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BAREFOOT MICROCHIP COMMUNICATIONS FOR DEVELOPMENT

BRIDGING THE GAP: Villages Plug Into Satellite

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1. PREAMBLE

Being neither an electronics engineer nor an economist but a social development communicatior, I am in a dilemma as far as the technical aspects of the subject matter of this colloquium are concerned. Hence this paper will try to concentrate on ideas, myths, and observations on opportunities and constraints the "microchip" technology renders in support of educational and communication programmes in rural areas in the developing world.

Note: The views expressed in this article are those of the author and do not represent the policy of UNICEF or Development Forum.

2. HISTORICAL PERSPECTIVES

The microchip in its rudimentary form has been with us for sometime now -- the transistor radio receiver, CB, SSB, etc. To date, this extraordinary invention has gone relatively underutilized for rural development. There have, however, been a few small-scale pilot projects in which the mass media -- radio, TV, newspapers, tape-recorders - have been used to improve the flow of information and support formal education and two-way communication processes. Such campaigns have been tried in the Ivory Coast, El Salvador, Mexico, Tanzania, India, Ecuador, Senegal etc. But none of these has more than a ten-year history, and the professional opinion of both those who have worked on these projects and those who have studied them, is that the message got through but their impact in terms of social change and modernisation has yet to be seen. Further research findings in the last decade indicate that the role of mass media in facilitating development has often been indirect and only contributory, rather than direct influencing.[1] Thus, it is important that media messages be supported by other elements such as extension services if people's attitudes are to be modified.[2] For example:

In 1975, UNICEF, the United Nations Fund for Population Activities and the Voice of Kenya agreed to co-produce entertaining health education programmes for open broadcast. The series, "Zaa Na Uwatunze" (Giving Birth and Caring for your Children), featured nationally-known entertainers in an episodic situation comedy. The upbeat presentations covered down-to-earth subjects -- the nutritional value of eggs, the dangers of entrusting the care of infants tp young siblings, and the need for inoculation, etc. -- and enabled listeners to identify with both the situations and the characters.

Like all "soap opera" regulars, the characters in "Zaa Na Uwatunze" are stereotypes, and their predictability was redeemed by their exaggerated flair. The role of Mzee Pembe was that of sop. He is hidebound, given to drink, and blissfully ignorant of many of the needs and problems of his 16 children. Mama Njeri, the protagonist, is Mzee Pembe's opposite and his mate. Her children's welfare claims almost her complete attention, and she must "educate" her stubbornly conservative husband in addition. Her dramatic task is to convince him episode-by-episode and change-by-change that it is in the family's interest to embrace some new ways and to let some traditions lapse. She is aided in this domestic struggle by a series of third parties, all of them played by a single versatile actor.

"Zaa Na Uwatunze" was broadcast in Swahili, Kenya's official language, once a week. Broadcasts lasted only 15 minutes each, but they commanded prime-time programming slots (on Sunday afternoons, and occasionally on Saturday nights). No scripts were used to produce the programmes, although health educators worked closely with the actors, and the budget was shoestring by almost any standard. The compensating ingredient for this lack of high-priced production techniques was spontaneity. The radio shows were recorded in studios packed with fans, so the actors played to the audience and used instant feedback to hone and tune their performances. "Zaa Na Uwatunze" was linked to non-formal and formal educational activities for adults. Its episodic structure, characters, and allusions to themes treated in previous broadcasts provided listeners with a sense of continuity and progress. Moreover, the programmes reiterated the themes being taken up by health educators and field workers, some of whom served as consultants to the production staff.

Evaluative information was gathered from four sources: the studio audience, fan mail, a questionnaire distributed at the end of the programme's first broadcast year and two panels of Government officials involved in rural education and development. Interestingly, the judgments of the panels of experts from the technical ministries conflicted with evidence culled from the other sources. Some experts insisted that the programmes should have taken a more serious tone, but the audience claimed to like the blend of message and madness. Highly educated Kenyans appeared least responsive to the programmes, ostensibly because the information woven into the comedy was not "news" to them. Other findings of the survey include the fact that 92 percent of those responding to the questionnaire knew of the programmes, that listening time was as great among those for whom Swahili is a second language as among those for whom it is the native tongue, that radio ownership correlates directly with listenership, and that the programmes seemed to hold roughly equal appeal for all age groups (25 years of age and under, 26 to 50 years, and over 50 years). Given the nature of this broadcast experiment, the single most important conclusion drawn from early evaluations was that somewhat over a third of the listening audience claimed to listen to the programme primarily because it was funny, while over half said they tuned in because they felt that they learned something from the humorous shows.[3]

The impact of the Zaa Na Uwatunze broadcasts has been measured primarily in terms of the size of the listening audience, listeners' recall of health messages and their familiarity with the characters. No attempt was made to study the effects on health practices or the knowledge gains and attitude changes brought about by the programme.

3. Support for Rural Social Services

3.1 Promise and Peril

Consider the following news items from your radio receiver, TV set or local newspaper [4]:

- "In Cairo, Egyptian President Hosni Mubarak recently talked with American businessmen about how they might invest in Egypt. Mubarak was in Cairo, the Americans in hotels in New York, Boston, Minneapolis, Los Angeles and San Francisco. All were linked up for the two-hour meeting through a satellite 'teleconference'."

- "Ever since her teacher took on a new assistant to teach mathematics, Nicaraguan second-grader Isabella Sanchez has loved studying mathematics. The assistant: a radio broadcasting math courses."

- "At the University of Hasamuddin on the island of Sulawesi, science professor Nengah Wirawan recently had a guest speaker tell his class how water hyacinths can be used to ease water pollution. The lecturer spoke from an office 900 miles away at Bogo Agricultural Institute on the island of Java. His talk was beamed by satellite."

These real life news items prove that with the new microchip technology governments can dramatically narrow the information gap between rich and poor countries and between sources of information in the capital city and para-professionals in remote parts of the same country.

If the technical problems and cost of earth stations and dish antennae can be overcome, communication satelites provide easy access to reliable radio, TV, telephone, mirocomputer and microprocessor services for small, isolated communities. These amenities may attract professionals, skilled workers and technicians who are familiar with metropolitan living and conveniences into small, possibly remote communities. Access to these communications means will enhance the attractiveness of these communities and at the same time enhance the growth and development of social services, industry and business in these locations.[5]

3.2 Distance Learning

The pressures to expand and equalize educational opportunities have increased worldwide in recent years. Fuelled in part by the population explosion and in part by the need of nations to prepare their citizens for jobs in ever more complex and inter-dependent societies, planners are seeking not only strategies that will make education available to greater numbers of people, but also forms of education that do not demand the level of investment and administrative support customarily associated with conventional school systems. If education is to meet the needs of different kinds of people, people who for one reason or another may never have attended a school or received any kind of formal instruction, it is clear that alternatives to the highly structured and immobile nature of most school systems must be developed. The interest in life-long learning and distance teaching strategies[6] represents people's desire for opportunities that are sufficiently flexible to accommodate them, no matter what their age, sex, physical location or previous educational experience are.

Therefore, the microchip revolution if seen in terms of radios, TV, microcomputers, word processors and SSB's, provides a mechanism to extend education beyond the school site so that a broader spectrum of people, old as well as young, rural as well as urban, can benefit. They also give an opportunity for sharing educational resources widely. For rural development the emphasis should be on rural skills and functional education necessary to deal with local service needs and rural industries. Since the application of this type of functional education is limited to local conditions it can be seen, under certain conditions, as a way to limit access of the rural populations to that privileged employment which requires certificates and degrees.[7]

2.3 Presentation and Retrieval of Social Information

Unlike traditional roles and social organizations, indigenous knowledge systems are seldom visible to development planners and extension workers. As a consequence, they may be overlooked in terms of their potential role in development programmes. This is so because those with formal education and training believe that their knowledge and skills are superior, and that uneducated and untrained people, by definition, are ignorant and unskilled.[8] This is not only inhuman but also foolish. For example, in the Puebla Project in Mexico, local farmers insisted that their open-pollinated corn varieties would outperform the new hybrid corn seed being introduced from the International Corn and Wheat Research Centre at Chapingo, Mexico. Field tests conducted by farmers and supervised by extension workers showed that the hybrid varieties were indeed inferior. As a result, the agronomists shifted their research attention to improving the yield of open-pollinated corn.[9]

Thus, the documentation, analysis, cross-referencing and dissemination of socio-cultural community profiles such as indigenous knowledge systems, inventory of indigenous institutions and associations, community-based participatory behaviour, traditional communication and decision-making patterns, etc. are essential. Cumulative information on this will help planners and extension workers to monitor changes and modify development and service programmes as "modernization" progresses. Up to recent times, efforts aimed at studying such information and communication systems have been hampered by the inability to manually handle and analyze the great amounts of data necessary to identify and cumulatively process communication structures of relatively large-sized systems. However, recent methodological advances in computerized network analysis now enable researchers to understand many added dimensions of communication structures which were previously hidden.[10]

2.4 Facilitating Modernisation through Support to Extension Service.

Studies of factors which influence individual change done in Argentina, Bangladesh, Chile, India, Israel and Nigeria demonstrate that access to information rank first, along with the school and the factory, as inculcators of individual development in urban areas.[11] Similar studies amongs rural people reveal that mass media, supported by an efficient extension service, play a major role in rural education programmes. Unfortunately, these extension workers do not always have reliable and credible sources of up-to-date information on pressing needs and possible actions or alternatives. Therefore, this technology can revolutionize the transmission and availability of information at the district or village level within easy reach of the development workers.

The isolation of rural health workers makes it very difficult to continue their training or even provide refresher courses. Although there have been efforts to enable field workers to return for refresher courses, it is difficult to efficiently address the whole range of problems which a worker may encounter during the year. The level of education courses through microchip technology can vary tremendously according to the time devoted to preparing materials and to studying in the field. The simplest types of training occur when field workers discuss their problems during one-to-one consultations or in a conference-call situation. This type of training is used extensively in Alaska.[12] Health workers in a particular area are on alert during the daily doctor call when each aide describes cases and the doctor provides diagnostic and prescriptive assistance. Listening in allows each aide to hear varying descriptions of illnesses, to learn ways of describing symptoms, and become aware of possible diagnosis and treatments possible for various symptoms. A more direct approach has been adopted in Guyana. Once a week, a general conference is held during which the physician presents a case which had been referred to Georgetown during the preceding week. The physician presents certain symptoms and quizzes the medics on them, the types of diseases associated with the symptoms, approaches to diagnosis, and the like. This session serves as a major review of specific illnesses and treatments.

2.5 Computer Services

It is possible to combine computers and telecommunications for patient record-keeping. Information on patients is written by medical aides on standardized forms from which data is entered in a computerized file. The file is available at any location in the health system either through a

computer terminal linked to the central computer or on a regularly up-dated microfiche. In addition to providing reliable information, the computer can provide lists of children requiring vaccinations or special attention because of evidence of malnutrition during earlier visits to a health facility.

2.6 Supporting Rural Social Services

The microchip has made communication systems so reliable that now they can assist the development of rural social services and the growth of rural economies. Potential applications of communications for soci-economic development are virtually unlimited. They include:

Health and Nutrition

Rural health workers can obtain advice from physicians and vice versa. Conferencing systems can be used for in-service training and emergency relief activities. Broadcast programmes can instruct in hygiene, nutrition and child care. The most utilized mechanism for consultations is the two-way communication system. The most critical use of this mode connects the rural health practitioners with physicians and nurses in regional or national hospitals. Such contacts are for consultations about patients' conditions for both diagnostic and prescriptive advice, determining whether a patient should be referred to a hospital for treatment, and following upon the condition of the patient either at the hospital or the field location. The need for and importance of this type of communication depend heavily on the medical protocols of the particular project. In Alaska,[13] the Public Health Service holds regular "doctor calls" for rural health aides -- the doctor contacts each health aide daily to provide consultation and to handle administrative

matters. These aides have minimal training (some less than three months) and require skilled outside interventions. In Guyana,[14] the medics (health workers trained by the MEDEX project in Guyana) are generally expected not to consult with the physician by radio except in the case of emergencies requiring referrals to hospitals, or in very difficult diagnosis. MEDEX developed an extensive handbook of medical protocols which indicate what steps they should take in various situations, including emergencies. The MEDEX field staff are not encouraged to call MEDEX headquarters for consultations except in cases falling outside of the protocols. The African Medical and Research Foundation,[15] which incorporates the East African Flying Doctors' Service in East Africa, connects field professionals to each other, to hospitals, to mobile units and to its headquarters via a two-way radio (SSB) system. The radio may also be used to alert doctors who can either fly to the site of the emergency or arrange for airplanes to evacuate the patient. The close ties between radio communications and transportation allow for a flexible and rapid response to various types of medical needs.

Support to Cottage Industry and Small Farmers

Instructional modules developed at a central place could help the cottage industry and extension service systems in extending training programmes to cottage industries and small farming communities. Such package possibly on video discs would provide simple step-by-step instructions to guide the viewers through every phase of an operation, such as overhauling a tractor engine, planting a new maize hybrid or using a herbicide. If the system has a teleconferecing capability the same groups could have access to information available in the data banks of neighbouring countries. Teleconferencing

systems can also provide links with experts to obtain advice on farming problems.

Project Administration and Management

Telephones can be used to co-ordinate logistics in the field, to provide supervision and guidance to field staff, and to gather feedback from rural areas on development projects.

It is probable that the health system's radio network mentioned earlier will be used for more than simple health communications. In the absence of public telecommunications systems or other rural radio networks, there may be increasing pressure to use the system for non-health purposes. Most commonly, messages are relayed either to headquarters or to another field post for passage to the recipient. The first non-health users will be the field practitioners, such as extension workers or teachers, who will use the radio to send reports, ask questions or simply to communicate with other field workers. Other users may include social service agencies which lack their own communication facilities. For instance, in Guyana the Inter-American Development Bank (IDB) uses the MEDEX system extensively for ordering building materials for the construction of new health facilities in rural areas. Messages from IDB are relayed to MEDEX headquarters in Georgetown, where they are telephoned to the IDB staff.

2.7 Strengthening Community Communications System and Organization

The microchip technology may expand opportunities for the public to achieve access to varied and relevant programmes and to have a feedback

mechanism to transmit its reactions and demands to the production organizations. Participation implies a higher level of public involvement in the production process, as well as in the planning and management and use of communication systems.[16]

(a) Access

By definition, access implies the possibility for the public to come closer to communication systems. In concrete terms, it can be related to the two levels of option and feedback.

At the Level of Choice, access includes:

* individual access to communication materials and the ability to listen to or view selected programmes, when and where he or she wants;

* availability of a wider range of materials, chosen by the public instead of imposed by production organizations (informational and educational materials, services and alternative programmes); and

* transmission of materials requested by the public.

At the Level of Feedback, access includes:

* interaction between producers and receivers of messages;

* direct participation by the audience during the transmission of programmes;

* the possibility to comment and criticize, and

* a means of keeping in touch with producers, technocrats, administrators and the managers of communication organizations.

(b) Participation

Participation implies the involvement of the public in production and in the management of communication systems. It also operates at different levels of production, decision-making and planning.

At the Production Level, participation includes:

* unrestricted opportunities for the public (individuals or groups) to produce programmes and to have access to professional help; and

* making available to the public technical facilities and production resources (i.e. a more advanced level of participation.

At the Decision-making Level, participation means involvement of the public in:

* programming (content and duration of programmes, scheduling of programmes);

* management, administration and financing of communication organizations.

At the Planning Level, participation means the opportunity for the public to contribute to:

* the formulation of plans and policies for communication enterprises (definition of objectives, principles of management and future programming); and

* The formulation of regional national, and local communication plans

3. PROBLEMS AND SOURCES OF FAILURES

Although the efficiency of technology components continues to increase and the price to fall, it remains a fact that their full potential for human development programmes in the developing world have yet been realized.

3.1 Political and Economic Restraints

Political restrains stemming from ideological positions are not the only limitations. Traditional hierarchies are also challenged by access and participation. Resistance is likely from influential people and groups such as those with power in the commercial sector or in bureaucratic spheres. These 'leaders' see their status quo threatened by the socio-political implications of access and participation which include an opening up of communication systems to the wider community. The closed doors of media institutions represent the means by which powerful groups retain their elite status.

Although used constructively, microchip technology could transform the lives of millions for the better, it is susceptible to manipulation for narrow, self-interest by the powerful few. It could prove to be a tyranny.

The danger of control by the few for the few underscores a problem now that is not much one of technology, but of how freely it is accessible to the masses.

Of the US $150 million spent on data processing and transmission by electronic means in 1980, less than 5% was spent in the developing countries[17]. Thus, the extraordinary concentration of the information market, unparalleled in any other sector of the world economy, is widening the North-South gap. The few supplying companies gather data in the developing countries, process it in the North, providing economic growth in their data-processing industry, and then resell it to the country of origin.

3.2 Professional Resistance

The process of access and participation calls on information generators to put aside some of their traditional notions of professionalism and to be receptive to a new range of influences from the very people they mean to serve. Much media material is based on a professional assessment of what the nation or community needs for information, education and entertainment. The process of access and participation invites the professional to adopt a responsive approach instead of a promotional or protective one.

3.3 Cost Considerations

The capital cost of bringing microchip technology especially micro-computers and word processors to developing nations and then extending it to remote rural areas is extremely high and therefore beyond the reach of most countries. Operational and software costs are also high and thus expensive for the public and private sectors. In many countries two-way

communications facilities are subsidized by big users of telecommunications users in urban areas through differential pricing to avoid charging rural areas prices commensurate with the high cost of providing rural service. The user, thus, usually pays less than the full costs of the facilities. Unfortunately, this option rarely exists in rural areas of developing countries due to lack of telecommunications facilities, to operational problems or to the traffic congestion common to such systems.This can create a skewed balance in the flow of news, TV programmes, films, magazines, books and other cultural software between rich and poor countries, overwhelmingly poor countries with the models and values of the rich and rendering national and -- in particular -- rural development goals virtually impossible to realise.

Middle income countries already using computers to manage their increasingly complex economies must replace their equipment every five years, solely because supplying companies launch new computer lines that render the previous generations obsolete.

3.4 Power Supplies

Power supplies present continuous technical problems. While the present capital cost of solar panels is higher their use will eventually eliminate the need for expensive fuel and generators.

3.5 Technical Expertise

Technical expertise for installation, maintenance and further development is not available in the developing world, and industrialized countries are adamant on the transfer of such technology at reasonable cost to the countries

which need it most. About 85% of the world supply of computers and computer data is in the hands of 10 western countries. Thus developing countries will be more dependent on outside inputs and therefore vulnerable to manipulation by external forces.

3.6 Software

Microchip technologies require well-trained people to undertake research, maintain and use them efficiently for development. Such expertise is not currently available and it will take a long time before indigenous engineers, programmers and technicians with efficient supporting services are put in place.

3.7 Information Base

There is no adequate information base necessary for maximum utilisation of these technologies. Therefore, the first priority is to establish a mechanism to gather such essential indigenous information.

3.8 Past Failures

Even the simplest technology -- the transistor radio -- has not yet been fully utilised in support of development because the power of mass media in development has been assumed as fact instead of proven. During the 1950s and 1960s, the media was expanding and literacy was becoming more widespread in most developing contries, leading to greater print media exposure. Transistor radios were pentrating every village with a predominantly one-way flow of information from government development sectors to the people. Therefore,

mass media reached large audiences with informative and persuasive messages about details of predetermined development programmes. The importance of people's participation was not seen as an important factor. Therefore, the role of mass media in facilitating behavioral change was merely assumed.

3.9 Cultural and Political Invasion

Microchip technology enables the globalization and transnationalization of the metropolitan modes of production, distribution, exchange and consumption. Simultaneously, metropolitan cultural commodities are produced, distributed, exchanged and consumed in the new microchip countries, invading their indigenous cultures. Studies of attitudes of transnational investors indicate that they consider political stability and disciplined labour forces to be prerequisites for their investments. In addition, the globalization of corporate industry implies transnational values of worldwide production and marketing, based upon a perception of the world as a global village with a global marketplace. From this perspective, national cultural patterns constitute hindrances to be transformed or co-opted, but not to be acknowledged. Hence, these microchip technologies could carry metropolitan values not necessarily relevant to the needs of receivers in other countries. As Marco Ordoñez analyzes for Latin America: "Especially radio and television carry to our societies values that are alien to the real needs. The creation of social myths, false heroes, the overemphasis on entertainment and violence are instruments of alienation and cultural disorientation."[18] The same systems, when threatened, tend to deliberately distort the news because of some suspected overall complicity among the ideological, political and economic establishments in the parent country of the transnational

communication system.[19] Therefore there is a real threat to the national sovereignity of the countries concerned.

3.11 Non-acceptance

New technologies are frequently regarded with scepticism and suspicion particularly by politicians in the developing world. Microship technology may meet with the same scepticism as solar cookers, windmills, bio-gas digesters, etc. encountered. Many rural development experts may find it unjustifiable to spend money on this high technology, which is controlled by outside forces, in countries where costs and unemployment are high and where many basic needs remain unmet.

3.10 Invasion of Privacy

Cable-linked home or office information systems which can control security and climate can also trace the occupants' comings, goings and private matters thus placing an ongoing stream of personal information in outside hands. Whoever keeps this record can then distribute this information on the street corner if he so chooses. Another problem grows with the increasing use of electronic mail, that is, communications in visual text between distant terminals. Such messages enjoy no privacy and anybody who wishes can have access to it. Thus word processors and computer terminals can keep us under surveillance. A supervisor can know how many keystrokes a secretary makes per minute, hour or day. Insensitive companies or governments may use new technology to control workers or citizens. Files can be altered, unauthorized commands can be added to programmes, and legitimate commands misused, often without discovery. Computers are woefully corruptible.

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VITA, AMSAT plan system for "Low-cost satellite to link villages" by Alice Gerlach and Gary Garriott, published in VITA News, April 1983

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