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TELECOM/IT CONVERGENCE :
EFFECTS ON A DEVELOPING ECONOMY

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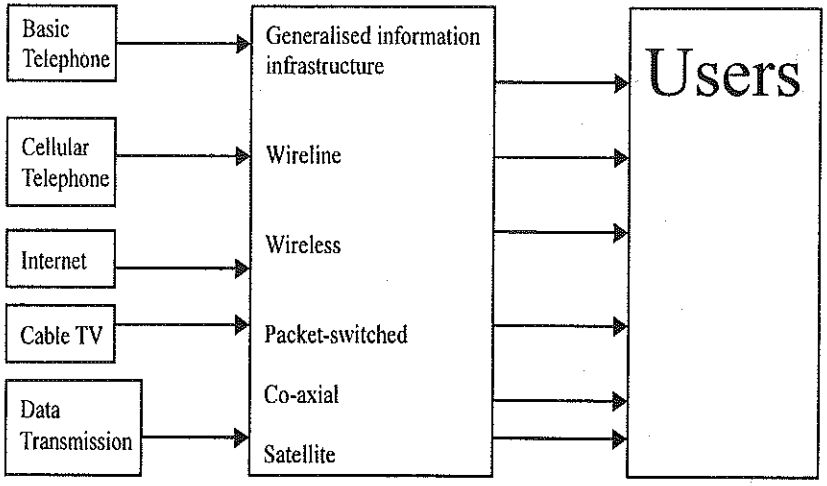
Convergence: an introduction to the new dimension

In the new millennium, boundaries are increasingly becoming blurred. This is more so in the case of telecom and information technology. As a result, tremendous possibilities are being envisaged for not only economic development, but also the very nature of living. The greatest advantage currently perceived is the dramatic reduction in transactional costs.



As can be seen from this graphic, with convergence, the whole problem of compatibility between various legacies is rendered redundant substantially. And this leads to a substantial decrease in transaction costs, powered by lower telecom access charges and usage rates as well as by dipping IT hardware prices.

From weather forecasting to farming, healthcare to education, policy-makers are foreseeing great possibilities for the rural economy. This study is an attempt to analyse some of the implications of the new

technologies and also analyse a few case studies from both developed and developing world.

Telecommunications in rural areas

Any research reviewed thus far suggests that there are both positive and negative effects of telecommunications technology for rural areas. However, it still is an issue that often fails to be raised in rural development circles. The positive view is that greater access is provided by mobile technologies to rural areas, thereby reducing the relative concentration of communication capability in large cities. The negative view focuses on the "rural penalty" of continuing concentration of the newest and most advanced technology in large cities, combined with the presence of large corporations whose demand for telecommunications technology ensures that they will not be deprived in the near future. This section briefly examines these two positions.

The "rural penalty" stems from three factors: (1) lower population densities, (2) the distance of rural communities from urban centers, and (3) economic specialization in sectors other than information - or knowledge-intensive ones (Parker et al. 1989: 24-27). Many dismiss the distance factor, citing the fact that telecommunications has effectively eliminated distance and indeed, the least dense and most remote areas may benefit most from. But Internet access does not favor the remote user: urban users can obtain network services and Internet access with a local phone call, whereas rural users typically must pay a long-distance charge for the same access.

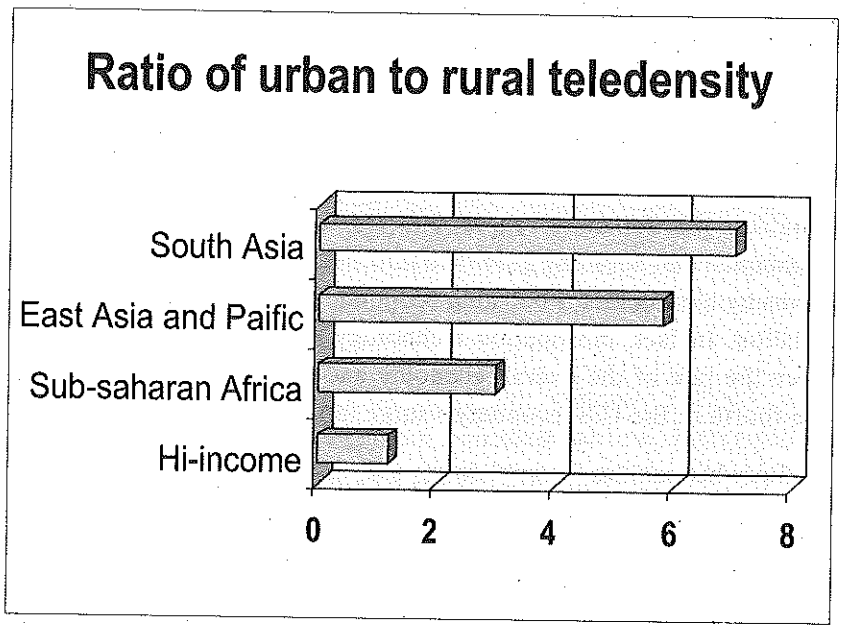
The third penalty factor is more difficult to dismiss. In general, rural areas have disproportionately low shares of producer services compared to their population. A significant exception to this is emerging in many countries: high-amenity locations, where a significant number of producer service firms have been founded by amenity-seeking entrepreneurs. However, even this exception illustrates the critical nature of face-to-face contact along with the growing use of telecommunications.

But some figure of the state of the telecom infrastructure in South Asia is revealing.

Telephone Main Lines, 1995 (per 1000 people)

Countries	Telephone lines	PC's
Low-income	25.7	1.6
Lower-middle	94.	10
Upper middle	130.1	24.2
Newly industrializing	448.4	114.8
Hi income	546.1	199.3
India*	25	4

*Source: WDR, 1998, *DoT Annual report, 1999*



Source: World Development Report, 1998

Obviously, in South Asia, most of the telecom infrastructure is concentrated in the urban areas. So any IT-based attempt to target rural economic development faces a serious problem.

It is clear that all rural areas are not alike. The three key characteristics of rural areas that put them at a disadvantage in economic development are: small scale and low density, economic specialization in low-wage, low-skill jobs, and remoteness. Nonmetropolitan areas tend to be dependent on one of three economic activities: farming, mining, services; a minority are nonspecialized. Remoteness affects the competitiveness of rural firms, which are distant from information and technical resources. In addition to remoteness, topology and terrain constrain telecommunications deployment, adding significantly to costs.

The New Economy: Internet at the forefront

The ICE (IT, Communications, Entertainment) economy, has been getting a lot of media attention in recent times. While it may seem that the importance of this is grossly exaggerated, in view of the sector's contribution to the nation's GDP (at 1%), it is really the potential of the sector that has generated so much excitement. The biggest attention-grabber has been the Internet phenomenon. Around the world, there seems to be a dramatic effect of Internet on the functioning of companies and economies. The Net seems to working just fine in an information economy like the U.S., and even in somewhat less cyberspace savvy countries like Japan. A recent U.S. Commerce Department report maintained that booming growth in information technology industries driven by the Internet is boosting economic growth and holding down inflation. In fact, information technology industries are growing at twice the rate of the overall economy and accounted for more than one-fourth of the U.S. economy's surge in the past five years.

But what can the Internet do for a developing country like India? What can India do to effectively tap into the Internet as a tool for its organisations and people, as well as a market for its software and Web solutions companies?

Issues at the national level include the use of the Internet, Intranet, Extranet and e-commerce in areas like disaster relief, public health, education, agriculture, manufacture, trade, government services,

hospitality and infotech. Macro-issues include the impact of the Net on the quality of the workforce and students, cultural identity, and national security.

Regional issues include bilateral and multilateral cooperation on Internet infrastructure and content areas between developing countries, or between countries sharing common religious, linguistic or ethnic ties.

Global issues cover the operations of infotech MNCs, online services, and international organisations ranging from the ITU to the WHO.

Numerous case studies at each of these three levels across the developing world abound.

The Asia Pacific Red Cross Web site provides updates and coordinates relief efforts on North Korea, Bangladesh, Afghanistan, Indonesia, and China. The ITU held the first World Telemedicine Conference for developing countries last year. Information and precautions about health hazards during the recent forest fire haze in South East Asia were widely circulated on the Net.

The NetDay initiative to wire schools to the Net has also spread from the U.S. to developing countries like South Africa, Malaysia, and China. More and more universities in Asia and Africa are connecting to the Web, publishing and sharing research information, and conducting courses online.

NGOs in India are using the IndiaLink computer network, with Internet gateways, to coordinate communications. International organisations like the Institute for Global Communications are actively supporting such initiatives in dozens of developing countries.

African farmers are increasingly expected to use the Internet for news and information on pricing and financial management. Export oriented databases have been launched on the Net in countries ranging from Cameroon and Mexico to India and Hong Kong. Internet banking is expected to become a norm in Asia by 1999.

News media in non-English languages in developing countries are rapidly coming online. Indian infotech companies like Aditi Technologies, ApTech and Infosys have effectively tapped into the Internet as a market, via tools for online customer support and online banking. Tourism via the Net is being aggressively promoted in much of Asia and Africa. The legal profession in Malaysia benefits from ready online access to legal information on the Web (www.cljlaw.com), a first in South East Asia. Government departments and services accessible online include India's **Department of Electronics,** Singapore ministry tenders, and the Chinese parliament. At the state level, infotech savvy chief ministers like Andhra Pradesh's Chandra Babu Naidu in India are at the cutting edge of providing online governmental resources on the Web, and pushing for departmental Intranets and public access Internet kiosks.

The Non-Aligned Movement used the Internet to publish resolutions drafted at recent summits such as the one in New Delhi in April 1997. The Africa Information Society Initiative recently stressed the importance of getting Internet access beyond urban areas to rural schools.

As such evidence of Internet impact continues to mount, it is imperative that they be documented, categorised, and analysed to identify overall patterns of effectiveness. Developing countries then need to formulate effective national information infrastructure policies which can help them tap into Internet benefits in the most efficient and locally relevant ways.

What is most important to study is where the potential of telecom/ IT can be most decisive. Is it in employment generation, attacking rural poverty, or is it in improving the human development indicators? And the extent of government support needed to make a serious dent in the socio-economic profile of the rural society.

It is pertinent, in this regard, to examine and critically analyse some of the successful cases of effective usage of IT/telecom in developing economy, and their effects, especially in rural development, education and healthcare.

The Grameen Bank experiment:

This is one of the most famous experiments in the use of high technology in the rural economy, especially targeted towards the rural poor. Grameen Bank, over the years, has built up a formidable reputation in the field of rural micro credit, an endeavour which has won critical acclaim the world over. It sought to extend this experiment in high technology applications in rural development. In 1996, Grameen Bank acquired a mobile telephone license, in collaboration with Telenor of Norway, Marubeni of Japan and Gonofone Development Corp. of US. Two companies were formed: Grameen Telecom(GTC) and GrameenPhone Ltd. (GPL).

The experiment has received a worldwide acclaim and recognition. A study done by the Center for Development Research, University of Bonn reveals some really exiting results. There has been, apparently, a great deal of disintermediation in the rural economy due to the presence of the Village Pay Phones (VPP). A great deal of efficiency potential is visible. But beyond that, the statistics do not show any great "redistributive" or "growth" effect of this experiment.

The reasons are not very difficult to perceive. Some of the essential criteria of ownership of the VPP are:

- Women members of Grameen Bank
- Good repayment record of GB loans
- They were to have a good business (preferably a grocery store).
- Able to read and write (and one family member literate in English digits)
- Electrical connection in the house
- Residences at the centre of the village

The last four conditions obviously rule out the poorer sections of the rural society. And in the initial stage itself, there is an "elitist" bias in the whole experiment. This is in turn borne out by some of the sample statistics of the research.

Characteristics of Sample Villagers in the experiment

Characteristics	VPP Owners	Users
Size of total landholdings	0.47 ha	0.93 ha
Per capita income (avg.)*	$273	$451
Proportions of: (%)		
Extremely poor	8	6.1
Moderately Poor	6	9.3
Non-poor	86	84.6
Whether adopt Family planning (%)	74	56.5
Children immunized	80	76.1
Literacy ate	94	89.3
Use of tube well for drinking purposes	100	98.6
Sanitary latrines	80	82.3
Access to electricity	100	90.2

*Note: income >=$147: non-poor *Source: ZEF Research*

The above figures amply reveal that the experiment has a definite "elitist" bias. The beneficiaries of this scheme, both the consumers and the providers are the relatively better-off sections. While this is not a bad thing in itself, it does show the glaring weaknesses in attempting a "direct attack on poverty" with such glitzy schemes.

Obviously, this programme can be made to address the below-poverty-line populace only with a measure of government subsidy. Such "self sustaining" projects, while good as projectors of the potential of telecom, can never be a significant help in themselves, without government aid.

In recent times, there have been many advocates of this experiment in India. This is undoubtedly a fine example of how telecom can be leveraged to generate efficiencies, but the caveat has to be considered also.

But another programme, of '70s vintage, shows more promise so far as effectiveness towards the rural poor goes.

Onchocerciasis Control Programme (OCP)

This was an international programme launched in West Africa to eradicate a disease known as river-blindness. This disease is caused by a parasite: Onchocera Volvulus: It is communicated by the blackfly. But the most damaging phenomenon is that the blackfly are concentrated in river beds. As a result, large tracts of fertile land remained deserted in West Africa.

In 1974, seven nations: Benin, Burkina Faso, Cote d'Ivoire, Ghana, Mali, Niger and Togo launched this programme. Today, the programme has 11 countries participating, and the World Health Organisation is executing the programme. Besides the WHO< various NGOs, community organisations and pharmaceutical companies have chipped in to eliminate this menace. Today, all the seven original member countries have completely eradicated this disease. As a result, over 30 million people have been protected, and 25 million hectares of riverine land is again available for cultivation.

The programme was successful as it blended local help with modern communication technology to achieve optimum results. It pinpointed the peak times to spray, allowing systematic control of the blackfly population, never overdoing it to prevent environmental damage. Information was collected along 50,000 river kilometers, using sensors on the river bottom. Local inhabitants and communities fed the data into computers. The data was then beamed across to satellite radio transmitters. The data was then sent across satellites to a network of entomologists/ laboratories, who in turn passed on schedules to the pilots responsible for spraying.

Such pinpoint and accurate information dissemination resulted in dramatic results; and even when the blackfly developed resistance to a commonly used insecticide, a combination was soon developed to counter the menace.

With much better technology available today, this experiment can be "scaled up" substantially. This is especially true in cases of disaster management, land reclamation and waste-land development in India.

Edu-net: an educational initiative

Way back in the '70s, a unique experiment in "tele-education" in the rural sector was carried out by the Indian government, with the help of an American APPLE satellite. It was a hugely successful experiment, and Doordarshan, a fledgling outfit at that time, had produced thousands of hours of software to carry out this experiment. Now, the Internet offers a great opportunity to "scale up" that experiment, and at a much lower cost. Today, the government spends Rs.1 lac p.a on an average on each primary school teacher (Ministry of HRD Report on Primary Education, 1999). This is over and above other establishment costs. Internet offers a unique opportunity in drastically reducing the cost of delivery and increasing the coverage of primary education in the rural areas. Experiments of this nature have been carried out in other countries, and have the potential to be replicated.

An interesting voluntary initiative in this regard is the move to wire classrooms to the Net, called NetDay. First started in the U.S. a couple of years ago, the aim there was to urge at least 1 million Americans each year to volunteer their help to schools around the country, for wiring classrooms for Internet access.

Resources which have been compiled in this regard include videos on how to go about getting a school connected, and lists of useful organisations and groups (such as student webmasters, technical volunteers, corporate and government connections).

The movement has spread rapidly abroad, and October 25 is now designated as NetDay not just in the U.S. but several other countries as well. The U.S. has set January 2000 as the target date for having every American school linked to the Internet; nearly 70 percent of their schools now have at least one computer with an Internet connection.

The 15 member nations of the European Commission launched the "Netdays Europe" in 1997. Canada and South Africa will be holding similar events, while Australia just launched its own effort. Other countries reported to have shown interest are New Zealand, Malaysia, China and Sweden: a broad spectrum of industrialised and emerging economies.

But in what ways does the Net really make a contribution to the educational process - and in what ways is it merely a distraction, or fascination with a hi-tech dream? The Net itself has been a useful resource to weigh and assess the progress and shortcomings of such moves. For instance, feedback to the first few initiatives showed that corporate support is needed in large doses in donating equipment; government leadership is needed in underwriting some of the infrastructure expenses.

More importantly, the initiative needs to be continually nourished: just wiring a classroom will not provide an infotech edge. Teacher training, student workshops, curriculum development, support desks, brainstorming sessions, and online forums for critical assessment of education areas suited (or not suited) to the Internet medium are all important parts of the follow-up.

Indian companies, government agencies, and educational institutes are well advised to assess the country's preparedness for the information age, and set aside some thinking, funding and effort for grassroots voluntary drives.

But the biggest challenge in India is to first "wire up" the country's schools. And that infact will be the least of the problems, at least financially. How? Let us see.

How about a programme of providing one school in one village with at least 10 PCs a year, 5 modems, 5 free Internet accounts per year? That should be a good start. What would be the financial implications of this?

10 PCs: Rs. 3,50,000

5 modems: Rs. 25,000

5 telephone lines: Rs. 15000 (Rs.3000 per line)

5 Internet a/c: negligilble, accounts are anyway becoming free

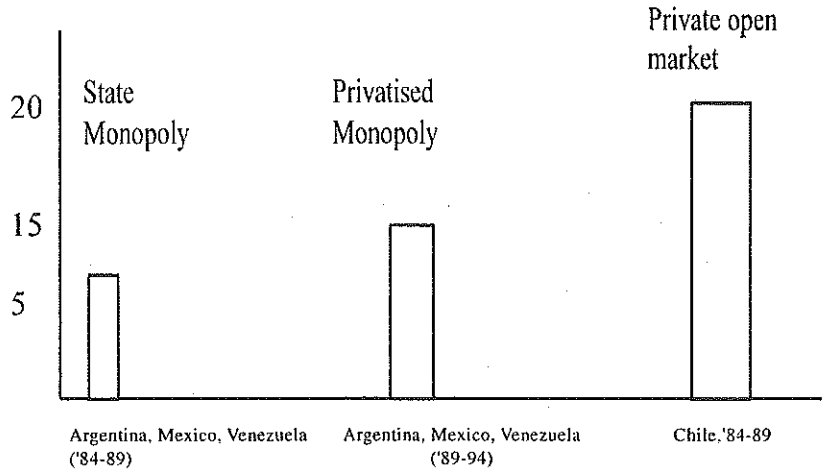
The local district NIC centre could provide workshops, technical magazines and training.

The existing physical infrastructure (buildings etc.) can be utilised.

Thus, the total cost of this comes out to be around ***3.90 lacs for one school.*** If the government sets a target of wiring up 1000 villages in a year, the total investment comes around to Rs.39 crores p.a. Not a high amount by any stretch of imagination. In fact, if the government provides suitable tax incentives, the private sector will pick up the tab easily. But the real drawbacks will confront us subsequent to this.

High Telecom Charges

But the essential drawback of this scheme is the telecom costs. Today, long distance teleom tariffs are prohibitively expensive, thanks to the monopoly rents being charged by VSNL/DoT. And remote villages will have to use long distance telephone calls to connect to the nearest international gateway. And it is here that the costs of operating this scheme will become prohibitively expensive. And international gateways will almost never be set up to cater to remote villages. Th solution is a drastically reduced long distance telecom tariff rate. This can be brought about by privatisation of both domestic and international long distance telephony.(The National Telecom Policy, 1999 has set a date of 2003 for the privatisation of international long distance telephony). But there are numerous points of contention yet to be resolved. The prime being the no. of operators to be allowed. The DoT is insisting on keeping a numerical tab on the no. of operators. This doesn't allow drastic reduction in tariffs. On the other hand, if the government treats long distance telephony as a natural monopoly, VSNL/DoTS should not be allowed to charge monopoly tariffs, and should be forced by the regulator to pass on most of the surplus to the consumer. Also, results across the world have shown that open markets have a faster rate of growth than state monopolies in the telecom sector.



Source: WDR,1998

Infrastructural constraints

The next big drawback of this scheme will again be the "elitist" bias of implementation. This scheme can be implemented only in areas that have access to electricity and at least a decent physical infrastructure (like school buildings etc.). The APPLE experiment was carried out with secondary power equipment like generators and batteries. But a sustained IT programme of the nature described above will require basic infrastructure. And in absence of that, the programme will be restricted only to the more developed regions.

But as a start, it is not a bad idea to start such a programme, even if it is restricted to the more developed areas. After all, the green revolution too was started in the more prosperous regions of Punjab and Haryana.

Net-enabled Farming: an exciting possibility

Background

Traditional farming in cash crops and small plot specialty crop production can benefit substantially in profitability and efficiency by the provision of an electronic network to all farmers and their customers. The Panchayat/ State Government should sponsor the design and development of such a network over a two-year period to be spun off to a private sector cooperative consisting of its users.

Profitable production of specialty crops is more than just sticking seeds in the ground. A successful operation, even on three acres, requires marketing, product selection, scheduling, transportation, quality control, financial management and accounting and access to equipment and technical expertise. For a homeowner to attempt to manage all these functions single handedly is an exercise in dedication and effort few people with the land and talent are willing to undertake for long. Yet most of the thousand owners of small rural parcels would like to be able to make something of their land beyond grazing it.

Fortunately most of the ancillary activities, like marketing, are information rich, suggesting that benefits can be realized by information automation. Similarly, several, like transportation, can be made less costly and more efficient by cooperation and horizontal integration for which computers are ideally suited.

Hence the industry can be greatly advanced and increased in size by the development of an area-wide information system made possible by computers. Such a system would increase profits by providing economies of scale, distribution of labor and integrated planning, and in size by greater efficiency.

Information Automation

Three large time-consumers of the SCP farmer are labor, marketing and transportation. In fourth place, for many, is bookkeeping. Computer technology can sharply reduce marketing, transportation and bookkeeping time demands. Then the labor problem could, in many cases, be handled more comfortably by the owners. Often the size of operations could be increased with increased profit to the producer and a wider range of better products for consumers at lower prices. New agriculture - related taxable businesses would spring up to support an expanded industry.

The technology involves setting up a private wide area communications network on the Internet connecting the computers of interested producers in the area, consumers anywhere and others by telephone to a single communications and information processing node consisting of a substantial computer which provides to the participants a large data base. Messages would flow into the central computer from the home computers of several hundred users, and would be visible on their

screens. Messages from the central computer describing transactions would flow to the participants in the net for information and action. This kind of system is familiar to users of AOL in the US, for example, where advertisements and opportunities to make a purchase are frequently displayed.

Marketing

Producers would list the produce they will have for sale on any day by quantity, quality and an acceptable price. Buyers scan this list and make offers for specific batches to which producers respond, or list their needs and propose a bid price much like traders in a stock market. Buyers likewise can request bids from producers to grow all or part of a particular product quantity for a season and growers can respond. ***An experiment of this sort is already underway at the Azadpur Mandi in Delhi.***

Sellers are any agricultural enterprise that can produce, harvest and pack a product. Buyers (restaurants, fast food suppliers, brokers for major chains, convenience stores, small markets, specialty shops, households and institutions, and farmers markets) are any unit which is interested in purchasing any quantity of specialty crops.

Each day in season, there could be one or more auctions. Over a short period of time -an hour, perhaps- negotiations would take place via the bulletin board between sellers of batches of produce and buyers. The result, usually, would be a clearing price for each product by quality.

The producer, following an established protocol, enters his producer code, the product, its quality, and the time and quantity it will be available. This data, called a batch, is listed by crop and within crop and quality class by producer who may specify a minimum price.

Buyers may bid by Internet on any batch listed, by quantity and price. The highest price offered for any batch or portion of a batch is posted (the batch being split if the highest price is for part of a batch). At some time certain, usually within an hour, bidding is closed. Then the producers call in and either accept or reject the bid price for their batches.

The producer might reject the highest offer and find some other way of marketing or simply wait until the next day. Products with shelf life are transferred to the next day's list with appropriate quality indicators if the producer so chooses. Delivery of accepted offers is according to pre-established procedures as are packaging, payment, quality control, etc.

For all buyers and sellers who agree, whether via the auction or by private treaty, each batch is added to the list of items to be transported from the farms to the consumers.

Transportation

The list of items to be transported by origin, weight and destination would be transferred to a computer program which generates a series of optimum routes gathering up all the batches and delivering them to their customers. This list is sent to various pre-qualified truckers who bid on routes. The lowest price for each route is selected, the route transferred to the trucker with a schedule of batches, origins and destinations. Buyers and sellers split the cost based on ton miles per batch and other factors.

Book-keeping

As pickups and deliveries are made, these events are reported to the central computer node. When distribution is complete, accounting is performed crediting each seller with the amount agreed to and debiting that amount to the receiving buyer. The node then collects from the bank account of each buyer the amount due for all batches regardless of source and distributes the amount due to the bank account of each source regardless of buyer. Detailed reports are later mailed to each participant.

Planning

Sellers will adjust their crop mix (a longer term process) to better meet the market on the basis of experience the previous season and statistics gathered by the system. Certainly any producer who wishes to establish a private relationship with a consumer is free to do so but the information in the data base of the system (suitably sanitized) is available to anyone including growers not in the system in order to maximize profitability.

Support Systems

Existing agricultural service organizations such as the Extension Service, the Farm Service Agency, relevant state and Federal agencies including VPI and support groups such as soil testing laboratories, seed producers and suppliers would be accessible through the system in response to queries.

Farmers' Market

This system adds a new service for farmers' markets which traditionally serve as locations where farmers gather to display their produce for sale and buyers assemble to buy. In this "virtual" marketplace, the buying and selling is completed before the goods are delivered. The market becomes a micro-distribution point from producers of small quantities of goods.

Alternately, the manager of the market may take delivery on and display fairly large quantities of goods for public consumption in small quantities adding his own markup, much like a supermarket. In this case the manager has made his deals with producers and paid his share of the transportation costs. From the standpoint of the system, the manager is the ultimate consumer. Such a system does not intrude on the behavior of traditional buyers and sellers.

Traditional crops and livestock operations can also benefit from such a system since commodity exchanges, auction houses and grain buyers and suppliers of seed and equipment would also be "on the net" and in general willing to compete for the business.

This experiment was carried out in a county called Loudon in England, and with great success. It is not impossible to replicate this experiment in the more developed parts of the countryside in India. This is especially true for the "green-revolution areas".

India: state of the network	
No. of PC's	*4 million*
No. of Internet Connections	*1 million*
No. of Cable TV Households	*20 million*
No. of telephones	*25 million*

It is evident that the trick is to maximize the "access" of the net to the masses. Processes can be "net-enabled", but the enabled processes should ultimately benefit the end user, and not be an end in itself. And that is a major problem in India, which today, has only half a million net subscribers.

It is a fact that telecom and IT have *"converged"* like never before through the internet. And the rural sector can be the biggest beneficiary of this convergence. No longer is the Personal Computer needed to link up with the rest of the world. And at the same time, there is no longer any need to pay high, exorbitant long distance telephone charges either. Voice-on-internet-protocol and *Internet telephony* has made access much cheaper and easier. Now, the existing village telephone network can be used by the villager to connect to the world at low costs. India has just 4 million PCs, almost a negligible no. of them in the rural sector, but 25 million telephones. These can be used as primary access devices for the net in the rural sector.

But for this, policy roadblocks will have to be removed. Internet telephony is still illegal, and it is seriously hampering the growth of internet access to the masses.

Much of the success of the Internet as a medium and as an economy depends on universal or near-universal access for citizens to cyberspace. But unlike ordinary telecommunications service, issues relating to access to the Internet do not stop at the level of the line and the device - that's where Net access issues begin.

Since the Net is a two-way communications and publishing medium, access issues (especially in emerging economies) should also take into account what publishing and communication resources are available at the user end. Internet users, after all, are not just consumers but producers and active participants in the information economy (or "prosumers," according to Alvin Toffler).

The Six C's of a successful national Internet agenda, then, could be aptly summed up as: connectivity, content, community, commerce, capacity and culture. In other words, national and local connectivity to the Net must also be coupled with locally relevant content, community groupings and e-commerce offerings. This entails challenges to local socio-political cultures and intra-organisational cultures. Gearing up to meet all these challenges requires local capacity in terms of technical expertise and organisational/national leadership.

Recent developments in Asia have made many Internet professionals and policy makers sit up and take notice of the importance of Net access not just for the domestic audience, but for the diaspora populations as well (especially for India, China and Vietnam). The Net was used by the global Chinese diaspora to coordinate protests against the human rights abuses of ethnic Chinese (www.huaren.org) during the recent riots in Indonesia . India's National InfoTech Task Force (it-taskforce.nic.in) used the Web to publicise and seek feedback on its policy recommendations. Thailand's SchoolNet initiative (www.school.net.th) has reportedly succeeded in wiring all its schools to the Net. And the recently published World Bank report on "Knowledge in Development" focused on the centrality of knowledge-oriented capacity in narrowing the knowledge gap between the industrialised and the emerging economies.

Connectivity issues fall into four categories: configuring and building a national Internet infrastructure with links to the global Net, regulations pertaining to Internet access providers (such as licenses for ISPs, permissibility of Internet telephony and site censorship), local access points (community access centres, public kiosks, cybercafes), and tariffs pertaining to Internet devices (customs duties on computers, servers, modems).

Several recent Internet initiatives reveal a mix of these four elements. For instance, the Leland Initiative aims to wire several African capitals

and universities to the global Internet; Malaysia recently opened up the ISP business to 6 new private players, but countries like India are moving very slowly to end government ISP monopolies; countries like China and Turkey have been cracking down on dissidents using the Net as a channel, revealing the perceived duality of the Net as a medium in these countries.

While universal access will continue to be a difficult proposition in many developing countries, several are moving in the direction of phased rollout of Internet access especially to educational and small-scale commercial organisations. For instance, Internet access initiatives at the school and library level are under way in Kerala and Goa (in India), Hong Kong, Australia (thanks to the National Office for the Information Economy), and voluntary initiatives like NetDay.

Internet access for SMEs has been launched for small-scale traders in Madurai (south India - www.maditssia.com), handicrafts organisations in Latin America (through PeopLink - www.peoplink.org) and the Asia-Pacific Coconut Community (www.apcc.org.sg).

At the level of Internet products and services, effective deregulation of the telecom sector and the lowering of computer taxes in Sri Lanka has led to the blossoming of 7 new ISPs and a doubling of the Internet user base this year. Singapore, too has undertaken numerous initiatives promoting local broadband Internet access and online community formation.

For those who still find the high costs of computers and modems as barriers to entry, initiatives like World-Tel's Internet Community Internet Access Centres (www.world-tel.com) are under way in Peru and Indian states like Tamil Nadu. For instance, in Tamil Nadu, World-Tel is involved in a $60 million project to setup 1,000 community access centres with 20 terminals each, employing about 50,000 people and giving a boost to the local content and services industries in Tamil Nadu.

Global initiatives like the UNDP's Sustainable Development Networking Programme have found that harnessing local communications entrepreneurship (eg. through video shops and phone kiosks) is key in proliferating Internet access for the masses.

At the government level, Indonesia's PTT has a network called WasantaraNet which provides e-mail access in post offices. Global IT giants also in the access and awareness promotion business include Cisco (with its "Internet Schools" in India, China, Taiwan, Philippines) and Microsoft (with its support for Malaysia's "Smart School" programme).

Once policy-makers are sufficiently convinced of the value of widespread Internet access, the push for Internet diffusion will come not only from the grassroots users but top level government agencies as well. The task for concerned Internet professionals is to chronicle such development benefits and share them with their counterparts in other countries so as to enrich the discourse over access benefits.

And most importantly, the political class of this country has to look beyond the limits of obscurantist nationalism/protection in order to usher in the real "information economy", even in the rural sector.

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