

Book Review

Science, Development and the Third World

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A review of Joseph Haberer, *Politics and the Community of Science* (New York: D. Van Nostrand Reinhold Co., 1969); Frederick Harbison, *Human Resources as the Wealth of Nations* (New York: Oxford University Press, 1973); Frederick Harbison and Charles Myers, *Education, Manpower, and Economic Growth: Strategies of Human Resource Development* (New York: McGraw-Hill Book Company, 1964); Robert Heilbroner, *An Inquiry Into the Human Prospect* (New York: W. W. Norton And Company, Inc., 1974); Edward Shils, *The Intellectuals and the Powers and Other Essays* (Chicago: The University of Chicago Press, 1972), Part I and Part III; and Surjit Sinha (ed.), *Science, Technology and Culture* (New Delhi: Research Council for Cultural Studies, India International Center, 1970).

The following essay attempts to organize the aforementioned books around the central theme of science and development in relation to the Third World countries. In brief, one perspective strongly views the direct relationship between the level of scientific development and modernization, the leading spokesmen of which are Harbison and Myers (1964), Harbison (1973), and Shils (1972). The other perspective provides a critique of the first argument, directly or indirectly, which can be seen in the works of Sinha (1970), Haberer (1969), and Heilbroner (1974). The last three works focus on the dynamics for operation of the scientific community and reveal that its activities are largely influenced by external circumstances.

The Role of the Scientist in Development

The centrality of human resources as active agents in harnessing modernization in the Third World is as-

serted by Shils (1972), Harbison and Myers (1964), and Harbison (1973). While Shils (1972) and Harbison (1973) fail to provide empirical evidences to show the relationship between these two variables, Harbison and Myers (1964) did a global survey of seventy-five countries to reveal the direct correlation between level of human resource development and level of economic growth. The relative bias of the authors for formal education was indicated by slotting the countries into four categories (underdeveloped, partially developed, semi-advanced, advanced) according to the composite index of the arithmetic total of enrollment at second level of education as a percentage of age group 15 to 19, adjusted for length of schooling and enrollment at the third level of education (or higher education) as a percentage of age group multiplied by a weight of five (pp. 31-32). GNP per capita in terms of U.S. dollars was used to indicate level of economic growth.

For the policy-maker, Harbison and Myers (1964) is most useful as the authors highlight the typical problems encountered by each level of human resources development and the strategies for overcoming these problems. However, though the authors recognize the availability of other avenues for human resource development other than formal education, these avenues are not reflected in this research. Furthermore, aggregate statistics (GNP per capita) is not a valid indicator of level of economic growth especially when equality or social justice is at issue. GNP per capita neglects consideration of improved standards of living for all sectors of the population. Another limitation of this work which the authors have themselves identified is the failure to capture the unique features of each country in attempting to draw general problems or bottlenecks for each level of human resource development. The history and particular circumstances in each country as they affect its growth and development have been underplayed.

Harbison, *Human Resources as the Wealth of Nations* (1973) seems to be an amendment to *Education, Manpower and Economic Growth* (1964) and attempts to make up for the latter's bias in using aggregate statistics of GNP as a measure of economic growth. The issue of equality and justice is dealt with by considering human resource approach as a precursor for the improvement of general standards of living. This approach emphasizes the increased involvement

and participation of all individuals in the "productive activities" of the nation. In addition, the strength of non-formal education as a strategy for developing capacities and knowledge is conveyed by providing successful stories of countries that have adopted it (e.g., Colombia and Thailand). This is a drastic departure from the book of 1964 which has given more emphasis on the role of formal education.

The significance given to training in science and technology for modernization is underscored in Harbison (1973), Shils (1972) and Harbison and Myers (1964). In Harbison and Myers (1964), emphasis on science and technology enables the Third World to develop by "leaps instead of steps" (p. 1). Human resource development is considered an important vehicle for the attainment of growth because it generates capital, exploits natural resources, builds social, economic and political organizations, and carries forward the task of national development (Harbison, 1973; Harbison and Myers, 1964). In Shils, however, human resources development which is more limitedly applied to *intellectual production*, is pursued because intellectuals are indispensable for the *continuity of society*. They are important, further, because of their abilities to infuse to the laity the general symbols for societal involvement and the provisions for the means for participation in the central value system. Secondly, they are considered important to the change process because they have the

capability of "creating alternative potentialities" either through the generation of an entirely new approach or through the modification of a heritage that enables society to adapt to new tasks and obstacles (p. 6). The intellectual class is distinguishable from the laity because of their uncommon reflectiveness about the nature of the universe and the rules which govern their society, and the frequent communion with symbols which are general rather than with the immediate concrete situations of everyday life. The scientists are subsumed within this rubric which also includes journalists, philosophers, artists, etc. Since they are under-represented in the Third World countries especially in the field of natural sciences, Shils encourages that the content of training for intellectual production meet this dearth.

The target for human resource development is therefore *broader* in Harbison and Myers (1964) and in Harbison (1973) than in Shils (1972). In the first two works, the approach aims at the socialization of all people in society to improve their knowledge, capacities and skills necessary for participation in societal activities (Harbison and Myers, p. 2; Harbison p. 157). Harbison's work (1973) departs from that of Harbison and Myers (1964) in that it includes not only the function of *developing* human potentialities but also the mission of *utilizing* the available manpower maximally. This is why the first work argues that the issue of social justice is dealt with by assuming that

standards of living will improve through the productive use of all "potentialities." Hence, the strategies for Harbison's approach are: the establishment of comprehensive and cohesive systems of learning for the development of knowledge, skills and capabilities through formal and non-formal means; and the generation of employment opportunities to enable the widest participation of available manpower. This approach is not averse to science and technology but suggests strongly that recent developments should not be contrary to the aims of human resource development. That is, while it may give high priority to science discoveries and application of advanced technology (e.g., the use of new seed varieties, fertilizers, pesticides to improve agricultural production), it must restrict the use of labor-saving mechanization if the adoption of these machines is not conducive to the maximum utilization of human resources. Land reform and labor-intensive means for production are, therefore, the pet projects in this approach especially so because they relate to developing countries where under-utilization of human resource in agriculture is a problem. Harbison (1973) cites the experience of Korea and Taiwan as test cases in the implementation of land reform and intensive cultivation strategies without expensive labor-saving machinery in order to cope with the problems of under-utilized resources. What is lacking is the information on the number of countries who have failed

in implementing these strategies and the reasons for their failure.

While Harbison (1973) should be credited for its attempt to address the issue of social justice, it is still concerned only with the interest of a limited sector and not of the entire population. Thus, it evades the more critical issue that has to be answered. It neglects the fundamental role of certain powers in either facilitating or impeding the resolution of inequities. Harbison fails to consider the fact that the implementation of the human resource approach rests on the destruction of existing power elites currently determining the direction of national development.¹

In Shils (1972), the functions of the intellectuals (including the scientists) can only be accomplished by a limited few. It implies, therefore, that change can be spearheaded only by a selected few. The question is, do they offer the best alternatives in bringing about the change? Which sector of society has benefited from the innovations they have so far introduced? What distinct experiences or background determines the intellectual's role in society and equips

¹ See Paul A. Baran and Paul M. Sweezy, *Monopoly Capital: An Essay on the American Economic Social Order* (New York: Modern Reader Paperback, 1966) and their other treatises on the role of giant corporations in the political, social and cultural life of capitalistic societies in the Third World and the developed nations. Even in the United States the federal aid to education was opposed by oligarchs to limit the avenue for upward mobility.

him with capabilities which differentiate him from the laity? In what way and to what extent has the intellectual class contributed to modernization? Supportive facts are hardly adequate to make Shil's arguments persuasive. For example, the following statements could have been complemented by data:

Intellectual systems of the new states are hardly adequate to the requirements of a modern intellectual system (p. 338).

The educated classes in almost all the Asian countries ... are markedly skewed to the direction of the arts subjects — literature, languages, history — and the social sciences, while the scientific and technological categories are rather poorly represented (p. 379).

Scientists' Roles in the Third World

Shils contends that the Third World countries are plagued with the problem of depending upon the production of the intellectual class in the developed nations because they consider themselves as "consumers" of the latter's "creations." Hence, the structure of the intellectual community is still basically unequal because of the dependence of one sector on the other. The center has a dominant position because of the capability of its intellectuals to generate more creative work. The *periphery* gives deference to the center because of its inability to engage in creative work. Shils's concept of the *intellectual community* suggests new

roles, values, and structures that separate this class of men from national communities. This is the arena where the role of a change agent comes in as a bearer of a new outlook afforded by cross-national interchange.

The argument against Shils lies in his elitist bias in evaluating the peripheral location of the Third World intellectuals in the stratification of the international intellectual community. He admonishes the Third World intellectuals to transcend their provinciality not by retreating from the transnational interchange of intellectual creativity but through "creative extension and enrichment of their indigenous tradition by creative assimilation and adaptation of the metropolitan tradition" (p. 370). Why can he not benefit from the experience of other Third World nations? As peripherality and centrality for intellectual life roughly coincides with levels of economic growth, he should have asked what it is about levels of development and growth that contributes to the "backwardness and provinciality" of the intellectuals in the Third World. The root cause for inequality in the transnational intellectual community has not been underscored.

Sinha (1970) presents some insights for such inequality in obtaining development of science in contemporary India. While science had been introduced by colonizers as early as the eighteenth century, failure to identify any outstanding indigenous contribu-

tion can be attributed to the exclusion of the natives from any substantive participation by the colonizers. Scientific undertakings were mostly governed by the colonizers to suit the military, administrative, economic and religious imperatives of the continent (p. 14). Only after the attainment of independence did Hindu scientific endeavor grow.

The resistance of the Hindus to adopt innovations appears to involve more than the colonizers' usual complaints about their traditionality. For instance, in the case of the slow adoption of filature for sericulture and cotton ginning, and the aborted use of engrafted machine for iron smelting, Bhattacharya argues that more rational factors were at play than the assertion held by the imperial power. When one examines closely the technological innovations and the social conditions affecting the adoption of these innovations, the argument about the traditional nature of the farmer is unfounded. The more logical reasons for resistance are:

- (1) *The technology was too costly.* For example, the slow adoption of filature for sericulture can be attributed to the cost and complexities involved in its operation. Hence, the farmers could not afford a replacement of the traditional method.
- (2) *The adoption required new skills to engage in the productive activity.* The adoption of the innovation did not only demand new skills from the workers but more so, higher levels of skills in connected areas of productive activity. The manufacture of

some parts of the machine especially the winch and cog-wheel, required a higher precision than the village blacksmiths and carpenters were capable of doing.

- (3) *Existing economic relations had been disrupted leaving out some traditional workers from jobs and favoring the economic position of colonizers.* The adoption of the technology made the *chassar* (raiser of the cocoon) dependent on the *pykar* (company's agent cum wholesale dealer) and on the owners of the filature who were mostly European capitalists. Formerly, the *chassar* or the women of his household could reel off the silk by themselves. This manual work had been replaced by the new machine and therefore held some members of the productive force inactive. The *pykars* very often compelled the *chassars* to sell cocoons to them at their prices.
- (4) *The technology was not suited to local conditions.*

In a survey of contemporary village communities in India, responsiveness to agricultural innovations was not mainly attributed to traditional outlook (Ranjit Bhattacharya's article in Sinha). The resistance of farmers were attributed to such factors as lack of economic resources to procure innovation, lack of communication between extension agents and the farmers (i.e., agents communicated more with upper classes many of whom were not primary producers), and the absence of perceived need for their adoption.

The survey of contemporary Hindu and Ceylonese scientists' problems in the practice of their profession reveals

the more common claims for inadequate incentives and insufficient opportunities made available by the community (Surajit Sinha, D. L. Jahasuriya and Ranjit Bhattacharya in Sinha). They suffer from measly pay and low status compared with other professionals. While traditional values (e.g., fraternalism, patronage, religious outlook, aversion for manual work) may affect the performance of their functions, these cannot be considered as the conditions primarily impeding the development of a scientific outlook. In fact, traditional values can be harnessed to mobilize people toward scientific undertaking in certain cases. For example, the kin-like relations of the *Guru-Shishya* (master-student) can be a vantage point for encouraging a scientific outlook if the master is an appropriate model in the field.

Power and the Community of Science

Haberer (1969) raised a very critical question that challenges the posture of scientists of today. As he provides evidences to prove that scientists, since the time of Bacon and Descartes, then of Max Planck in Germany and of Robert Oppenheimer in America, have communicated the apolitical stance for science, their "prudential acquiescence" to the state negates their claims. While these leaders admonish that science should not be subservient to power, a discordance between their avowed philosophies and behavior is observed. Perhaps, this is because they know

that their efforts to resist power would be futile. When they ask how the power structure assaults the values of the scientific community, they have to confront political indignation. For example, Oppenheimer's espousal of disarmament during the Eisenhower Administration was considered an indication of his lack of loyalty to the state. This case was brought to open trial and past convictions were unearthed to prove a questionable reputation especially in relation to three areas of decision-making where he was involved (i.e., development of the bomb, planning for the international control of atomic energy, and the struggle over atomic weapon development and military strategy). The response of the other members of the scientific community was weak and tenuous. The most vocal group that made a stand about Oppenheimer's case was the press.

What is therefore needed, Haberer says, is for scientists to re-assess their stand on the relationship between the community of science and power. That is, the ethic should be more defined when scientists confront power-holders who utilize the knowledge they possess or impose the priority of values in the conduct of their work. A well-developed methodological ethic (or the rules of the scientific pursuit) is not enough to cover these problems. An institutional ethic should accompany it defining the kind of relationship between the community of science and the external environment, and the relationship among the members of the community themselves. A political

theory, he says, should be developed which is applicable to the concerns of the enterprise.

As the number of scientists, and the resources within their command increase so does the need to establish more elaborate and formal political practices and institutional devices to cope with the internal and external affairs of science (p. 327). In confronting the dangers of an encroaching community on the values of science, the scientist is not to withstand the crisis alone. He must develop the strength derived from unified action in defense of one's community or to rally to the defense of another colleague when faced with the same circumstance.

Heilbronner's "Inquiry Into the Human Prospect" (1974) does not share the optimistic outlook of Shils (1972), Harbison (1973), and Harbison and Myers (1964). For him, science and technology pose a threat to the future third or fourth generation of the world community. The revolution of science and technology has created formidable problems of population explosion, obliterative weaponry and declining environmental resources. The advent of a command over natural processes and forces far exceeds the reach of the present mechanisms of social control (p. 57). While the prospects for mitigating the first two problems can be undertaken with the employment of science and technology, the environmental capacity to support the demands for it is rapidly approaching its limit. The expansions of industrial

civilization has grown out of proportions which pose dangers to the human prospect. While both industrial capitalist and socialist societies may plan their economies to minimize injudicious use of resources, such planning will not entirely solve the problem of the third or fourth generation. The hope lies in lowering the pace of industrialization of the developed world to restrict the diminution of resources.

Heilbrunner implies a different direction for the path of development for the Third World. Instead of calling on scientists and technicians whom Shils (1972), Harbison (1973) and Harbison and Myers (1964) envision to be vanguards for modernization, he suggests new leadership which veers away from an industrialized state. Scientists shall, therefore, have a much reduced role. The author, in fact, admonishes that societies should turn in the "direction of many pre-industrial societies — toward the exploration of inner states of experience rather than the outer world of fact and material accomplishment" (p. 140). He hopes, however, that future men can re-discover "the self-renewing vitality of primitive culture without reverting to its level of ignorance and cruel anxiety" (p. 141).

Reaction

Heilbrunner raised a critical question challenging the importance that should be given to science and technology for the future of human so-

cieties. Considering that technology has contributed less than is desired for the survival of mankind, the author drastically offers to move away from science as controller of the problems of human existence. Technological innovations have created contradictions in society. While they have been developed for the very purpose of coping with survival problems, they have also provided weapons for mankind's destruction.

Perhaps, Heilbrunner's argument has merits, but this could have been more persuasively handled if he offered evidences as the bases for forecasting the dismal future of the third or fourth generation. How in particular have societies employed science? How has science led (or is leading) to societies' own destruction. His tendency to overgeneralize his "dim" forecast should have been supported by facts. What is the basis for his contention that whether one's country is socialist or capitalist, declining environmental resource is expected? Why can planned economies not be able to halt the injudicious use of natural resources? What are the experiences of socialist countries in controlling the consumptive behavior of man in exploiting resources beyond his capacities to absorb?

Baran and Sweezy (1966) and O'Connor (1973) share the dim prospects for advanced industrial societies. Like Heilbrunner (1974), they considered the centrality of technology in bringing about contradiction but only insofar as the basic and dominant

units of capitalist nations *have directly* applied it. The developments in technology have improved the capabilities of giant corporations to generate *surplus* which mankind has little capability of absorbing. The extraction of *surplus* from the Third World only increases the advanced capitalist nations' *stagnation* because of the heightened problems for surplus absorption (Baran and Sweezy, 1966). On the part of the Third World, the prospect for development even in the distant future is not foreseeable because of the massive transfer of its wealth and resources to the more developed nations.

The problems, therefore, confronting the third or fourth generation, may not be overcome simply by

underplaying science and technology, as Heilbroner would suggest. It is neither as simple as challenging the scientists to re-assess their ethics regarding the ultimate ends for which the technology they have generated is intended (Haberer, 1969) — for then, we are blaming only the victims of power. A brighter human prospect may rest in the answers to the questions, "Who dominates the 'use' and 'mis-use' of science? What particular institution in a nation or the world community dominates the use of the 'products' of science?" The destruction of the institutions that command the "mis-use" of science may be the answer for the betterment of the future generation as well as for the promise of "development" in the Third World.