SATELLITE COMMUNICATIONS: PROGRESS, PROSPECTS and PROBLEMS IN ASIA

(Workshop on "Satellite Communications and Development," Institute for International Co-operation, Ottawa, Nov. 10, 1976)

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Arthur C. Clarke, now widely recognised as the "father" of satellite communications, relates a story of British reaction to an important event in the history of communications technology -- the invention of the telephone. The British Cabinet was called into special session, he says, to consider the implications of the event. The Postmaster General was asked whether in his considered view the "old country" should import and absorb the new technology. That august official is said to have replied with a touch of asperity: "Certainly not, gentlemen. This may be a good invention for America, but not for Great Britain. We have plenty of messenger boys here."

Mr. Clarke perhaps finds some malicious glee in recounting this myopic and, as events have shown, miscalculated response to a pre-satellite but nevertheless revolutionary innovation in communications technology. For there was a time when his own predictions about and hopes for the future of satellite communications were received in much the same way. He encountered disbelief when he said 31 years ago that rocket technology and microwave engineering could be combined to produce a global system of communications technology, "thus transforming the world into an electronically-linked global village."

The technology of satellite communications has made several giant leaps in the intervening years, and awesome possibilities have become a part of our lives in a matter of decades. As Clarke describes the state-of-the-art today: "The wiring of the electronic global village is now complete. But not all the fittings are yet installed. When they are, the world will be changed beyond recognition." Or, as Henry Kissinger puts it: "Satellite technology offers enormous promise as an instrument for development. Remote sensing satellites can be applied to survey resources, forecast crops, and improve

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land use in developing countries. They can help foresee and evaluate natural disasters. Modern communication technologies, including satellites, have large untapped potential to improve education, training, health services, food production, and other activities essential for development."

That is the optimistic view, and it is a view to which many Asian politicians and planners subscribe. There is a pessimistic view, too, -- or perhaps more accurately, a concerned view --with fears that "galloping communications technology" will widen the gap between industrialized and developing countries. Doubts have also have been raised about the capacity of Third World societies to absorb advanced communications technology. Compare the sweep of communications made possible by high technology with some Third World realities, and you will see why hope and doubt co-exist.

Satellite technology has already developed its own specialised and exotic jargon, while some developing countries are engaged in the task of refining their calligraphy or expanding the somewhat restricted vocabularies of their national languages. Some of the villagers who were the audience of India's recent Satellite Instructional Television Experiment had never seen moving images before. Scientists in Austria, Switzerland, and West Germany have been able to participate in a conference held at Houston, Texas on cancer and tuberculosis, without leaving the comfort of their homes. They were hooked into the event via satellite, just as cardiologists from Montreal and Lyons discussed infarctions and related conditions through a satellite connection in June 1972. In many Asian countries, on the other hand, governments are finding it increasingly necessary and practical to deploy bassically trained paramedics, who traverse footpaths or bumpy country roads, delivering the messages and the appurtenances of health care from door to door.

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Will satellite communications create an excessive cultural shock in a society that is still largely traditional? Developing countries are plagued by ever-growing balance of payments deficits, shattering burdens of loan-repayment, and widely fluctuating prices for their primary commodities. Is satellite communication a luxury they can afford? Conversely, must these countries forever remain at the far end of human development, while the rest of the world thrusts itself forward towards new frontiers, widening the gap between themselves and the poorer nations of the world in the process? Are the long-term benefits of advanced communications technology so compelling that they warrant phased investment by developing countries?

These and related questions have to be considered by each developing country within the context of its own goals, resources and limitations. They need to be assessed, too, against a wider and fundamental question: Can the transformations inherent in the process of national development (whatever one's precise definition of development) be accomplished without the application of science and technology -- appropriate, locally derived, adapted or whatever -- to various parts of human endeavour that make up the sum of human life?

In the distant past, many Asian countries boasted complex irrigation facilities, effective sewerage networks, techniques for recycling what might otherwise have been considered agricultural waste material, and so on. The massive and ornate temples of Asia that have survived the ravages of time, are obviously the product of formidable expertise in construction engineering. Surgeons at ancient Nalanda University were said to have been experts at trephination. Physicians in South and Southeast Asia used ekaveriya (rauwolfia serpentina) to treat hypertension many, many years before the world's big pharmaceutical companies bottled the drug as a pill. Indigenous

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communicators were so dexterous that they worked out a variety of drum beats, each with its own nuance and message. And if you want to be extra-sensory, the puranas, old Hindu scriptures, talk of the "divine sight" with which Sanjay was able to watch a battle from far away and describe it in minute detail, much in the manner of a spy satellite.

Are today's descendants of men and women who possessed and used engineering, medical and other skills in the past unready for modern science and technology, including the technology of satellite communication? I was born in the "mystic east," so let me remain true to the stereotype. I don't propose to provide you with answers; only with questions.

Let me say, however, that many governments of developing countries in Asia seem determined to tap the benefits of satellite communications technology for their countries. Several have joined the Intelsat consortium, and have built their own ground stations, including at least one Asian country that does not have a domestic television service. Many, including Bangladesh, which is usually listed among the world's "least developed" countries, are building up their expertise to participate in remote sensing programs. Indonesia has a domestic satellite in orbit. India recently concluded a crucial experiment in the use of satellite communications for development. A domestic system established in Malaysia last August electronically linked Peninsular Malaysia with other parts of the federation.

Three years ago, a United Nations study pinpointed four areas in which satellite systems could be particularly beneficial. These were Communications, Meteorology, Earth resources, Surveys, and Geodesy. That study further listed the possible applications of satellite technology in each of those areas as

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follows: Communications -- Point-to-point communications over long distances, voice broadcasts over a large area, facsimile transmission, data relay and data collection, and aids to navigation; Meteorology -- Day and night cloud cover, long-range weather forecasting, continuous observation of meteorological changes, storm and hurricane warnings; Earth resources survey - Agriculture and forestry, water resources, oceanography, pollution control, geology and minerology, geography and cartography; Geodesy -- a world geodetic reference system.

Some of this potential has already been realised, and the literature about these accomplishments is substantial. Developments in all the areas of application outlined by the UN study have been significant, some of them exciting. The fact that "eyes in the sky" have "seen" copper deposits in Pakistan, and groundwater sites in Kenya, for example, provides evidence of the contribution satellites can make to development planning.

For myself, I am particularly hopeful about what the satellites might eventually do in an area sometimes neglected or misunderstood by scientists and policymakers alike, the use of communication as a component of development, change, progress or whatever you want to call it. Let us not be diverted into a definition of "development" that would keep us all night.

Shortly after an Intelsat satellite was launched from Cape Kennedy in 1971, Lester Pearson said that while the event was "important and encouraging," the real test for satellite communications technology would be its ability to produce satellites capable "not merely.... (of) relaying programs to television systems which would exclude the people of many developing countries, but of sending them directly from the satellite to the television set." The technology

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passed that test when, in May 1974, America launched ATS-F, the sixth in a family of applied technology satellites. Whereas messages from other satellites can be received only by multimillion dollar earth stations, ATS-F can accurately beam its programs direct to fairly simple antennas, built at the cost of a few hundred dollars and strategically placed in areas covering small clusters of television receivers in homes, schools, or community centres. Canada's communications technology satellite is however, the most powerful communications satellite now operating, and may be the forerunner of a new generation of satellites that could best serve the purposes of developing countries.

The late Dr. Vikram Sarabhai, India's pioneer in satellite communications technology, felt that a system of direct-broadcasts via satellite would enable his country to set up a nationwide network in 10 years as opposed to the 30 or 40 years it would take to develop a conventional earthbound, microwave system. A West German assessment has this to say: "In a nutshell, through direct broadcast satellites, developing countries can benefit from educational television and radio in earlier time, at a lower price, serving a wider population and offering a greater range of different educational service and applications."

The immense potential of satellite telecommunications may be seen if one remembers that in Asia the media are not organs of "mass" communication as known in the industrialised West. Most of the rural populations of Asia remain virtually excluded from the conventional media. Most of Asia has not reached the "minimum desirable standards of mass media availability" formulated by Unesco in the 1960's -- ie. 10 newspaper copies, five radio receivers and two television receivers for each 100 inhabitants. Consequently, Asia's rural

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peoples have as low levels of access to communication as to, for instance, abundant food or adequate housing. Satellite communications hold out the promise of taking the message of development to these peoples, cutting across distance and time and, in the process, of helping to move rural Asia away from the corrosive perils of poverty.

There is sufficient evidence to show a relationship between communication and development. Y.V. Laksmana Rao, who surveyed two Indian villages, and F.W. Frey, who assessed attitudes in some 400 Turkish villages, found that the diffusion of information triggers change, which, in turn, affects the quality of information, the forms of diffusion, and the targets and strategies of change. My favorite example of how communication serves to motivate desirable change comes from Singapore. For over 15 years now, Singapore has conducted a vigorous and generally successful family planning campaign. Sixteen years ago, when family planning was a topic of heated political controversy, the Singapore Family Planning Association conducted its first experiment in persuasive communication, when it held a family planning exhibition in the heart of the city state. That was in November 1960. The exhibition presented in fairly simple visual form, a number of exhortations as to why family planning was necessary, and perhaps as many explanations as to how families could be planned, and where advice, assistance and equipment were available. The exhibition had 10,000 to 12,000 visitors a day for 11 consecutive days. The next year attendance at family planning clinics rose by 16 per cent, and the crude birth rate dropped from 37.8 (in 1960) to 35.5. Now, it is a fairly simple matter to communicate messages to the people in a country the size of Singapore, with an area of 222 or 224 square miles, depending on whether the tides are in or out. How does one achieve this in larger developing countries, with large populations, a diversity of languages or dialects, and a relatively poor communications structure?

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There is considerable interest today in the Chinese model of mass communication in relation to development, and much discussion about the applicability of this model to other developing countries. Peter Wilenski, an Australian scholar, has described the use of mass exhortation and mass participation techniques in China in the health field, and it is clear from his account that the Chinese example has certainly been effective. Prof. Doak Barnett says that "one of the most impressive characteristics of the Chinese communist regime has been its ability, using revolutionary 'mass line' techniques, to organise and mobilise millions of human beings to work actively toward the Communist Party's goals of social change and economic development." He adds, however, "that the responsiveness of the masses to Party persuasion can be explained to a considerable extent by the sometimes subtle and sometimes not so subtle totalitarian elements of coercion that are a fundamental part of the system." In short, mass exhortation, mass persuasion and mass participation as known in China cannot easily be achieved in other parts of Asia where the tradition of questioning, disputing and even resisting change remains fairly strong. One reads ever so often of creeping authoritarianism in Asia, of human rights being curtailed, of democratically elected governments arrogating more and more power to themselves -- and one readily assumes that these governments should be able to impress the messages of change and progress on their peoples with ease. The fact, however, is that much as the rural peoples of Asia will acquiesce in seemingly authoritarian permutations of political power "at the centre," they show much more resistance to any change that might immediately affect their day-to-day lives. They will, for example, unquestioningly

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accept the postponement of general elections, even where the legal basis for such a postponement is questionable, but will spend interminable hours debating the need to instal a roadside communal tap for running water where a well had existed before. This example, may I add, without mentioning names, is from real life.

Some 10 days ago I asked a visiting Asian politician who also manages a newspaper, what he considered the most effective medium of communication in his country. His response was prompt and terse. "The rumour mill," he said. This reply is not really as facetious as it sounds. It implies that interpersonal communication is important and effective in developing societies, and cannot be replaced overnight by impersonal or mass channels of communication, however technologically superior these might be. There is a need to mesh interpersonal with mass communication techniques and I shall return to this aspect of the subject after briefly describing to you the most significant Asian experiment in the use of satellite communications as part of the development apparatus, namely, India's Satellite Instructional Television Experiment, better known by the acronym SITE.

India's year-long experiment in the social application of satellite communication technology ended last August. The effects of the experiment are now being assessed. A comprehensive process of post-experiment evaluation was built into SITE, and these inquiries are likely to be completed by mid-1977. When this evaluation is complete, other development countries should have a set of indicators based on actual experience, rather than conjecture, on which to base their own plans.

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SITE was very much the brainchild of the late Dr. Vikram Sarabhai who, as head of the Indian Space Research Organization (ISRO) felt that the most appropriate and justifiable application of space technology would be in relation to national development. In January 1967, ISRO, with the Indian Agricultural Institute, All India Radio and the local administration of New Delhi began a pilot agricultural television project in 80 villages near Delhi, which had India's only television transmitter at the time. The aim of the project was to test the effectiveness of educational television in a rural setting. Dr. Sarabhai hoped that the information gathered would help the Indian authorities decide whether it was worth organizing a wider instructional television system, hooked into satellite technology. The results of the 1967 experiment were so encouraging that later in the year ISRO sent a mission to NASA to examine the available technological options for a nationwide television system in India. The main recommendations of the mission were:

(1) India should use a hybrid of direct broadcasts from a synchronous satellite to remote village areas, and rebroadcasts to densely populated rural regions.

(2) Such a system would be more dependable, and would be some 60 per cent cheaper to set up, than a nationwide extension of the existing microwave system.

(3) A one-year experiment in satellite instructional television should be conducted as a joint venture between NASA and SITE.

(4) A domestic satellite system should be planned, if the SITE results were positive.

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This was the genesis of SITE. An agreement was signed between NASA and the Indian Government in 1969. Under the agreement, NASA said it would make the ATS-F satellite available for the experiment. India undertook "to develop, provide and maintain in service the ground segment of the television satellite experiment, so as to meet the technical objectives of the experiment," and "to develop and utilize instructional television program material that will fulfill the instructional objectives of the experiment." ATS-F was moved into a position at 35°E longitude, for the experiment. Programs were beamed to ATS-F from a ground station at Ahmedbad, and ATS-F then relayed these programs to villages deep in the Indian hinterland.

The overall objectives of the experiment were to test the effectiveness and long-term prospects -- in terms of cost, local technical capability, programming, and audience response -- of instructional television via satellite in areas such as family planning, teacher training, primary education, health and hygiene, agriculture, and national integration.

Indian planning for the experiment was carried out under a multiministerial group and involved a variety of personnel from technicians through social scientists to television program specialists. A great amount of pre-testing was done, with both software and hardware. As a result of these tests, clusters of villages in six states were chosen for the experiment. Some 2400 villages received their programs direct from ATS-F. The programs were rebroadcast from ground stations in Ahmedbad, New Delhi and Amritsar to another set of approximately the same number of villages. An estimated five million people viewed 1,200 hours of SITE programs.

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SITE villages were carefully selected by a number of criteria including their backwardness because Indian planners were anxious to study the impact of instructional television in areas previously unexposed to sophisticated technology or modes of communication. A 10 foot antenna made of chicken mesh was installed in each village, together with a television set. Electricity from the nearest supply point was run into most villages where there was no electrification. A few villages were supplied with a set of two heavy-duty 12-volt batteries. The total cost of this hardware -- all made in India -- is said to have been about $500 per village. One maintenance team for each cluster of villages was also moved into place. In each village, a "supervisor" was hired to switch the television set on and off, protect it from vandals, and report on the reception of the set and the size of the audience. He was expected to fill out a prestamped postcard size form and mail it to the headquarters of the maintenance team, if problems were encountered.

Each SITE program was in two segments; an instructional program in the language of the "cluster", followed by a Hindi news program from Delhi. Each cluster was also able to view programs meant for other clusters after it had viewed the program prepared specially for it. Programs - again, based on strenuous pre-testing - used local ballad singers, folk musicians and rural men and women with no previous broadcast experience, as their "stars". Instruction was presented in the simplest possible terms, using examples to which rural peoples could relate, keeping in mind the fact that many viewers were illiterate. An agricultural program used "fist width" as the measurement to describe the most suitable distance between plants. A program on dental hygiene described how the thin branches of certain trees could be woven into rough-and-ready toothbrushes.

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The advantages SITE demonstrated from the beginning were speed, and the possibility of extensive coverage. At its current rate of growth, India's ground television network is expected to cover about 17 per cent of the country and reach 25 per cent of the population at the end of 1980. The newspaper dispersion rate is 16 copies per 100 residents, but this figure does not take into account the fact that newspaper circulations in India are mainly urban. Given the necessary backup services and support, a satellite can cover the entire country as soon as it is operational.

Several other aspects of SITE are worth considering. The experiment was made possible by a bilateral agreement, and the use of ATS-F was without charge. This facility will not be available for anything but an experiment, and SITE did not give a true picture of costs. Complete official figures of what the experiment cost on the ground are not yet available. A British estimate puts Indian expenditure on software, hardware, and maintenance at £6 million. Satellite communication does not come cheap, and a recurring argument against its use is that it requires enormous amounts of money that could be better spent. India's SITE group has examined this objection closely, and a comment made by SITE's Professor E.V. Chitnis is worth noting. He said: "Many people ask us whether it would be better to provide tube wells and drinking water instead. However, what one is attempting to do through SITE is not to give TV sets to villages, but to make them self-reliant and to get them new information which will enable them to do something worthwhile for themselves - to learn to work together and acquire new skills, including those required for digging wells."

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It is expected that as the technology improves and its use increases, installation, maintenance and operational costs will be proportionately reduced. On the other hand, a recent US study charges that major electronic companies have deliberately delayed changes and improvements that would cut costs to users of the technology while reducing producers' profits. Here, obviously, is a suitable area for further inquiry, and perhaps some form of internationally accepted monitoring.

Another important aspect of SITE was that it was conducted in a country with a high degree of industrial skill. There is grinding poverty in India, to be sure, but there is also advanced industry. Industrial production in India increased by 13 per cent in the first half of 1976. In fact, India is an exporter of industrial know-how. Its electronics sector had the expertise necessary to turn out the hardware for the experiment. Equally, India was able to produce a range of instructional programs for the experiment.

Difficulties -- including inter-departmental jealousies and friction among SITE's planners -- were encountered along the way, but India was able to fulfill its responsibilities under the SITE agreement because it already had a fund of expertise from which to draw. A similar level has to be reached by other countries who wish to adapt satellite communications to development, and this is particularly true of programming. Technology can be transferred under a variety of arrangements, but this will be ineffective without suitable software.

SITE also paid attention to a subject I mentioned earlier; the effectiveness of interpersonal communication in developing countries. Eleven years ago a report of India's Information Ministry said that the objective of communication "should be to inform, persuade and inspire, to make people's minds receptive, to make

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them familiar with social and material changes that planned development brings in its wake, and to develop local initiatives for decision-making." The persuasive aspect of communication is undoubtedly crucial, and it has been properly emphasised by many developing countries. It has, however, often been emphasised to the exclusion of the other aspect of development-communication -- interaction between the planners and the planned-for.

SITE's software managers sought to overcome this problem by tailoring programs to needs articulated by potential peasant audiences during pre-tests carried out by teams of research people deep down in the villages. Research Assistants were located at viewing stations throughout the experiment, too, and they were able to carry on a dialogue with viewers. This interaction could provide the basis for changes in later programming when, or if, India sets up a domestic system. It is certainly part of the post-test evaluation process, and a vital part.

One can stimulate traditional peoples with images, music and words, to change their attitudes. But experience has shown that changes brought about in this manner -- however scientifically sound, however economically benign -- will run into problems if the people directly affected by change are though of only as "targets" and not as participants. Such participation in the decision-making process is an old tradition in Asia, and was built into the operation of village councils in South and Southeast Asia: the gamsabhas of Sri Lanka, the panchayats of India, the tambons of Thailand, for instance. In the present cultural context of rural Asia, this tradition can be revived only at the interpersonal level. That is why the application of satellite communications to development has to be part of a wider system of communications, integrating old techniques with the new technology. This is a field in which

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some research has been done, and in which much more remains to be done. It is a field that does not deserve neglect. The best scientific and economic policies that man can produce will be of little relevance unless and until they are disseminated, understood, modified if need be and, above all, wholeheartedly accepted.
