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CULTURAL AUTHENTICITY AND THE QUEST FOR MODERN SCIENCE AND TECHNOLOGY: PROBLEMS, DILEMMAS, AND PROSPECTS

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Abstract

In their quest for modern science and technology, Asian nations and cultures have to contend with more fundamental issues relating to religion, culture and values, apart from economic and technological matters. This paper tries to show how such non-economic factors are of at least equal importance, which should be taken into consideration, when Asian nations attempt to modernize through science and technology. Such 'intangibles', it is argued, will determine the shape of Asian modernization, and the extent to which the cultural authenticity of non-western societies can be preserved.

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I INTRODUCTION

This paper will attempt to explore some of the salient issues involved in the effort by developing countries to modernise through science and technology. Will the acquisition of modern science and technology transform society and culture to the point where they lose their cultural authenticity, becoming satellites of the West not only in an economic sense but also culturally? or can they retain their own cultural identity in the process?. It is argued here that culture is an irreducible entity that cannot be flattened out on a common plane through globalisation, and that each culture must grapple with its own issues of modernisation despite the seeming universalism of science and technology.

The position taken here, however, differs from the more radical cultural relativists found among the counter-Enlightenment thinkers such as Harmann and Vico, since it admits of some areas of rapproachment and dialogue, brought about not only by structural convergence and the forces of technological determinism, but also by a more genuine human yearning to find the commonality of humanity which is vital to our contemporary existence and survival. The paper is divided into six parts. The first part deals with the historical background to the problem of modernity in Asian societies.

The second part looks at the model developed by George Basalla to describe the process of transmission of science from the western world to the non-western world. The third part deals with the process of acculturation of science in Asian societies, and the value-change involved. The fourth part examines several instances of attempts by Asian scientists and philosophers to reconcile modern science with their own traditional legacies and belief-systems. The fifth part examines the issue of whether the route to modernisation is one or many/several. The sixth part concludes by looking at the relevant parameters that have to be taken into account in Asian modernisation, and to suggest a possible viable model.

II THE HISTORICAL BACKGROUND TO THE PROBLEM

The predicament faced by most developing nations today, the Asian nations in particular, is how to modernise while retaining their socio-cultural stability. I prefer the term "stability" to "identity" because "identity" suggests a certain type of "luxury", while

"stability" suggests a social urgency, which is indeed the case to me. Asian nations seek to modernise themselves through economic development based on modern science and technology. In so doing, they have alienated a part of their traditional culture, including traditional knowledge and practices, which were thought to be incompatible with modern knowledge. Examples would be the field of medicine, and views regarding the natural world. In seeking to modernise themselves, these nations which are mostly post-colonial states, are actually continuing the legacy of their former masters, with the difference that they now have political control over the various institutions and State apparatus such as the Military, the Police Force, the Civil Service, etc.

Ironically, the rationale for such modernisation—and hence alienation—is the quest for self-determination and the sovereignity of the State. In an age when economic, scientific and technological power, determine the position of countries in world affairs, no country can afford to be left behind in the race for economic, scientific and technological supremacy. China, for instance, under the Communist regime led by Mao Tse Tung, sought to transform China overnight from an agricultural to an industrial country. Similarly, countries like Taiwan and South Korea have chosen the path of modernisation, albeit by capitalistic means. On the surface it appears as if the process of modernisation can be brought about either by force or through economic planning and incentives, without the need to worry about socio-cultural problems that might arise as a result of such transformations.

Only Iran perhaps, constitutes a clear case of the backlash of modernity because of its inability to accommodate itself to the underlying religious currents. But in the case of most other Asian nations, it was assumed and treated as if no such underlying socio-cultural currents exist, and that one can proceed with modernisation 'linearly' so to speak, without any qualms of the possibility of the 'backlash of modernity'. The main problem it seems, is economic and technological in nature, not cultural or 'ideational'.

III THE TRANSMISSION OF SCIENCE TO ASIA: THE BASALLA MODEL

Although the American historian of science, George Basalla first proposed his model of the transmission of science to the non-European world in 1967, its features are still relevant and helpful in gaining an understanding and entry into the process of transmission of

Colonial Science from the Metropolis to the Colonies. In this section I will therefore elucidate certain features of the model, and perhaps introduce some modification where relevant, which will later find its substantiation in our examination of science in British Malaya. According to Basalla the process of transmission involved three major phases. These are:

(i) the period from about the 16th to the 18th century when Europeans voyaging into new lands explored and studied the flora and fauna of these lands, and bringing back the results with them.

(ii) the second phase can be considered as an extension of the first phase and referred to by Basalla as the period of "Colonial Science", whereby the 'scientific activity in the new land is based primarily upon institutions and traditions of a nation with an established scientific culture' (Basalla 1967: 613). At this stage, the colonial scientist, who could either be a European or a native of the colony is dependent for his education, training, institutional affiliation, and even facilities, on the Metropolis.As for the term "Colonial Science", Basalla pointed out that it is not used in a pejorative sense, and in fact it is quite possible for the land in which research was carried out not to be a colony of the nation with the established scientific culture. This is nicely illustrated in the case of Charles Darwin, an English naturalist who collected his specimen from South America during the voyage of the H.M.S. Beagle.

(iii) the third or final phase is the stage which saw the completion of the process of transplantation, accompanied by the attempt to achieve an independent scientific tradition (Basalla 1967: 611).

Basalla noted that the transition from dependence (phase 2) to independence (phase 3) cannot be taken for granted, and here he outlined seven obstacles that needed to be overcome. Among these factors, Basalla highlighted the 'resistance to science on the basis of philosophical and religious beliefs,' as a cultural impediment that 'must be overcome and replaced by positive encouragement of scientific research' (Basalla 1967: 617). The attempt to create an independent scientific tradition, or to link science with the economic production process, has been unsuccessful in some states even after achieving independence. For Goonatilake for instance, the remedy for failure to progress along the lines of western nations need not not be the ones prescribed by Basalla. Here Basalla's model perhaps needs to be

revised or modified in the light of researches subsequently carried out by scholars such as Susantha Goonatilake (1984) and Lewis Pyenson (1989), and of criticisms made by Roy Macleod (1987) and Dhruv Raina (1999).

Goonatilake instead suggested the radical alternative of post-colonial societies "indigenising" science by going back to their own cultural roots and the sciences which those ancient cultures once supported such as in the case of India and China. In the first phase, the colonies served as research subjects or materials for the European scientist, especially its rich flora and fauna that led to studies in Botany and Zoology. The influence of Francis Bacon's philosophy of science is clearly marked at this stage, especially the exhortation to collect and classify data, to read the book of nature, to gain practical understanding, etc. Bacon's influence in the formation of the Royal Society of London in 1662 has been amply demonstrated, and it is not surprising to find some of the scientists involved in scientific expeditions in Asia to be have been associated with the Royal Society.

In this regard even though colonial scholars in British Malaya such as Richard Winstedt, knew about the presence of what is now known as "ethno-botany", its status as "science" was in doubt as compared to the science of Botany as it developed in the west. In fact, even local plants were analysed in terms of the Linnean system of taxonomic classification and given Latin names. This process of the "internationalisation" of local flora and fauna, though welcomed in a sense, does create a dichotomy between "local" knowledge and the supposedly more universal scientific knowledge. In the second phase, the spectrum of scientific activities tend to broaden, going beyond natural history and moving on to research in plants, crops and medicine. In some cases, as had been shown in the case of Indonesia by Pyenson, even astronomical observatories, magnetitical and meteorological stations, and technical colleges were built by the Dutch and managed by Dutch scientists.

In the case of Malaya under British rule, colonial science mainly took the form of research in tropical diseases through the *Institute of Medical Research*, and research on rubber through the *Rubber Research Institute*. As can be seen in both cases, the kind of scientific research done in the colonies were of the practical kind, serving colonial economic and political interests. Given this background against which science was transplanted to the colonies, it cannot therefore be expected that science should play its 'universalising',

'humanising' mission, as some of the more academically-oriented scientists were wont to believe. As the historian of science Roy Macleod (1987: 218-219) commented:

> ...Western science has traditionally been regarded as benevolent, apolitical, and value neutral; its extension, a value-free aid to material progress and civilisation. Western science since the seventeenth century has had...little more than a contingent relationship to conquest. Trade follows the flag, and science may improve the prospects of trade, but this imposes no responsibility upon science. The civilizing, improving advantages of new knowledge, in moral and material progress, surely cannot be questioned. If the imperial idea is accepted, if the complex association of commercial, humanitarian, and ideological motives underlying empire is understood, then science has only an incidental function in its articulation.
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> Closer inspection, however, reveals certain flaws in this reasoning. The creation of a free-market based on economic hegemony, the control of the seas, the provision of communication and the protection of transport, and the glorification of progress as a civilising ideal, all raise questions in which new knowledge has quite specific application. The control of that knowledge became critical. The way that knowledge was controlled, the "metropolitan" forces to which it refers, may have moved and changed, but the bonds forged through science are indissolubly linked to political development.
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> Through science comes a language—conveniently the language of the mother country; through this language, neatly conveying the instrumental rationality of western knowledge, comes control—in the imperial context, control often without accountability to the people who are governed, and knowledge "marginalized"—directed to the limited purposes of government, in such a way that the great majority of people remain far from enjoying the "relief of man's estate". This condition of life, familiar to science educators and development economists, reveals the contradiction, familiar to all historians of empire, that improved means do not necessarily imply improved ends.

The third phase constitutes the stage when science carried out in the post-colonial States are supposedly independent of the scientific centres found in the West. In practice, complete independence is rarely achieved. Local nationals are usually trained abroad to carry

on the work left by colonial scientists, as part of the colonial scientific legacy. In Malaysia for example we find this to be the case in research institutions such as *The Institute of Medical Research* and *The Rubber Research Institute*, although they have now been re-oriented to serve national interests.

(i) Indigenous Knowledge and Colonial Science: Malay Ethno-Botany as a Case Study

The colonised lands were not devoid of their own system and repository of knowledge before the coming of the colonial powers. In the case of India, this was well studied and documented by scholars such as Arjun Appadurai, Bernard Cohn, and Zaheer Baba (1996). In the Malay world, not much has been studied with the exception of Lewis Pyenson's (1989) work on colonial science in Indonesia. In a study made by Hairudin Harun (1989) on the Malay manuscripts at the Wellcome Institute in London, documentation on the existence of some form of Malay classification system in ethno-botany was recorded. Because of a lack of written tradition amongst the Malays before the introduction of formal schooling by the British in the late 19th century, most of the indigenous Malay science of nature went unrecorded and existed either in oral form or in the minds of its possessors, who were often at the same time, medicine men.

It is interesting to note the process of knowledge transfer, <u>not</u> from the colonisers to the colonised, but rather from the colonised to the colonisers. A similar process of knowledge transfer took place in Malaya, as it did earlier in India. In Malaya, knowledge transfer was effected through the medium of the *Munshis* or Malay scribes, who often work in the service of their British masters. More broadly, the appropriation of local knowledge—be it judicial, historical, geographical, literary, scientific, or even religious—is deemed important for the business of colonial administration. The task of acquiring such knowledge was indeed made possible by *Munshis* and other native informants who are not necessarily literate. But the service rendered by these colonial officers-cum-scholars, such as J.D. Gimlette and Richard Winstedt, was to document these knowledge in written form, thus making them available not only to a wider audience, but also to future generations.

Eventually of course, Malay 'proto-science' gave way to western science, as happened in the case of their knowledge of plants and animals. The Malay system of plant taxonomy for example, even though quite sophisticated for its time, and even overlapping

with the scientific taxonomy of the west at certain points, were eventually discarded in favour of the more modern western system based on their criteria of classification. For example, one important criterion used in European taxonomy is the division of plants into *genus* and *species,* where a specific name is given after a generic name. For example the genus *Eugenia* has species *Eugenia malaccensis* and *Eugenia aquea.* While plant classification system in Malay ethno-botany might coincide with the European system at places there are also cases where 'they have no European equivalents at all, for names like *Kedundung, Tinjau Belukar*, *Puding* and the like refer to the character of the tree, leaf, or growth-habit of the tree...which modern taxonomy would describe as unrelated species of tree' (Hairudin Harun 1989:10).

One important characteristic of European taxonomy that distinguished it from Malay plant classification, is the 'scientific' orientation towards abstraction and structure which would systematise plant classification in a more comprehensive manner, thus giving it 'universality'. The Malay classification system is based more on local considerations, especially since observations are based on smaller samples, and its usefulness to the local folks—as in the case of herbs for instance.

IV THE ACCULTURATION OF MODERN SCIENCE AND TECHNOLOGY IN ASIAN SOCIETIES

The successful transfer of modern science and technology to developing countries indeed involves more than a physical transfer of resources, machinery, equipment and personnel, but also includes the successful implantation of the scientific attitude and a positive attitude towards modern technology. Cultural impediments such as value-systems that negate scientific values and technological innovation, could be a hindrance towards the successful implantation of modern science and technology in developing countries. It is in this area that we find potential and actual conflicts occurring between modern science and technology and traditional value-systems and lifestyle.

In such cases, the dilemma facing modernising nations is that of trying to decide to what extent one should 'modernise' and to what extent 'traditional' values and lifestyle should be preserved. Such a dilemma inevitably arises because the adoption of the one usually involves a rejection of the other. There are of course various strategies that are

available and that have been adopted in facing such dilemmas, without necessarily sacrificing the one or the other in its totality. Sometimes a compromise is effected, or sometimes one adopts the *substance* of modernity, while dressing it in traditional garb using the rhetoric of nationalism or traditionalism or by some other form of symblic masking.

Conventional wisdom, at least the one advocated by western academics such as the historian George Basalla (1967) and the economist Robert Solo (1966), has it that value change and a change in work ethic must precede or accompany the transfer of science and technology to non-European societies if they are to see a successful implantation of modern science and technology to these societies. It was assumed that Europe had already gone through that stage through the various social, religious and cultural revolutions it had undergone such as the Protestant Reformation, the Scientific Revolution, the Enlightenment, and the Industrial Revolution. Non-European societies lacking in such historical transformations has to somehow consciously bring it about either through government intervention and policies, or through education, or through mass awareness programs. According to Robert Solo (1966:7).

In Western Europe and the United States, the cognition of mechanism and the skills of mechanics and technicians and the cognition of process can be acquired—and for the most part are being acquired through daily observation—through apprenticeships, through *ad hoc* training or through mangerial experience on the job—all outside the system of formal education. Formal education, inasmuch as it has had a functional objective, has produced the scientific and technical elites at the apex. But in low-productivity societies which have not yet crossed the threshold of industrialization, the mass cognition of mechanism, the skills of a middle mass of mechanics and technicians, and the essential cognition of process cannot be acquired spontaneously, outside the system of formal education. Rather the gigantic task of incalculating them needs to be planned and programmed. This suggests that a quite different policy and system of formal education is needed in developing societies than is traditional in the West.

But if such a path were to be chosen, the governments concern has to be careful not to *alienate* the local populace by presenting it as an imposition of an alien system on to an existing local system. For if such a perception were to exist, it could destroy the basis of

> physics? One could interpret these episodes as confirmations within the domain of modern physics of principles of a metaphysical and cosmological order not belonging to the physical sciences themselves. (S.H. Nasr 1981: 114)

Nasr adopts an Islamic perspective towards knowledge, especially scientific knowledge, and seeks to interpret science within the framework of Islamic mysticism or Sufism. For him, no knowledge is profane, and even modern physics can be accomodated within the Islamic scheme of things, although to be sure he does not treat them on the same plane but regard them merely as symbolic manifestations of the divine order. Not all Muslim thinkers adopt Nasr's Sufistic or neo-Platonist perpective. The Pakistani-born writer, Ziauddin Sardar, for example adopts a more pragmatic approach towards science, and regards the pursuit of scientific and technological progress as legitimate, provided it is conducted within the framework of Islamic ethics.

V COMING TO TERMS WITH THE PAST: ASIAN SCIENTISTS IN SEARCH OF CULTURAL ROOTS

The transmission of science to Asia through colonisation has indeed brought about a scientific scene in Asia which is different from that in the West. What is this scene and how is it characterised? Although most Asian countries have achieved independence, their attempts to completely free themselves from dependence in scientific and technological terms have not been successful. In science the centre-periphery model still prevails, with the West acting as centres of scientific excellence, and the East as its satellites. Most Asian scientists, having been trained in the West continued with what they have imbibed from the West, with perhaps minor adjustments in terms of applying their theories and methodologies to local problems.

The knowledge scenario in Asia can roughly be divided into the following stages. First we have indigenous knowledge which existed in Asian cultures prior to the coming of the European powers such as the Portuguese, the Spanish, the Dutch, and the British. Some of these existed in written form, while some existed in oral form. They not only contain historical and literary knowledge, as found in the Malay world for instance, but also knowledge about nature, cosmology, etc. To be sure, they are often bound up with a

metaphysics and world-view which are religious in nature such as Taoism (Needham), and Hinduism (Goonatilake 1984). But the science brought about by the western powers were mostly science in its modern, western form, i.e. post 17th century science, which was largely mechanistic and secular (Dijkterhuis 1986, Kearney 1972), in contrast to the earlier organic, metaphysical and religious forms of science found in both Oriental cultures as well as in ancient and medieval Europe. In this sense modern western science is a rejection of not only "Eastern" science (Winter 1952), but also the science associated with its own past.

As British historians of the scientific revolution such as Herbert Butterfield and A.R. Hall have argued, the scientific revolution occuring in Europe in the 17th century arose as a result of its rejection of Ptolemaic astronomy, Aristotelian and medieval science, and its replacement by a form of science which is experimental in its methodology and mechanistic in its ontology and world-view. If one looks at Greek science for instance, from which the origins of western science was supposed to have emerged, one finds certain similarities in its conceptual content with some of the theories of nature found in the Eastern traditions. A clear example would be the four element theory found in Empedocles and Aristotle, and its similarity with the five element theory (*Wu Xing*) found in Chinese Science (Needham) and in the *pancha bhuta* concept found in Indian science (Goonatilake 1984:43).

The transplant of western knowledge and western science by the colonial powers in Asian societies, interlocked as it were with colonial political, administrative and colonial interests, had effectively marginalised indigenous knowledge. Even after independence, the attempt to revive these earlier froms of knowledge had not proven to be an easy task. Here one could perhaps digress briefly in making a comparison with the situation which Thomas Aquinas confronted in the 13th century with the rediscovery of the Aristotelian corpus in twelfth century Europe. The impact of "pagan" knowledge in the form of Greek philosophy and science in twelfth century Europe could not be ignored by the Roman Catholic Church. Part of the Catholic response in the form taken by Thomas Aquinas, was to rationalise Catholic theology in terms of Aristotelian philosophy (Edward Grant 1977).

It was a move which saved Catholicism until its confrontation with the new science brought about by Copernicus and Galileo in the 17th century. Such a reconciliation was made possible because of the parity between the powers involved. In the case of Asia, the ruler-ruled

relationship found in Colonialism, led to the ruling ideas being that of the ideas of the ruling class, i.e. that of the colonial West. The longer the period of colonisation, the more entrenched the ruling ideas become, and consequently, the more marginalised the indigenious forms of knowledge became. Thus the task of reconciliation became doubly difficult. In the west whatever tensions and incompatibilities between western science and western religious and cultural beliefs were resolved through an evolutionary process involving intellectual dialogues between the parties involved. As a result there was a "cultural accomodation" of science in western culture. In Asia, because science was introduced and transplanted under conditions of colonisation and later maintained because of its economic links, it did not go through the process of "cultural accomodation" as part of its social institutionalisation.

As a result, some Asian scientists and intellectuals with an awareness of this problem, have consciously--though rather belatedly--attempted to come to grips with this problem by searching back into their past, be it Islamic, Taoist, Buddhist, or Hindu, in an attempt to reconcile modern science with the legacy of their own cultural and religious traditions. In the Islamic world, Seyyed Hossein Nasr has been in the forefront of attempts to propagate the notion of Islamic science (for a critical view see Toby Huff in Social Epistemology). In Malaysia, Osman Bakar, a student of Nasr, has been equally active in the Islamisation of science, supported by the *Akademi Sains Islam* (ASASI). Goonatilake, a Sri Lankan, has also advocated the idea of reviving authentic South Asian knowledge and science in the contemporary setting. Likewise Capra's attempt to show the parallels between Eastern mysticism (yin and yang) and some of the ideas of quantum physics have found resonance in Asian scientists coming from the Buddhist or Taoistic tradition.

VI MUST THE ROADS TO MODERNITY BE THE SAME?

Non-European countries are modernising at an interesting time in human history; that is a time marked by an awareness and even recognition of cultural pluralism. Epistemologically speaking, even the West is undergoing a transition, i.e. from the hegemony of modernist epistemology dominated by Enlightenment philosophy towards a shift to postmodernism. This shift in intellectual sensibilities on the part of the western intelligentsia presents interesting possibilities for Asian modernity. For now modernity need not be homogeneous and uniform,

but could admit different forms. Gone are the days of singular rationality, invariably construed in terms of Enlightenment ideology, which in turn is identified with "western rationality" of the colonial masters, and in comes epistemological pluralism and the tolerance for "multiple rationality". This shift in intellectual sensibility is noted and even lamented by the late Ernest Gellner in his book *The Legitimation of Belief*, published in 1974. Various thinkers in the history of western thought have been responsible for the shift.

For a start we have the Romantics of the 19th century such as Nietschze who ballasted western rationality in favour of the 'the dark side of humanity', i.e. the so-called "irrationality" of humanity. Then we have the extremely important and influential contribution of Wittgenstein in the 1950s. Thomas Kuhn (1970) writing in the 1960s and 1970s penetrated right into the heart of western rationality, i.e. that of scientific rationality or rather "non-rationality", by portraying science as an activity that does not fully embody the Enlightenment image of science as being rational, objective, and (ontologically) progressive knowledge. Kuhn, of course, was influenced by Wittgenstein in his exposition of the historical development of science. Then came Richard Rorty who challenged the whole concept of western epistemology as the unjustified quest for intellectual "foundations", in his 1979 book entitled *Philosophy and the Mirror of Nature*. What has all these got to do with Asian modernity, one might ask?. Definitely this is highly relevant for the project of Asian modernity, construed along lines different from its western counterpart.

The image of modernity hitherto constructed by western thinkers from Hegel to Weber to Gellner and even Habermas is that of *modernity as rationality*. Weber sometimes exhibits a certain degree of ambivalence, exemplified for example through his dualistic distinction between *instrumental rationality* and *value rationality*. He deplores for example the autonomous development of instrumental rationality, freed from its ethical moorings as found in *value rationality*. Yet Weber does not flinch from the basic thesis of modernisation as rationalisation, finding historical support from western history, and even the comparative study of world religions. Like Hegel, Weber essentially saw the march of humanity as the progression of rationalisation in human society and culture.

Weber adopts a characteristically Eurocentric approach in his treatment of human civilisations and world religions, unlike Fernand Braudel for instance. For him, modernisation

globalisation. Europe had paid its price in the course of modernisation through the Galileo episode in the Copernican revolution, and is still living with its scars. How do or should developing countries handle the situation? One suggestion would be to have courses which address such questions directly, so as to create awareness, especially among the (future) elites, as to the nature of the problem and how they should be addressed. Such courses would include subjects like History and Philosophy of Science and Technology, Sociology of Science and Technology, Science and Technology Policy, and Civilisational Studies. At the University of Malaya in Kuala Lumpur, the Department of Science & Technology Studies have already conducted such courses at the Faculty of Science since 1976. At present they have a full-fledged undergraduate and Master's program in History and Philosophy of Science, and in Science & Technology Policy and Management.

(iii) The Cultural Dimension

The cultural dimension largely involves literature, cultural activities, and traditional lifestyles. How does one relate to one's own literary and cultural heritage, especially if they involve mythologies and folklores which appear counter to scientific explanation and sensibilities. How can we bring about the acculturation of science in society, and yet retain a sense of cultural identity through literature. Here again, there are no easy solutions, and whatever policies are designed and formulated must be based on research at the fundamental level, i.e. philosophical and intellectual. We can suggest certain directions that one might take; for example, to treat literature as a creative activity of the human mind and spirit, not bound by the strictures of logos and material efficacy. Thus its domain of rationality is not that of instrumental rationality, and should be treated as such. Distinctions between fact and fantasy, fact and fiction, however, must be maintained, so as not to encourage epistemological anarchism and a sense of intellectual nihilism, which would be false and damaging to the human spirit.

(iv) The Socio-Economic Dimension

The problem here is basically one of harmonising between the demands of economic man, and his being as a cultural and spiritual self. Modern economic life, driven and

shaped as it is by the nature of science and technology, has the ability to impoverish the soul and spirit. The economic life has to be reworked and reshaped in such a way that it is not dehumanising, but enriching to the human spirit. In this regard the relationship between science, technology and the economy has to be reexamined from a new perspective. The present arrangement—dictated largely by international economic competition—in which science and technology serves the interest of the economy through R &D for example, does not lead to the edification of man. This is not, however, suggesting a severing of the relationship, but to suggest that we get our priorities right. That human capital should come before financial or physical capital, and that the latter should serve the former. Resources should be utilised for the balanced enrichment of man and not the reverse. The economic system should be man-centered in other words, and should be utilised for the development of human potential as argued by Amartya Sen (2000). Science and technology should be made as creative and interesting as possible, not humdrum routine, and in fact this is also conducive to economic growth in an era of technological innovation. However, the concept and practice of innovation should not run wild, as to leave the disadvantaged behind. There must be a system of ethics that govern the development of science, technology and the economy, a realisation that will soon be driven home by the very nature of our interdependence in this globalised world.

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