Research Article

eChoupals: A Study on the Financial Sustainability of Village Internet Centers in Rural Madhya Pradesh

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Abstract

Over the past few years, the long-term sustainability of ICT initiatives has increasingly come under question. Despite persistent doubts, governments, international agencies, NGOs, and private companies are pressing ahead to set up more such projects. This paper studies the financial sustainability of India's largest rural ICT initiative known as eChoupal. *The* eChoupals *are distinct from other telecenter projects in that the value added is not in providing ICT infrastructure alone, but rather, in enabling efficiencies in the agricultural sector through greater information exchange and creation of an alternative market structure.*

An analysis of available data indicates that this project has a potential payback period of 3.9 years. Although several assumptions have been used in these calculations, a sensitivity analysis has been performed to provide a range of possible scenarios that show the profitability of the project. Through this analysis it seems that ICT projects can be financially sustainable when they are viewed not as an end in themselves but as tools to facilitate information exchange whereby, use of the technology enables higher efficiencies in another existing or new business setting, which provides the source of revenue to recover the initial investment.

ICTs and Sustainability

Introduction

The last decade has seen exponential growth in information and communication technologies (ICTs) with computers, digital organizers, mobile phones, Internet, and wireless computing spreading all across the globe. These technologies have unleashed a "cultural revolution in the way individuals and organizations interact, in terms of time, cost and distance" (Munyua, 2000). Apart from changing business and government activities, the potential of these technologies to act as a catalyst to promote socio-economic development in Third World countries has become a popular topic of discussion among development agencies, NGOs, governments, academicians, and experts. The Food and Agricultural Organization of the United Nations noted in one of the earliest books on the topic of ICTs and development that being a "flexible, decentralized, information-sharing tool," the Internet

> offer[ed] the possibility of initiating economic development for agricultural producers, expanding the effectiveness of community development programmes, increasing the amount of participatory research conducted, promoting small business enterprises, and improving news

> media networks. If used as a tool for encouraging two-way communication processes and creating links between people, then it may open up new opportunities for rural people to participate in the global society (Paisley and Richardson, 1998).

In the 1980s, community access points (CAPs) emerged in Scandinavia whereby entire communities accessed computer technology through a shared center known as a *telecottage.* Since the mid-1990s, there has been an explosion of such centers—now called *telecenters*—that deploy Internet technology supported by international and national donor agencies, governments, and even private-sector companies in developing countries. Roman and Colle (2002) from Cornell University characterize this "telecenter movement" as an eclectic process, largely devoid of systematic research and planning. Billions of dollars have been allocated by first-world development organizations, such as the G8, World Bank, UNDP, and bilateral grant agencies, in addition to developing country governments and nonprofit organizations, to set up and sustain these projects. Little careful empirical study, however, has been conducted to evaluate the impact of ICTs on poverty reduction or socioeconomic development. In fact, according to Heeks and Davies (1999),

> failure has been downplayed. . . . estimates suggest that the majority of ICT based initiatives end in *total failure* of a system that never works; *partial failure* in which major goals are unattained or in which there are significant undesirable outcomes; *sustainability failure* that succeeds initially but then fails after a year or so; or *replication failure* of a pilot scheme that cannot be reproduced (authors' emphasis).

In the context of finite and time-bound donor funding, sustainability in the long run and replication (or scalability) of the project are crucial factors. Typically, donor agencies do not expect to fund these projects beyond an initial incubation period, and evaluation of community telecenters focuses carefully on returns on financial and other investments apart from the achievement of initial social objectives (Whyte, 2001). The International Development and Research Centre (IDRC) of Canada demands a strong business plan at the end of a 3-year period, according to Richard Fuchs, director of the Information and Communication Technologies for Development Program Area (Cisler, 2002). The World Bank Development Gateway, the ACACIA initiative of IDRC, the InfoDev program, and the World Summit on Information Society all have sustainability as a vital question on their agenda.

Sustainability

The term *sustainability* seems to have come into common usage as the phrase *sustainable development* emerged in 1987 with the publication of *Our Common Future,* the report of the World Commission on Environment and Development. The commission defined sustainable development as a form of progress that ensures human development and that "meets the needs of the present without compromising the ability of future generations to meet their own needs" (Brundtland, 1987). In the realm of development projects, sustainability most often refers to financing of the project in the long run, either from commercial revenue or from continuing donor support.

Some development experts such as Björn Wellenius (2003) of the World Bank argue that telecenters may not be able to achieve commercial sustainability beyond initial public support in poor and rural localities. In fact, demand for financial sustainability may not even be appropriate given that "many places do not have enough people with money to spend on the needed services," writes Cisler (2002) of the Association for Community Networking, even though the projects may be important to the community. Many telecenters face the question of how they can generate income yet serve those in the community who cannot afford to pay for "public goods" kinds of services, such as access to health information (Roman & Colle, 2002).

It is important to realize that donor money spent on ICT projects means explicitly not investing it in other development areas. Heeks (1999) challenges "ICT fetishists" to demonstrate how ICT-based information represents a more important resource than water, food, land, shelter, production technology, money, skills, or power in the development process. Many of these projects are on a pilot, demonstration, or proof-of-concept level, and most literature enumerates positive impacts of information empowerment on a small scale or an anecdotal basis; but one cannot make inferences for the potential impact of ICTs on a larger scale or for the longer term. The opportunity cost of development money is very high and "telecenters that cannot finance themselves in the long run become a drain on public resources. [Moreover], telecenters not subject to market disciplines lack incentives to perform well and the ability to face competition when it arrives," cautions Wellenius (2003). More significantly, if a telecenter is doing well today, can it continue to provide those benefits in the long term? What happens to the project when the funding runs out? If a telecenter does not generate enough revenue to cover operational and maintenance costs apart from generating a surplus to replace equipment, "inevitable equipment breakdowns and obsolescence will eventually force the telecentre to shut down," warns Proenza of the UN's Food and Agriculture Organization (2001).

In addition to financial sustainability, the literature elaborates on social/cultural, political/institutional, and technological sustainability for long-term survival of telecenters. Batchelor and Norrish (2002) define social sustainability as minimizing social exclusion and maximizing social equity. This means ensuring access to the telecentre for heterogeneous groups of people in the community and responding to their different needs. Delgadillo et al. (2002) of the IDRC observe that "if people in the community feel themselves empowered by the telecentre, they will be more active in seeking ways to keep it running."

Political sustainability stems from the recognition that one of the biggest threats to ICT-enabled projects is resistance to change, particularly from vested interests set to lose out in the process of information exchange (Tinio, 2002–2003). Gaining the cooperation of community leaders and policy makers is necessary to create an environment or a "regulatory framework that will protect, promote and support community telecentres and their activities" (Delgadillo et al., 2002).

Technological sustainability is fundamentally related to financial sustainability since the most visible cost usually comprises equipment and technical maintenance. Various projects are trying to adopt modular techniques to make these components of sustainability an integral part of their functioning. Nevertheless, Munyua (2000) notes that "most projects established with external funding face major challenges after the project period has ended. . . . There are as yet few examples of success in attaining such sustainability, and there is an urgent need for viable models to be developed and tested.

This paper is a study of a commercially motivated, rural ICT initiative in the state of Madhya Pradesh in India focusing on the question of financial sustainability. It does not address the questions of social, political, technological, or institutional sustainability, which are perhaps more important. While recognizing this limitation of the paper, the author has chosen to focus on financial sustainability because without it, the project will not survive. The concerns of sociopolitical impact (for instance, impact based on caste, class, gender, and occupation, and the relationship of the project to political and institutional forces in the village, etc.) will be addressed by the author in a forthcoming paper.

ICT Projects in India

The software services export boom in India has been accompanied by another, parallel explosion of projects described by the *Economic and Political Weekly* as "one of the largest set of civil society experiments to use ICTs to empower as well as to increase the range of services to the marginalised at reduced costs" (Vijaybhaskar & Gayathri, 2003). Not only have several state governments and nonprofit institutions started ICT projects such as Gyandoot, Bhoomi, TARAhaat, and Jiva telecenters,[1] but increasingly venture capitalists have entered the fray. A sound business plan, stressing market knowledge, economical use of resources, and revenue generating capacity (Delgadillo et al., 2002), has been the hallmark of these commercially-sponsored ventures, which aim to tap the potential market of 600–700 million Indians living in rural areas by using information technology to provide them with much-needed connectivity and ICT-based services.

This paper undertakes an evaluation of the financial sustainability of India's largest commercial ICT project, started by the India Tobacco Company's

1. Gyandoot: an e-government project started in 2000 in Dhar district, Madhya Pradesh (www.gyandoot.nic.in); Bhoomi: an online land records available through kiosks set up by the government of Karnataka (http://www.revdept-01.kar.nic.in); TARAhaat: an e-commerce portal and telecenters set up by the NGO Development Alternatives (www.tarahaat.com); Jiva Institute: telecenters known as Baatchit that provide education and other services (http://www.jiva.org/enterprise/baatchit.asp).

International Business Division (ITC-IBD),[2] known as the *eChoupals.* The eChoupals are unique in conception and different from the usual telecenter project. Their actual value proposition is the provision of futures' price information and the creation of an alternative buying infrastructure, which is supported by computers and connectivity. Financial sustainability of the eChoupals depends on the ability to recover the investment of the ICT infrastructure but the returns to this project are not from transactions related to the computer but rather from the larger re-engineering of the agricultural supply chain. Most ICT projects set up the infrastructure and then figure out how best to recover the cost of that investment. The struggle is to find viable business propositions by providing information or services through the established network. In contrast, the eChoupals (also known as *soyachoupals*[3] in the state of Madhya Pradesh where the primary rainy/summer season crop is soybean) fundamentally differ from this approach. For the eChoupals, ICTs are not valuable in themselves, but generate value only when they enable the creation of an alternative agricultural infrastructure through the exchange of information, as will be evident from the analysis that follows.

Evaluation of available data on revenue and costs of the eChoupals suggests that this initiative has the potential to be financially sustainable in the long run. The payback period for all capital investment and running costs is 3.9 years. This is exceptional given that most ICT projects are struggling even to recover daily operating costs. A sensitivity analysis shows both optimistic and pessimistic scenarios in Table 6, but in the worst case, payback (without depreciation) is 5.8 years, and in the best case, payback is 3.5 years and the project is able to pay for the replacement cost of the entire capital within 7 years. Several assumptions regarding the correct measurement of capital and operating costs, as well as calculations of savings/revenue, are noted in the paper, which could make the conclusion vary to a certain extent. Despite these problems, it is hoped that this study will encourage further empirical research into the question of the long-term sustainability of ICTs for development.

Research Methodology

In December 2002 and January 2003, the author spent 3 weeks studying the eChoupals,[4] first interviewing ITC-IBD personnel at the firm's headquarters in Hyderabad for 5 days, then traveling to the soyachoupals near Bhopal and Indore in Madhya Pradesh for 14 days, speaking to choupal operators, to farmers, and to villagers using the choupals.[5] Detailed questionnaires for operators, farmers, traders, villagers, and ITC-IBD personnel were developed and used as guides for conducting formal and informal interviews. Group discussions were conducted at tea shops, market places, and village congregation areas (*Panchayat bhavans*), as well as at the choupal premises themselves.

Financial data were obtained from the Hyderabad and Bhopal offices in raw form (from ITC-IBD's online financial management software and from data tables on eChoupal transactions maintained by the financial team in Bhopal) and were amalgamated by the author. This was supported by interviews with ITC-IBD operations, finance, and technical managers, with personnel in two processing plants, and with other field staff. For instance, figures for the average cost of an eChoupal were compared from different sources within the company (see Footnote 1 in Table 4) and also cross-checked with the cost of kiosks set up by other projects studied by the author. Similarly, data on operating costs were obtained from separate sources in Hyderabad and Bhopal and were re-checked in interviews with technical support staff. For revenue/

2. ITC-IBD stands for India Tobacco Company-International Business Division. ITC and ITC-IBD are used interchangeably in this paper to denote the same company.

3. eChoupals, choupals, and soyachoupals are used interchangeably in this paper to refer to ITC-IBD's village Internet kiosks in Madhya Pradesh.

4. Prior to research on the eChoupals, the author spent some time working and researching in Uttar Pradesh (north India) at TARAhaat's village Internet centres started by the NGO Development Alternatives. Following this, the author worked with n-Logue Communications, a company based out of the Indian Institute of Technology, Madras, to set up village Internet kiosks and conceptualize and implement Internet-based services in the south Indian state of Tamil Nadu.

5. See Appendix A for a list of the choupals visited and the characteristics of the villages they serviced.

savings data, the output from ITC-IBD's electronic transaction system, *Entrest,* was calculated at Bhopal by adding up total tons bought by ITC-IBD from all the choupals and using the daily futures' price quoted by ITC. Individual choupals visited by the author were asked to verify the total amount of soybean they had supplied to the company in the last year to see if it tallied with the data in *Entrest* (Appendix A).

The financial analysis was sent to managers in Hyderabad and Bhopal to verify the accuracy of the statistics and claims made in the paper. They suggested a number of corrections, which have been incorporated into the analysis.[6] The data have been put through rigorous tests using conservative discounting rates for the opportunity cost of capital, the failure of monsoons (since the revenue is directly dependent on buying agricultural produce), and differing rates of depreciation. Six scenarios were analyzed, ranging from highly pessimistic to fairly optimistic, based on revenue data from soybean procurement. If other potential revenue streams using the existing infrastructure are added (savings from buying wheat and commission from rural distribution through the same choupals) then profitability in all scenarios is fairly realistic.

The paper is organized as follows. Section two describes the soybean agricultural market structure in Madhya Pradesh followed by the changes brought through the eChoupals and analyzes the benefits accruing to farmers and ITC-IBD (Table 1). The third section and Table 2 enumerate the total revenue for ITC-IBD over a 16-month period and discusses possible sources of revenue in the future. The fourth section presents ITC's variation of the telecenter model and the fifth section enumerates the capital costs and operating costs of the eChoupals (Tables 3, 4, and 5), which have been completely borne by ITC. This is followed by an analysis of the financial data in Table 6 using standard measures of return on investment and payback period to ascertain the financial sustainability of the project. In the last section, this paper provides a brief discussion of the social context of the eChoupals in the villages and reflects upon the potential of this large-scale project to bring about significant changes in rural India.

eChoupal's Proposition

Intermediaries in Soybean Agriculture

ITC-IBD is the 13-year-old agri-business division of the large Indian conglomerate, India Tobacco Company Ltd. ITC-IBD primarily procures and exports agricultural commodities in raw or processed form and is India's largest overall agricultural exporter. With the opening up of Indian agricultural markets in 1996–97 under the World Trade Organization's rules, ITC faced increasing competition from large, low-cost suppliers of agricultural products in the United States, Brazil, and other countries. ITC's procurement costs were much higher due to gross inefficiencies in India's markets, detailed in an influential report on the state of Indian agriculture released in 1997 by McKinsey and Company (FAIDA report; Confederation of Indian Industry and McKinsey and Company 1997). This report lamented India's low productivity and wastage in production and distribution, particularly arising from the small size of landholdings in the country, as a source of higher costs to processors like ITC.

Let us take the example of soybean. ITC-IBD has a network of 130–140 commission agents (CAGs, or traders) in the state of Madhya Pradesh who coordinate the buying of soybean from wholesale market yards (*mandis*) and from a network of smaller traders. ITC-IBD arranges for the processing of all soybean it buys to produce soybean oil, which is sold domestically, and de-oiled cake, which is exported for cattle feed to the Middle East and Southeast Asia. Farmers bring their produce in trolleys, or small wagons, to the mandi, where it is auctioned to a group of traders, some of whom are agents for companies like ITC. These agents weigh and bag the material they purchase, settle the price for the farmer and send the produce to ITC's warehouses for processing. ITC pays its agents a commission along with the cost of bagging and transportation over and above the price of soybean. Farmers, too, have to pay the agents for weighing the produce once it has been auctioned and for labor charges in-

6. ITC-IBD was open and cooperative, both in providing the data and in checking the financial analysis. However, any errors that remain and claims made in the conclusion are the sole responsibility of the author.

volved in moving it to the agent's warehouse. Many agents directly collect the produce of large farmers from the village itself (and get paid extra), while small and medium-sized farmers usually take their produce to the village trader who, in turn, goes to the mandi to sell to larger commission agents, such as ITC.

Given the lack of basic physical infrastructure in the Indian countryside, such as paved roads, cold storage facilities, warehouses, telecom connectivity, etc., and given the geographic dispersion of farmers and the small farm sizes, traders, commission agents, and local mandis have been seen as necessary to ensure the distribution of agricultural produce. These middlemen take the responsibility for quality and bear the financial risk of trading with large numbers of farmers. Often, they are also the brokers of financial capital for seeds and inputs (seed, fertilizer, and pesticides).

Local traders have the power to quote a given price to farmers, as well as the authority to downgrade the price according to their own estimation of the quality of the produce. Manohar Mandloi, an eChoupal entrepreneur from Kurana village, elaborates, "Traders change their prices all day. In the morning they will buy at a higher price, say, one truck for 1,300 Rs. a quintal and another for 1,000 Rs. Over the course of the day, they will keep reducing the price and finally buy several inferior quality lots just for 400–500 Rs.[7] Then they mix it all and sell it for a profit." In this manner, ITC and other companies get a lower overall quality of soybean, which upon processing yields less oil and more contaminated de-oiled cake.

In the mandi, although the auction generally takes place in a competitive manner,[8] prices fluctuate at least 20 rupees per quintal in either direction on a daily basis. Ever since the soybean market in India was pegged to the world price in 1999, however, downward and upward trends have become more difficult to ascertain. Earlier, it was clear that if a farmer was able to hold on to the crop and sell after the season was over (i.e., after January or February rather than in September or October), he would get a better price. Today, with soybean from Brazil and the United States coming on the market at different times of the year, the fluctuation in prices has become uncertain over the course of a year.[9] Traders have information on these price fluctuations through their contact with larger market yards and export companies like ITC, and are able to maximize their own profit margins at the expense of farmers who are unable to predict price changes.

Market Price Information

To lower its procurement cost and improve its quality of soybean, in 2000 ITC-IBD developed the concept of the eChoupal. eChoupals are village Internet kiosks run by local entrepreneurs who provide futures' price information to farmers[10] and enable them to sell their produce directly to ITC, bypassing the middlemen and wholesale market yards (mandis). Through the eChoupals, ITC spends less per ton of produce (since it is not paying commissions and transaction costs to middlemen) and farmers know the price they will receive for their produce if they sell the next day.

Best and Maclay (2002) have called into question the benefits of the provision of market price information for the agricultural sector. They argue that other community characteristics including availability of transport, credit, and alternative markets are important factors that determine whether farmers can act upon the market price information they have obtained. The eChoupal concept has taken this into account by setting up a buying infrastructure parallel to the traditional mandi system. This includes four processing plants and nine warehouses in Madhya Pradesh (that were in operation as of January 2003) where farmers can come directly with their produce, reimbursement of transport costs to

7. One dollar was equal to approximately 50 rupees (Rs.) in 2003.

8. There are certain problems even with the mandi system where the high cost of entry for traders, a monopoly by an influential group of agents, and price fixing are not unknown. Delving into these issues, however, is beyond the scope of this paper.

9. See http://www.cbot.com/cbot/pub/page/0,3181,1288,00.html for historical soybean price volatility at the Chicago Board of Trade. Accessed March 10, 2004.

10. ITC pegs the price for each day based on the previous day's international market rate for soybean. ITC takes a risk in that, if the market plunges the next day, ITC still must honor its commitment to farmers at the quoted futures' price, and incur a loss.

farmers at a fixed rate per quintal,[11] and an entrepreneur (called a *sanchalak*)[12] who runs the choupal in the village helps farmers analyze the price information, and arranges transportation. In many cases, sanchalaks transport the material at their own expense to compete against traders who come to the village and directly negotiate deals with large farmers, thus bypassing the mandi altogether.[13]

The main advantage of ITC's price is that it is a quote for the future. Usually when a farmer sells at the mandi, he has already borne the expense of bringing his produce to market and is forced to sell at whatever rate he can get because it is too expensive to transport the material back to the village and back to market. He may have found out the prevailing rate from returning farmers along the highway or from local trading outposts or even from the local language newspaper in the region, but these prices are for earlier in the day or the prior day. Through the eChoupal, before leaving the village farmers know what price to expect based on a particular level of quality. Moreover, those choupals with Internet access can provide access to world market trends in soybean from the Chicago Board of Trade.[14]

eChoupal versus the Mandi[15]

Once a farmer has decided to sell to ITC, the sanchalak gives him a *sauda* number (transaction slip) that is shown to the officer at the processing plant or warehouse (to be able to track the amount of soybean coming from each choupal). At the plant, the crop is first tested for quality using an electronic machine in the laboratory. Any farmer who contests the results can ask for resampling and retesting of their crop's quality. If the quality is within the limits of 2% bad seed, 2% foreign matter, and 10% moisture, the farmer obtains the highest price advertised the night before. Inferior quality material is downgraded in price by ITC's sampling officer.[16] Once a farmer accepts the price, the produce is weighed on a large, automated scale instead of on a manual scale. In other words, the entire loaded trolley is weighed, then emptied into the silo

11. ITC was setting up choupals in villages more than 100 km away from its four processing plants, making it difficult for farmers to come all the way. So it started an incentive system to pay a certain amount per quintal as freight expenses for every kilometer farmers traveled to reach the plants. ITC also rented nine warehouses in areas away from the four processing plants so that the nearby choupal farmers could travel less to sell their produce to ITC.

12. There are no women operators/entrepreneurs because ITC's selection criteria specifically call for a male operator of a medium-sized farm in the village. A discussion of the gender implications of this choice, while crucial for evaluating the claims of ICT projects to promote overall rural prosperity and socioeconomic development, is beyond the scope of this paper. This topic will be addressed in a forthcoming article by the author that examines the social aspects of the use and benefits of the eChoupals. This paper refers to operators using the masculine gender to draw attention to this important issue.

13. In other cases, ITC's commission agents organize for bulk transportation and get paid an extra commission from ITC.

14. ITC has been experimenting with a system known as Jhangad, *where farmers "sell" their soybean to ITC as soon as they harvest it, and receive 10% of the total price quoted on that day. They also sign a futures' bond whereby on a day of their choice within the next 6 months, the farmers can come back to ITC and collect the rest of the money based on the price prevailing that day. This way, ITC gets the soybean into its processing system and is able to maintain large buffer stocks to use during the lean season; and farmers lacking storage facilities have the option of getting a higher price sometime in the future by paying a nominal fee to ITC.*

15. One of ITC's processing plants was close to the Mandideep mandi (near Bhopal) and competed directly with the mandi for a share of the soybean from the surrounding areas. The largest trader at this mandi complained that they were losing margins and market share to ITC ever since the eChoupals were started. Moreover, ITC had employed an agent to exclusively buy soybean from this mandi for the processing plant. He could bid in the auction up to ITC's quoted price for the day. This created a minimum price cushion under which no other trader could bid and get away with it unless the quality of the material was very poor. Thus, even at this particular mandi, farmers were assured of getting, at minimum, ITC's price for their crop (albeit without the other benefits of freight reimbursements, etc.). Farmers who came to sell specifically at the mandi would often inquire about ITC's price to make sure they were getting the best possible deal.

16. While this may be better than a manipulative trader, there are margins of error in this system. both machine and human. The lab technician pegged the machine at about 3–4% margin of error but did not consider this to be significantly large. Most farmers seemed to treat the lab's analysis as "genuine" compared to the trader's "sight" analysis. While in practice disputes may occur, the author did not have an opportunity to witness such a case.

and reweighed to get the weight of the soybean delivered. In the manual process of the mandi, the material was packed into bags that were then weighed, leaving room for seeds to fall on the ground and excluded from the weighing. Furthermore, the mandi process gave the person balancing the scales an undue advantage to tip against the farmer. Many farmers complained that they would regularly lose 1–2 kilograms per bag (each bag holds approximately 90 kg of material) at the mandi compared with ITC's electronic weigh-bridge. The farmer had to pay the trader in the mandi for *tulai* (labor charges for weighing) and *hammali* (labor charges for bagging and storing). In ITC's case, these services are free, since the grain is directly stored in ITC's silos, instead of being bagged. And finally, ITC gives farmers full payment for produce at the time of the transaction, unlike the mandi, the government-buying center (*Tilansangh*), or even many traders who pay in installments or pay after some amount of time ranging from a few days to a few months. The farmer's cost of selling to ITC is reduced to nearly zero since there is no payment for bagging or weighing, and freight is paid by ITC.[17] ITC-IBD estimates that on average it saves Rs. 275 per ton of soybean purchased through the choupals, while farmers save Rs. 270 per ton. Table 1 shows the average transaction costs incurred both by ITC and the farmer in the traditional system and through the choupals.

Soybean procurement is only one aspect of the larger project of ITC's eChoupal network. ITC also provides updates on the weather and access to lower-priced inputs through pooled purchasing at wholesale prices. Further, ITC has plans over the next several years to use the choupal network to connect farmers to agricultural scientists and to information on best practices to encourage higher productivity. With improving rural incomes, ITC hopes to convert the buying process into a cost-effective rural distribution network selling consumer products, to villagers, such as motorbikes and televisions, and services, such as insurance.

ITC-IBD's Revenue and Savings from the Soyachoupals

Table 2 calculates the savings accruing to ITC over the first 16 months of operation of the eChoupals to December 2002. The data for Year 1 is for the entire year, while the data for Year 2 is for the first 4 months of the season.

From the nearly 73,400 tons of soybean purchased through the eChoupals in the first season (over and above the regular procurement of soybean through ITC's commission agents in the mandis—nearly 30% of all soybean bought by ITC that year), ITC calculated that it saved Rs. 13.3 million in transaction costs or almost 2% of the total value of the produce (Table 2). Moreover, through the choupal system, the produce comes loose in trolleys (usually from a single farm) without being mixed and bagged at the mandi, and is of better quality compared with mandi-procured soybean.[18] Consequently, ITC-IBD estimates saving Rs. 12.9 million in the first year of operation through better quality of oil and de-oiled cake after processing the choupal soybean (Table 2).[19]

Of a total 460 choupals in operation during the first year (September 2001 to June 2002), farmers

17. At certain ITC warehouses where electronic weighing machines are not available, farmers have to pay for manual weighing at the rate of Rs. 3–5 per quintal up to 10–15 Rs. per quintal. Also, at the Indore processing plant, payment for freight was discontinued due to irregularities. Instead, the price per ton was increased by Rs. 20–30 across the board. Many large farmers do not even travel to the mandi to sell their produce since traders negotiate the deal at the village and pick up the material as soon as it is threshed. For these farmers, the opportunity cost of the time they spend transporting the produce is an important component of the cost. Thus, transaction costs for farmers would not be zero in all cases.

18. The choupal material usually comes directly on trolleys and is not mixed or bagged, and is directly unloaded into the silos. Material from CAGs usually comes bagged in trucks, which are then unloaded into huge storage areas covered by tarpaulin.

19. In the first year, ITC ran a separate batch of soybean procured from the choupal through its processing plant and then ran a batch of material from the mandi. The difference obtained in quality was used as the baseline for calculating savings of approximately Rs. 200 per ton. In all, Rs. 7.5 million were saved as crude oil, Rs. 2 million as refined oil, and Rs. 3.4 million as protein content of the de-oiled cake, or a total of Rs. 12.9 million. This data was provided by Raghav Jhawar, finance manager, ITC-IBD Bhopal.

Table 1. Transaction Costs for Farmers and ITC-IBD in Rupees per Metric Ton[1]

	Through the Mandi		Through the Choupal	
	Details of Cost	**Amount**	**Details of Cost**	**Amount**
Farmer Pays	Transport to mandi	100	Transport to Processing Plant[6]	0
	Bagging and Weighing Labor[2]	70	Bagging and Weighing Labor	0
	Labor Khadi Karai[2]	50	Labor Khadi Karai	0
	Handling Loss[2]	50	Handling Loss	0
	TOTAL	270	TOTAL	0
ITC-IBD Pays	Commission to CAG	100	Commission to Sanchalak[4]	50
	Cost of Gunny Bags[3]	75	Cost of Gunny Bags	0
	Labor for Stitching Loading[3]	35	Cash Distribution Cost[5]	50
	Labor for Unloading at Factory[3]	35	Labor for Unloading at Factory[5]	35
	Transport to Factory	250	Transport to Factory (Paid to Farmer)[6]	100
	Transit Losses	10	Transit Losses	0
	TOTAL	505	TOTAL	235

Savings per ton to ITC-IBD is Rs. 275.

[1]All figures in this table have been estimated by ITC-IBD.
[2]Farmers must pay the laborers who pack their loose material into gunny bags and weigh it. Labor Khadi Karai is payment for moving the bags to the agent's warehouse. Handling loss occurs when the produce is packed into bags and some seeds fall on the ground.
[3]The material from different farmers is mixed by the laborers, put into bags and the bags are stitched up at the agent's warehouse. A truck is hired to transport the stitched bags to the processing plant where another set of laborers unloads them. All this is paid for by ITC-IBD.
[4]Instead of paying CAGs, ITC pays a commission per ton to the person who runs the choupal in the village. This person, called the sanchalak, advertises the choupal to farmers, informs them of ITC's price and the market price, and gives them a transaction slip when they decide to sell to ITC.
[5]Through the choupal system, ITC must pay the farmers and sanchalaks as well as manage large cash flows. ITC has commissioned a bank or its CAGs to do the same.
[6]ITC has started an incentive system to attract more farmers to use the choupals whereby it pays freight charges to farmers as a fixed amount per kilometer for the distance from village to factory.

from 280 choupals sold soybean to ITC.[20] In the second season, starting September 2002, the number of choupals increased to 796 and total procurement at the end of 4 months (through December 31, 2002) was 60,547 tons from the 550 choupals in operation. This was nearly 43.8% of the total procurement for ITC in those 4 months and seems quite large compared with the 73,400 tons in the first year. However, given that most of the soybean is sold by farmers in the early part of the season and that the number of choupals sending in soybean increased from 280 to 550, this procurement was very low. A poor soybean crop yield due to delayed monsoon rains was the main cause. Average output per acre in the second year was close to 3–4 quintals per acre instead of the usual 7–10 quintals per acre. Second, due to increasing price fluctuations in world markets, there were many days when prices in the mandi were greater than those ITC had quoted the previous day (the average price per ton in the second year was approximately Rs. 11,700 compared with Rs. 9,800 in Year 1). Thus, even when farmers had taken the transaction slip from the sanchalak and were on their way to the ITC processing plant or hub, if they encountered a mandi on the way buying at a higher price, they would sell there instead. The financial calculations in section five of this paper take into account the probability of a

20. The season starts with planting of soybean in June–July, and it ends with the sale of nearly 60–70% of the harvest by December–January. The rest of the harvest trickles in until next June when the new planting season begins. September is chosen as the start date for financial calculations because that is when the freshly harvested soybean first comes to market.

Table 2. Cost-Revenue-Savings Analysis of Procurement of Soybean through the Soyachoupals[1]

A	B	C	D	E	F	G	H
Year of Operation[2]	Quantity of Soybean Bought Through the Soyachoupals (Metric Tons)	Quantity of Soybean Bought by ITC Through All Sources (CAG,[3] Mandi, Choupal)	Percentage of Choupal Quantity as Part of the Total Soybean Quantity	Cost of Soybean Bought Through Soyachoupals[4] (Rupees)	Cost of Soybean Bought by ITC Through All Sources (Rupees)	Number of Choupals Installed by Year-end	Number of Choupals Active (That Sold Soybean to ITC) by the Year-end
Sep. 2001 – Aug. 2002	73,400 tons	268,068 tons	27.38%	Rs. 725,000,000	Rs. 3,240,952,712	460	280
Sep. 2002 – Dec. 31, 2002	60,547 tons[5]	138,524 tons	43.79%	Rs. 773,600,000[5]	Rs. 1,778,173,204[5]	796	550
Overall for 16 Months	133,947 tons	406,592 tons	32.94%	Rs. 1,498,600,000	Rs. 5,019,125,916	—	—

[1] *The data for this table were provided by Raghav Jhawar, finance manager-Bhopal, ITC-IBD.*
[2] *The first season for procurement of soybean through the soyachoupals was from Sep. 2001–Aug. 2002. The soya sale calendar is actually from September to June when the next crop is sown. The second season has data only for 4 months.*
[3] *CAG = Commission Agent. ITC has about 130–140 CAGs in Madhya Pradesh who buy soybean on behalf of ITC at the mandis.*
[4] *Total Cost is the aggregate Landed Cost for ITC to procure soybean from the Choupals each day. Landed Cost includes price paid to farmer (raw material price), commission to Sanchalak, transportation and bagging (if required), and other associated costs.*
[5] *Average Price of soybean per ton was Rs. 11,719.79 in Year 2 compared with Rs. 9,890.05 in Year 1. Hence, despite the smaller quantity, the cost was much greater in Year 2. The daily price of soybean seed is governed by international market fluctuations.*

Table 2 continued. Cost-Revenue-Savings Analysis of Procurement of Soybean through the Soyachoupals

A	I	J	K	L	M	N	O
Year of Operation[2]	**Transaction Cost Savings for ITC[6]**	**Average Transaction Cost Savings per Ton for ITC[7]**	**Transaction Cost Savings as a Percentage of Total Cost**	**Savings for ITC Through Improved Quality of Choupal Procurement[8]**	**Savings Through Improved Quality as a Percentage of Total Cost**	**Savings as a Percentage of Total Cost**	**Total Value of Savings (Transaction and Quality)**
Sep. 2001 – Aug. 2002	Rs. 13,300,000	Rs. 181	1.83%	Rs. 12,900,000[9]	1.78%	3.61%	Rs. 26,200,000
Sep. 2002 – Dec. 31, 2002	Rs. 12,500,000	Rs. 211	1.59%	Rs. 3,000,000[10]	0.39%	2.00%	Rs. 15,500,000
Overall for 16 months	Rs. 25,800,000	Rs. 194	1.71%	Rs. 15,900,000	1.06%	2.78%	Rs.41,700,000

[6]ITC calculates the difference between the total Landed Cost of soybean bought from the mandi each day vs. one ton bought through the choupal. This is aggregated for the entire season to obtain the total transaction cost savings.

[7]The total transaction cost savings is divided by the total number of tons bought through the choupals to obtain the average amount of money saved per ton. ITC estimates this to be in the range of Rs. 200 per ton. See Table 1 for details.

[8]Since soybean bought from the choupal is usually from a single farmer's field and has not been mixed and bagged with other soybean by CAGs at the mandi, it is of better quality (i.e. moisture, foreign matter, and bad seed are minimal). When this soybean is processed, it provides better quality of oil and deoiled cake. ITC has imputed a value for this quality improvement through comparisons (see footnotes 18 and 19).

[9]In Year 1, ITC ran a batch of soybean procured from the choupal alone through its processing plant and then ran a batch of material from the mandi. The difference obtained in quality was used as the baseline for calculation of savings. Rs. 7.5 million was saved as crude oil, Rs. 2 million as refined oil, and Rs. 3.4 million as protein content of the de-oiled cake. This was corroborated through laboratory sample tests.

[10]The savings through quality in Year 2 were calculated only on the basis of laboratory sample tests and the amount was much lower than Year 1.

good rain year and a bad rain year in determining the profitability of the choupal investment.

Even though total procurement in Year 2 was low (13,000 tons lower than Year 1), the savings from transaction costs were almost at the same level as the first year's transaction cost savings (Rs. 12.9 million, in nominal terms). This was because the price of soybean shot up approximately Rs. 2,000 in the second year (or almost 20% higher), as mentioned earlier. Savings from better quality only amounted to Rs. 3 million, much less than in Year 1 (Table 2, footnote 10).

During Year 1, ITC bought 5,465 tons of wheat from 95 choupals in January to April 2002. This was a trial run for wheat and there were plans to procure many more thousand tons in Year 2. ITC's long-term plan is to make choupals the node for buying all commodities grown in villages in Madhya Pradesh, as well as the distribution centers for agricultural inputs such as seed, fertilizers, pesticides, and such consumer items as oil and insurance. The savings documented in Table 2 do not include wheat procurement or the profits on the sale of inputs and must be treated as partial. In fact, nearly Rs. 45 million of transactions had taken place in input and consumer goods sales over the course of the first 16 months of operation. No substantial data on the savings or commissions to ITC from these input sales were available as of January 2003.

eChoupal: Entrepreneurial Model

Before enumerating the costs of the eChoupals and working out a financial analysis, it is important to understand the technological and business aspects of the village Internet centers. ITC's village Internet centers are run by entrepreneurs selected by the company. ITC's selection process focuses on finding a farmer with a medium-sized operation in a village (this varies from place to place, depending on the average landholding size) who is well-respected and can be an agent of change. Studies have shown that local entrepreneurs are best able to identify and respond to the needs of customers, investigate the market, and promote services to a broad population (Wellenius, 2003).[21] ITC's entrepreneurial model rests on this premise but differs from the usual investment pattern in two distinct ways.

In most small entrepreneur business models, the individual invests in the capital equipment and provides paid services to the entire community to recover the investment. However, in ITC's model, first, the capital investment for the eChoupals is entirely borne by ITC and second, villagers are not charged for any services related to the computer.

ITC covers the capital cost of the computer and Internet connectivity. Even costs such as earthing and wiring of village locations where the computer is to be installed are not left to the entrepreneur. Local start-up costs such as labor and services required to establish the eChoupal as well as training costs for the center owner are also borne by ITC. The entrepreneur incurs only limited operating costs, such as electricity and telephone bills,[22] and occasionally the cost of travel to ITC's processing plant or office for training or for collecting commission payments. An International Telecommunication Union report notes that at the local level the most significant operating costs are salaries for employees and other building-related costs, such as rent, utilities, maintenance, and security (Townsend, 2002). But the sanchalaks did not need to employ someone to run the center because computer use was minimal and most transactions were conducted over the phone. Moreover, all choupals were in the houses of sanchalaks, eliminating rent payment.[23] Nevertheless, the sanchalak is foregoing private use of part of his house as well as bearing security costs, such as building a firm door and installing a lock.

Mr. Sivakumar, CEO of ITC-IBD, explained the ra-

21. Also see R. Kumar & A. Jhunjhunwala, Taking Internet to Villages: Case Study of a Project in the Madurai Region, submitted to the United Nations Centre for Regional Development (UNCRD), August 2002. Accessed 17 November 2003. http://edevelopment.media.mit.edu/SARI/papers/uncrd_report_7.8.021.pdf

22. In places with VSATs, ITC takes care of bandwidth costs but in places with dial-up connectivity, the entrepreneur has to pay for the phone line charges. Currently all price information is accessed through the phone and entrepreneurs pay for that cost from their own pocket.

23. Having the computer inside the house of the sanchalak creates several barriers to access for others in the village, most notably for farmers from lower castes. However, since the price information was being obtained through the phone and being relayed through word of mouth, it quickly becomes public information in the village. Moreover, there is not much general use of the computer, hence this provision has not yet become a large hindrance for pursuing the main objectives of the choupal. Nevertheless, the issue of access is a serious one and will be addressed in a forthcoming paper by the author.

tionale behind this model. First, if an entrepreneur in the village invests his own capital, he expects returns in the short term and on a daily basis. If the stream of income is very small, the entrepreneur is averse to taking further risk. ITC would like the entrepreneurs to "think strategically as a group for long-term prospects such as increasing agricultural productivity and enhancing competitiveness instead of being concerned with short-term returns." In other words, by relieving short-term financial pressures on the sanchalaks, ITC hopes to encourage their deeper involvement in the project of learning how to use ITC-IBD's capital infrastructure and alliances with other organizations to best serve the needs of villagers. Given that sanchalaks as a group are themselves leading farmers in their villages, they are close to ITC's customers and have a good understanding of local market dynamics.[24]

Second, all use of the eChoupal is free for the community and there is no payment to find out prices, weather, or information on best practices in agriculture. The revenue for ITC-IBD is through the transaction and quality savings outlined above, while the revenue for the entrepreneur (sanchalak) comes from a 0.5% commission that ITC-IBD gives him on every rupee of produce sold through his choupal. Charging villagers for accessing prices, best practices, e-mail, etc., would lead to a "transaction-oriented, low-equilibrium approach to ICTs," emphasizes Sivakumar. "The minute you charge, the number of people accessing [the information] will become restricted and eventually you cannot develop customized solutions for all," he argues.

Stoll & Menou assert that a "business model" based on the provision of ICT and related services, on its own, is often not a sufficient basis for achieving financial sustainability. This is even more likely to be the case if the aim is "the development of a community whose members have initially limited requirements for telecommunications and a very low purchasing power, if at all" (2003). ITC-IBD's aim is to provide information for free and thus encourage a change in transaction behavior. In other words, it hopes that farmers will learn about better quality agricultural inputs and order them through the eChoupal, consequently producing a higher quality crop. This way, ITC would obtain further savings through the buying of better quality agricultural commodities as well as commission from the sale of certified agricultural inputs.

It is clear, then, that the revenue for the eChoupal project is not dependent on transactions stemming from the direct use of the computer but rather from a business proposition that has been enabled through the exchange of information. Savings from improved market efficiencies accrue to ITC and are used to defray the cost of capital investment. If the sanchalaks's commission of 0.5% were to be the only source of revenue used in the model, then the sustainability of the entire operation would become questionable.

Financial Analysis of the eChoupal Network

Investment of ITC-IBD

This section, including Tables 3, 4, and 5, outlines the overall investment made by ITC-IBD to set up the choupals. Each choupal consists of a multimedia computer, a printer, and an uninterrupted power supply with solar backup. Connectivity to some places is provided through VSATs (Very Small Aperture Terminals). Research suggests that for both power and Internet charges, costs for solar photovoltaic (PV) power and wireless connectivity will incur lower recurring operating costs as compared to grid power sources and wire line connectivity. Best and Maclay (2002) argue that the savings in operating costs will make up for the added capital costs when amortized over a period of years. ITC seems to have adopted this strategy in pursuing the installation of solar panels and VSATs for power and Internet connectivity. While current capital and operating cost estimates cannot demonstrate reduced overall costs, given that wire line connectivity and grid power are highly unreliable in the region, ITC's proposition seems to make good business sense.[25] The company estimates the average cost of the en-

24. The sanchalak acts as a bridge between the farmer and the technology: he provides information to farmers, sends their queries and concerns to ITC, aggregates their requirements for the purchase of agricultural inputs and consumer products, and physically handles goods through the choupal, that is, stores and distributes these goods. Many sanchalaks go along with farmers to the processing plants to ensure a smooth experience for first-timers.

25. Using wire line connectivity and grid power sources would reduce initial capital costs, but the downtime of these sources would be much greater in the long run. This would increase the downtime of the eChoupal (thus causing loss of potential revenue) and adding costs such as the use of a portable generator.

Table 3. Hardware and Installation Cost of a Soyachoupal[1]

COST of Choupal without VSAT	Rupees
Computer with Multimedia	42,000
Dot Matrix Printer	7,000
UPS with Battery[2]	8,000
Solar Charger Panels[2]	9,600
Earthing[3]	4,500
Painting the Choupal Wall[4]	1,000
Insurance and Warranty	3,500
Plaque, Mousepad, Wiring, Miscellaneous	2,000
Keyboard	1,500
Total	79,100
Choupal Cost with VSAT Installation[5]	
Basic Cost of Choupal	79,100
VSAT	90,000
UPS with Battery	8,000
Solar Charger Panel	9,600
Total	186,700

[1]The primary data for this table was obtained from Chander Mohan, head, Technical Services, ITC-Bhopal and Raghav Jhawar, finance manager, ITC-Bhopal. The author received different estimates for the cost of some of the hardware (UPS, solar panels, printers, and VSAT) from two technical support staff and the head of technical services in Hyderabad. One reason for this was the constant reduction in price of hardware and the experimentation with different models to reduce maintenance costs. However, the final numbers have been selected by the author to reflect the average prevailing cost at the time of the study and have also been cross-checked with the cost of kiosks in other projects that the author has studied.
[2]Since most of these villages do not get electricity for more than 6 hours every 2 days, it is necessary to provide an uninterrupted power supply powered by solar panels for the computers.
[3]Earthing is mandatory for the installation of any electronic equipment. Given that most villages get wildly fluctuating power that switches between 2-phase and 3-phase, earthing becomes even more important. ITC-IBD bears the cost of this for every choupal installation.
[4]The outside wall of the sanchalak's house is painted with the logo of soyachoupal to create uniform branding and establish the identity of the choupal.
[5]When installing a VSAT at any location, an additional UPS and solar charger are necessary.

tire set-up as approximately Rs. 80,000 without a VSAT and Rs. 187,000 with one. Table 3 provides a detailed breakdown of the cost.

Table 4 outlines the major capital investments made by ITC-IBD while setting up the choupals. Apart from the basic cost of choupals, this has included the upgrade of telephone exchanges to allow transfer of data over local phone lines. Telecenters in many developing countries have been plagued by delays in getting hooked up to the public telecommunications network, and once connected, suffered from limited bandwidth, poor reliability, and high costs for Internet connections because of a lack of local points of presence (Wellenius, 2003). ITC-IBD has been no exception. Of the 796 choupals established up to December 31, 2002, only 240 had dial-up connectivity after intensive efforts by ITC to install RNS kits in local telephone exchanges (see footnote 5 in Table 4). One hundred of the most promising villages were provided with VSATs, and ITC had plans to install VSAT in every village. Another capital cost was the development of a web portal in Hindi (www.soyachoupal.com) that provides market rate information along with best practices, weather details, and a question-and-answer section. The available data indicate that the total capital investment made by ITC-IBD over the two seasons of soyachoupal operations amounted to approximately Rs. 76 million.

Table 5.1 provides a generic breakdown of operating costs for all 796 choupals over the course of one year (see footnote 2 in Table 5.1 for details of

Table 4. Infrastructure Capital Cost of the Soyachoupals[1]

	Number	Unit Cost in Rs.	Total Cost in Rs.
	2001–2002[2]		
Choupals without VSAT[3]	360	79,100	28,476,000
Choupals with VSAT[4]	100	186,700	18,670,000
RNS Kits[5]	130	7,500	975,000
Website Development	1	1,000,000	1,000,000
Total			49,121,000
	2002–2003[2]		
Choupals without VSAT[3]	336	79,100	26,577,600
Choupals with VSAT[4]	–	–	–
RNS kits[6]	–	–	–
Website Development	–	–	–
Total			26,577,600
Total for 2 Years			75,698,600

[1]*The data for this table was provided by Raghav Jhawar, Finance Manager, ITC-Bhopal; Mr. Chander Mohan, technical services head, ITC-Bhopal; and V. V. Rajasekhar, chief information officer, ITC-Hyderabad. All these costs are approximate figures and this table is not a comprehensive list of all possible capital costs.*
[2]*Year 1 is the soya calendar from September 2001 to August 2002. Data for Year 2 covers only September 2002 to December 31, 2002.*
[3]*The breakdown of cost per choupal is given in Table 3.*
[4]*The breakdown of VSAT costs is given in the second half of Table 3. The total of Rs. 186,700 is obtained by adding the basic choupal cost of Rs. 79,100 and the VSAT cost of Rs. 107,600.*
[5]*RNS = RAX (Rural Automatic Exchange) Network Synchronization. There are about 2,000 rural exchanges in Madhya Pradesh, of which 256 were providing modem connectivity to ITC's initial set of soyachoupals, but they needed to be upgraded to allow for data transfer. ITC started the upgrade process in June 2001 by installing 130 RNS kits on behalf of the public telecom company Bharat Sanchar Nigam Ltd. (BSNL). BSNL reimbursed the value of the RNS kits at current market price in 2002 causing ITC to incur a loss. ITC also had to bear the manpower costs for installation. The hardware cost is Rs. 12,000 and software cost is Rs. 3,000 per exchange. In the next year, BSNL bought all the hardware and software for 140 more kits that were installed by ITC personnel. ITC had to bear the operating expenses for these installations. This has made dial-up connectivity possible in 240 more villages apart from the 100 that already have VSATs.*

this calculation). This includes basic operating expenditure, annual maintenance costs for computers, and bandwidth charges for the VSATs. Table 5.2 provides a sample of operating expenditures for December 2002, which is on the low end (see footnote 2 in Table 5.2). Keniston (2003:8) of the Massachusetts Institute of Technology provides a comprehensive list of the kinds of costs incurred when setting up ICT projects. He focuses on the costs of leadership, planning, and pre-studies, separate from operating costs. The data presented in Keniston's paper do not include the cost of the time and effort of several senior and top management members of ITC-IBD nor the effort involved of midlevel and junior personnel in establishing and monitoring several pilot test choupals. ITC includes these costs in the operational costs for running its regular agricultural procurement and export business.

Payback Period and Sensitivity Analysis

To calculate the profitability of the soyachoupal investment, ideally one would use cash flow data for several years. However, since the project is so young, one has to extrapolate from the 16 months of data that are available. It is clear that such analysis will require several assumptions to be made, which could influence the outcome in different ways. This paper presents a sensitivity analysis using variable rates of risk (probability of monsoons), interest (opportunity cost of money), and depreciation

Table 5.1 Operating Costs of the Soyachoupals[1]

Expenses	Unit Cost in Rs.	Annual Cost in Rs.
Operating Expenditure for 1 Year[1]	Rs. 418,841 average per month[2]	5,026,092
Annual Maintenance Cost[3]	Rs. 55,000 per month for 796 choupals	660,000
Bandwidth Cost for 1 Year	Rs. 21,000 per VSAT for 100 VSATs	2,100,000
TOTAL Operating Expenses for 1 Year	—	7,786,092

[1]The costs included under operating expenditure are only those incurred by ITC for setting up new soyachoupals and maintaining the existing soyachoupal infrastructure. The operating costs incurred for daily trading, buying from commission agents, exporting, and running the main office are not included since they would have been borne by ITC regardless of the investment made in the choupals.

[2]Rs. 418,841 has been obtained by dividing the sum of operating costs from April 2002 until December 2002 (9 months) by 9. The total for 9 months (Rs. 3,769,568) was provided by Raghav Jhawar, finance manager, ITC-Bhopal. It includes 5 months from Year 1 (Sep 2001–Aug 2002) and 4 months from Year 2 (Sep 2002–Dec 2002).

[3]The AMC estimate seems unusually low—only about Rs. 900 per choupal per year. Another estimate of operating costs given to the author was Rs. 1,000 per choupal per month making the total operating cost approximately Rs. 9,552,000. If we subtract the bandwidth and operating expenditure from this number, we can obtain an estimate of the AMC (assuming these are the only three operating costs). This number is Rs. 2,425,908 or approximately Rs. 3,000 per choupal per year. However, using Rs. 9,522,000 as the total operating cost would increase the operating cost used in the calculations by about 20%; but as the revenues are nearly five times the operating costs on average, the reduction in net profit will be only about 5%. Thus, the difference to the overall sustainability of the choupals will not be very large.

Table 5.2. Sample Operating Expenditure for 1 Month[1]

December 2002	Cost in Rupees
Traveling and Staff Welfare	63,376
Vehicles	16,965
Stationery	20,414
Manager's Expenses	20,050
Communication Costs	21,773
Land Rent	65,000
Training	39,882
Miscellaneous	1,590
Total for December[4]	24,9050

[1]The information for this table was provided by Raghav Jhawar, finance manager, ITC Bhopal.

[2]The amount for December is low compared with data for other months, which ranged as high as Rs. 4–8 million. This may be due to reducing levels of procurement as the soybean season's peak ends, or perhaps not many new choupals were established at this time.

(profitability to allow replacement of worn-out equipment) to check for the robustness of the calculations on profitability. Six scenarios are developed in Table 6 ranging from extremely pessimistic to fairly optimistic based on the following assumptions.

First, the eChoupal investment bears high risk because the revenue is completely dependent on the output of agricultural commodities (in this case, soybean), which is dependent on rainfall. This is already evident from the data on revenue where the procurement in Year 2 is very low (even though 796 choupals were installed) as compared to Year 1 (when only 460 choupals had been established). The first year was a relatively normal year for monsoons (though not very good) and the second was practically a drought year, which significantly reduced the soybean output. The calculations for the return on investment take this risk into account by assigning probabilities to rainfall failure. Two scenarios are analyzed: one with a 50% probability of rainfall failure over the course of the project and one with a 20% probability of failure. The 50% probability, which is an extremely pessimistic and highly conservative choice, has been used to see whether ITC's investment turns out to have a reasonable payback period even under such adverse conditions. If yes, then the potential for profitability is much greater.

Second, the opportunity cost of the money invested in the eChoupals must be accounted for in this analysis. Usually the opportunity cost of capital (OCC) is the amount (or percentage) of interest that will be foregone if the capital had been invested in a bank deposit or treasury bonds or even the stock market. Each of these OCC values depends on the interest rate given by the bank or the Treasury but it also includes a risk rate. In other words, while a fixed deposit might give an interest rate of 6%, the stock market will usually give returns around 15% because of the inherent risks of the venture. Thus, the OCC is a cumulative interest rate that includes a savings rate as well as a risk rate. Since this project is quite risky (because of its dependence on the monsoon), we assume at least 10% (6% savings rate plus a 4% risk rate) as a realistic opportunity cost of capital. The value of any profit obtained on this investment has to be discounted by the OCC rate to account for this foregone interest. However, to perform a sensitivity analysis to incorporate lower and higher risk than 10%, two other values of OCC—6% (very safe investment) and 20% (very risky investment)—have also been used in calculations.

Third, it is important to keep enough money aside from the revenue that comes in to replace computers and VSATs once they reach their life span. It is acknowledged that due to pressures within the technology industry to innovate, change products and specifications, and sell new technologies, ICT equipment changes rapidly. Generally, the needs and demands of users of ICT equipment change much more slowly (Cisler, 2002). Thus, it is unknown whether this equipment will have to be replaced over the course of 5 years or 10 years, and depending on which depreciation period is chosen, the profitability of the investment differs significantly. While the percentage recommended by Indian government authorities for tax write-off purposes for computer equipment is 60% per annum from October 2002 onward,[26] this paper conducts an analysis based on two variables of 15% (7-year depreciation) and 20% (5-year depreciation) as a conservative estimate, as we are trying to assess actual replacement needs over time.

Tables 6.1 through 6.6 provide a comprehensive financial analysis of the data on revenue and costs. Table 6.1 calculates net income (profit) and two rates of return on investment. Table 6.2 includes the probability of monsoon failure and provides two weighted rates of return on investment that are used to calculate future streams of profit in Table 6.3. Table 6.4a and 6.4b calculate the present values of investment and profit after each year (for a total of 7 years) using three rates of the opportunity cost of capital to enable comparison for the final calculation of net present value of the investment and the payback period.

Table 6.5 provides the calculations of the net present value (NPV) of the investment from Year 4 to Year 7 to see how long it takes to recover the initial investment (net present value becomes positive) using the three OCC rates. At the point where the NPV is zero, the project has completely paid for itself. The amount of time taken for this is known as the payback period. As the OCC rate rises (from 6% to 10% to 20%), it takes longer for the project to achieve a positive NPV and the payback period increases. Similarly, using the 50% rainfall failure scenario, the payback period is much longer as compared with using the 20% failure rate.

The most realistic scenario is a payback period of 3.9 years with an OCC of 10% and probability of monsoon failure at 20%. However, even in the worst case scenario with an OCC rate of 20% and a 50% rainfall failure probability, the payback period is 5.8 years. The project does seem to be financially sustainable, but the analysis so far has not included the cost of depreciation. The project will have to replace capital equipment (computers and other

26. Visit http://www.financialexpress.com/fe/daily/19991020/fec20001.html which lists the depreciation rate for computers under the "Plants and Machinery" category at 25% (for tax write-off purposes). Visit http://www.helplinelaw.com/news/1002/d_deprate1002.php for the amendment to the Income Tax Act, which states that computers as a separate category are entitled to depreciation at 60% per annum since October 2002.

hardware) as it gets obsolete or breaks down over the course of the 7-year period. Can the profits sustain this new investment at repeated intervals? Table 6.6 compares the cost of re-investment at the end of 5 years and 7 years with the NPV of the project. At the end of a given number of years, the value of the NPV is the amount available to be re-invested in replacing equipment at that time. It is clear that only in the most optimistic scenario using 6% OCC and 20% monsoon failure is there sufficient money left over at the end of 7 years to pay for replacement costs entirely. In the realistic scenario of 10% OCC and 20% monsoon failure, about 83% of replacement costs can be covered at the end of 7 years but only 31.5% can be covered at the end of 5 years. While this means that the overall profitability of the project is reduced, the discussion in the next section analyzes other sources of revenue that could help the project achieve long-term sustainability.

Discussion on Financial Sustainability

The calculations in Tables 6.1–6.6 give us a static financial picture at the end of December 2002, whereby ITC-IBD, with no further investment and no changes in operations over time, would recover its costs within 3.9 to 5.8 years, depending on the assumptions used. However, the profitability of the project in the calculations has only used revenue figures from soybean procurement. ITC-IBD had already initiated the procurement of wheat from the choupals in Year 1 and was gearing up for massive buying in the months from January to April 2002.[27] The addition of revenue from wheat would change the calculations significantly, given that wheat is a larger tonnage crop in Madhya Pradesh compared to soybean.[28] Even more important, the choupals had become distribution centers for a variety of agricultural and consumer products like seeds, pesticides, fertilizers, soybean oil, and even insurance. The commission accruing to ITC-IBD from these sales is potentially significant, but it is unknown and therefore has not been included in the calculations. Clearly, since the eChoupals have only been in full operation for less than 2 years, and since potential revenue from wheat procurement and input sales could be substantial, the possibility for payback in 3.9 years using the soybean data alone gives confidence that the choupals are well on their way to financial sustainability.

Several cautionary notes are in order. ITC-IBD itself suggests that the savings from transaction costs and quality improvement will decrease over time and die out in a few years because of increased efficiencies in the market and greater competition from middlemen and other companies.[29] Instead, ITC's expectation of a long-term source of revenue is not primarily from procurement but from the sale of consumer goods and agricultural inputs. Since this evaluation of sustainability is based on a linear extrapolation for 7 years, if these transaction savings go down, sustainability will be negatively impacted. And since there is no data yet available for commission revenues from rural distribution of agricultural inputs and consumer goods, it cannot be said for certain how the project will shape up in the future.

Next, there are questions with the quality data used as part of the savings calculations in Table 2. In the first year, apart from conducting laboratory sample tests, ITC ran a batch of eChoupal soybean and regular soybean through its processing plant in Indore. Data on the quantity of soybean tested, detailed percentage breakdown of quality improvement, margins of error, and the method used to obtain numerical values for savings are not available. The data for Year 2 are significantly lower and are based only on laboratory sample testing. Using the first year's percentage of 1.78% savings, the savings from quality in Year 2 increased by 4 times compared with the actual value of Rs. 3 million. While there have been improvements in quality, they could fall within the range of 0.5% to 2.0% of the price of soybean bought. This is a very large range, and unfortunately, more precise data were not available.

Finally, and this is the most important, most of

27. January is the start of the wheat harvest and most farmers sell their produce within 4 months of the harvest.

28. See http://www.kisanwatch.org/eng/statistics/aug.02/stat_area_prd_soyabean.htm and http://www.kisanwatch.org/eng/statistics/aug.02/stat_area_prd_Wheat.htm Accessed April 13, 2003.

29. Already ITC's competitor companies like Ruchi Soya and Savariya Soya have set up their own computer centers in some villages and are on a massive advertising campaign to attract farmers with higher prices and value-added services like pick-up from home. Local traders in small towns have also responded by opening branches closer to villages and village traders have been forced to quote a higher price even to very small farmers lest the latter go to the choupal and sell the material to the sanchalak (who amalgamates these 1–2 bag sales and takes them together to ITC).

Tables 6.1 to 6.6. Calculation of Financial Returns from the Soyachoupals

Table 6.1 Calculation of Net Income (Profit) and Rate of Return on Investment for Year 1 and Year 2

	Year 1 (Sep. 2001–Aug. 2002)	**Year 2 (Sep. 2002–Dec. 2002)**
Investment Made Each Year[1]	49,121,000	26,577,600
No. of Choupals Added Each Year	460	336
Total Choupals in Operation During the Year	460	796
Revenue[2]	26,200,000	15,500,000
Operating Costs[3]	4,449,500	2,595,364
Net Income (Profit)[4]	21,750,500	12,904,636
Rate of Return on Investment[5]	44.28%	17.05%

[1]The capital investment figures come from Table 4. The cash flow values in this table are all nominal (not discounted for inflation) and will be discounted in Table 6.4 for using different nominal rates of interest for the calculation of net present value and payback period.
[2]The revenue figures come from Table 2, Column O. The figures do not include anticipated revenue from the procurement of wheat or sale of inputs.
[3]Operating costs come from Table 5. The figure in Table 5 is a cumulative annual cost for 796 choupals (Rs. 7,786,092). In the first year, only 460 choupals were in operation, hence this figure has been adjusted linearly to reflect fewer numbers of choupals. For the second year, even though 796 choupals were in operation, our data is only for 4 months. Hence the overall number from Table 5 is discounted for 4 months.
[4]Net income (profit) has been calculated using the simple formula Profit = Revenue − Operating Costs for Year 1 and Year 2.
[5]Profit is divided by investment in Years 1 and 2 separately to obtain two annual rates of return on investment (ROI). The ROI in Year 1 is designated as a Good Rain Year ROI (GRY) while the ROI in Year 2 is designated as a Bad Rain Year ROI (BRY).

Table 6.2 Calculation of Rate of Return on Investment Using Factor Probability of Monsoons in India[1]

Probability of a bad rain year	**Calculation**	**Weighted ROI**
Every Other Year (50%)	Weighted ROI = (GRY[2] × 0.5) + (BRY[3] × 0.5)	30.66%
1 in 5 Years (20%)	Weighted ROI = (GRY × 0.80) + (BRY × 0.20)	38.83%

[1]The rate of return on investment is adjusted using a factor of probability of the monsoons to obtain an average annual rate of return that can be used to calculate future values of profit. An extremely conservative estimate assumes a 50% chance of monsoon failure, thus weighting the ROI from Year 1 and Year 1 equally. A more realistic estimate assumes monsoon failure at 20%, or once in 5 years.
[2]GRY = Good Rain Year.
[3]BRY = Bad Rain Year.

Table 6.3 Estimation of Future Streams of Profit Using Weighted ROI at 50% and 20% Rainfall Failure Probability[1]

Profit Streams	Using 50% Rainfall Failure Weighted ROI	Using 20% Rainfall Failure Weighted ROI
Year 1 Actual Profit	21,750,500	21,750,500
Year 2 Actual Profit	12,904,636	12,904,636
Year 3 Estimated Profit	24,140,244	30,571,898
Year 4 Estimated Profit	25,105,854	31,794,774
Year 5 Estimated Profit	26,110,088	33,066,565
Year 6 Estimated Profit	27,154,492	34,389,227
Year 7 Estimated Profit	28,240,671	35,764,796

[1]*This weighted rate of return on investment is used to calculate constant future streams of profit for 7 years. This is done by adding the total investment made in Year 1 and Year 2 and multiplying this by the weighted ROI. The estimated profits from Years 3 to 7 are adjusted for inflation, since this is a nominal value.*

To calculate inflation rate, the Wholesale Price Index has been obtained from "The Consumer Price Index Numbers for Industrial Workers—All-India (Base: 1982 = 100)" table available at the Reserve Bank of India website http://www.rbi.org.in/index.dll/34044?OpenStoryTextArea?fromdate=06/30/97&todate=03/12/03&s1secid=70&s2secid=0&secid=2/70/0&archivemode=2). The 2000–2001 index is 444, while 2001–2002 index is 463. The year is calculated from April to March. Actual inflation is calculated to be 4.28%, but 4% is used for ease of calculation.

Table 6.4a. Calculation of Present Value of Investment[1] *Using Different OCC Rates*[2]

	Nominal Value of Investment	Present Value @ 6% Discount Rate	Present Value @ 10% Discount Rate	Present Value @ 20% Discount Rate
Year 1 [3]	49,121,000	49,121,000	49,121,000	49,121,000
Year 2[4]	26,577,600	25,073,208	24,161,455	22,148,000
TOTAL Initial Investment		74,194,208	73,282,455	71,269,000

[1]*To obtain a cumulative present value of total investment, the investment in Year 1 and Year 2 need to be added together, but only after obtaining their present value. This figure will be used to calculate Net Present Value of the investment (by subtracting it from the Present Value of cumulative profits) at the end of a given number of years.*

[2]*The Opportunity Cost of Capital (OCC) must be taken into account when calculating the present value of any investment. To perform a sensitivity analysis, three values of OCC—6% (very safe investment), 10% (risky investment), and 20% (very risky investment)—have been used in calculations in Tables 6.4a and 6.4b. The OCC rate is also called the discount rate.*

The Fixed Deposit Savings rate of ICICI Bank is 6% and has been used as the baseline savings rate for discounting. See www.bankofindia.com/interest_rates.html and www.icicibank.com/pfsuser/icicibank/depositproducts/fixeddeposits/interestrates.htm which provide fixed deposit interest rates for deposits of more than Rs. 10 million for more than 1 year at 5.50% per annum and 6.0% per annum.

[3]*Investment in Year 1 is made at the start of the year, that is, Time (t) = 0. Thus, it is not discounted.*

[4]*Investment in Year 2 has been made at t = 1 (or at the start of the second year) so it is discounted only for one year (and not 16 months) to get its Present Value in t = 0.*

Table 6.4b. Calculation of Present Value of Profit[1] Using Three OCC Rates[2]

	50% Rainfall Failure Weighted ROI			20% Rainfall Failure Weighted ROI		
	Present Value @ 6% Discount Rate	**Present Value @ 10% Discount Rate**	**Present Value @ 20% Discount Rate**	**Present Value @ 6% Discount Rate**	**Present Value @ 10% Discount Rate**	**Present Value @ 20% Discount Rate**
Year 1 Actual Profit [3]	20,519,340	19,773,182	18,125,417	20,519,340	19,773,182	18,125,417
Year 2 Actual Profit [4]	11,935,475	11,353,052	10,406,965	11,935,475	11,353,052	10,406,965
Year 3 Estimated Profit	20,268,614	18,136,923	13,970,049	25,668,755	22,969,119	17,692,070
Year 4 Estimated Profit	19,886,188	17,147,636	12,107,376	25,184,439	21,716,258	15,333,128
Year 5 Estimated Profit	19,510,977	16,212,310	10,493,059	24,709,261	20,531,735	13,288,711
Year 6 Estimated Profit	19,142,845	15,328,003	9,093,984	24,243,048	19,411,822	11,516,883
Year 7 Estimated Profit	18,781,659	14,491,930	7,881,453	23,785,632	18,352,996	9,981,298

[1]The present value of the profit obtained over a given number of years is required to be able to add up these values and derive a cumulative profit value at the end of a certain period of time. The present value of investment is subtracted from this cumulative profit value to obtain the net present value of the project.
[2]The value of any profit obtained on the eChoupal investment has to be discounted by the OCC rate to account for the interest foregone. Since our project is risky (because of its dependence on the monsoon), we assume at least 10% (6% savings rate plus a 4% risk rate) as a realistic opportunity cost of capital. However, to perform a sensitivity analysis to incorporate lower and higher risk than 10%, two other values of OCC, 6% (very safe investment) and 20% (very risky investment), have also been used to discount the profit values.
[3]Year 1 profit has been obtained at the end of the year, hence it needs to be discounted for one year (divided by one year's OCC rate) to find out its Present Value in Time (t) = 0.
[4]Net Present Value of Year 2 Profit in Time (t) = 0 is calculated by dividing Year 2 profit by a 16-month rate of return since it has been obtained at the end of 16 months. This 16-month rate of return is calculated by multiplying the annual OCC rate of return by 4/12 and adding 1, which gives us a 4-month discount and multiplying this by 1 plus the annual OCC rate of return.

Table 6.5 Calculation of Net Present Value (NPV)[1] and Payback Period[2] of the Total Investment

	50% Rainfall Failure Weighted ROI			20% Rainfall Failure Weighted ROI		
	Present Value @ 6% Discount Rate	**Present Value @ 10% Discount Rate**	**Present Value @ 20% Discount Rate**	**Present Value @ 6% Discount Rate**	**Present Value @ 10% Discount Rate**	**Present Value @ 20% Discount Rate**
Total Profit After 4 years	72,609,617	66,410,793	54,609,805	83,308,009	75,811,612	61,557,579
NPV of Investment After 4 years	(1,584,590)	(6,871,662)	(16,659,195)	9,113,801	2,529,157	(9,711,421)
Total Profit After 5 years	92,120,594	82,623,103	65,102,864	108,017,269	96,343,347	74,846,290
NPV of Investment After 5 years	17,926,386	9,340,649	6,166,136	33,823,062	23,060,892	3,577,290
Total Profit After 6 years	111,263,439	97,951,106	74,196,849	132,260,318	115,755,169	86,363,173
NPV of Investment After 6 years	37,069,232	24,668,651	2,927,849	58,066,110	42,472,714	15,094,173
Total Profit After 7 years	130,045,098	112,443,036	82,078,302	156,045,950	134,108,164	96,344,471
NPV of Investment After 7 years	55,850,891	39,160,581	10,809,302	81,851,742	60,825,710	25,075,471
Payback Period	4 years	4.5 years	5.8 years	3.5 years	3.9 years	4.9 years

[1] *NPV = Net Present Value. (Cumulative Profit − Initial Investment) has been calculated starting from Year 4 onward and turns from being negative (where the cumulative profit is still less than the initial investment) to positive (when the cumulative profit is greater than the initial investment).*

[2] *The number of years required to reach the point at which the cumulative profit equals initial investment is the payback period of the investment. Using variable rates of discounting for the opportunity cost of capital (to take into account the risky nature of the project), different payback periods are obtained. See the section: Payback Period and Sensitivity Analysis.*

Table 6.6 Depreciation Analysis for Two Rates of Replacement[1]

	50% Rainfall Failure Weighted ROI			20% Rainfall Failure Weighted ROI		
	Present Value @ 6% Discount Rate	Present Value @ 10% Discount Rate	Present Value @ 20% Discount Rate	Present Value @ 6% Discount Rate	Present Value @ 10% Discount Rate	Present Value @ 20% Discount Rate
Scenario A						
NPV of Investment After 5 Years[2]	17,926,386.45	9,340,648.65	(6,166,135.79)	33,823,061.78	23,060,892.04	3,577,290.09
Year 5 Proposed Investment[3]	74,194,207.55	73,282,454.55	71,269,000.00	74,194,207.55	73,282,454.55	71,269,000.00
Percentage of Replacement Investment That Can Be Made Using Profits	24.2%	12.7%	(8.7%)	45.6%	31.5%	5.0%
Scenario B						
NPV of Investment After 7 Years[2]	55,850,890.82	39,160,580.96	10,809,301.55	81,851,742.17	60,825,709.85	25,075,470.97
Year 7 Proposed Investment[3]	74,194,207.55	73,282,454.55	71,269,000.00	74,194,207.55	73,282,454.55	71,269,000.00
Percentage of Replacement Investment That Can Be Made Using Profits	75.3%	53.4%	15.2%	110.3%	83.0%	35.2%

NPV = Net Present Value.

[1]The calculation of payback period is incomplete without an analysis of depreciation. It is clear that the project will have to replace its capital equipment (computers and other hardware) at some point. High profitability will imply that the cost of this new investment will be completely covered through future streams of profit over and above recovering the cost of the initial investment. If future profit cannot produce enough capital to make this replacement, then profitability is lowered. Two scenarios are recreated here using two rates of depreciation; Scenario A uses 5 years as the time required to replace all capital and Scenario B uses 7 years.

[2]Net Present Values for Year 5 and Year 7 have been taken from Table 6.5.

[3]Future investment required in Year 5 and Year 7 has been calculated by multiplying the total nominal investment for Year 1 and Year 2 by the inflation rate. This has been divided by the OCC rate to obtain the present value of the investment to compare with the NPV.

the transactions and information exchanges for prices and setting up sales (transaction slips) were not being conducted via the computer and Internet. In fact, in places where the choupal was functioning, most data transmission (information exchange) took place through the telephone owned by the eChoupal operator himself. Thus, the savings calculated do not reflect the returns on investment from ICTs.[30] In this project, ICTs are a catalyst for (or an instrument of) the process of improving transaction flows by disintermediating and bringing efficiencies into the agricultural value chain. The resultant savings are not a direct result of the technology, which was not in general use at all. Rather, efficiencies improved because the process of information exchange resulting from introducing the technology led to the rationalization of production flows. Thus, it is not the computers, email, and Internet that are generating these savings but the elimination of inefficiencies from the market. Technology is a catalyst for another process, which is social and economic, and to argue that all this has been because of computers would not be accurate.[31]

Conclusion

This paper has not attempted to outline or evaluate the impact of the soyachoupals on their primary users, namely the farmers in rural Madhya Pradesh. In the author's interviews at the village level, it became apparent that caste affiliations, political alignments, and even the size of one's farm were important issues that influenced access to the eChoupals and determined to what extent farmer incomes were changing. Moreover, eChoupals had only been established in larger and more prosperous villages so their reach into the poorer and remoter parts of rural India is still an open question. Concerns were also raised regarding the possible market monopoly by ITC-IBD in the future, given that the alternative mandi system and local traders were losing market share and their business was being greatly threatened.[32] While recognizing the limitations of this paper in leaving out these important social, economic, political, and cultural issues, the author concentrates on financial sustainability because without it, the project would close down and there would be no question of studying impact on the people.

ITC-IBD is itself convinced of the sustainability and scalability of the eChoupal model. It recently adopted an ambitious 5-year plan to establish 20,000 choupals in the country. It seeks to modify and refine the eChoupal model as it expands into other states and starts buying other crops. There are several challenges. First, ITC itself believes that the profitability of the choupals will diminish over time because the information revolution of the eChoupals cannot be confined to the choupals alone. Other companies have already picked up the process of rationalization and disintermediation, but ITC is prepared for continuous changes of its system of information delivery and potential competition is part of company planning. Second, despite a sensitivity analysis and obtaining a range of payback periods, the analysis of financial sustainability in this paper is based on limited availability of data and contains a significant amount of extrapolation to the future. This needs to be taken into consideration when one examines the results. Third, the project is running on the basis of enthusiastic, talented people who have taken it upon themselves to ensure its success. The cost of their time and energy, especially since the choupal responsibility is in addition to their regular work of export trading and procurement, is not included in these calculations. This omission becomes crucial as the company expands and more

30. ITC argues that transactions have been higher from eChoupals with satellite connectivity compared with eChoupals without satellite connectivity (or no connectivity at all), implying that the presence of a connected computer made a significant difference in encouraging farmers to try out the new system. However, several factors are involved in determining activity levels of choupals, including the distance from processing plants, choice of operator (sanchalak) and his entrepreneurial ability, level of soybean harvest, etc., making it difficult to isolate the impact of connectivity alone.

31. This brings up an interesting question: Is the telephone sufficient to produce these kinds of market efficiencies? In other words, would investment in call centers be more "appropriate" on the part of ITC rather than expensive computers and VSATs? Most of the interviewees at ITC-IBD pointed out the unique ability of transmitting volumes of information to a number of places through computers and the Internet, especially when it came to providing information on best practices and setting up consultancy with remote agricultural scientists. Further research into the costs and benefits of both these technologies (it has not been undertaken as part of this study) will be useful to explore the value-added by high-end ICTs and perhaps justify the popular deployment of computers as the technology of choice.

32. These are critical questions and the author hopes to address them in a forthcoming paper.

people are recruited to handle larger numbers of eChoupals. ITC is aware of the challenge to maintain the initial level of enthusiasm and to train new people to align with their vision as they move toward 20,000 choupals. Internal training sessions and a knowledge management system, while in place, are yet to be fully implemented at the field level to collectively pool the learning of many field workers in the expansion process.

Despite all these challenges, what is impressive is that after 16 months of operation, the eChoupal project seems to be not only self-sustaining, but in fact, profitable. A number of factors promise to keep it self-sustaining. Already, there are ongoing efforts to use the choupals to procure additional crops in the yearly crop cycle and for bulk sale of cheaper agricultural inputs. Both activities propose to benefit farmers and to help ensure year-round transactions and commissions for ITC and the operators. Second, with additional training and by removing connectivity hurdles, the computers installed in the villages will be used to conduct these transactions, thus introducing new economies of scale. Moreover, ITC believes that computers will play a vital role in disseminating agricultural best practice information and connecting farmers to agricultural scientists for consultancy—an ambitious aim to encourage higher farm productivity and improve the overall competitiveness of Indian agriculture. Third, ITC has long-term plans to use this network for the sale of other products, such as motorbikes and insurance, which entails a commission to the company. And finally, given a computer network of 20,000 nodes, there are possibilities of using this infrastructure to disseminate noncommercial information to rural areas more effectively. All these are positive elements on the side of ITC that will strengthen the sustainability of the eChoupals.

The data presented here and the promise of the future have prompted India's largest agri-exporter to make a huge investment in this previously untried and untested domain. With dedicated and enthusiastic personnel, with a desire to learn from mistakes, and with a clear vision, the eChoupals may become the largest successful ICT initiative in India. It is essential, however, that this research is placed within the context of the larger debate on ICTs and development. For that, further studies are required to understand the impact of the eChoupals on the lives of rural women, small and medium-sized farms, agricultural laborers, lower castes, and the destitute, especially as the eChoupals expand to cover much of India. Only then will it be possible to understand to what extent ICTs can contribute to changing the life of the rural poor in the long run. ■

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Bibliography

Batchelor, S., & Norrish, P. (2002, April). *Sustainable information and communication technology (ICT),* Sustainable Initiatives, Working Paper in the Research Program on ICT Sustainability

Factors. Accessed November 13, 2003. www.sustainableicts.org/Sustainable.htm.

Best, M. L., & Maclay, C. M. (2002.) Community Internet access in rural areas: Solving the economic sustainability puzzle. In G. Kirkman, J. Sachs, K. Schwab, & P. Cornelius (Eds.), *The global information technology report 2001–2002: Readiness for the networked world,* GITR Press Reports. Accessed October 28, 2003. http://www.cid.harvard.edu/cr/pdf/gitrr2002_ch08.pdf.

Brundtland, G. (Ed.). (1987). *Our common future: The world commission on environment and development.* Oxford: Oxford University Press.

Cisler, S. (2002). *Schools Online: Planning for sustainability.* Schools Online. Accessed November 16, 2003. http://www.schoolsonline.org/resources/Sustainability-booklet.pdf.

Confederation of Indian Industry and McKinsey and Company. (1997, January) *Food and agriculture integrated development action: Modernizing the Indian food chain.* New Delhi: McKinsey and Company.

Delgadillo, K., Gomez, R., & Stoll, K. (2002, November). *Community telecentres for development: Lessons from community telecentres in Latin America and the Caribbean.* Ottawa: IDRC Canada. Accessed November 12, 2003. http://web.idrc.ca/ev_en.php?ID?11917_201&ID2=DO_TOPIC.

Heeks, R., & Davies, A. (1999.) Different approaches to information age reform. In R. B. Heeks, (Ed.), *Reinventing government in the information age.* London: Routledge.

Heeks, Richard. (1999, June). *Information and communication technologies, poverty and development,* Development Informatics: Working Paper Series, Paper No. 5, Institute for Development Policy and Management, University of Manchester. Accessed 12 November 2003. http://idpm.man.ac.uk/publications/wp/di/di_wp05.pdf.

Keniston, K. (2003, May). *Notes on sustainability,* Mimeo, Massachusetts Institute of Technology.

Kumar, R., & Jhunjhunwala, A. (2002, August). *Taking Internet to villages: Case study of a project in the Madurai region.* Submitted to the United Nations Centre for Regional Development (UNCRD). Accessed November 17, 2003.http://edevelopment.media.mit.edu/SARI/papers/uncrd_report_7.8.021.pdf.

Munyua, H. (2000, November). Information and communication technologies for rural development and food security: Lessons from field experiences in developing countries. *SD Dimensions,* Sustainable Development Department, Food and Agricultural Organisation of the United Nations. Accessed November 12, 2003. http://www.fao.org/sd/CDdirect/CDre0055b.htm.

Paisley, L., & Richardson, D. (Eds.), (1998). Why the first mile and not the last. In *The first mile of connectivity,* Food and Agricultural Organisation of the United Nations. Accessed November 13, 2003. http://www.fao.org/docrep/x0295e/x0295e03.htm.

Proenza, F. J. (2001). Telecentre sustainability–Myths and opportunities, *Journal of Development Communication,* 12, 3. Available from http://www.fao.org/ag/ags/AGSP/pdf/ProenzaTelecenter.pdf.

Roman, R., & Colle, R. D. (2002, January) *Themes and issues in telecentre sustainability,* Development Informatics: Working Paper Series, Paper No. 10, Institute for Development Policy and Management, University of Manchester. Accessed November 10, 2003. http://idpm.man.ac.uk/publications/wp/di/di_wp10.pdf.

Stoll, K. & Menou, M. (2003, June 30–July 2). Basic principles of community public internet access point's sustainability. In M. Gurstein, M. Menou, S. Stafeev, (Eds.), *Community networking and community informatics: Prospects, approaches and instruments,* Preparatory process to the International Conference "Building the Information Commonwealth: Information Technologies and Prospects for the Development of Civil Society Institutions in the CIS Countries," Saint Petersburg, Russia. Accessed November 12, 2003. http://www.communities.org.ru/ci-text/ts3.doc.

Tinio, V. L. (2002–2003). *ICT in education,* e-primers for the information economy, society and polity, e-Asean Task Force and UNDP-APDIP. Accessed

November 16, 2003. http://www .eprimers.org/ict/page25.asp.

Townsend, D. N. (2002, December 7–8). Model universal service/access—Policies, regulations and procedures, *Part III: Telecentre options and strategies,* "Draft", November 26, 2002, International Telecommunication Union and Commonwealth Telecommunications Organisation, Telecommunication Development Bureau, Document: 9, Global Symposium for Regulators, Hong Kong, SAR, China. Accessed November 17, 2003. http://www.itu.int/ITU-D/treg/Events/Seminars/2002/GSR/Documents/09-USModel_part3_doc.pdf.

Vijaybhaskar M., & Gayathri V. (2003, June 14). ICT and Indian development, EPW Commentary, *Economic and Political Weekly,* Accessed November 17, 2003. http://www.epw.org.in/showArticles.php?root=2003&leaf=06&filename=5922&filetype=html.

Wellenius, B. (2003, January). *Sustainable telecenters: A guide for government policy,* Public Policy for the Private Sector: Note Number 251, Private Sector and Infrastructure Network, The World Bank Group. Accessed November 16, 2003. http://rru.worldbank.org/Viewpoint/HTMLNotes/251/251Welle-121302.pdf.

Whyte, A. (2001). Assessing community telecentres: Guidelines for researchers. *The Telecentre Evaluation Plan,* The Acacia Initiative, International Development Research Centre, Canada. Accessed November 12, 2003. http://web.idrc.ca/ev.php?ID=28310_201&ID2=DO_TOPIC.

Appendix. Profile of the eChoupals Visited During This Research

Choupal	Quantity Supplied to ITC in 2002 Season	Quantity Supplied to ITC in 2001 Season	Date of Installation	VSAT	Tehsil*	District*
AbdullaBarkhedi	0	0	09-May-01	—	Bhopal	Bhopal
Bagroda	25.395	17.18	14-May-01	Yes	Huzur	Bhopal
Bala_Barkheda	6.43	—	24-Apr-02	—	Vidisa	Vidisha
DoubleChowki	439.915	2103.365	20-May-01	Yes	Dewas	Indore
GoharGanj	0	—	25-Apr-02	—	Goharganj	Raisen
Kalwar	0	—	18-Jun-02	—	Kannod	Dewas
Kamlapur	(not available)	707.865	16-Sep-01	Yes	Bagli	Dewas
Karnawad	427.705	241.59	19-May-01	Yes	Bagli	Dewas
Khasrod	135.293	199.063	08-Dec-00	Yes	Gourganj	Raisen
Kurana	222.645	8.145	14-Nov-01	Yes	Bhopal	Bhopal
Matmore	352.885	228.45	16-Sep-01	—	Bagli	Dewas
MungaliyaChap	273.195	344.005	10-Sep-01	Yes	Bhopal	Bhopal
ParwaliyaSadak	1017.61	31.88	18-Apr-01	Yes	Huzur	Bhopal
Rapadiya	22.975	0	21-May-02	—	Huzur	Bhopal
Salamatpur	216.81	33.695	26-Nov-00	Yes	Raisen	Raisen
Tumda	139.775	0	15-Dec-01	Yes	Huzur	Bhopal

Note: Villages were chosen based on the following criteria: (a) amount of soybean delivered (active/inactive sanchalak), (b) Internet availability, (c) education level and age of sanchalak, (d) size of sanchalak's landholding, (e) village population, and (f) distance of the village from major towns and highways.
** Districts make up a state; tehsils make up a district.*

Appendix (continued)

Total Choupal Population	Total Number of Farmers in Choupal	Total Acreage Under Choupal	Bank	School Until X Standard	Hospital	Government Soybean Buying Centre	Cooperative Center
800	100	1,500	Yes	8	—	—	—
3,000	300	2,800	—	8	—	—	—
1,400	200	2,000	Yes	8	Yes	—	—
3,000	40	500	Yes	12	Yes	Yes	Yes
4,000	1,500	2,200	Yes	12	Yes	—	Yes
3,000	300	3,000	—	5	—	—	Yes
4,500	700	12,000	Yes	12	—	—	—
1,000	955	3,500	Yes	12	Yes	—	Yes
400	30	700	—	5	—	Yes	Yes
1,500	100	1,327	—	8	—	Yes	—
2,000	200	1,500	—	8	—	—	—
5,000	500	3,000	Yes	12	Yes	Yes	Yes
1,200	100	3,000	Yes	10	—	—	Yes
1,000	250	1,000	—	8	—	—	Yes
3,824	1,044	286	Yes	12	Yes	—	Yes
7,000	350	3,000	Yes	10	Yes	—	Yes