CHAPTER 1

A YOUTH LEADERSHIP PROGRAM FOR AFRICA

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Introduction

This chapter introduces a youth volunteer program for information and communication technologies (ICTs) for communities in Africa. The program, known as the Youth Leadership Program for Information and Communication Technologies and Community Development in Africa (ALPID), derives its impetus from the realization that information gaps and lack of access to existing informatics will further marginalize Africa as we enter the 21st century. The serious dichotomies between urban and rural areas and between formal and informal sectors delineate where the needs are greatest and the likely constituency for this program.

This program will bring together youth from participating countries of Africa, Europe, and North America. We can rely on youth, who are usually agents of change, to act as harbingers of the Information Age, bringing existing and emerging technologies into communities, activities, or sectors where lack of access to information has undermined and constrained development efforts. In connection with this program, the term *community* refers to a group of people residing, working, or associating together in a given location and linked functionally or residentially. Such communities could be residential, occupational, educational, or health-, production-, or service-oriented. In sectors such as health, microenterprises, and environmental management, information can contribute to optimal outcomes, and the program we articulate below pays special attention to these areas of great importance to Africa.

Underlying principles

Our proposal is based on the following fundamental principles:

- That youth have been critical to the propagation of community knowledge and have a big influence on their parents and other adults in their communities;

- That through youth-to-youth and youth-to-community education prog-
rams, the youth have (even at a tender age) succeeded in helping to
improve the quality of life in Africa where others have failed;

- That status and other problems tend to constrain adult-to-adult education
programs, whereas youth-to-adult education programs do not have such
problems;

- That the youth have shown leadership in acquiring the skills needed to
use ICTs and that most adults are already learning these skills from
young members of the community (we need to structure and organize
this transfer of skills at the community level);

- That the youth, as agents of ICTs, would have a unique opportunity to
give back to society a bit of what society has given them in terms of
their care and education;

- That most youth in Africa have been systematically alienated from their
communities through education and that through such community-based
programs they can be reintegrated into their communities and be given
an opportunity to engage in community development;

- That for community-based programs to succeed, they must recognize,
respect, and reciprocate with community systems of knowledge, power,
and production;

- That the national youth service programs of various governments have
laid the foundations for the integration of the youth into their communi-
ties and that a youth-to-community education program for information-
technology (IT) literacy would add a greater value to the role of youth
in community development; and

- That "information poverty" is at the core of Africa's slow recovery and
stagnation and that equipping youth with IT skills and proper method-
ologies to transfer such skills to adults involved in production and ser-
vices can go a long way toward spearheading Africa's entry into the
global information society.

Objectives of the program

The main objective of the program is to use skilled youth volunteers to train and popularize the use and absorption of ICTs in various producer, service, and administrative communities in Africa. We will attain this objective by placing the youth at the centre of this development process.

Specific objectives

The project seeks to achieve the following:

- To enable communities to improve their capacity for decision-making on development issues by increasing their capacity to use the new ICTs;

- To enable the youth to participate in community development;

- To provide an opportunity for communities to use the new ICTs to upgrade their indigenous systems and knowledge in the areas of health and production;

- To provide an opportunity for communities to use the new ICTs to upgrade their traditional information systems and networks; and

- To create information packages and databases of indigenous knowledge and systems of production, environmental management, and indigenous technologies.

The problematique and its justification

The conventional view of knowledge transfer is that knowledge is best transferred from adults to youth or from adults to adults. Even liberal educators who attempt to use participatory, or Socratic, methods of learning have jealously guarded the elderly image of the teacher. Even in peer tutoring, older or smarter youths have been used as substitutes for teachers. Only in evangelical preaching have youth been easily accepted as capable of transferring their knowledge without impersonating their elders. But even here, youth who preach are assumed to be gifted.

Societal prejudices have sustained these conservative views on the capabilities of youth. In most communities, young people are assumed to be unsure of

what they want, short-tempered, lacking in coping skills, immature, restless, un-settled, and unable to handle stress. Because of these prejudices, youth have not been given more responsibility or a chance to use their potential to the maximum.

These prejudices have had dire consequences for development processes in Africa. Elders who have maintained their right to be educators have been unable to update themselves in various areas. Most of their views and skills have remained static. The youth, on the contrary, have been acquiring knowledge and skills that they have had difficulty transferring to their elders and their communities. As a result, communities have failed to be transformed by the educational systems and institutions around them. The youth have been relevant to all other institutions except their communities.

A related problem is that of mutual irrelevance. Because adult skills have remained static, they have become irrelevant to the youth, and the youth have acquired some new and dynamic skills that their communities have not completely internalized, because these skills have remained in the youth sectors of society. This mutual irrelevance has widened the divide between the modern sectors and the indigenous sectors and slowed the processes of mutual enrichment. For this reason, education has continued to benefit more and more people in the modern sectors while the so-called traditional sectors have fallen further and further behind. In the past two decades, however, the myth of adult monopoly over knowledge and the mechanisms of its transfer has been shattered. Youth-to-youth schools have sprung up in Angola, Benin, Botswana, Burkina Faso, Cameroon, the Congo (Kinshasa), Ghana, Kenya, Lesotho, Liberia, Malawi, Niger, Nigeria, Rwanda, Senegal, Sierra Leone, South Africa, Tanzania, Togo, Zambia, and Zimbabwe.

Youth volunteers, working with the help of teachers and other specialists, have become very effective in the areas of health, nutrition, safety, sanitation, and environmental management. In Zambia, for example, the youth have helped to popularize immunization for polio, measles, diphtheria, TB, etc. Using songs and poems composed by young people, the youth have easily changed other youths' and the community's attitudes toward immunization (Otaala 1986[1]). In Botswana, Zambia, and Zimbabwe, youth have spearheaded community programs on clean water and sanitation, good diets and nutrition, and the prevention of diarrhea. They use songs and demonstrations, plays, dramas, paintings, drawings, games, etc. In Botswana, one also sees youth-to-youth programs on safety and survival, covering, for example, road signs, road crossing, and first-aid techniques.

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[1] Otaala, B. 1986. Child to child in southern Africa: a report of an international workshop held in Gaborone, Botswana, 25–29 August 1986.

In many African countries, youth-to-youth programs have developed into youth-to-community programs. In Kenya, the African Medical Relief Foundation started a pilot youth-to-youth education program in Nakuru District after people realized that the elders were going to be ineffective in health education: the health habits of the elders were already static, and the elders would not be excessively reliable in delivering health education. Initially, in 1986, the project covered 35 primary schools.

After only 3 years, a few changes were noted. First, the number of children going to clinics for the treatment of stomach upsets, parasitic infections, and similar ailments decreased by 60%, and generally the rate of pupil illness declined by 65%. Second, before the program, very few people cared about children's hygiene. Most parents left it to the teachers and vice versa. After the program was launched, parents and teachers formed voluntary groups to repair toilets and maintain cleanliness. Third, and most important, the villagers began organizing themselves to dig pit latrines for each other, at the initiative of the youth, and when the children started earning a little money making nurseries and selling seedlings, the adults also began setting up nurseries for commercial purposes (Kinunda 1989). This is one of the many examples of how the youth have contributed to community development in Africa. Although in most countries youth-to-youth and youth-to-community programs only started in the mid-1980s, they have had a big impact on communities (Howes 1988; Tay 1989). ALPID will seek to build on the excellent work of the youth in these earlier programs.

Critical areas and needs in community development

The urban and rural poor in Africa stand a high chance of becoming even poorer if they are unable to gain access to the new ICT-driven sources of information. The causes of poverty are multiple. Africa as a continent is, in a sense, not poor, as it has a rich variety of natural resources. What is lacking are the skills to turn these resources into wealth. Therefore, at the heart of Africa's development problem is a lack of dynamic and relevant skills and the information needed to put the available skills to optimum productive use. Critical needs that ALPID can immediately address are outlined below.

Understanding the causes of stagnation in Africa

The typical poor person in Africa is not devoid of resources, such as land or assets for use in production and distribution. Most of the poor individuals and communities in Africa lack knowledge of how to better use their natural resources, add

value to their primary products, create commodities out of their materials, attract consumers from within and outside the community, etc. Most African communities, whether rural or urban, have a distance problem. Some industrial estates located in big cities are unreachable because of bad roads, personal security problems, etc. In some cases, industrial operators have had to build roads and small bridges to make their estates reachable. The rural areas are mainly accessible only by footpath and canoe. Transfer of commodities and products to and from such areas depends on human, animal, and bicycle portage. This creates a distance penalty. Anybody who wants to help reduce poverty in such areas must have a clear understanding of the role of communication infrastructure and the potential for telecommunication and information systems to reduce this distance penalty.

One also needs to see how to use existing telecommunication infrastructure to improve access to information on health, social services, environmental management, and industrial production and services. In the majority of cases, people still make only social use of telephones, where these are available. More often than not, they use telephones to reduce their need to physically go and see someone, rather than for accessing information on social services, production, distribution, or governance. ALPID will address the need for communities to change their outlook on ICTs.

Empowering individuals and communities to help themselves

Education, health, and extension services have so far clung to classroom settings, dependent as they are on space, human resources, materials, etc. Health services have made the ill the "object," not the "subject," of health support systems. And, in industry and agriculture, extension services have had to depend on scarce extension officers, who are mostly not even eager to remain in certain areas. As the public service shrinks, moreover, it may either fail to reach the majority of producers or come to a complete standstill.

ICTs can help fill the widening gap between emerging needs and available resources. With a single, simple communication and information centre (CIC), many producers — unreached or unreachable by extension officers — can access information at a low cost. Those who cannot reach doctors for medical advice can easily access information to decide whether, when, and where to see a medical practitioner. Most important is that existing educational systems, social services, and extension support structures fail to address all the information and skills needs of various communities. CICs, if properly equipped, can provide for the needs of individuals and communities and widen their choices and opportunities.

Managing the cultural dimensions of information domains

Communication problems in the delivery of social services, health services, and conscientization[2] programs have not received due attention. In the treatment of bilharzia, diabetes, and similar diseases, medical personnel have had immense problems getting people to bring stool or urine samples in for examination. More serious problems have surfaced in dealing with issues of sexuality and sexual behaviour. For most people, such things belong to a private information domain. Public-health information campaigns on TB and AIDS have achieved mixed results. The success of these programs depends, in many cases, on the extent to which program workers understand the divide between private and public information in African communities, particularly rural communities.

What is clear is that the private information domain is wider than the public one in many African communities. If one asks a typical African parent directly how many children he or she has, the answer may not be instantaneous. If asked how many children have died in the family, she or he may give no answer. Similarly, a typical African business person will not instantaneously answer questions about volumes of production, amounts of money, or rates of loss.

Indigenous communication packages have a lot of rites, rituals, fictions, and taboos. Communication mechanisms are songs, poems, jokes, stories, riddles, jests, etc., most of which are indirect. People using modern mass media have tried to incorporate songs, poems, and other such mechanisms into the delivery of messages, but in most cases these efforts have failed because of the mass nature of these media. In training, one should carefully ensure that information is packaged to take account of the various status systems based on age, gender, rank, title, etc. Putting women of all ages together and showing them a video may fail to convey information because this strategy fails to account for the fact that the information needs of certain groups may be private or different. Similarly, enrolling young and old people together in a class and giving them a course or showing them a video on issues of sexuality or reproductive duties and responsibilities may cause problems in many African communities.

The new ICTs carry great potential to bridge the existing information gaps. Community-based telecentres can give individuals the privacy they need to access information systems and databases. Health information systems can also be designed to help people who believe that their health is very private to access information on the symptoms of various diseases, on ways to cope with these symptoms, and on when to seek medical advice or treatment.

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[2] An ongoing process by which a learner moves toward critical consciousness.

Packaging and repackaging information

Africa is currently a net consumer of information packaged by other societies. Although access to such information packages may help improve productivity, we also need to package our own relevant information on indigenous systems of production and services and make it accessible to African entrepreneurs and other producers. We must develop local-area networks (LANs) and local databases on trading, manufacturing, ecology, environmental management, health facilities, etc.

We also need to disaggregate information needs by social group. Conventional mass and social media, extension services, etc., have traditionally marginalized women and their areas of specialization in agriculture, small-scale production, and trading. In rural production, most of the available information and extension support systems have focused on cash crops and livestock. They have neglected food crops and small farm animals, which are the domains of most rural women and have remained an exotic interest of some gender-conscious researchers or those doing food-security research. These areas have not had enough extension or other support. Extension officers are simply not equipped to serve such producers. Organized information databases are urgently needed to provide people in marginalized areas with information on agriculture, aquaculture, and silviculture. Retraining programs are needed for extension officers to enable them to reach out to marginalized people and focus on their activities.

In industrial production, an exchange of information on local and international markets, import and export regulations, and quality-control techniques is needed. An exchange of information would also help develop local-area trade networks on inventory and procurement systems to promote intersectoral linkages between firms of various size and specializations. ALPID will seek to build this capability, determine the relevant needs (through baseline surveys on various activities), and develop appropriate information packages to meet those needs.

Creating an information society in Africa

Africa's indigenous information systems and networks are rapidly disappearing. Rapid urbanization and destruction of rural systems of production, coupled with the skills drain from rural to urban areas, have substantially contributed to the ossification of indigenous information systems that originally developed inside indigenous production systems and services, ecological and environmental management, and religious beliefs. Myths, rituals, rites, totems, taboos, songs, drama, art, etc., are the major means of information packaging and communication in

indigenous knowledge systems. As the social, political, and ecological bases of these systems disappear, so too do the systems. ALPID will seek to build on what remains of these systems to create a wider and richer information and communication culture. ALPID will enable African communities to borrow from others to strengthen themselves as members of the global information society.

Priority areas for intervention

To have the maximum impact, the program will concentrate on providing support in three main areas: health; small and medium-sized enterprises (SMEs); and land use and environmental management (including research on indigenous systems of production and biotechnology).

Health

The health system in Africa is at crossroads. In the early 1970s, most countries on the continent modernized their health sectors, setting up rural and urban clinics, health centres, and even mobile clinics. African countries made medical facilities available and increased the number of hospital beds.

During the economic crisis, which became more acute in the early 1980s, these facilities began to deteriorate. Clinics were empty for lack of medicine; there were too few beds; and sterilization facilities were inadequate. Health centres began turning into death centres. In some cases, diseases such as yellow fever, cholera, leprosy, smallpox, measles, and tuberculosis, which everyone thought were on the decline, began to resurface. New deadly diseases, such as Lassa fever, Ebola, and meningitis, also began to surface, with serious consequences. Some of these diseases broke out in areas with poor sanitation and high concentrations of population, such as slums, illegal mining areas, refugee camps, and collectives.

In the background of all these developments was the return to superstition, insecurity, and fear and distrust of conventional medicine. The number of traditional healers, herbalists, and fortune-tellers increased in both rural and urban areas. Health-care delivery systems failed to adjust to these developments. Public-health programs continued to rely on "visual literacy" (Western forms of literacy), ignoring African oral traditions and systems of "audio" (informal, person-to-person) communication. Health campaigns that rely on visual literacy seem to imply a power relationship, which has made them less effective. They are seen as propaganda, owing to the assumed superiority of the demonstrator or teacher. This

power relationship creates a distance between the teacher and the learner. The impact of "physical vision" (what people see and touch) in all public communications is reduced by the failure to capture "mental vision" (what people think).

In African culture, mental vision develops through personal contact. In public-health education, for example, home visits that start with greetings and conversation and end with counseling are more effective than public meetings. Oral and audio communication is very effective, both in health education and in healing, because it takes place in a narrow space; puts the learner, patient, or client at the centre; allows the learner to listen to his or her own voice and the voice of others; and permits the learner to construct, reconstruct, and deconstruct mental visions of the problem and the solution.

ALPID should build on this culture. Without playing down the importance of physical vision in health services, the program will seek to use the new ICTs to entrench the oral and audio tradition. At community telecentres, ALPID will provide information packages on sickle-cell anemia, TB, sexually transmitted diseases, HIV, hypertensive diseases, and so on. Although medicine has advanced and there are better ways of handling these diseases, information is lacking. The program will also provide information packages on dietary patterns, sanitation, hygiene, maternal and child health care, etc. Then, through home visits and other community-based interactions, the youth volunteers will attempt to change the communities' attitude toward the use, diffusion, and absorption of this health information. Once trust is established in the CICs, these centres will likely be more effective at transferring knowledge than public-health meetings are, for the following reasons:

- Public-health meetings usually occur only occasionally and take place at inconvenient times for some people. CICs will provide people with more choices and flexibility.

- Public-health meetings take a "closed-menu" approach and fail to provide enough options to solve each of the problems encountered by individuals and communities. CICs will take a "boutique" approach, with a choice of packages for individuals or groups to use whenever they prefer.

- Traditional public-health education systems take a "custodial" approach and target people in clinics who are either already ill or about to go into

"medical custody." CICs will adapt a "horticultural" approach, targeting individuals and their needs whether they are ill or not.

- Conventional systems of public-health education ignore how wide the private information domain is in African culture. CICs will provide private spaces and increase and protect the private information domains of people in the community, regardless of gender, age, or status.

- CICs will build on traditional methods of healing and diagnosis, which are based on communication between humans and invisible forces, and will build on the traditional oral means of communication. These fill the gaps left by physical vision, which has failed to create effective mental vision or to reduce fear, distrust, and superstition.

To ensure compliance with medical ethics, medical specialists should accompany youth volunteers.

CICs will provide information packages on the following topics (among others):

- Common diseases and child and maternal health care;

- Dietary patterns;

- Oral health;

- Counseling for the elderly and for those who are mentally or physically disadvantaged;

- Stress, stress management, and abuse of drugs, alcohol, and other addictive substances; and

- Fertility and sex education.

To maximize the benefits of these kinds of activity, ALPID will target only closed communities, such as plantations or farming estates. Such locations have common stop shops or meeting places to use as information centres. A majority of the working people have no serious after-hours activities and could therefore spend

most of their leisure time at the information centres if they found the information useful and relevant to their needs and problems.

Small and medium-sized enterprises

In the past decade, many SMEs in Kenya, Nigeria, Tanzania, and Uganda have established subcontracting and related linkages with firms from East and South-east Asia. These initiatives have led to significant production and technological changes. However, the SMEs still lack information on choices of suppliers for technology and technology goods, on quality control, on raw materials, on markets, etc. If they had such information, they could increase their contribution to the economic growth of the region.

SMEs, especially those in the engineering sector, have contributed substantially to the development of Africa. In some of the poorest countries on the continent, SMEs are the prime movers of industrial activity. Between 1962 and 1980, for example, Rwanda established about 220 small enterprises (GOR 1994). These have, to date, remained the most prominent feature of industrial activity in Rwanda. Mali had no industrial base in 1965, when it achieved independence. By 1985, it had 118 600 small enterprises, mostly in the rural areas (Capt 1992).

SMEs have played a significant role in poverty alleviation. But in Kenya, Nigeria, Tanzania, and Uganda, SMEs have gone beyond poverty alleviation: they have contributed substantially to employment, local skills formation, the supply of local demand, import substitution, and export promotion and have strengthened local entrepreneurship (ATP 1992; GOT 1993; Oyelaran-Oyeyinka 1996). SMEs' share of engineering-product sales averaged 21% in Tanzania and Uganda before trade liberalization and 30% after; and 10% in Kenya and Nigeria before and 15% after.

The broad categories of SMEs can be broken down into six major specializations: foundries and forges, metal fabrication, vehicle assembly and automotive components, electrical and electronic components, construction materials, and end-item assembly. SMEs operate under serious information constraints. They lack information on technology suppliers, raw-materials suppliers, markets for their products, import and export regulations, local and international demand characteristics, etc. To support the information needs of SMEs, ALPID will seek to establish the following:

- *Local-area trade networks* — Local-area databases built within LANs on production systems, order and payment procedures, volumes of

production, materials, specialized products, inventory structures, etc., will be established to strengthen production management, scheduling, and quality control; to establish linkages with large-scale firms; and to reduce warehouse costs.

- *Electronic data-interchange linkages* — Links with other producers through electronic data interchanges would improve the capacity of SMEs to choose among various technology systems and suppliers and acquire new skills related to core chores, design processes, and quality-control techniques. Current links with Chinese, Korean, Malaysian, and Taiwanese firms could improve engineering capabilities.

- *Internet and e-mail links* — SMEs need online links with technology emitters such as technology laboratories, technology parks, and technology incubators (innovation laboratories); consultancy firms; advisory centres; markets; technology suppliers; and national, regional, and international research-and-development institutions.

The biggest advantage of SMEs, whether rural or urban, is that they tend to be located in the same area. To create economies of scale, they also tend to cluster themselves by specialization. Foundries and metal fabricators, for example, are likely to cluster together, which makes it easy to establish a single CIC in one industrial complex, install ICTs, and allow access at a reasonable cost.

Land use and environmental management (including indigenous systems of production and biotechnology)

Most of the research on biotechnology has not successfully filtered into policy and production in Africa. The International Institute of Tropical Agriculture, in Nigeria, the International Livestock Research Institute, in Ethiopia and Kenya, the International Centre for Insect Physiology and Ecology, in Kenya, and the Southern African Centre for Cooperation in Agricultural and Natural Resources Research and Training, in Botswana, have all funded biotechnology research on tissue culture, embryo–ovule culture, embryo genesis, genetic improvement of tubers, gene-mapping, biofertilizers, biocides, etc. But most of the research findings have been inadequately disseminated. The same is true of most research conducted by national research institutes in Africa. Their findings need to be organized in databases.

Africa's grasslands, forests, marshes, and oceans hold precious herbs, spices, fruits, oils, resins, dyes, gums, fibres, and medicinal organisms. These resources have been wantonly harvested and exported to foreign countries for small amounts of money, and many species are now near extinction. Several nongovernmental organizations (NGOs) and research institutes have conducted research on the plunder of Africa's biodiversity, but their findings have not influenced environmental or trade policies. These findings also need to be organized in databases and made accessible to producers and policymakers. ALPID will give first priority to linking up with research institutions in environmental studies and establishing databases on available findings. It will seek to establish local-area databases and promote ICT links between researchers and policymakers.

In environmental management, the program will seek to team up with associations of small, informal-sector operators; vocational training institutions; and voluntary organizations involved in employment generation, poverty alleviation, and small-enterprise development. In collaboration with these partners, ALPID will design information packages and video and computer training programs to inculcate a culture of environmentally friendly production methods and services. It will develop databases on comparative practices, regulations, and management systems to promote awareness of import regulations pertaining to environmental standards, eco-scanning systems, and eco-labels in the management of international trade. ALPID will take the lead in developing such databases and designing training packages and materials but will not be involved in training activities.

ALPID's target countries

The program will be implemented in four countries of sub-Saharan African (SSA): In East Africa, Kenya, Tanzania, and Uganda have been tentatively selected; in West Africa, Nigeria has been. But the list can be expanded if resources allow.

The following criteria were used in selecting and ranking the countries:

- *Telecommunications infrastructure* — The average teledensity in SSA is 0.46 lines per 100 inhabitants. With the exception of Tanzania, all the countries listed above have a reasonably high teledensity.

- *Telecommunication and information policy* — These countries either have an explicit telecommunications policy (Nigeria and Uganda) or are in the process of formulating one (Kenya and Tanzania). Most of these

policies include or are likely to include guidelines on ownership and control of telecommunications; supply of Internet and e-mail services; deregulation of telecommunications-equipment, computer-hardware, and computer-software imports and of sky-based information networks; tax regimes on information and communication systems; and participation in various recently launched cable and satellite systems.

- *Good experience in youth-to-community education* — Most of these countries have had successful youth community-service programs. Kenya, Nigeria, and Tanzania have national youth service programs, which, through internship and attachment, have strengthened the integration of youth into their communities. Some of the most successful youth-to-community programs in Africa have been in the four target countries.

- *Organizational networks in the areas of health and small business* — In these four countries, the organizational infrastructure for health groups (including societies for the disabled, substance abusers, children, and the elderly), producer organizations, small-business associations, etc. is very highly developed and has been on the ground for a long time

The process

Target group

Youth 20–25 years old, with a college degree (or equivalent) in a discipline relevant to ALPID, will be given the opportunity to spearhead the program. ALPID will involve youth from Africa, Europe, and North America who are selected on the basis of their commitment to community development. Through training, the program will equip them with skills to use ICTs, expose them to an appropriate view of community-based development, and inculcate in them the relevant vision and values. ALPID will give these youth an opportunity to build on existing community systems of information, communication, and education to promote the acquisition, use, and diffusion of the new ICTs. Through the program, the youth will be better integrated into their communities.

Execution of the program

ALPID will be executed in collaboration with local NGOs that have a community-based development orientation. The participating NGOs will be selected on the basis of the following criteria:

- Their experience in training youth for community development;

- Their experience in managing youth development programs;

- Their experience in managing youth-to-youth and youth-to-adult education programs; and

- Their projected budget and systems of accountability.

Youth exchange programs

Under the program, youths from one country will have an opportunity to visit youths in other countries to share experiences. European and North American youths will get an opportunity to participate in program activities in the four countries for 3 months every year. African youths will also have an opportunity to visit information centres in Europe and North America for 1 month every year.

Training strategies

The training program will train trainers (the youth) for 1 month, and these trainers will then train various actors in the community, upgrading these actors' information skills or enabling them to use the new ICTs. The preliminary activities of the program will include the following:

- *Selection of community-oriented youth* — ALPID will place advertisements in youth-oriented media, inviting people 20–25 years old to apply for the program. It will select 10 youths in each country and give them 1 month of intensive training and preparation at selected sites in producer, farming, and residential communities.

- *Identification of communities and institutions to link up with* — The program will identify which communities come close to its objectives and which youth would be suitable for such communities.

Table 1. Schedule of ALPID activities.

Activities	1997	1998	1999	2000
1. Selecting CBOs to work with	Dec	—	—	—
2. Establishing management and administrative structure	Dec	—	—	—
3. Selecting volunteers	Dec	Oct	Oct	—
4. Training volunteers	—	Jan	Jan	Jan
5. Deploying volunteers	—	Feb	Feb	Feb
6. Assessing community needs	—	Feb	—	—
7. Identifying target groups	—	Feb	—	—
8. Developing LANs and developing or updating databases	—	Mar–Dec	Feb–Dec	Feb–Dec
9. Experimenting with information-delivery mechanisms	—	Jul	Jul	Jul
10. Training community members on the use of ICTs	—	Jul–Dec	Jul–Dec	Jul–Dec
11. Setting up backup systems	—	Dec	Jan	—
12. Monitoring and evaluating	—	Dec	Dec	
13. Reporting	—	Jun and Dec	Jun and Dec	Jun and Dec

Source: Based on workshop deliberations.
Note: ALPID, Youth Leadership Program for Information and Communication
Technologies and Community Development in Africa; CBO, community-based organization;
ICTs, information and communication technologies; LAN, local-area network.

Activities

ALPID will carry out some of the activities outlined below, such as setting up management structures and target groups and assessing community needs, early in the project. The remaining activities will be ongoing throughout program execution (for a schedule of activities, see Table 1):

- *Setting up a management and administrative structure* — It is envisaged that the program will be implemented by an essentially pan-African youth volunteer group, although ALPID will also admit young volunteers from other countries, such as Canada, for up to 3 months. ALPID will admit, train, and assign the African volunteers to community organizations for 12 months. An overlap of intakes will allow

volunteers already in the program to train new ones for at least 1 month. The volunteers will be given a subsistence allowance and pocket money to live and work in the communities for the period of attachment. The ALPID Secretariat will design and put into operation a management system to operationalize the program. In every country, a small project-implementation committee will be set up to help the Secretariat mobilize local resources and government support and to give direction.

- *Assessing community needs and identifying local resources* — Having selected the communities, ALPID will assess their information needs, together with their levels of communication and information literacy. It will then identify resource persons within the communities to act as opinion leaders or those capable of influencing the absorption of the program. ALPID will assess local facilities and their potential to use ICTs, as well as assessing community attitudes, knowledge, and outlooks of traditional and new media.

- *Identifying target groups and designing information packages and databases* — Given the pluralistic nature of most of the communities in the target countries, ALPID will have to break down groups on the basis of their needs and levels of literacy. In the areas of health and SMEs, a clustering of groups and subgroups will make training and the meeting of needs easier. Data banks of environmental research will be established in close cooperation with research institutions.

- *Developing databases and LANs* — In some research organizations, databases and LANs already exist, such as PADIS (Pan African Documentation and Information System), AGRIS (Agricultural Information System), and the gene bank in Arusha. The ALPID Secretariat will ensure that the youth leadership program is linked to these programs. Developing databases and LANs will be one of the most tedious and demanding of activities. With the needs identified, baseline surveys will be undertaken to establish local databases on trade and investment patterns and on research findings that have so far been inadequately used. The youth volunteers will have to establish their own websites and as much as possible build in information that is relevant to health, SMEs, and the environment. However, in all cases, efforts

will be made to tap local knowledge and build it into emerging infor-
mation systems and packages.

- *Upgrading databases* — Updating the databases will be a continuous
  activity, calculated to keep the information current and relevant.

- *Experimenting with and selecting information-delivery mechanisms* —
  The nature and type of target groups will inevitably influence the choice
  of mechanisms and technologies to use in the various community-based
  information centres. Needs are not likely to be uniform, and the special
  needs of disabled people will also have to be taken into account. In
  fact, care will be taken to meet their audio and visual needs.

- *Training community members on the use of ICTs* — Activities will be
  launched to train the youths to use various ICTs. Some of the tech-
  nologies will be visual, and some will be audio. In both cases, training
  on how to access information and interpret it will be crucial. The
  youths will have to develop an appropriate attitude toward adult educa-
  tion, and strict discipline will be encouraged.

- *Setting up backup systems* — To ensure continuity, ALPID will set up
  management, administrative, and technical backup systems.

- *Monitoring and evaluating* — The ALPID Secretariat will design
  mechanisms for monitoring and evaluating the program. The regular
  monitoring will aim at identifying the achievements and maximizing
  their impacts, as well as identifying obstacles and eliminating them.
  Capacity-building will be measured constantly, and the ALPID Secretar-
  iat will design evaluation mechanisms to adequately involve the volun-
  teers and the communities.

Conditions for program sustainability

A few factors will be very important to ALPID's success. Some of these are out-
lined below:

- *Policy support for ICTs* — Government support for the acquisition and
  use of ICTs will be crucial to ALPID's success. Such support would
  include deregulation, lower taxes on ICT imports, and permission to use

public institutions, such as hospitals, community halls, and schools, to house the CICs. In some countries, the youth and the state have had very antagonistic relations, and the use of youth in community develop- ment is viewed as an obstacle. In all these cases, continuous govern- mental support for the program is essential.

- *Modification of attitudes and perceptions* — Many public-education officials are hooked on physical vision. This has to change to a reliance on mental vision, which can be better provided using ICTs. In addition, most people have to learn to appreciate the production value, rather than the status, of ICTs.

- *Building on community needs and strengths* — Constant needs assess- ment is the key to success. Information systems based on the exotic dreams of volunteers or the marketing needs of suppliers cannot remain in demand for long. The needs of the communities have to be at the centre of the program.

- *Adequate feedback mechanisms* — Regular feedback meetings will be needed to keep the interest of all stakeholders (that is, communities, community-based organizations, and relevant government departments). These meetings could be supplemented with quarterly activity reports.

- *Regular, sufficient, and timely financing* — Realistic budgets, timely financing, adequate bookkeeping, and a system of reasonably priced user charges are needed to ensure the sustainability of the CICs. A long-term objective should be to make the centres self-financing.

- *Adequate management and effective accountability* — An understanding of the problems involved in voluntary services and organizations is also essential. Management, human-resources development, and motivation strategies will be needed to keep the volunteers committed to the pro- gram and make them see themselves as part of it and to ensure that the communities do not feel like guinea pigs. Systems of accountability to the communities, actors, funders, and government bodies should be designed to ensure that the support for the program grows.

- *Equal partnership between actors and counterparts* — It is hoped that local NGOs and other organizations involved in health, youth education, and production will be very enthusiastic about teaming up with ALPID and the actors involved in the program. This enthusiasm may fade if these organizations are relegated to subsidiary roles in the process. The program should ensure that close, constant, and mutual coordination and consultation are part of its operating norms and culture. Coordinating and consultation committees should be formed in the communities and relied on to ensure that program activities conform throughout to the principles of equality and partnership.

- *Adjustment of program strategies* — Through constant monitoring and regular evaluation, the program will recognize changing needs and adjust its strategies, after consultation between the relevant actors and their program counterparts.

- *Systematic and progressive commercialization* — In the areas of SMEs and environmental research, the program should progressively design a system to commercialize access to, and use of, this information. During the second year, ALPID should carry out a market survey to determine whether the demand for information would be adequate to meet a substantial portion of the costs in the short run and all of the costs in the long run.

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CHAPTER 2

TECHNICAL FEASIBILITY OF IMPLEMENTING ALPID

Muriuki Mureithi

Introduction

The Youth Leadership Program for Information and Communication Technologies and Community Development in Africa (ALPID) is an initiative of the International Development Research Centre (IDRC). The program will target small and medium-sized enterprises (SMEs) at the threshold of excellence in terms of product quality, product standards, market orientation, and export promotion. ALPID will also target rural communities with limited information sources, with a view to helping them acquire information for health, hygiene, and responsible community living. In addition, ALPID will mobilize information resources generated through local research on indigenous systems of production, biotechnology, and environment management; identify potential end-users of this information; and disseminate, popularize, and, in the long term, commercialize such information.

The main challenge for ALPID will be to improve the quality of life, production, and knowledge. Hidden within this will be smaller challenges cutting across ALPID's three priority areas. These smaller challenges will include maintaining quality in the face of rapid local, national, regional, and global change; using appropriate intervention programs; and identifying the amounts and types of resources required to put ALPID on a sustainable footing. This will have technical, technological, human, financial, and infrastructural implications. A high-quality ALPID product can only come from the input of high-quality resources. Finally, ALPID must promote and create such high quality by transforming, rather than reinforcing, the forces of alienation, or "de-Africanization."

ALPID's primary objective is to establish community-based information resources to support informed decision-making in community self-advancement and general development efforts. The program will use a youth-to-youth and youth-to-community approach to catalyze change. Skilled youth volunteers will be

trained to collect and process information or identify such sources of information and establish databases of knowledge resources.

ALPID will initially provide access to information through community-based infrastructure for information and communication technologies (ICTs). This is expected to sensitize the users to the benefits of ICTs and encourage them to eventually buy their own.

With the liberalization of economies, global competition is seriously challenging the survival of SMEs. Kenyan enterprises lack the information their international competitors have to achieve efficient production. SMEs are expected to take a keen interest in ALPID and be early innovators. The target countries for the program are Kenya, Nigeria, Tanzania, and Uganda. This chapter focuses on the Kenyan situation, although it draws on comparisons with Uganda.

Preparation of this chapter involved interviews and consultations with people in various sectors, searches for available documentation on the Internet, and extensive application of my own experience.

The Information Age and global trends[1]

A subtle transformation is now evident in the societies of developed countries. The Industrial Revolution focused attention on energy and matter, with the most visible output being tangible goods. But today, in the Information Age, intangible goods have a dominant market share. Economic output has increasingly shifted from agriculture and industry to services. In the member countries of the Organisation for Economic Co-operation and Development, the service-industry and public-sector share in the economy is now 70%, whereas manufacturing and agricultural account for only 25 and 3%, respectively (Forge 1995). This trend is also evident in the poorer countries, where the service-sector share in the economy is higher (43%) than those of manufacturing and agriculture.

This demand is creating a new industry, an industry devoted to creating, processing, and disseminating information to consumers. The information industry is now highly recognized: it creates jobs and, most important, provides important services to the entire economy. In global terms, the information industry has been growing at twice the rate of the rest of the economy. Its greatest contribution, however, will be its impacts on the efficiency and competitiveness of nations in the 21st century.

Characteristic of the emerging Information Age is the transformation of information into a commodity created, produced, manipulated, and distributed to

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[1] This section relies on Mureithi (1997b).

consumers throughout the world. Information infrastructure is a prerequisite to participation in the Information Age.

By all parameters, target countries for ALPID fair poorly and are ill-equipped to participate in the Information Age. However, along with rural-to-urban migration, unemployment, and the immense challenges in education and health delivery, the new order also offers opportunities. Policy obstacles must be removed to foster investment in the development of information infrastructure and its applications. Countries that do have the capacity to participate in the Information Age have put in place policies to foster and promote

- Information generation, acquisition, and creation;

- Information processing, storage, and retrieval (typically, through information technologies [ITs]); and

- Information-dissemination systems (typically, through telecommunications systems).

It should be noted that as governments become more conscious of the impact of the information industry, they are putting policies in place to foster the development of ICT infrastructure and to harness its benefits and enhance development into the 21st century.

Connectivity

Like other countries in sub-Saharan Africa (SSA), Kenya faces serious challenges in its quest to provide universal telecommunication services. By the end of July 1997, the total number of connected lines in Kenya was 269 000, generating a teledensity (ratio of telephones per 100 people in the population) of slightly less than 1%. Although this is high for SSA, which has an average teledensity of 0.5%, it is far lower than the 60% common in Europe. Yet, telecommunications applications are now available for use in health-care delivery (telemedicine, home working), telecommuting, and interactive distance learning — the very applications the country badly needs in its quest for development and newly industrialized country status by 2020. In recognition of the need to develop telecommunications, the Kenyan government published a sector policy guideline in January 1997 to chart the way forward (GOK 1997) (Figure 1).
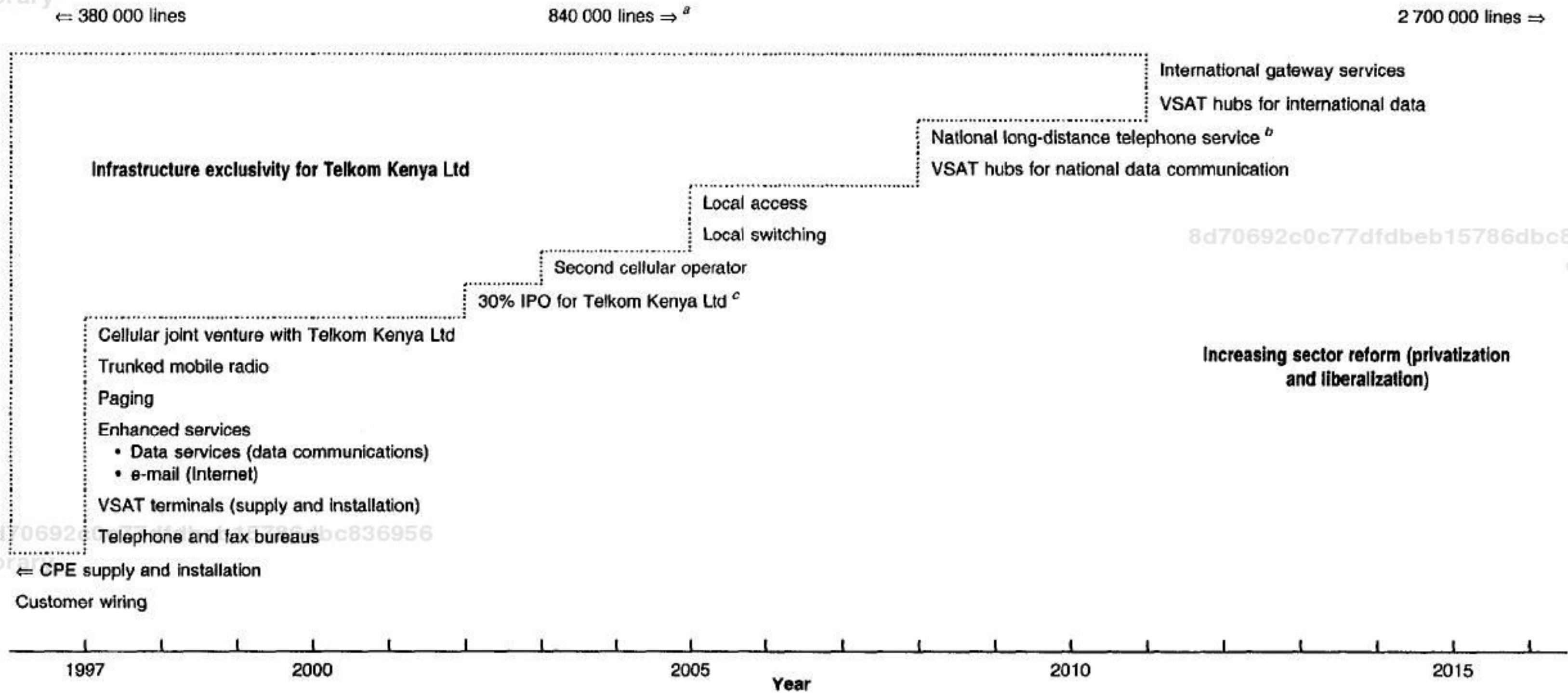
⇐ 380 000 lines   840 000 lines ⇒ [a]   2 700 000 lines ⇒

International gateway services

VSAT hubs for international data

National long-distance telephone service [b]

Infrastructure exclusivity for Telkom Kenya Ltd   VSAT hubs for national data communication

Local access

Local switching

Second cellular operator

30% IPO for Telkom Kenya Ltd [c]

Cellular joint venture with Telkom Kenya Ltd

Trunked mobile radio   **Increasing sector reform (privatization
                                                                         and liberalization)**
Paging

Enhanced services
 • Data services (data communications)
 • e-mail (Internet)

VSAT terminals (supply and installation)

Telephone and fax bureaus

⇐ CPE supply and installation

Customer wiring

| 1997 | 2000 | 2005 | 2010 | 2015 |

Year

Figure 1. Structure of Kenya's telecommunications market. Source: Based on GOK (1997). Note: CPE, customer-premises equipment; IPO, initial public offering (of shares); VSAT, very small aperture terminal. [a] Assumed annual growth rate of 12%, based on historical performance. [b] Date of implementation subject to Ministers' discretion after evaluation of liberalization process thus far. [c] According to Nairobi Stock Exchange rules (21 Mar 1997), audited financial statements for the past 5 years (rule 5.2d) and a track record of 3 years' profitability (rule 4.3.2a) are prerequisites for a listing on the stock exchange.

Key targets were the following:

- To construct 2.7 million lines, at an estimated cost of 5.4 billion United States dollars (USD) by 2015, thereby raising national teledensity to 5% (the national teledensity spread is expected to be 20 and 1% in the urban and rural areas, respectively);

- To progressively facilitate private-sector participation in the telecommunication industry and thereby provide the bulk of the financing; and

- To unbundle the dominant player — Kenya Posts and Telecommunications Corporation (KPTC) — and establish bodies with distinct regulatory and operational mandates.

Following up on the policy paper, the government published a parliamentary bill to unbundle KPTC and establish a regulatory body and legal framework for licencing private-sector operators. At the time of writing, the bill had not been enacted by the last parliament. In line with parliamentary procedures, the bill was being redrafted for discussion in the new parliament and for enactment within the year. Kenya's telecommunication market recorded reduced investment in the last 5 years or so on account of a misunderstanding between the government and multilateral donors.

With the enactment of the bill, more opportunities for the private sector will open up, bringing fresh capital and stimulating fast growth to reduce a mounting backlog of unsatisfied customers, particularly those who want enhanced service. The public switched telecommunication network (PSTN) will continue to be a restricted domain of Telkom Kenya Ltd, the offshoot of the telecommunication component of KPTC. Regulatory provisions will continue to restrict international access to Telkom Kenya Ltd, as well as to the PSTN. The import duty for telecommunication equipment is high, raising the overall costs by 33.4% and thus affecting the affordability of services (Table 1).

KPTC manages the Kenyan telecommunication system as a monopoly. The system comprises a total switch capacity of 380 000 ports from more than 180 switches, 68% of which are digital. The 269 000 or so customers are connected through a national transmission network running on 4 400 km of terrestrial microwave (point-to-point links for telecommunications on the ground). However, international services are satellite based (Atlantic and Indian Ocean Intelsat satellites).

Table 1. Tariffs for ICT equipment and services, Kenya, 1997/98.

Nomenclature			Rate (%)		
SITC	Harmonized System	Description	Duty	VAT	Cumulative over CIF [a]
8987.91.00	8524.99.10	Computer discs	15	16	33.4
8987.99.00	8524.99.90	Other software	15	16	33.4
		Computers	5	16	21.8
7641.50.00	8517.30.00	Telephonic or telegraphic switching apparatus	15	16	33.4
7641.70.00	8517.40.00	Other apparatus for carrier-line system	15	16	33.4
7641.91.00	8517.81.00	Telephonic	15	16	33.4
7641.92.00	8517.82.00	Telegraphic	15	16	33.4
7643.29.00	8525.20.90	Transmission apparatus incorporating reception apparatus, assembled or partly assembled	25	16	45.0
7643.21.00	8525.20.10	Unassembled	15	16	33.4
7648.32.00	8526.91.00	Radio navigational aids	15	16	33.4
7649.10.00	8517.90.00	Parts for telephone sets, video phones, cordless handsets, facsimile machines, teleprinters, and telephonic and telegraphic switching apparatus	15	16	33.4
7649.99.00	8522.90.00	Parts for any transmission apparatus other than transcribing machines, radiocassettes, dictating machines, etc.	15	16	33.4
7649.39.00	8529.90.00	Parts for use with items of SITC chapters 8525–8528	25	16	45.0
		Telephone service		16	
		Internet service		16	

Source: *The Finance Bill*, 1997.
Note: ICT, information and communication technology; SITC, Standard International Trade Classification; VAT, value-added tax.
[a] CIF, cost, insurance, and freight; calculation for indicative guidance only.

As in other public telecommunication networks in the region, the dominant product in Kenya is voice services, followed by data services; these services brought in annual revenues of about 300 million USD in 1996, making the operator the fifth largest in Africa in terms of revenue.

KPTC has implemented a packet-switching data network, with nodes in all the major towns in the country. Going under the brand name Kenpac, the network is also accessible over the PSTN. Another network, Kenstream, provides high-speed infrastructure for high-volume consumers at 64 kbps, using the existing network, with data terminal units on customers' premises. Kenstream service is only available in the main cities of Nairobi and Mombasa. Low-volume customers continue to use leased analogue circuits. With line conditioning, the PSTN can support up to 19 200 kbps. In the late 1990s, KPTC planned to launch its very small aperture terminal (VSAT) service. KPTC will restrict this service to corporate users in East African countries. With this service operational, KPTC will be able to establish communication capability in any part of the country and thereby overcome the lack of infrastructure in the rural areas.

In 1986, KPTC embarked on countrywide rural automation. It has progressively raised automation to the current level of 98%. As of 1997, only 5 500 lines were manually switched. This has generally improved the quality of service and increased the call-completion rate. Manually switched telephone exchanges are to be found in small trading centres in rural areas. This type of telephone exchange gives a reasonable quality of service for voice calls but remains problematic for data calls because of the need to manually dial a modem at the distant end. This problem has been overcome with new software. Microsoft Windows 95, for example, has a feature for manually assisted connection. Gesellschaft für Technische Zusammenarbeit (GTZ, agency for technical cooperation) is using this feature for full Internet access at two sites (three sites in Tanzania have e-mail only). The advantage of this feature is the negligible investment required to access the Internet in areas without automatic telephone service. If ALPID is implemented in an area served by a manually switched exchange, this feature will be advisable, although KPTC staff will need simple training to recognize modem calls. KPTC also uses multiaccess radio systems to provide services to widely dispersed sites. Such technology is used in large farming plantations and tourist lodges in the middle of national parks.

Since 1991 KPTC has progressively initiated measures to foster private participation in certain areas, including customer-premises equipment (CPE) – private automatic branch exchange, terminal set — telephones, and fax. The easy mode of entry into the sector and the availability of products have brought 245 companies into the CPE market, bringing tangible benefits to the consumer: lower prices, high-quality products, and support. In addition, KPTC has licenced more

than 250 bureaus countrywide, and many more operate without licences, particularly in the residential areas. Paging is the only telecommunication service provided by any private-sector company.

Developments in Uganda

In neighbouring Uganda, liberalization is happening more quickly. In January 1996, in a Telecommunication Sector Policy Announcement (TSPA), the Minister of Works, Transport and Communications promulgated the national vision for the telecommunication sector. The objective of the TSPA was to reorient sufficient private-sector capital to expand and enhance the quality of telecommunication services nationally. The government would withdraw from direct participation and actively facilitate private-sector operators as the engine of growth. The strategy to achieve this vision would be to create an enabling environment and level playing field to stimulate and build a competitive telecommunication market, with little or no intervention by the government, save that in its role as a regulator. The policy provides for the introduction of competition and licencing procedures for multiple operators and sets targets for provision of services, quality, and national spread. Key targets are the following:

- Increased network capacity — 300 000 lines in 5 years (within the same time frame, the teledensity would increase to 2 lines per 100 people from the 1996 figure of 0.25);

- Pay phones, public call offices, and other appropriate telecommunication services in the rural areas;

- Automated telephone services in all district and county headquarters; and

- A regulatory body to manage the telecommunication sector.

Uganda recently created an independent regulatory body — the Uganda Communications Commission — and awarded a licence to a private-sector PSTN operator, thus unleashing competition in all sectors of telecommunications. A mark of confidence in the growing telecommunication sector is the new network operator's commitment to pay 5.6 million USD to the government for the concession to build and operate 89 000 lines within 5 years. Although the initial target

of 300 000 lines may not be realized, the network will be more advanced by far than it is today. Advertisements have appeared for the sale to the private sector of Uganda Telecom Ltd — an offshoot of the former public monopoly, Uganda Posts and Telecommunication Corporation (UPTC). With the expected completion of the process by mid-1998, Uganda will become a unique telecommunication market in the region, with full competition and the private sector playing the leading role in its development.

At the time of writing, the Uganda Communications Commission intended to establish a fund to meet the special needs of rural and disadvantaged communities and to support community-based communication initiatives, such as telecentres. One such pilot telecentre, at Nakaseke, in the famous Luwero triangle region, is supported by IDRC, the International Telecommunication Union (ITU), the United Nations Educational, Scientific and Cultural Organization, and Uganda Telecom Ltd.

Alternative technologies

Datacasting

Datacasting is a fast, efficient, and low-cost way to disseminate information to an unlimited number of users. Datacasting takes advantage of already existing media infrastructure, such as broadcasting — television or radio — either terrestrially or via satellite. Packet radio can also be used. Operating at higher frequencies, television may provide higher data throughput. The receiver stations have standard antennae linked to standard personal computers (PCs), with special software and hardware to receive the information. The content developer develops the data and relays these to a broadcasting company for distribution over the broadcast network. Once data are received, they are stored on the computer hard disk and can be manipulated easily to suit the user.

Typical information might be entire databases established by ALPID. A typical television "vertical blanking interval" line can transmit data at 14.4 kbps (14 400 × 3 600 bits an hour, or 51.84 megabits of information) to many recipients simultaneously. The information can then be distributed to the target community via hard copy or any other appropriate format. This technology does not offer interactivity; however, ALPID could use it for centres in rural areas where switched telephony is unavailable. Coffee traders and paging services in Uganda are now applying variations of this technology.

Data over radio

One commercial application of ICTs in the rural areas is the transmission of data over high-frequency radio. At transmission speeds of 2 400 bps, manuals can be sent over the system to information centres in the rural areas. ALPID can therefore use the network to disseminate data to selected centres. In Uganda, a local company, Bushnet, is providing e-mail services to rural-based organizations. Although the startup investment is up to 10 000 USD for equipment, including a computer and a monthly polling fee (and this is high for mass use), more than 40 large organizations subscribe to the network. The Ugandan government has indicated its interest in using this technology to disseminate information to rural-based departments. Although Kenyan-based intergovernmental institutions involved in relief work are using this technology, no company has offered it as a commercial service.

Satellite

Large multinational corporations are testing global mobile personal communication systems (GMPCS), based on mobile satellite constellations orbiting the Earth. Low orbits make voice telephony possible through small handsets in any part of the world. Other services to be offered include fax, paging, and e-mail. User charges are expected to be 2–5 USD per minute, which is much higher than local PSTN tariffs. The services will therefore be aimed at international business travelers. Nevertheless, with the commercial operation of GMPCS, no point in Uganda will be without reliable communications services.

In 1998, the Iridium and Globalstar corporations were undertaking in-flight testing, with the hope of commencing commercial operations later in the year. Iridium was expected to inaugurate commercial operations on 23 September 1998, and 46 satellites of the 66-satellite constellation had already been launched and successfully tested in orbit. Two e-mail store-and-forward satellite systems can be used, Vitasat and Satellife. These operate in remote locations where terrestrial infrastructure is lacking.

The Inmarsat satellite system is already providing competitive mobile telecommunication services, using terminals the size of a laptop computer. Larger terminals are being used for more capacity, and these can be used to provide rural telephone services. Other fixed satellite systems offer telecommunication capacity, using VSATs to provide ground infrastructure. VSATs are simple to install at the point of service and are now used to provide a range of services: voice and data telecommunications, distance learning, and telemedicine. VSATs provide the best option in rural parts of Africa with no reliable telecommunication infrastructure.

Policy and regulatory constraints

Regulatory provisions hamper the use of satellite systems in many countries. Monopoly telecommunication operators fear that VSAT and Inmarsat systems will carry telecommunication traffic away from their networks, thereby taking away revenue. In such countries, either these systems are banned or licence fees are high to dissuade people from using them, which restricts competition and maintains the high price of international telecommunication services.

All of ALPID's target countries allow the use of Inmarsat terminals and VSAT. Kenya was testing VSAT service and had approved Inmarsat in February 1998. Taxation has had a high impact on the final pricing of telecommunication products and services. In Kenya, the cumulative taxation on telecommunication equipment is 33.4%, and telecommunication services attract a value-added tax (VAT) of 16%. This has a negative impact on the affordability of these services. Governments are recognizing the role of telecommunications in national development and are looking for ways to reduce or even remove tariffs on telecommunication equipment. In December 1996, trade ministers from 32 countries, including the European Union, agreed on a timetable according to which tariffs would be completely removed by 1 January 2000 (Molony 1997). The Information Technology Agreement calls for a worldwide duty-free market for network hardware and telecommunication switching and transmission equipment. Signatories include India, Indonesia, Malaysia, and the Philippines.

The significance of the foregoing is that communication technology is available to serve ALPID in its target countries; however, regulatory and commercial issues in these communities have often hindered the use of these technologies for development. To develop telecommunication infrastructure, the target countries, especially Tanzania and Uganda, have been restructuring the sector, facilitating the input of fresh capital from the private sector, and removing barriers to accessibility by promoting competition.

Information technology in East Africa

At the time of writing, Kenya has yet to formulate a comprehensive IT policy. Nevertheless, even without such a policy the government has taken actions with significant bearing on the development of the industry. The government has progressively reduced the tariff barriers in the IT industry, and the import duty on computers is now 5%, down from a high of 40–45% in the early 1990s. Lower duties have brought down the prices of computers and enhanced their affordability, as is evident from the increase in the number of PCs. The country has an estimated 200 000 PCs (*The East African*, 5–11 May 1997), a number expected to

increase by 10–15% a year. At this level, the PC density (the number of computers per 100 people) is almost equal to teledensity at 1%. However, this compares poorly with the figures for Southeast Asian countries. By 1995, Malaysia, Singapore, and South Korea had PC densities of 3.97, 17.24, and 12.08, respectively. In the same year, South Africa had the highest PC density in Africa, at 2.65 (ITU 1996/97). Although data for Africa are largely unreliable, ITU (1996/97) estimated PC density in Nigeria at 0.41 and in Uganda at 0.05 (Table 2).

In addition to importing ITs, local entrepreneurs have established a thriving business in PC assembly. As clones of major brands, these assembled PCs come with lower price tags, which also brings pressure to bear on the prices of name-brand PCs. Similarly, a thriving local software industry is in place in Kenya, satisfying specialized needs. At least seven companies supply off-the-shelf, mass-packaged software products (Upstart Ltd Nairobi 1996). This is a major milestone in the local supply of the types of IT application needed by ALPID.

The Kenyan government has increasingly accepted the use of computers in its offices, thereby also providing a role model in the acquisition and use of ITs. The actual benefit the government offices derive from their use of ICTs is another matter, as at the time of writing the Kenyan government had no cohesive policy on the use of ITs.

As the result of the increased number of computers on the market, the sales and maintenance points have increased rapidly and spread nationally. Major towns have sales and support outlets, as well as the capacity to give training in basic computer awareness. Additionally, the government has decided to introduce computer courses in secondary schools and make the subject examinable (students must pass the course). This is going to be a major impetus for the enhancement

Table 2. Information-technology indicators, 1995 and 1998.

	Estimated PCs / 100 people, 1995 [a]	Internet hosts, Feb 1998 [b]
Kenya	0.07	458
Uganda	0.05	30
Tanzania	—	25
Nigeria	0.41	49

Note: PC, personal computer.
[a] ITU (1996/97).
[b] Network Wizards (www.nw.com/zone/www/dist-bynum.html).

of IT awareness in the country. Leading the advocacy of IT development are professional IT associations, such as the Information Technology Standards Association (ITSA) and the Computer Society of Kenya. ITSA has been leading the crusade to standardize training in the industry. Continually falling prices and increased awareness of ITs will be the driving force for increased use of ITs in the coming years.

In Uganda, the environment for the IT industry is similar to that prevailing in Kenya. Uganda has no institutional framework to coordinate the orderly development of ITs. Consequently, market forces largely determine the acquisition of IT products. The import-taxation regime has not provided a sufficient margin to encourage the local assembly of equipment. Local assembly would, in time, lead to increased local content, job creation, and localization of IT products. So far, only high-income earners and institutions can afford these products. Taxation has been cited as the major factor sustaining high prices. Imported products are subject to withholding tax, import duty, and 17% VAT. These increase the end price considerably. The Internet Society of Uganda (ISUGA) has asked the government to waive taxes to make computers affordable.

Private institutions provide training, and Uganda has no local standards. Numerous companies in Kampala are offering training and appreciation courses. Nakawa Training Institute, a training school owned by UPTC, has started basic computer literacy courses and may introduce advanced courses. In light of privatization, the institute could design and implement packages for companies and for initiatives such as telecentres (Mureithi 1997a).

Finally, availability, particularly in rural areas, is restricted by problems with power, telephones, equipment sales, etc. Furthermore, companies that sell computers are largely based in Kampala and have few technical-support centres in the rural areas. Software is largely a packaged product sold by computer vendors, with little local input.

National IT development

Kenya

The first full Internet service was launched by the African Regional Computing Centre in the last quarter of 1995. Since then seven more Internet service providers (ISPs) have appeared. This has unleashed competition, which has brought down prices, increased the points of presence (PoP) in all major towns, and generally raised Internet awareness. The greatest challenge continues to be the low

level of locally relevant information on the Internet and therefore its value. All the major towns in the country — Eldoret, Kisumu, Mombasa, and Nakuru — have an established Internet PoP in Nairobi (Box 1).

On 1 April 1997, KPTC reviewed its telephone tariff policy and enlarged the local telephone call zones to have a 60-km radius. Internet users in the environs of the PoPs therefore enjoy cheap local telephone charges. Machakos and Garissa and towns in the Mount Kenya region — Embu, Meru, and Nyeri — have to pay long-distance charges for the Internet, at 28 KES per minute (in 2000, 74.35 Kenyan shillings [KES] = 1 USD). This raises operating costs significantly. At the time of writing, KPTC's intention was to implement a national Internet backbone for as many as 30 000 customers within the year. All parts of the country are expected to be within reach of the Internet at local rates.

However, Internet development in Kenya has faced a number of constraints, especially in policy. In April 1996, KPTC declared the provision of Internet service over "privately" leased lines illegal (*The Standard*, April 1996). At the time of writing, this position had still not been publicly withdrawn. Meanwhile, African countries have been actively promoting the development of Internet use, particularly through academic institutions. A policy statement released by the Ministry of Transport and Communication in January 1997 was perhaps the first official recognition of the Internet. Currently, ISPs have to pay a hefty licence fee of 250 000 KES and a higher price for international leased lines, almost four times what ISPs have to pay in Uganda. Kenya has restricted the use of satellite technologies (that is, VSATs), which would offer cheaper international connectivity and provide more capacity than available through KPTC.

Box 1

Internet service providers' websites

- African Regional Computing Centre   www.arcc.or.ke
- Africa Online   www.africaonline.co.ke
- Form-Net   www.form-net.com
- Inter-connect Connect   www.iconnect.co.ke
- Swift Global   www.swiftkenya.com
- Net 2000   www.net2000ke.com
- NairobiNet   www.nbnet.co.ke
- Insight Technologies   www.insightkenya.com

Source: Summit Strategies, Nairobi, Kenya. Internal document.

Table 3. Telephone rates in Kenya, Tanzania, and Uganda, 1998.

	Local telephone charges		Unlimited-use charges (USD)		Total per h (USD)
	Per min	Per h (USD)	Per month	Per h	
Kenya	1.17 KES	1.13	97	0.55	1.68
Tanzania	20 TZS	1.90	50	0.28	2.18
Uganda	75 UGX	4.09	50	0.28	4.37

Source: Summit Strategies, Nairobi, Kenya. Internal document.
Note: VAT not included; all Internet accounts are unlimited-use, assuming 8 hours of use in 22 days for comparison. In 2000, 74.35 Kenyan shillings (KES) = 1 United States dollar (USD); 805 Tanzanian shillings (TZS) = 1 USD; and 1520 Ugandan shillings (UGX) = 1 USD.

The higher operating charges for ISPs translate into higher charges levied to customers; consequently, Internet charges in Kenya are the highest in the region. However, extremely low local telephone rates reduce total costs (Table 3).

Moreover, governments are the largest consumers and the largest generators of information. Governments have increasingly used ICTs, particularly the Internet, to disseminate public information. The use of the Internet to disseminate public information provides a role model. Only one Internet site for the Kenyan government was found, and that was the site of the Kenyan embassy in the United States (www.embassyofkenya.com). This site had last been updated in mid-1997. There were other "national" sites, including those of the Kenya Sugar Authority (www.tcol.co.uk/orgs/ksa/kensugar.htm) and Moi University (www.tcol.co.uk/orgs/moi/moi.htm).

Government use of the Internet gives the development of ICTs a much-needed boost. The Minister of Information and Broadcasting was reported as having demanded that the Kenya Broadcasting Corporation be connected to the Internet (*The Daily Nation*, 15 February 1997). This could have a significant influence on other government departments. The private sector, in contrast, has wholeheartedly embraced ICT use. Currently, Kenya has 458 Internet hosts, the highest number in SSA outside of South Africa (see the Network Wizards website at www.nw.com/zone/www/dist-bynum.html). And Kenya has an estimated 20 000 e-mail accounts.

Although all major towns in Kenya have commercial power, large parts of the rural areas do not. Only about 7–8% of the population has access to commercial power, which also has its problems. Power failures occur often, and even

when power is available, wild fluctuations occur, which are disastrous for electronic equipment. Expensive stabilizers, even generators, must be considered. This can be expected to significantly increase project costs. Some institutions have been carrying out extensive research to design cheap power solutions for ICT applications in rural areas. The South African company, BayGen, for example, manufactures simple radios that operate without batteries or other external power sources (Box 2). Apple Computers has also reportedly been researching the prospects for mass production of laptops using the cranked-radio principle. If this is successful, it will be a milestone toward a truly universal information highway traversing rural Africa.

The Kenyan government has progressively reduced import duties and VAT on photovoltaic units to promote their use and make them affordable, and the use of these units has been increasing. Kenya could be expected to sustain this policy. Eight Nairobi-based companies and numerous agents in the rural areas install and maintain the systems. More than 20 000 photovoltaic units have been sold in Kenya since 1987, largely to rural middle-class people who are integrated into the cash economy but live far from commercial power lines (World Bank 1997). Solar power is therefore a tested technology, with potential for use in ALPID projects in the rural areas. KPTC has installed solar-powered radio stations in northeastern Kenya as part of the national transmission network and has been using solar power to run small rural exchanges in areas where commercial power is unavailable. Solar energy also has the economic potential to meet energy requirements for rural communities, given the high cost of traditional network electrification.

Box 2

The clockwork radio — power to the people

The principle of the "clockwork radio" is fairly straightforward. A single winding coils the spring, much like cranking up an old gramophone. As it unwinds, the spring pushes power through a gearing mechanism to the generator. This, in turn, fuels the radio, which can run for an hour after a 25-s windup. Liberty Life, a leading South African insurance company, provided investment capital to bring the product to market in 1996, and Bay-Gen, another South African firm, is now cranking out 20 000 of the radios a month from its factory in Cape Town. Endorsed by South African President Nelson Mandela, the lunch-box-size radio is being snapped up by aid agencies such as the United Nations High Commissioner for Refugees and the International Red Cross.

Source: Barnard and Ferreira (1998).

Box 3

Ugandan-government websites

• Ugandan government	www.uganda.co.ug
• Electoral Commission	www.imul.com./interim
• Uganda Post Ltd	www.ugandaweb.com/ugapost
• Ugandan embassy in the United States	www.ugandaweb.com/ugaembassy
• Uganda Investment Authority	www.imul.com/invest.auth/uia.html
• Makerere University	www.imul.com/muk

Source: Summit Strategies, Nairobi, Kenya. Internal document.

Uganda

The Ugandan government has embraced Internet technologies wholeheartedly, and their use has been increasing. Having several departmental websites (Box 3), the government is a role model. Many departments also have e-mail accounts.

Currently, Uganda has three major online ISPs, with close to 2 000 e-mail accounts in all. Internet accounts are fairly cheap in regional terms, facilitated by the open-sky policy adopted by the government for VSATs. Local telecommunication tariffs are, however, very high, nearly wiping out the benefit from the low cost of Internet use.

In July 1997, Uganda launched a local chapter of the Internet Society (that is, ISUGA) to act as an advocacy and sensitization group to support the development of an Internet community. At the launch of ISUGA, it was strongly felt that the government should spearhead the industry by forging a clear vision and playing a coordinating role to avoid the development of a chaotic industry. Other sensitization programs include the following.

- *The World Bank-supported School to School Initiative* — Launched in October 1996, this initiative connects three schools in Kampala to the Internet, for the development of educational activities.

- *The Uganda Connectivity Project* — Launched by a nongovernmental organization (NGO), this project promotes rural connectivity and aims at making the Internet available to the rural communities through training and the introduction of mobile "Internet centres." The project is also intended to demonstrate the use of recycled, older model computers and