteristic of the industrial revolution under capitalism, but it could not change, or was able to

change only partly, its inner logic (the breaking down of the labor process into separate simple operations, and a certain restriction of growth of consumption). The traditional industrial structure of the productive forces, as experience shows, cannot ensure the conditions for collective life based on the full, free development of the individual and the mutual spiritual enrichment of the members of the community. It can be said that in its initial phase socialist society makes use of an alien, inherited production base, just as capitalism once used the forms of small-scale cottage industry and only gradually, in the course of the industrial revolution, built up its own production base. Only the all-round advance of the scientific and technological revolution can give rise to a new form of civilisation which, as regards both level of development of labor and consumption, corresponds to the requirements of communist society.

Marx's criticism of capitalism was directed not only against the capitalist relations of production. It was criticism of the entire industrial civilisation created by capitalism and reflecting its contradictions and limitations. This criticism looked forward, in addition to the revolutionary reconstruction of production relationships, to a new foundation for civilisation—the process which we today call the scientific and technological revolution. Marx's definition of the production base of communist society is a remarkably precise picture of this revolution; for what is in question is a civilisation founded "not on developing productive forces that reproduce or perhaps enlarge the given condition, but, on the contrary, on the free, unrestricted, progressive and universal development of the productive forces which is the precondition for the existence of society." From this standpoint the scientific and technological revolution is a complex social process, an integral component of communist reconstruction in general.

The concrete progress of civilisation is not, however, merely an illustration of this logical pattern. The socialist countries had to complete the process of industrialisation, while the developed industrial capitalist countries were confronted with the alternative, either use some of the elements of the scientific and technological revolution or be found wanting when confronted with that universal "imperative of growth" which nowadays in the West determines the basic mass of practical solutions and theoretical quests (theory of growth). This imperative engendered by social revolution and the existence of socialism obscures the relationship between the technological and social processes. Yet grave social problems also arise wherever fundamental problems of the scientific and technological revolution are on the order of the day. This is manifest in the unceasing conflict between capital and science, since the latter,

being essentially a social productive force, calls for more far-reaching forms of social integration than those offered by the capitalist private-property relations. From this conflict stem reform programs aimed at adapting the economic and political forms of capitalism to the conditions of the scientific and technological revolution. One cannot but note the growth of state regulation and state financing of the bulk (about 70 per cent) of all research projects in the developed capitalist countries, the evolution of the monopoly system into state-monopoly capitalism, and the spread of forecasting and programming bodies in the West-European countries. It would be a mistake to underestimate the new developments in the economic, social and cultural system of capitalism. On the other hand, each step forward in science and technology demonstrates that the above-mentioned "adaptation" of the capitalist production relations to the new conditions is only partial, that in view of the social consequences of scientific and technological progress in our time the industrial system of capitalism by and large begins to misfire and deforms the process of the revolution under way.

But even in the industrially developed socialist countries, whose social structure make it possible fully to use science as a direct productive force, this question is far from easy to solve. The economic forms in a number of socialist countries have so far conformed to the needs of industrialisation. This is evident from the example of Czechoslovakia, where management by directives proved inadequate when the sources of extensive growth became exhausted.

Development of social relations which not only do away with the narrow confines of antagonistic interests but which also readily react to the new aspects of civilisation, to the dynamic potential of the scientific and technological revolution, is a condition for the triumph of socialism. This revolution is not a short-lived upheaval to be carried out by directives issued at the top. It is a prolonged universal process of structural change which greatly enhances the dynamics of growth. Only a flexible economic system of management extending to all areas of social labor and possessing an adequate system of reciprocal interconnections can ensure intensive growth. Man's interest structure itself must be dynamic.

Ever since the socialist countries began to go over to economic forms of management, bourgeois ideologues have tried to persuade the world that we are restoring the capitalist relations of production. Actually the contrary is the case. A careful examination of the theoretical concepts underlying the new system of management and economic reforms will leave no doubt that contemporary Marxism is engaged in perfecting a strictly socialist economic

structure, and thereby solving a key problem from the standpoint of tackling the tasks of the scientific and technological revolution. Analogous tasks face Marxists also in the study of other areas of social life. The Thirteenth Congress of our Party underscored the intrinsic link between the new system of management, the scientific and technological revolution, and the development of socialist democracy.

We are now only at the beginning of the scientific and technological revolution. Hence it is not easy to visualise all its social and human implications. The economic processes in the developed industrial countries as before are based mainly on the old industrial structure of the productive forces. The initial elements of the scientific and technological revolution are therefore finding realisation in the context of the processes of the final phase of industrialisation under way in the two diametrically opposed social systems. Moreover, these elements are emerging at a time when other countries and continents are just setting out on industrialisation.

The development of capitalist industry deepened the gulf between the imperialist countries and that vast section of humanity which lives in perpetual want in practically a state of natural economy. Theoretical reflections concerning the future of the third world lead to the conclusion that the economic problems of the developing countries, especially those with large and rapidly growing populations, cannot be solved in the life-time of generations unless the scientific and technological revolution is drawn on to reduce to the minimum the pains of the initial industrialisation, and unless the influence of the socialist forces accelerates the search for ways of doing away with the yawning gap between the haves and have-nots of modern civilisation.

In all probability it will take decades for the scientific and technological revolution to become the predominant process in the areas where it does not encounter social obstacles. The revolutionary social changes of recent times, however, hold out the promise that the obstacles can be overcome. But unless we understand the essence of the scientific and technological revolution we will not be able to grasp the meaning of the changes taking place in the world. The ideological basis of the future development of civilisation will surely be creative Marxism, which remains true to the principle inscribed by its founder on the portals of science:

*Here all mistrust must be abandoned
And here must perish every craven thought.*