'SCIENCE, TECHNOLOGY AND VALUE'*

My Happiness about this Golden Jubilee Session :

This 1975 Session of the Indian Philosophical Congress is its 50th, that is the Golden Jubilee, Session of the Congress : and I feel so very happy about it, as I happen to be one of the few living Members of it at present, who had the good fortune of being present at the very *First* Session of it held in 1925 in Calcutta, with the initiative and under the benign Leadership of the Late Dr. S. Radhakrishnan, then King George V Professor of Philosophy in the Calcutta University. The Indian Philosophical Congress has done pretty good work, during its fifty long years' career, of bringing together every year the philosophical intelligentsia of India, and of creating and stimulating a sort of dialectical atmosphere among them, which has given an impetus to the philosophical studies and reflection in India, which have also borne fairly good fruit. I give to the Congress all my respectful warm good wishes for its increasingly more and more vigorous and useful work in its field in the future.—I am thankful to the Authorities of the Congress for the opportunity given by them to me to participate in this Session in this Chair, which has good privileges and no exacting duties !

Subject for this Session :

This Golden Jubilee Session comprises *six* Plenary Sessions, each of them being assigned its own specific subject or topic : and this Second Session has ' Science, Technology and Value ' as such its topic assigned to it.—I propose very briefly to indicate in this my Inaugural Address my own orientations, outlooks and indications with special reference to the said subject, which will then be treated by the Participants in their own ways in their Papers contributed to this Session.

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* Prof. D. D. Vadekar's Presidential Address to the Second Plenary Session on ' Science, Technology and Value ', 30–12–1975, in the 50th (Golden Jubilee) Session of the Indian Philosophical Congress, held under the Auspices of the University of Delhi, Delhi–7.

INDIAN PHILOSOPHICAL CONGRESS

GOLDEN JUBILEE SESSION, DELHI.

ADDRESS AND REPORT

Knowledge on Three Levels :

Now, a most fundamental fact or phenomenon of man's life is Knowledge,—Knowledge of his environment and of himself, which is concurrent with all life as such, and in particular, with human life. Knowledge, which man is perpetually busy gathering, is man's very necessary basic equipment in and for his life, which enables him to effect a comfortable adjustment between himself and his environment. This Knowledge, in its development, emerges and operates on *three* levels—common sense, science and philosophy. *Common Sense* knowledge is generalised only piecemeal, and is in the nature of practically useful *Information* of its different objects in the life's environment, and is mostly on the *perceptual* level, whereas *Scientific* knowledge is a systematically departmentalised and methodically and deliberately pursued theoretical *Apprehension* of its various objects in the world, and is typically on the *conceptual* level; and *Philosophy* is a systematically organised and synthesised reflective *Comprehension* of its one and sole object, viz., the world or the universe as a whole, and is typically on the *speculative* level.

Knowledge as Discovery and Invention :

Science and Technology : Now, Knowledge on all these three, viz., common sense, scientific and philosophical, levels in human life does not remain merely on the inoperative, theoretical-cognitive level, but percolates to the practical-conative levels in life, where it motivates man to effect, with its help, suitable and comfortable adjustments with the various facets or aspects of his life's environment, both within and outside himself, which he *discovers* in that Knowledge : and this adjustment comes to be effected with the use of suitable means or tools or instruments, which that knowledge also helps him to *invent* or construct.—Thus, Knowledge is, in human life, the fundamental source of man's most important two-fold equipment in life, viz., (1) the *discovery* of the facts and facets of his life-situation, and (2) the *invention* of the *values* or goals in life and of the *techniques* by way of the devices and means for their realisation on the basis of the *discovery* of those facts. It will thus be seen that this Knowledge is two-fold in its nature—of the nature of both *discovery* of the facts and *invention* of techniques.—Without referring to the *three*

levels of knowledge above referred to, and in unsophisticated terms in ordinary and practical usage, it may be said that '*Science*' is knowledge in the sense of '*discovery* of facts', and that '*Technique*' or '*Technology*' is the knowledge in the sense of '*invention*' of devices.—'Science', in its literal and unsophisticated, broad and general sense, discovers the nature of man's life-situation : and 'Technology' invents, by the help of science, devices or instruments, which enable man to realise his desired goal or fundamental value in life, viz., satisfaction, which is in the nature of an amalgam of a sense of harmony with the environment and of consequent happiness about it.—It may be noted that, taken in this broad sense, 'Science' and 'Technology' are as old as human life itself, which, from its very incipient stages in the evolution of man, is characterised by its scientific and technical orientation, outlook and efforts. Man is and can be said to be the *only* tool-making and tool-using animal, even though at the sub-human stages of animal life these processes of making and using tools may be noticeable in their very primary and incipient stages.—And it may also be noted that 'Science' and 'Technology' in human life keep on continually and concurrently developing and also have their mutual impacts on each other in and for their development.—Science leads to the advancement of technology, as can be seen from the fact that from the developed physical sciences has emerged man's technological use of air-crafts for his space journeys, which have now been extended to the Moon, Mars, and other planets round the earth; and these extended space-craft journeys, in their turn, have added a lot to man's knowledge of the planetary universe, and may even lead to the discovery of life on some of the planets; and this knowledge again, in its own turn, has developed into a very sophisticated technology of the radio and allied or similar systems of communication.

Human Civilisation Based on Technology :

It is to be noted, further, that Science and Technology emerge in human life mainly from man's natural equipment by way of his analytical and synthetic, critical and constructive reason; and, as such, they are naturally conterminous with, and have figured in, human life from its beginning to date. The primitive man's efforts to secure food (vegetables or animals) or shelter

(thatches) for himself illustrate his use of his primitive science and technology : and today there is nothing in human life which is not the product of his science and technology of today. The room I sit in, the book I read, the table and the paper I write on, or the pen I write with, etc.—these are all products of the mutual impacts of science and technology in human life.—This is true also of all the sectors of the life of man—social, political, national, international, etc.—In fact, all civilized life is technology-based, and, in its essence, it means life based on or conditioned by the various techniques developed by man on the basis of his science i.e. knowledge. Civilisation means, or is essentially characterised by, the peculiar pattern of the technical arts and their material products, which develop on the basis of science as at a given stage, and which figure in and shape human life in a society at that particular stage of its development. (We have thus many civilisations, which have appeared in human history, e.g., Indian, Egyptian, Assyrian, Babylonian, Greek, Roman, etc.). Civilization, in brief, is mainly the pattern of the life a society as shaped by science and technology as developed at a given stage of its evolution.

Problems Created by Technology :

It is obvious that the development of scientific technology has its far-reaching effects on, and leads in various ways to vital changes in, the life of the society and creates very vital problems in it : and this is especially true about the social and national life of our modern and contemporary developed societies in the whole of the world today, though it is true to some exrent also about our developing societies including ourselves also. It is not possible here to enter into any detailed consideration of this point : but it would be interesting to note some typical representative *criticisms* of the impacts of technology, which really indicate the *problems* created by those impacts. For instance, Robin Clarke of the U.S.A. has said : "To summarise : the principal criticisms of modern technology are : high pollution rate; high capital cost; exploitative use of natural resources; capacity of misuse; incompatibility with local cultures; dependence on a technical specialist elite; tendency to centralise; divorce

from traditional forms of knowledge; and alienating effect on workers."[1]

Varied Impacts of Technology :

Development of Technology also has, in particular, its impacts on our life, by way of social changes brought about by it; and a good deal has also been written about such changes, though we cannot afford to go into these phenomena in any detail. But it may be desirable to note that Technology (1) causes and accelerates social change through various avenues—the automobiles, the motion pictures, radio and television, aviation, atomic energy, etc., and (2) influences industry, communications and transportation, agriculture, medicine, war, etc., and also (3) creates trends and crises and raises vital problems of adjustment with them.[2]

Technology and International Relations :

Technology has also had its impacts, right from the beginning of human social-political life, on the International Relations : and a good deal of thought has been given to this subject by the Western experts in the field.—W. R. Schilling, for example, has said : " The relationship between technology and international relations has been continuous and intimate. From the time of man's most primitive politics, the foreign-policy problems and opportunities of states have been influenced by the nature of technology for transport, communication, warfare, and economic production. The glory of Athens rested on silver mines, and the might of Sparta on a process of making steel; the Romans ruled through roads, and the Assyrians overran Babylon and Egypt with chariot. Contemporary effects of hydrogen bombs and inter-continental missiles dramatise a relation between technology and power and between power and policy that goes back in time through steam engine and gun powder to the ox, hoe and sword and into pre-historic time."[3] Schilling has also dealt, in this Article, with the characteristics of and trends in the

1. *Vide* American Review, Vol. 19, No. 4 (Summer 1975)-Robin Clarke's Article on ' The Need for Alternative Technologies', p. 80.

2. *Vide* F. R. Allen and Others : Technology and Social Change, Appleton-Century-Crofts Inc., New York, 1957.-Perhaps there are also *other later* Books on the subject.

relationship between Technology and International Relations, and he concludes with this following indication of the prospects of that relationship : " It is a safe prediction that the foreign-policy problems and opportunities of states will continue to be influenced by technological change."[3]

Consideration within the Delimited Scope of Personal-Social-Moral Life :

With this background of the significance of Science and Technology in and for human life in all its stages right from its beginning and at all its levels,—individual, social, national, political and international, we have now to proceed to consider their impact on the phenomena and operation of Values in our contemporary human life.—However, I am not competent and cannot be expected in the present context to be able adequately to deal with this problem in all its facets and at all the levels of our modern human life.—Accordingly, I propose in what follows to deal with the problem only in the context of the personal-moral life of the human individual in the set-up of developing societies like ourselves, and with reference to the question regarding the preservation of the abiding value or values in human life, not on the high speculative—theoretical level of moral philosophy, but on the practical level of the concrete routine life of the individuals.—Now, if I remember right, T. H. Green has said in his *Prolegomena to Ethics* that the *form* of the ideal of human life abidingly remains the same, even if the *content* of it may change from stage to stage in human development; and this abiding form is *self-realisation*, which may be interpreted to mean the maintenance of the normal health and the progressive sublimation or perfection of the physical—bodily and mental —spiritual facets or strands of human nature, leading to man's adjustment and satisfaction with his life's environment and to his overall happiness in life. (Medical sciences have laid down the norms of physical—bodily health and happiness, into which we need not enter here.) Modern Psychology has held that cognition, affection and conation are the three cardinal strands or constituents of man's nature : and accordingly, progressive

3. *Vide* W. R. Schilling's Article on 'Technology and International Relations', in D. L. Sills' International Encylopaedia of the Social Sciences, Volume 15, pages 589 ff., The Macmillan Company and the Free Press, 1968.

development of them in his relation with the world or the universe around him as his life's environment, consummating in his adjustment with it and the satisfaction or happiness emerging therefrom, is the abiding supreme value in the concrete routine of human life.

Impacts of Science and Technology and the Ways to Meet Them in Life :

It would now be desirable to locate and indicate, in a general way, (1) the impacts or effects of science and technology on the (personal and social) life of men, and (2) the ways to meet them with a view to maintaining the health and happiness in their physical and spiritual life, in our contemporary set-up.

A. Science :

Let us first try to categorise the broad aspects of the impact of science, which is knowledge of the universe or of the world and man, and its perennially continuing development in human life :

(1) Specialisation :

Continued development of *science*, in its hunt for knowledge of the universe in all its parts and facets, leads to the continuing and increasing need for *specialisation* of science into its several branches and sub-branches and their further and further specialised micro-branches or mini-branches, which will necessitate the pre-occupation of increasing intelligent personnel with them and its distribution among them.

(2) Inter-disciplinary Studies : This specialisation of the *sciences* naturally leads to a continuing need for the *inter-disciplinary synthetic studies*, which are highly necessary for the development of a synoptic world-view, which alone can be the ultimate basis for guidance in human life on the highest level; and in this context, it may be realized that such synthetic studies (for the development of a synoptic world-view), which must have for their basis the multi-specialised sciences, will also tend to become more and more complicated and also further specialised in their nature and get confined only to the topmost intellectuals in science.

(3) Suitable Choice of Scientific Studies :

It is obvious that proper care will have to be taken by individuals in their taking to science or scientific studies, so as to suit their equipments and dispositions and to enable them to serve specialised or synthetic scientific studies.

B. Technology : Coming to Technology (application of scientific knowledge for securing easy and expeditious control over nature, and its use for *practical* ends in life), the following may be said to be, broadly, the concrete effects of it in the daily routine of the life of man :

(1) More and More Leisure :

(a) Easy technological control over nature saves for man a good deal of his energy in making use of natural resources (e.g. water and electricity, and oil and gas) and their services for his practical ends; and this creates more and more leisure in his life, which creates the need for the circumspect planning of the proper use of those easily avilable resources and services and of the leisure made available by them.—Mere vacuous leisure, without any occupant for it, has a tendency to develop abnormalities and even vices, which are very harmful to the health and harmony in man's personal and social life; and it may, therefore, be desirable to fill in such leisure with enjoyable and healthy artistic—cultural activities with moral orientations towards that life. If necessary in this context, even moderation in the use of technical products and services may also have to be considered.

(b) Further, leisure (which is in essence the time saved by the use of technological aids) has also become further available, on a lower level, by (1) the use of the *productive instruments* (e.g. machinery in the mills) as substitutes for *manual* labour, as also, on a higher level, by (2) the use of the highly sophisticated *calculating instruments* (computers) as substitutes for higher *intellectual* labour.—Large scale use of both these types of instruments creates problems respectively corresponding to them, such as (1) the *unemployment* among working labour and its harmful social and political impacts, or (2) the *miscarriages*, by way of miscalculations, consequent even on the slighest inattention or distraction in their use on the part of the users of the calculating instruments (computers) and their grave social consequences (as

was the case in respect of the grave situation recently created in Maharashtra by the use of computers in the preparation of the results of the S.S.C. Examination).—It is very difficult for students of philosophy to suggest adequate or concrete solutions for these problems : but in any case, the only appeal that can be made in this behalf to the social, economic and political leaders is that they should not lose sight, in their efforts to work out their solutions in this context, of the ultimate goals, in human life, of social adjustment and harmony to which their solutions may as far as possible conduce.—It may only be suggested that (1) there may be some kind of deliberate and circumspect planning of the scope and limits of the development and use of the productive instruments so as to avoid unemployment or at least to visualise and keep ready suitable remedies for it, if it does come about, and (2) some kind of check-up-and-re-check-up techniques may be evolved and used in respect of calculating instruments to guard against their miscarriages and their grave consequences.

(2) Versatility of Alternative Time-Occupants and Usable Materials and Energies :

(a) Time-Occupants :

Technology also offers synchronous, versatile and aternative variants of time-occupants (e.g. Radio, Television, Cinema-shows and Talkies, etc.) ; and this creates mental pulls in different directions and the consequent need for proper selective preferences among them with a view to utilise them towards the circumspectly chosen goals in personal and social life.

(b) Usable Materials and Energies :

Technological services also make available more and more sophisticated variants of materials and energies for use (e.g. various variants of technologically produced food, cloth, etc., or atomic and other forms of energy and power) ; and this, in its turn, indicates the need for proper selectivity *re* these variants to suit the considerations of health and economy, adjustment and peace in personal and social life.—Both these problems may also have to be considered from the point of view of the conditions and the goals in man's personal and social life, and with a view to ascertain the need, if and as necessary, to observe certain desirable

limits of self-control and moderation in the use of those variants in one's life. [India's declared national outlook in the policy of exploring, by her recent experimental atomic explosion, the nature and availability of atomic-nuclear energy or power with a view to utilising it *only* for peaceful national and international purposes (which fall under the category of 'moral values' in the present context) and *not* at all for any anti-human and destructive purposes (under the 'anti-value' category) are an indication of India's consideration and regard for and commitment to the 'moral values' in the modern technological age.]

(3) Utilisation of Unuseful Materials :

Technological advances also lead to suggestions *re* the possible utilisation of materials not originally useful as they are in nature, which situation also needs consideration for finding out and controlling suitable ways of the proper utilisation of them, if any, and if and as necessary, for desirable ends (e.g. the utilisation of moss or other herbs, not directly useful, but usable after technical processing of them).

(4) Utilisation of Harmful Materials :

(*a*) Some natural objects (e.g. some poisonous plants and gases), and (*b*) some of the products in the natural life of animals and men (faecal excreta or dung), as also (*c*) some types of the scrap or refuse materials discarded by men (e.g. rusted motor or machinery parts) are not only not useful by themselves, but also cause deterioration and poisonous pollution of the surrounding physical environment and atmosphere of life, and also are actually harmful, if not properly disposed of or usefully channelled.—These categories of harmful objects or products or materials really constitute a challenge to human technological potentials or research abilities, which have to be directed towards the development of alternative technologies or counter-technologies to be evolved with a view to usefully utilising them for the ultimate good of the human beings, as has already begun being done. (E.g. consider the modern techniques of the 'gober gas or bio-gas plants', or the 'compost fertilisers', which are making good use of the human or animal dung or faecal excreta for obtaining heat and light, or good agricultural manures.)

(5) Incidence of Accidents :

It may also be noted that, though technology is purposive *re* its ends, it is purely and completely *mechanical* in its actual operation: and since man's life and behaviour in general are not wholly or always mechanical, the technical instruments or equipments constructed by man are not always free from faults; and, even if they are free from faults, man also cannot always ensure himself against his own inattention or distraction.—This entails the possibility of the incidence of accidents, which are harmful and sometimes even fatal. (E.g. accidents *re* the natural energies in the air and electricity, in air-travels or in the operation of the electrical machineries or gadgets.) Avoidance of these accidents will probably be somewhat of a continuing problem, though 'fortunately technology is showing signs of being able to evolve insurance ' techniques to meet them without any harm to life.

(6) Industrial Urbanisation :

Technology usually and naturally operates, on larger scales, in the city areas, which, as a consequence, become more and more industrialised ; and this causes unduly increasing *urbanisation* of life, which creates its own multifarious problems *re* the life in these areas. (E.g. compare the conditions of life created in cities like Bombay, Calcutta and now even Poona.) These problems relate to housing, health, employment, etc.; and there are evident signs that they have now begun to be met with on the basis of the new national policies which are developing, which again are bound to be based on the use of technological aids towards the maintenance of the health and harmony of life in those areas.—Proper areawise planning and distribution of the industrialised communities is also fortunately being resorted to in our national policies in this behalf, which are expected to curb the continuing inflows of crowds into the cities from the suburban and rural areas, and to prevent undue and undesirable industrial concentration and density in a few given city areas.

(7) Collectivisation of Aids :

Another noticeable phenomenon in the technologically oriented human life is the collectivisation of life's essential aids, such as the supply of water (by the constructions of water dams and supply machinery) or light (by the construction of electric

powerhouses and supply machinery), the old provision for which by way of wells and wick-lamps has now been almost pushed back into history. This development involves the large-scale impacts, on wide areas, of even small accidents or miscarriages in the operation of the technical machinery. Technology is of course trying to ensure against these impacts also; but the problem appears bound to be a continuing one, with no permanent solution for it.

(8) Mechanisation of Life Routine :

Yet another phenomenon in the technologically oriented human life is the increasing *mechanisation* of the daily time-table of human life in the technologically governed areas of human habitation. E.g. Bombay, where individuals are perpetually overshadowed with the mechanical need to catch, at appointed times, their trains, trams or buses, which they cannot afford to miss, and which they have to try their best to catch in the midst of the queues or crowds.—Perhaps mechanisation of the daily routine may percolate, at least to some extent, to the psychological level of habit-formation, which may also reduce the strain of that mechanical routine and help towards adjustment and ease in life.

(9) Elimination of Personal-Social Contacts :

Yet another, yet a very important, phenomenon in the technologically shadowed and crowded life in the cities is the *increasing elimination of personal-social contacts* in that life. Men, especially the middle and lower class men in the chawls, and also those in the multi-storeyed sky-scrapers, live in their residences, which are like bee-hives or ant-hills indeed, where they have minimum contacts or mutual participation even with their neighbours, and such personal-social contacts of theirs, whatever they are, are only occasional and strewn far and wide among persons living at long distances, and are therefore not pulsating or thrilling, lively or active enough to give them a sense of continuing and intimate social comradeship.—This is a very important development, which has uncomfortable effects on the routine life of men, depriving them, as it does, of the very desirable and comfortable consciousness of having readily available and desirable comradeship around to stand by them as needed.—The only remedy to meet this situation is to curb the over-urbanisation of life in the cities and to prefer the development of decent-sized towns to crowded cities.

Concluding Remarks :

In the preceding Section, I have tried to present my own, a layman's, broad observations and orientations on the typical impacts of Science and Technology in the different contexts of the personal and social life of man in our contemporary life's set-up and the problems emerging from them ; and I have also given my indications *re* the broad ways in which they can and may be confronted with.—If we take due cognizance of the fact that Science and Technology have been conterminous with human life itself from its very beginning, it is clear that they will continue vitally to figure in that life perpetually, and that there is *no* going back on them. Accordingly, all we can do is to try suitably to plan out their operation in and impact on life so as to suit and help the proper synthesis and realisation of the fundamental concrete goals or ends or values in the bodily and spiritual life of man, viz. adjustment and harmony between man and his environment, physical, mental and social, and the attainment of satisfaction and happiness in his life as a whole. And for this, it would be necessary and desirable to be vigilantly taking continuing and circumspect cognisance of the effects and impacts of science and technology on human life, and also to be making continuing and circumspect attempt to meet and adjust with these effects and impacts for the maintenance of the health and harmony, satisfaction and happiness in human life, individual and social, as the concrete values in the routine life of man. This is the general upshot of my broad orientation and outlook in this present context of the subject of this Session—' Science, Technology and Value '. I have done.

Post-Script : This is just a *Post*-Script, which was originally not a part of the above Address, and is meant to convey a suggestion to the Philosophical Community, especially in India.-When I was looking up relevant references and reflecting on the subject of the Address, I came to have a feeling that ' Philosophy of Technology ' may well be considered as a *specialised* sub-branch of ' Social Philosophy ', already a recognised Branch of Philosophy', even as ' Philosophy of Economics ' has now begun to be treated as its another specialised sub-branch. And, in this context, just as for the purposes of their work on the ' Philosophy of Economics ', Philosophers need to cultivate some concrete acquaintance with the fundamentals of the Science of Economics, even so, for purposes of their work on 'Philosophy of Technology', the Philosophical Community, especially ourselves in India, needs to cultivate some concrete, though general, acquaintance (which we do not adeqately

have at present) with the fundamentals of Technology in its various spheres and facets. · Philosophy of Technology ' needs to be treated as an important field for specialised philosphical research. 15-2-1976.)

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