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Social Contents of Scientific and Technological Revolution*

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An attitude of ambivalence prevails today about science and technology and its social contents. Its roots lie in such questions as: how far does the revolution in science and technology hold promises for successful realisation of the goals of social revolution in most human societies? How far are the two revolutionary processes compatible with one another?

Does scientific advancement in world's developed nations promote advancement of ideologies commensurate with its postulated ethos—the ideology of rational humanism, socialism and world brotherhood?

If it does not, what are its reasons, and where does the root of this failure lie? Does it lie in the nature of the technological and scientific systems or in the structure and process of social systems themselves? To what extent does the inner structure of societies, class character, elite composition and moorings of ideologies determine the goals and directions of scientific and technological revolutions, and in this context what is the role of principles and processes of social stratification within nations and between nations in successful and unsuccessful institutionalisation of science and technoology?

The answer to most of these questions belongs to the domain of the content of scientific and technological revolution. It is related to the historicity of the mode of institutionalisation of science and technology in various societies and their specific socio-cultural responses to its challenge. If we look at the many analyses that social science offers to us on the problems of scientific and technological revolutions in the developed and the poor nations of the world we would notice a naive assumption underlying most of them. This assumption is based on the simplistic definition of the

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functional role of science and technology in human societies which postulates a concomitant relationship between the growth of ideologies of universalistic rationalism and humanism and the progress in scientific and technological domains. It is believed that science as a rational system of explanatory knowledge and technology as a means of controlling and managing it, would by itself promote the generation of ideologies of rational humanism and universalisms.

The contemporary history of nations and the response of mankind to the systems of technological and scientific revolutions falsifies this assumption. Not only does a dissociation exists between the system of science on the one hand and technology on the other, but the advancement of both even in the developed nations of the world does not seem to have resolved many basic existential and ideological dilemmas : such as the irrationality of the ethnic and racial prejudices, predatoriness and exploitation of one set of class or nation by another and the primordial instinct for individual and collective violence emerging both from reason and unreason. This problem is further compounded by the contradiction that seems to have been growing in the contemporary times between the processes of scientific and technological revolution on the one hand and the urges and aspiration for social revolution at the levels of groups, collectivities and nations on the other. This contradiction can be observed more sharply in several historical situations where the might of the scientific and technological revolutions is employed by a dominant minority to suppress the very rational humanistic urges of a subordinated majority which the scientific worldview is logically intended to promote. In such situations one wonders about the assumed autarky of the scientific worldview.

The problems related to the social content of the scientific and technological revolution aim at analysing these basic issues. One would notice that the falsity of evaluations of the nature of scientific and technological revolutions today lies both in ideological and a historical nature of methodologies that have been employed by social scientists to understand this problem. This frame of analysis suffers often from what may be called the 'fallacy of over-abstraction' in determining the nature both of science and technology. Such analysis loses sight of the fact that both science and technology reflect a social historical moment and inhere objective conditions determined by existing social contradictions. No wonder, that most analysis of the social role of scientific and technological revolutions originating especially from the nations sufficiently advanced in these two domains tend to suffer from *culturological fallacies* as they tend to promote a viewpoint of science and technology as purely universalistic and symbolic systems.

The systems of science and technology, however, comprise not only a cognitive symbolic reality but more importantly structures and resources embodying instrumental potentials at the hands of classes or nations for perpetuation of relationships based on the asymmetry of domination and

power. Obviously, the culturological treatment of the systems of sciences and technology postulate a false subject-object relationship between the two systems ; it is assumed that science, the rational explanatory worldview governs technology, the mode of its rational instrumental adaptation. Its logical inference is that scientific-technological revolution should reinforce the processes of social revolution in societies based on a universal evolutionary time scale that would promote values of humanism, social justice and egalitarianism at a global level, eventually.

This mode of analysis suffers not as much from the honesty of intentions as it does in the poverty of its analytic categories especially those of social structure and power. The universalistic nature of science cannot be denied, nor its rational humanistic role for the solution of social, material and existential problems of mankind. There is urgent need, however, to place these ideological goals of science and technology into their proper structural context.

The first major structural issue in the revolution of science and technology today is that of the inversion of their sequence and organisational form. Basically technological revolution precedes scientific revolution in human history. Today, however, due to near optimal advancemennt in the cognitive and theoretic paradigms of science the structure of scientific revolution depends more and more on technological revolutions and the potential that societies hold for organisationally and resourcefully managing these revolutions. From this fact a fundamental situation of contradiction comes into being.

The historical and sociological coordinates of promoting scientific and technological revolution in the rich or the developed nations and the poor or the developing nations do not harmonise; even they might run at cross purposes implying international relationships of domination, exploitation and neo-colonialism.

Under these circumstances the universalistic cultural ethos of science is subordinated to the structural reality of the social stratification of national societies and their inequality of wealth and power.

The structural form of the present day scientific and technological revolution is characterised by two important features, *contemporaniety* and *contradiction.* Apart from the manifestation of these features in the social stratification of the national societies to which mention has been made it is revealed in the distribution of the scientific manpower and resources. "Ninety percent of the scientists that ever lived are living today, and 90 per cent of them are now in few developed countries of the world. In addition a significant fraction of competent scientists are lost to the developing countries through migration to the developed world... and an overwhelming proportion of the industrial output of the developing countries is based on technologies imported from the developed countries". (NCST: 1973: New Delhi). The import of such technologies itself

generates further structural contradictions. Apart from the fact that it creates problems of balance of payment through monopoly pricing, transfer of inappropriate technology in terms of capital-labour intensity, it distorts the nature of priorities in production and investment in the developing countries. *Instead of helping the production of goods commensurate in quality and scale, necessary for the large masses of the deprived people, the imported technologies encourage production of high quality goods to meet the requirement of the high income consumer-elites in these nations.*

This brings us face to face with another structural contradiction of the contemporary scientific and technological revolution especially in the developing nations whose causal linkages extend to the highly developed nations of the world. Owing to the historical dependence of the scientists and scientific institutions in the developing countries on those in the developed nations in the context of the several structural contradictions mentioned before the role of scientists and scientific institutions in these countries tends to be marginalised and alienated from the fundamental needs of production and innovation. Underdevelopment not only thwards the capacity for investment in research and development activities in the poor nations but also distorts the role of science and scientists there by artificially linking them with a system of science and technology of the developed world whose functional needs are of a dissimilar order altogether. Consequently, the elitism that such artificial growth of scientific profession generates in the developing nations has many attributes of neo-colonialism. It survives on its capacity to establish dependency relationship with political and other sections of elites, who are themselves often products of structural contradictions of neo-colonialism, both internal and external. It survives not on the basis of its autonomous growth in tune with the structural needs of society but through artificially stablising its dependence on systems of technology and science dissociated from the structural capacity of the social system to benefit from its growth.

At this stage of analysis we see a logical inter-relationship between the scientific and technological revolution and social revolution in the developing societies. The significance of such relationship also bears relevance for the developed nations but for the developing nations it assumes prime importance. It establishes the need for basic structural changes in the social systems of the developing countries most primarily in the orientation and organisation of its elites and middle classes to engender relevant social context for meaningful scientific and technological revolution. Evidentally it would also mean that in developing nations of Asia, Africa and Latin America, the processes of scientific and industrial revolution would have to proceed simultaneously with social revolution.

It would imply structural changes in their systems of social stratification, structure of power and elite ideologies which may promote the process of growth of science and technology for production which harmonises with the needs of the common people and organic interests of their

societies. It would also imply the institutionalisation of such systems of science and technology in these nations which does not become a disguised source of neo-colonialism and thwart the possibility of successful scientific and technological revolution in consonance with the organic and historical needs of these societies. □

ON THEORY AND PRACTICE

If we have a correct theory, but merely prate about it, pigeonhole it, and do not put it into practice, then that theory, however good, has no significance.

Knowledge starts with practice, reaches the theoretical place via practice, and then has to return to practice. The active function of knowledge not only manifests itseif in the active leap from perceptual knowledge to rational knowledge, but also—and this is the more important—in the leap from rational knowledge to revolutionary practice. The knowledge which enables us to grasp the laws of the world must be re-directed to the practice of changing the world, that is, it must again be applied in the practice of production, in the practice of the revolutionary class struggle and revolutionary national struggle, as well as in the practice of scientific experimentation. This is the process of testing and developing theory, the continuation of the whole process of knowledge.

—Mao Tse-tung