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Satellites for Rural Development

SITE Unseen: Implications for Programming and Policy

by Clifford Block, Dennis R. Foote, and John K. Mayo

*Its technical success illustrates that large-scale
rural applications of satellite broadcasting
are possible; the evaluation of its effectiveness
raises important considerations for future programming.*

Ever since two-way and broadcast communication by satellite to inexpensive terminals became technically and economically feasible, people have been speculating and experimenting with possible applications that take advantage of the particular capabilities of this technology. Initial speculation focused on programs for primary school education, sometimes involving several nations. Subsequent experimental projects concentrated on support of professional activities and continuing education. SITE is the first application to include education of a mass rural population as a major component. Furthermore, it is the first use of satellites for social development on such a large scale.

In this article we consider aspects of the project which may have not been measurable or even visible, but which are important in understanding both the internal dynamics of the project and its implications. We first examine SITE's

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The authors visited the SITE project in July and August, 1976. During that visit they observed activities and conducted interviews at the Indian Space Research Organization (ISRO) in Ahmedabad, the base production facilities in Delhi and Hyderabad, and in six villages in different parts of the country. Their purpose was to assess the SITE experience in terms of its implications for other countries. They are particularly grateful to the following Indian officials who made their visit possible: Professor E.V. Chitnis, Director of SITE; Professor Yash Pal, Director of the Space Applications Center; and Dr. P.V. Krishnamoorthy, Director of Doordarshan, the National Indian Television Service. A more detailed monograph is available from the Bureau for Development Support, A.I.D., Washington, D.C. 20523.



implications for development policy, assessing the project's performance in terms of the feasibility and usefulness of large-scale rural broadcasting by satellite. We then look at what the SITE experience can tell us about producing educational programming for heterogeneous rural communities in developing nations.

The potential of satellite communications is seductive: providing reliable communications for vast numbers living in the most remote and poorest communities could be a key addition to the development equation. Prior to SITE, however, most planners both inside and outside of India were skeptical as to whether such a large-scale enterprise involving daily programming could be managed. There were doubts about whether the on-the-ground hardware would operate after the first malfunctions, whether programs could be broadcast reliably and on schedule, and whether sufficient bureaucratic cooperation could be obtained to carry off a sustained effort.

To those questions, SITE provides very encouraging answers. The system ran at a level of reliability both in hardware and in program delivery which rivals U.S. experience under much easier conditions. Well over 90 percent of the communities received broadcasts of excellent technical quality at any particular time and virtually without exception programs always appeared on schedule.

The scale of SITE remains unprecedented. None of the ATS-6 satellite experiments which preceded SITE—in Alaska, the Pacific, Appalachia, and the Rocky Mountains—had more than 70 satellite reception sites. The more than 2300 reception locations of the SITE network constitute a massive step toward designing systems of sufficient scale to make investment in equipment and programming worthwhile. (Indeed, this pilot project would be large enough to serve the entire population of a number of smaller countries.) In short, the experiment demonstrated most convincingly that the community broadcast satellite can be a reliable technological system for reaching large numbers of widely dispersed and heterogeneous populations.

In terms of SITE's social utility and its impact on rural people, judgments must be considered speculative and tentative at best, given the short duration of

the experiment. SITE was thought of from the beginning as a one-year learning experience in a sequence of activities going from detailed planning studies for a national system, started in 1967, to a nationwide operational system, now targeted for 1981.

It seems clear from the results of the SITE evaluations that the introduction of this one-year supply of information to Indian villages neither transformed them into hotbeds of development, as some had hoped, nor caused the disintegration of Indian rural society, as others had feared. The effects were more particular and subtle, and the village audience proved to be a sturdy and discriminating one.

In addition to effects on the target audience, there were other outcomes related to India's collective achievement in conducting SITE. First, SITE provided the experience that was a prerequisite to mounting a national system—experience for the technical managers, the program producers, and the social scientists who will help to guide future programs. Second, it strengthened Indian confidence, because of the high technical standards that were achieved and the ability of the project's managers to succeed without undue reliance on foreign technical assistance.

Third, it provided a stimulus to India's electronics industry, stemming from the project's commitment to strengthen local capability and experience. One reason the 860 MHz frequency was selected for satellite transmission was that the hardware required for its reception could be designed and fabricated in India. Accordingly, the design of the receiving antenna and the front-end converter was undertaken by the Indian Space Research Organization (ISRO), and the production of both was carried out by the Electronics Corporation of India (ECIL), a government enterprise. While such equipment was not produced on a scale large enough to have made an immediate impact on the Indian electronics industry (SITE's 2400 receivers were part of an annual production of approximately 95,000), its development did provide ECIL engineers with valuable technical experience in the adaptation of standard television sets for rural use. The industry's abilities to meet heavy short-term demand and to reduce unit costs were also enhanced.

Finally, it set India's national television service on an unprecedented course—that of producing a full program service specifically designed to serve its rural citizens.

The success of the technical management of the large-scale SITE satellite can be attributed in large part to the working styles of participating Indian agencies.

The key participants in SITE were: ISRO; Doordarshan, India's National Television Authority; the Indian National Council of Educational Research and Training (NCERT); and NASA. NASA's responsibility was to position and maintain its ATS-6 satellite over India for the one-year experiment. The Indian agencies were responsible for the development and deployment and operation of the ground equipment and for the production, utilization, and evaluation of all television programs.

SITE was characterized by a flexible and responsive management system. The activity was unprecedented and therefore managed to avoid the liabilities of traditional bureaucratic management. Some of the features of the system that help account for its success are discussed below.

The experience and prestige of ISRO, one of India's foremost scientific research organizations, help to explain the unusual management strategies that were implemented for SITE. ISRO's heritage was that of a problem-solving research and development organization, whose patterns of organization and approach were derived from its work on large-scale applied physics and engineering problems. This background infused an R&D character into many SITE-related activities—the entire hardware installation and maintenance system; the classroom television programs on science produced by ISRO; and the general organization of the project, which ISRO coordinated. The goals of the individual projects were well-defined but the means used to achieve them were flexible, placing high priority on "mid-course corrections." This working style stands in marked contrast to that of other, more traditional and bureaucratic government ministries in India and in most other countries of the world.

Day-to-day operations illustrate this working style. All project operations were coordinated by an internal ISRO entity, the SITE Management Board. These operations included development, procurement, deployment, and maintenance of the community receivers and earth stations; design and execution of the research plan; relations with state governments as well as other agencies, both domestic and foreign; and finally, ISRO's own television production activities. The Board, which held daily meetings during the height of the project, was composed of engineers, software and research specialists, and a cadre of professional managers hired to work exclusively on SITE. By all accounts, active policy debates within the Board were the norm and these had a character quite different from the typically hierarchical communication and decision patterns characteristic of most bureaucracies.

Each manager was also accountable for the planning and budgeting of one of SITE's subsystems. Once individual plans and budgets were approved by the Program Manager, the project managers required no additional authorization to conduct their work. This degree of delegated authority was rare within the Indian government, but probably essential to the development and coordination of SITE's subsystems, most of which had never been tried in India. Active monitoring by the project managers was apparently successful insofar as it helped them to identify and find solutions for potential problems before they assumed crisis proportions. SITE's ability to hire experts only for the duration of the project, rather than as life-time civil servants, plus the great flexibility it had within its budget, were without doubt essential to its success.

ISRO and SITE in general also were blessed with the ability to draw from a very large skilled pool of personnel, an advantage not easily replicated elsewhere in the Third World. India, in addition to being a developing nation, is the world's third largest producer of college graduates. It also has a growing industrial sector served by well-established technical training and research institutes, particularly in engineering. Thus, ISRO leaders did not have to invest in the va-

riety of long-term training programs which have accompanied, and delayed, communication projects in other less-developed nations.

While the pool of trained and experienced system planners was relatively small compared to that of communication engineers, the former was of high quality and included some engineers who had received a year or more of training at the Indian School of Management, where both engineering and scientific management techniques are taught on the MIT model. Such individuals were ideal recruits for SITE and they became key actors in the project through their work as project managers. In other areas, such as television production, the pool of experienced personnel was small relative to the need, which contributed to the resulting performance being less even.

ISRO applied its systems management skills impressively. During the pre-broadcast phase of the project, virtually everything from the smallest electronic component to the amount of time required by an equipment deployment team to assemble a village antenna was tested. Less was done on the software side. However, a number of experiments-within-the-experiment were undertaken to evaluate program formats and various production techniques, and an extensive field research program, with a staff of 100, was developed to assess the acceptability and impact of SITE programs at the local level.

The close association between the technical staff and the project management at ISRO led to useful technical solutions to problems encountered in the project.

For example, technical advances were made in the design of one-half inch video equipment, which increased markedly the mobility of television production crews, permitting a greater use of on-site production. A Limited Rebroadcast Van (LRB) incorporating a mobile 15-foot antenna and 100 watt transmitter was developed to expand the flexibility of satellite transmissions.

At the local level, the maintenance effort required to sustain SITE was of major magnitude and central to the project. During the pre-broadcast phase of the project, four towns in each participating state were designated as maintenance centers, and reception villages were then chosen within a 40 kilometer radius of the centers. Each center was responsible for approximately 100 villages and was staffed by a technician equipped with a jeep and a generous supply of spare parts. The success of this intensive maintenance effort has been attributed to the mobility and backup provided the local technicians. Most repairs and adjustments were actually made in the villages. This was usually a simple process because the receivers had been equipped with removable modular circuit cards. The technician merely pulled out the module with the defective part and plugged in a spare. If the repair could not be handled in such fashion, the technician removed the malfunctioning set, leaving a good one in its place.

SITE achieved a high level of technical success through a combination of detailed system planning, rapid adaptability to technical adversity, and an insistence on local responsibility for local problems. The major criterion for success was reliable reception, and this criterion was applied to set design and place-

ment, to investment in an extensive network of repair technicians, and to the support of these technicians with sufficient spare parts. Such an operation could probably not have been devised without the administrative back-up of ISRO which retained control of all technical operations in India.

Although India's experiences provide many insights on how best to manage a large scale communication system, it is important to keep in mind that SITE was an experiment, limited both in time and objectives. Major accommodations and compromises would inevitably have been required were SITE ever to have been expanded or given a permanent institutional identity. At the same time, the infusion of the scientific R&D approach into this social experiment brought management methods and philosophies worthy of emulation.

As a result of the success of these technical accomplishments, uncertainties surrounding future satellite applications stem primarily from questions concerning educational purposes and effectiveness.

As an educational communication project, SITE faced many of the same choices and problems that any attempt to use television programming for rural development would encounter. Certain of those choices were conditioned by the special characteristics of satellite broadcasting. An attractive, if unproved, argument for direct satellite broadcasting to rural areas is that the customary urban orientation of television can be avoided. When a television system begins with service to urban areas and only subsequently expands to cover outlying rural areas, program content invariably reflects urban interests and tastes. This is hardly surprising, since the largest share of the television audience (and the most vocal) customarily remains in the cities, and since program producers generally come from urban backgrounds. A communication satellite makes it technically possible and financially feasible to program for a rural audience initially, without first passing through an urban programming stage. Thus, the opportunity exists to base program judgments on rural needs and, ideally, to establish national television as a predominantly development-oriented medium, provided that an institutional commitment to rural needs exists.

A somewhat countervailing characteristic of satellite broadcasting, however, is that it may accentuate the bias already existing within most countries toward central program design and production. Such a tendency may have been both an advantage and a disadvantage in India. It was an advantage in so far as it facilitated the delivery of certain programs, such as news, to the entire nation simultaneously, helping to bring the country together. It was a disadvantage in that there were limited types of such programs that were universally applicable to all parts of the country. This tension between programs adapted to local conditions and programs capitalizing on mass coverage capability affects all broadcasting activity, but it is most severe for satellite broadcasting. India's solution was a decision to combine national and regional program origination.

India's rural population encompasses an enormous range of ethnic, regional, and linguistic subcultures. Furthermore, there are major regional differences in

agricultural practices and conditions, in levels of economic and educational development, and in local resources. SITE planners responded to such differences by creating three Base Production Centers in different regions of the country. These centers produced local language programs for one or more states. At the regional centers, television production was undertaken with local talent and wherever possible was situated in those geographic areas for which the programs were intended, in order to match the content as closely as possible to local characteristics and needs.

Localization was carried a step further in an important experimental system in the Kheda district of Gujarat state, in the vicinity of ISRO headquarters. There, national programs were supplemented by programs produced especially for the Kheda district by an ISRO studio at Ahmedabad, thereby reaching a much more local and homogenous audience than the coverage from the regional stations. (The comparison is roughly similar to that between a county-wide system and a state-wide network.) This more localized approach made it possible to target the programming more precisely, to time the program content to accommodate local development priorities, to use feedback more effectively, and to generate more integration with local institutions (most notably with a major dairy cooperative). Attendance in this district was consistently high, more than double the national average. In a subsequent national study for India's operational system, the greater degree of localization of the Kheda model was recommended for future implementation.

The programming strategies and their implementation involved a myriad of tactical decisions and constraints, many of which have general applicability.

SITE addressed the problem of regional languages and dialects by selecting several languages for broadcasting. The solution generated its own problems. Because the satellite transmitted only one video channel at a time, the broadcast of different regional programs necessitated scheduling programs at different times for each reception cluster. Attendance suffered in areas where time gaps occurred between the nightly national program from Delhi and the local language broadcasts. In such instances, village viewers either had to sit through programs they could not understand, or leave and return later. Conflicts between particular time slots and a range of local conditions and commitments (e.g., conflicting meal or work hours, cold weather, etc.) were frequent problems associated with SITE's fragmented broadcast schedule.

This scheduling problem will be reduced by having two separate video channels in the planned INSAT system. Another possible solution would be to use multiple soundtracks for different languages on the same program, with language selection switches on the local receivers.

A more fundamental problem on the software side was the lack of precise definitions of what SITE's programs were supposed to accomplish, particularly for the evening community programming. General objectives covered a broad

range of development concerns—agricultural productivity, family planning, health, and nutrition—and programs on all of these themes were produced. However, there were no clear priorities within this range of objectives and no overall strategies to guide the choice of contents and formats. A wide variety of program approaches were eventually developed—some emphasized information, some taught skills, some attempted to change viewer attitudes, and some simply provided entertainment. Producers at the various base production centers were the ones actually responsible for the day-to-day selection of program objectives and content. They, in turn, worked with experts from various government ministries to identify appropriate content in agriculture, health, family planning, etc.

Some content themes did not pertain directly to specific government agencies, but rather to deeply rooted social customs within India, such as the restriction on widow remarriage and the collection of hereditary debts. In such sensitive areas, the producers sometimes worked with social scientists from nearby academic institutions. Since both program objectives and content varied within as well as between localities, considerable fine-tuning of the production process was required to maximize efficacy. However, the pressures of preparing programs to meet the relentless broadcast schedule limited sharply the possibility for such fine-tuning.

SITE's programs placed a priority on innovations deemed useful to small farmers and their families. As the project proceeded, it was found that a large part of the audience was made up of other groups as well, particularly landless laborers and children. In retrospect, different streams of programs directed at specific socio-economic and age groups might have proved an effective programming strategy, but more information concerning viewing patterns and incentives for attracting different segments of the audience would have been necessary for such an approach to succeed.

Two motives for villagers' attendance were assumed: to gain useful information, or to be entertained, either by the programs themselves or by the social occasion created by the community viewing situation. When programming began, SITE managers also became aware of a third motive—sheer curiosity. This turned out to be a powerful audience motivator, particularly in the first two or three months of the experiment.

SITE never really settled on an answer to the question of whether regular or only occasional viewing was desired. Programs were usually "free-standing" and did not build directly on information from previous broadcasts. However, it was soon found that many of the audience members were "regulars" and programs in the future might well be designed to capitalize on this through cumulative instruction.

Had a clearer agreement on SITE's specific social objectives and goals been present among the television producers at the base production units, they might possibly have had more success resolving such issues as (a) whether to promote sustained viewing by a larger audience or to try to attract a smaller, but more homogenous viewing audience; (b) what role to assign entertainment in either of

the above strategies; (c) what other media to employ to supplement television; and (d) how to adjust the program mix once feedback data from the field became available.

SITE's producers were confident that large audiences could have been maintained by the unbridled pursuit of a mass entertainment strategy, emphasizing the romantic and escapist qualities of popular Indian films. They rejected that option and concentrated instead on development themes and on entertainment consisting predominantly of regional music and dance sequences. These entertainment sequences comprised 40 to 50 percent of the programming. Allocations of time between instruction and entertainment did vary some across the various content areas and across the reception zones, as a result of the varying tastes and motivations of individual producers. At this point, there are no data to judge what was the most effective mix of information and entertainment. To provide such an answer would have required more precise effectiveness criteria and the systematic variation of the proportion of instructional versus entertainment sequences.

From discussion with villagers as well as project leaders, it was apparent that viewers often did not know what program they were to receive on a given evening. Lack of information about the broadcast schedule may have discouraged villagers from developing loyalties to particular programs. It also prevented selective viewing by audience members. This, in turn, may have been at least partially responsible for the decline in attendance once the novelty of television wore off.

Group activities at the local level probably would have enhanced and reinforced SITE's impact on the villagers, but such activities were neither planned for nor budgeted on a large scale. Villagers simply viewed SITE programs on their community receivers. Generally, there was no follow-up, there were no listening or discussion groups, and there was no attempt to coordinate the broadcasts with other activities sponsored by Indian development agencies. A small, experimental utilization program was conducted in five villages within each reception cluster, however. In these villages, four programs were selected each month for intensive follow-up. Printed materials were provided along with discussion and demonstration by local leaders. To the extent possible, attempts were also made to make the innovations mentioned in the broadcasts (fertilizers, credit, birth control devices, etc.) more readily available to the villagers. These efforts met with some success. However, it is important to note that the very advantage of satellite broadcasting—its ability to reach mass audiences—tends to make unlikely any efforts at local organization, because of the numbers and diversity of local institutions covered by the satellite signal.

In contrast to the limited amount of formal needs assessment and local follow-up activity associated with SITE, there was extensive monitoring of audience reactions to the programs.

After each evening broadcast, data were collected from a sample of the audience. Villagers were asked to indicate if they had any difficulty seeing or hearing the programs, whether they comprehended the content, and whether they

found the programs interesting and useful. Their responses were compiled into average scores and presented to the producers.

SITE's feedback procedures encountered a number of familiar problems. First, it took almost a month for the data to be collected from the field, summarized, and finally presented to the producers, an intolerable lag considering that the producers were working up to three months ahead of the broadcast schedule. Second, the feedback was too general to provide much practical guidance for producers. It was composed of summary assessments of individual programs (e.g., "on a five-point scale, viewers rated the program '2' in usefulness"), but little interpretation of what aspects of the program viewers found useful or confusing was provided. Lacking precise guidance, it was difficult for SITE producers to take corrective action. As the program proceeded, more informal and flexible feedback procedures were tried, the success of which reportedly depended on the degree of closeness achieved among various groups of producers and feedback specialists.

The complexities SITE's leaders had to grapple with in implementing their programming were accentuated by the experiment's ambitious but somewhat imprecise social goals, which made it extremely difficult to predict or explain its performance. This difficulty in defining specific objectives is not peculiar to communication satellite projects. It is almost inherent in all non-formal education programs designed for such large audiences with such general development goals in mind. The more demonstrably successful projects of recent years, however, have increasingly targeted a few specific objectives—a set of agricultural practices, for example, or certain nutritional or health behaviors.

SITE illustrates the struggle of a national broadcast entity as it adds to its objectives a major mission to support rural people in the practical concerns of life.

Broadcasters rarely have had that responsibility as a part of their training or tradition. Doordarshan was compelled to take a large step in a new direction—quickly. Rather than producing aesthetically creative programming, they were expected to produce educationally clear, and often very simple, programming; rather than programming simply to attract the largest possible audience, they decided to work within the rigid bounds of local entertainment forms; rather than reaching a home audience, they were expected to attract viewers away from their homes to view and absorb programming that was "good for them." And for the first time, social scientists were insisting that the broadcasters had a responsibility for the effects of their programs on village viewers.

The results of this effort to alter the character of the television service were mixed, of course, as they would be with any large mass of programming. Does the average of 80 nightly viewers per village—perhaps 8 percent of each village's population—represent a respectable success? Probably so. As India's experience with rural broadcasting grows, success at reaching and serving rural audiences should also grow, assuming that the commitment to rural educational broadcasting is retained.

The high worldwide visibility of SITE and the unprecedented autonomy of its managers raise questions as to the extent to which this experience can serve

as a model for Third World nations. The experiment's spectacular satellite component and its sponsorship by ISRO, for example, help to explain the virtually unassailable political position its leaders enjoyed. Such a position was apparently undiminished either by Mrs. Gandhi's declaration of the Internal Emergency just 34 days before SITE broadcasts began or by the steady deterioration of U.S.-Indian relations during the life of the experiment.

Indian press coverage was substantial and generally positive throughout the experiment. Perhaps equally important, world awareness of SITE remained high. Such attention, combined with the perceived importance of the experiment to India's international prestige, exerted a strong influence on project personnel and on government leaders to fulfill their respective institutional and political commitments.

During most of SITE, ISRO's leaders reported directly to Mrs. Gandhi. Such an arrangement increased the flexibility and speed with which management decisions could be implemented. ISRO's leaders were also provided an adequate budget as well as broad discretion over its disbursement. Furthermore, they were exempted from many of the administrative restrictions that applied to all other Indian agencies. Equipment procurements, hiring, and travel, for example, could be arranged within a much shorter time than normal procedures would have permitted.

The fact that SITE had an "unslippable" starting date, determined by the availability of NASA's satellite, made the bending of bureaucratic rules both necessary and acceptable, and the "invasion" of established bureaucratic domains somewhat more tolerable than usual. By the same token, the realization that the experiment would run only one year helped to sustain an extraordinary level of commitment and effort by the project staff.

In the final analysis, SITE remains an extremely instructive and pivotal experience, not only for India, but for all other nations interested in the expansion of development communications. The vision that created and guided the experiment was bold and pragmatic. The project was devoted to the installation and maintenance of a sophisticated rural communications system and, thus, program planning and utilization were forced to play a somewhat secondary role to that goal.

SITE has shown that large-scale rural applications of satellite technology are possible. It has demonstrated management strategies and technical considerations for such efforts. It has illuminated a host of issues on programming for a heterogeneous rural audience—issues of scheduling, audience segmentation, localization, integration with local activities, the tension between attracting an audience and providing serious information, and the targeting of objectives.

SITE leaves open the issue of the overall, long-term utility of community television broadcasting as a development tool. It again underlines the fact that utility is determined by the precise uses to which the medium is put. Other nations can now plan with somewhat greater optimism and, at the same time, with much greater realism.