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What Works Case Study

WHAT WORKS: ITC'S E-CHOUPAL AND PROFITABLE RURAL TRANSFORMATION

Web-based information and procurement tools for Indian farmers

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EXECUTIVE SUMMARY

Agriculture is vital to India. It produces 23% of GDP, feeds a billion people, and employs 66% of the workforce. Because of the Green Revolution, India's agricultural productivity has improved to the point that it is both self-sufficient and a net exporter of a variety of food grains. Yet most Indian farmers have remained quite poor. The causes include remnants of scarcity-era regulation and an agricultural system based on small, inefficient landholdings. The agricultural system has traditionally been unfair to primary producers. Soybeans, for example, are an important oilseed crop that has been exempted from India's Small Scale Industries Act to allow for processing in large, modern facilities. Yet 90% of the soybean crop is sold by farmers with small holdings to traders, who act as purchasing agents for buyers at a local, government-mandated marketplace, called a *mandi*. Farmers have only an approximate idea of price trends and have to accept the price offered them at auctions on the day that they bring their grain to the *mandi*. As a result, traders are well positioned to exploit both farmers and buyers through practices that sustain system-wide inefficiencies.

ITC is one of India's leading private companies, with annual revenues of US$2 billion. Its International Business Division was created in 1990 as an agricultural trading company; it now generates US$150 million in revenues annually. The company has initiated an e-Choupal effort that places computers with Internet access in rural farming villages; the e-Choupals serve as both a social gathering place for exchange of information (*choupal* means gathering place in Hindi) and an e-commerce hub. What began as an effort to re-engineer the procurement process for soy, tobacco, wheat, shrimp, and other cropping systems in rural India has also created a highly profitable distribution and product design channel for the company—an e-commerce platform that is also a low-cost fulfillment system focused on the needs of rural India. The e-Choupal system has also catalyzed rural transformation that is helping to alleviate rural isolation, create more transparency for farmers, and improve their productivity and incomes. This case analyzes the e-Choupal initiative for soy; efforts in other cropping systems (coffee, wheat, and shrimp aquaculture), while different in detail, reflect the same general approach.

THE BUSINESS MODEL

A pure trading model does not require much capital investment. The e-Choupal model, in contrast, has required that ITC make significant investments to create and maintain its own IT network in rural India and to identify and train a local farmer to manage each e-Choupal. The computer, typically housed in the farmer's house, is linked to the Internet via phone lines or, increasingly, by a VSAT connection, and serves an average of 600 farmers in 10 surrounding villages within about a five kilometer radius. Each e-Choupal costs between US$3,000 and US$6,000 to set up and about US$100 per year to maintain. Using the system costs farmers nothing, but the host farmer, called a *sanchalak*, incurs some operating costs and is obligated by a public oath to serve the entire community; the *sanchalak* benefits from increased prestige and a commission paid him for all e-Choupal transactions. The farmers can use the computer to access daily closing prices on local *mandis*, as well as to track global price trends or find information about new farming techniques—either directly or, because many farmers are illiterate, via the *sanchalak*. They also use the e-Choupal to order seed, fertilizer, and other products such as consumer goods from ITC or its partners, at prices lower than those available from village traders; the *sanchalak* typically aggregates the village demand for these products and transmits the order to an ITC representative. At harvest time, ITC offers to buy the crop directly from any farmer at the previous day's closing price; the farmer then transports his crop to an ITC processing center, where the crop is weighed electronically and assessed for quality. The farmer is then paid for the crop and a transport fee. "Bonus points," which are exchangeable for products that ITC sells, are given for crops with quality above the norm. In this way, the e-Choupal system bypasses the government-mandated trading *mandis*.

Farmers benefit from more accurate weighing, faster processing time, and prompt payment, and from access to a wide range of information, including accurate market price knowledge, and market trends, which help them decide when, where, and at what price to sell. Farmers selling directly to ITC through an e-Choupal typically receive a higher price for their crops than they would receive through the *mandi* system, on average about 2.5% higher (about US$6 per ton). The total benefit to farmers includes lower prices for inputs and other goods, higher yields, and a sense of empowerment. The e-Choupal system has had a measurable impact on what farmers chose to do: in areas covered by e-Choupals, the percentage of farmers planting soy has increased dramatically, from 50 to 90% in some regions, while the volume of soy marketed through *mandis* has dropped as much as half. At the same time, ITC benefits from net procurement costs that are about 2.5% lower (it saves the commission fee and part of the transport costs it would otherwise pay to traders who serve as its buying agents at the *mandi*) and it has more direct control over the quality of what it buys. The system also provides direct access to the farmer and to information about conditions on the ground, improving planning and building relationships that increase its security of supply. The company reports that it recovers its equipment costs from an e-Choupal in the first year of operation and that the venture as a whole is profitable.

In mid-2003, e-Choupal services reached more than 1 million farmers in nearly 11,000 villages, and the system is expanding rapidly. ITC gains additional benefits from using this network as a distribution channel for its products (and those of its partners) and a source of innovation for new products. For example, farmers can buy seeds, fertilizer, and some consumer goods at the ITC processing center, when they bring in their grain. Sanchalaks often aggregate village demand for some products and place a single order, lowering ITC's logistic costs. The system is also a channel for soil testing services and for educational efforts to help farmers improve crop quality. ITC is also exploring partnering with banks to offer farmers access to credit, insurance, and other services that are not currently offered or are prohibitively expensive. Moreover, farmers are beginning to suggest—and in some cases, demand—that ITC supply new products or services or expand into additional crops, such as onions and potatoes. Thus farmers are becoming a source of product innovation for ITC.

DEVELOPMENT BENEFIT

The e-Choupal system gives farmers more control over their choices, a higher profit margin on their crops, and access to information that improves their productivity. By providing a more transparent process and empowering local people as key nodes in the system, ITC increases trust and fairness. The increased efficiencies and potential for improving crop quality contribute to making Indian agriculture more competitive. Despite difficulties from undependable phone and electric power infrastructure that sometimes limit hours of use, the system also links farmers and their families to the world. Some *sanchalaks* track futures prices on the Chicago Board of Trade as well as local *mandi* prices, and village children have used the computers for schoolwork, games, and to obtain and print out their academic test results. The result is a significant step toward rural development.

KEY LESSONS

The e-Choupal model demonstrates that a large corporation can play a major role in recognizing markets and increasing the efficiency of an agricultural system, while doing so in ways that benefit farmers and rural communities as well as shareholders. The case also shows the key role of information technology—in this case provided and maintained by a corporation, but used by local farmers—in helping bring about transparency, increased access to information, and rural transformation. Critical factors in the apparent success of the venture are ITC's extensive knowledge of agriculture, the effort ITC has made to retain many aspects of the existing production system, including maintenance of local partners, the company's commitment to transparency, and the respect and fairness with which both farmers and local partners are treated.

WHAT WORKS: ITC'S E-CHOUPAL AND PROFITABLE RURAL TRANFORMATION

Rural India is a difficult business location. Transport, electric power, and information infrastructure are inadequate. Business practices are underdeveloped or outdated. Lack of access to modern resources has resulted in an under-trained workforce. Rural society is structured around subsistence and is unprepared for modern products and services. These constraints, along with many others, have dissuaded most companies from taking on the challenge of rural commerce. Yet such an engagement can serve a dual agenda: bridging rural isolation and the resulting disparities of education and economic opportunity, while at the same time creating a potentially large profit opportunity for the organization willing to tackle the inefficiencies. The key question is how modern resources and methods can be practically deployed to profitably overcome rural constraints. Also important are the social impacts of such an engagement.

ITC's e-Choupal initiative began by deploying technology to re-engineer procurement of soya and other crops from rural India. It has gone on to serve as a highly profitable distribution and product design channel. The effort holds valuable lessons in rural engagement and demonstrates the magnitude of the opportunity while illustrating the social and development impact of bringing global resources, practices, and remuneration to the Indian farmer.

THE PARADOX OF INDIAN AGRICULTURE

Agriculture is economically and socially vital to India. It contributes 23% of the GDP, feeds a billion people and employs 66% of the workforce. Agriculture's share of GDP has shrunk steadily but at 23% it remains a critical component of the economy (see Table 1).

Table 1. GDP by Sector[1]

Macroeconomic indicators	1993	1998	1999	2000	2001	2002	2007
Nominal GDP [measured in thousands of US$]	273.93	414.32	444.35	450.68	481.42	500.99	695.78
Agriculture (% of GDP)	28.16	25.42	23.85	22.74	22.76	23.15	19.60
Industry (% of GDP)	23.88	24.33	23.53	24.23	23.59	26.35	30.60
Services (% of GDP)	38.90	42.05	43.59	44.16	44.85	50.50	49.90

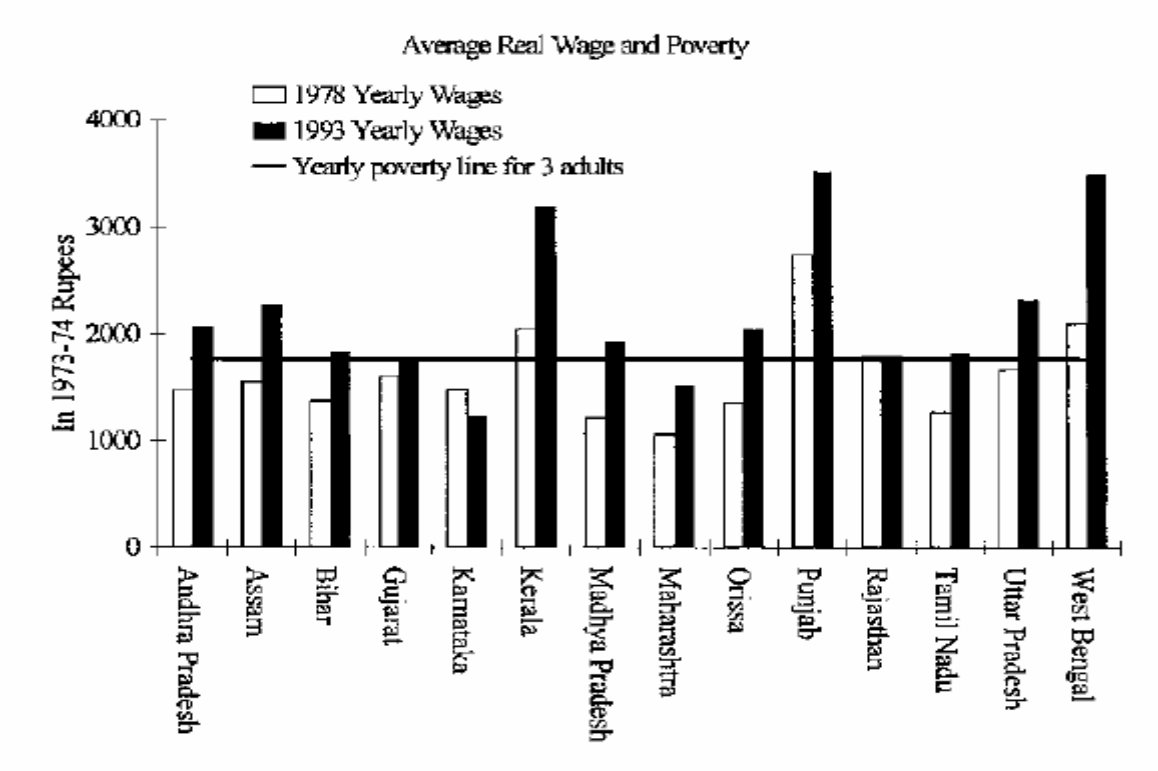
Yet despite this economically vital role, Indian agriculture has until recently been regulated in an archaic fashion that limits its productivity. Non-optimal farming practices and capricious weather patterns left post-Independence India with an under-performing agricultural sector, acute food shortages, and dependence on food imports. Legislation from this period brought heavy government intervention in agriculture, including control of land ownership, input pricing, and regulated of product marketing. Produce could only be sold in government-recognized locations to authorized agents. Processing capacities, private storage, futures trading and transport were restricted. The result was corrupt and inefficient systems, in which starvation existed alongside granaries overflowing with food stocks of over 60 million metric tons. At the same time, the unprofessional business environment made the sector unattractive to modern companies and blocked their influence in rationalizing the market.

[1] Copyright© 2003, The Economic Intelligence Unit

High Production yet Impoverished Producers

The goal of being self-sufficient in food supply brought Indian agriculture into the mainstream of political and social consciousness. The Green Revolution brought great strides in agricultural productivity to some parts of India and made the country a net exporter of most food grains by the mid-1970's, thus resolving previous famine paradoxes. However, the Indian farmer did not progress correspondingly. After independence, the government parceled and redistributed larger land holdings to rectify historical inequities and entrust ownership to end cultivators, thus encouraging productivity. In subsequent years, ownership ceilings were legislated and inherited land was partitioned into smaller lots, such that by 2003, the typical Indian farm is a very small-scale operation with total landholdings often measured by fractions of an acre. Unable to realize economies of scale, most Indian farmers are very poor as a result of land redistribution policies. Figure 1 illustrates that in 1993, agricultural laborers in most states made barely enough to keep a three-person family above the poverty level[2].

Figure 1. Incomes of Agricultural Laborers



In recent decades, the economy has been growing far more rapidly in non-agricultural areas, especially the service sector in urban areas. From 1993 to 2003, the (primarily urban) service sector has seen its share of national GDP rise by 11.6%, while rural agriculture has seen its share of GDP decline by 5.01% over the same period.[3] There is a vast disparity in access to education and opportunities between urban and rural India. This means that farmers rarely know of non-agricultural opportunities and likely would not have the resources to pursue them even if adequate information were available. Remedying this asymmetry of opportunity will require providing rural India with both the knowledge of opportunities and the ability to pursue them. ITC's e-Choupal is an example of how a commercial venture can provide a channel for knowledge and opportunity, bringing global resources and practices to Indian villages as well

[2] "Poverty Dynamics in Rural India" – IMF Working Paper, Revised Nov 06, 2002
[3] See Table 1; data from the Economic Intelligence Unit.

as higher incomes for farmers, and helping create the conditions for many other enterprises to cater to the rural market.

ORIGINS OF E-CHOUPAL

The ITC group is one of India's foremost private sector companies with a market capitalization of around US$4 billion and annual revenues of US$2 billion. ITC has a diversified presence in tobacco, hotels, paperboards, specialty papers, packaging, agri-business, branded apparel, packaged foods and other fast moving consumer goods.

Spurred by India's need to generate foreign exchange, ITC's International Business Division (IBD) was created in 1990 as an agri-trading company aiming to "offer the world the best of India's produce." Initially, the agricultural commodity trading business was small compared to international players. By 1996, the opening up of the Indian market had brought in international competition. Large international companies had better margin-to-risk ratios because of wider options for risk management and arbitrage. For an Indian company to replicate the operating model of such multinational corporations would have required a massive horizontal and vertical expansion. In 1998, after competition forced ITC to explore the options of sale, merger, and closure of IBD, ITC ultimately decided to retain the business. The Chairman of ITC challenged IBD to use information technology to change the rules of the game and create a competitive business that did not need a large asset base. Today, IBD is a US$150 million company that trades in commodities such as feed ingredients, food-grains, coffee, black pepper, edible nuts, marine products, and processed fruits.

Corporate and social responsibility is an integral part of ITC's philosophy, and ITC is widely recognized as dedicated to the cause of nation building. Chairman Y. C. Deveshwar calls this source of inspiration "a commitment beyond the market."

> "ITC believes that its aspiration to create enduring value for the nation provides the motive force to sustain growing shareholder value. ITC practices this philosophy by not only driving each of its businesses towards international competitiveness but by also consciously contributing to enhancing the competitiveness of the larger value chain of which it is a part."[4]

This view of social consciousness allowed ITC to recognize the unique opportunity of blending shareholder value creation with social development. The social impact of the e-Choupals as envisioned by ITC ranges from the short-term provision of Internet access to the long-term development of rural India as a competitive supplier and consumer of a range of goods and services in the global economy. The sustainability of the engagement comes from the idea that neither the corporate nor social agendas will be subordinated in favor of the other.

THE OILSEED COMPLEX

Edible oil from vegetable sources is a fundamental part of the Indian diet. The oilseed complex refers to the class of crops from which edible oils are extracted.[5] The complex is further classified into traditional oils (groundnut, rapeseed/mustardseed, safflower) and non-traditional oils (sunflower, soy, cottonseed). The process of oil extraction varies by oilseed, but consists of two basic stages: mechanical crushing and solvent extraction to obtain residual oil. The residue, called de-oiled cake, is sold as animal feed. Because of its low oil content, soy oil extraction is done almost exclusively by the solvent extraction process.

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[4] ITC Wants to do a Wal-Mart, BS Bureau in Kolkata, July 26, 2003; cited on Rediff (URL TK)

[5] A major source for this section is World Bank Report #15677-IN: India The Oilseed Complex: Capturing Market Opportunities, July 1997

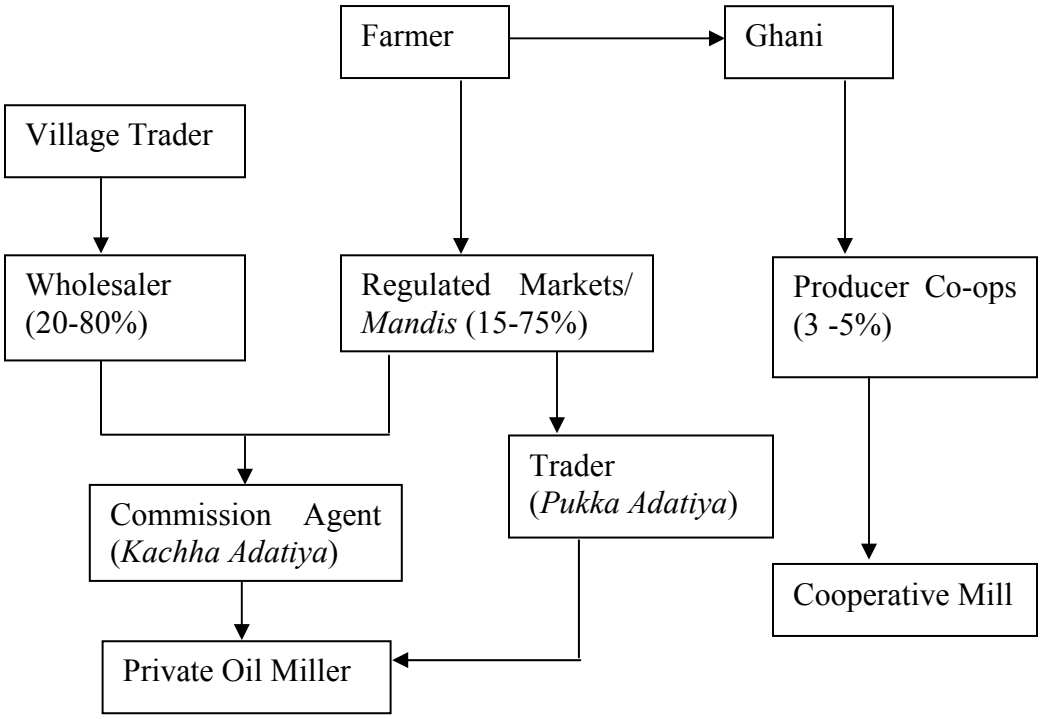
In the 1970's, oilseed production stagnated. By 1980, imports accounted for 32% of the domestic supply. Following the Green Revolution in wheat and rice, the government of India turned regulatory attention in the early 1980's to oilseeds, sharply limiting imports. Protectionism brought substantial gains in domestic production, doubling oilseed output to 21 million metric tons by 1994 and increasing the reliability of supply. About 40% of the increased output came from the introduction of new crops, especially soy and sunflower. Soy thus represented an important innovation in the Indian oilseed complex, resulting in better utilization of scarce resources and greater cropping intensity. Soy was exempted from the Small Scale Industries Act to allow for processing in large-scale, modern facilities. Nonetheless, the industry remains dominated by small farmers. Some three million soy farmers produce about five million tons of soybeans annually.

When ITC entered the soy industry in the 1990's produce was generally bought and crushed by small crushers who also functioned as traders. ITC began with buying and exporting de-oiled soy cake. Within a year, the company realized that it needed greater presence to better understand product dynamics. ITC then began renting processing plant time and buying soy directly from local *mandis*. ITC's procurement has grown rapidly and has seen the introduction of professional business practices, transparency, and formal contractual relationships between agents and buyers.

PRODUCTION CHANNELS PRIOR TO THE E-CHOUPAL

There are three commercial channels for soy: traders, government-mandated markets (*mandis*), and producer-run cooperative societies for crushing in cooperative mills (see Figure 2). In addition, farmers traditionally keep a small amount of their crops for their personal consumption and get the produce processed in a small-scale crushing-plant called a *ghani*. The system varies among states and districts, as does the percentage of produce going through each channel, but on average, 90% of soy crops are processed through traders and *mandis*.

Figure 2. Operation of the *Mandi* Distribution System



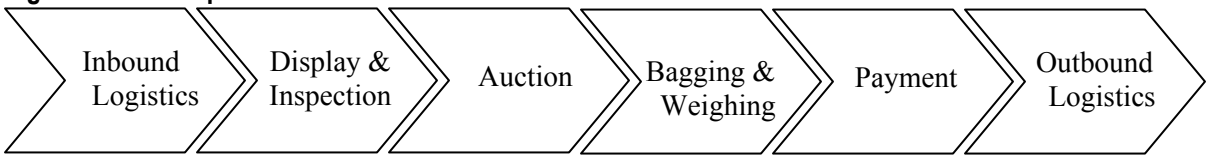
The Agricultural Products Marketing Act legislated the creation of *mandis* to enable a more equitable distribution of the gains from agriculture among producers, consumers, and traders. The *mandi* is central to the functioning of the marketing channel, and acts as delivery point where farmers bring produce for sale to traders. In the soy growing areas of Madhya Pradesh, a *mandi* typically serves around 700 square kilometers, although the area served by a *mandi* varies by state. With traditional grains, large portions are used by the farmer or bartered for different crops. But since soy is not native to the Indian palate, its major market is the crushing plant and nearly the entire crop must be exported. This makes the *mandi* a vital part of the soya chain.

Mandi trading is conducted by commission agents called *adatiyas* (brokers who buy and sell produce). They are of two types: *kachha adatiyas* are purchasing agents that buy only on behalf of others and *pukka adatiyas* who finance trade as representatives of distant buyers and sometimes procure crops on their own account. All the *adatiyas* belong to the Agarwal and Jain community, an economic class distinct from farmers. This community manages grain trade across the entire country including south India, a remarkable feat considering the vast cultural and social diversity across the nation. The lack of professional competition combined with the communal stranglehold on rural trading has made commission agents extremely wealthy. Commission agents from medium sized *mandis* can possess assets and incomes in the millions of dollars. The adatiyas established and grew the soy industry on the basis of familial and community trust, with buying and selling based upon oral agreements. Their expansive personal networks within the industry and their financial influence make them a formidable presence.

The operation of the *Mandi* consists of a number of different stages, from the logistics of transporting grain to the market to quality inspection, auction, bagging and weighing, and payment. Based upon local information within the village, farmers decide in which of the nearby *mandis* to sell. They transport their crops to the *mandis* in carts drawn by animals or tractors. Very often, to avoid peak-time crowds, farmers will arrive at the *mandi* the night before they intend to sell. When the *mandi* opens in the morning, farmers bring their carts to display areas within the *mandi*.

The inspection by buyers is by sight. There is no formal method of grading the produce and the only instrument used is the moisture meter; the crop is not tested for oil content.

Figure 3. *Mandi* Operation Process



Once potential buyers have inspected the produce, a *mandi* employee conducts the auction, where commission agents place bids. The auctions are typically open oral auctions with incremental bidding. The auction represents a stark contrast from the buyer's and seller's perspectives. For the farmer, the moment is pivotal: a scant 30 seconds assesses the results of six months of investment and hard work and establishes the value of one of only two or three paydays he will have in the year. For the commission agent, on the other hand, the moment is routine; he has many more carts of produce to buy and his margin is assured irrespective of the price.

Once the price has been established by the auction, the farmer moves the cart to the weighing area run by the buying commission agent. In most cases, the weighing area is in the *mandi* complex. In some cases, especially if the *mandi* is small, the weighing area may be at the commission agent's home near the *mandi*. Here, the produce is transferred from the cart into individual sacks. The sacks are then weighed,

one at a time, on a manual scale. After weighing, the full value of the grain is calculated. The farmer goes to the agent's office to collect a cash payment. The agent pays a *mandi* fee (1% of purchase value in Madhya Pradesh) to the *mandi*. The bagged produce is then loaded on to the buyer's trucks and transported to the processing plant.

Limitations of the *Mandi* System

The *mandi* system does not serve the farmer well, and is burdened by inefficiency. Because the farmer does not have the resources to analyze or exploit price trends, the timing of the sale may not result in the optimal price for the crop. Moreover, since the actual sale price is determined at the auction, by the time the farmer gets the price, it is too late to go to another *mandi* to make his sale. Other expenses and inefficiencies exist: the overnight stay near the *mandi* costs the farmer money; most crops are displayed in open air courtyards, and are therefore subject to being negatively affected by the weather; the inspection process is unscientific and often arbitrary, tending to favor the buyer, and generally does not provide an incentive to farmers to invest in better seed or farming practices that lead to higher quality—even though quality, especially oil content, matters to soy processors.

In addition, farmers find the auction process demeaning. Agents belong to a close-knit community that is socially and economically distinct from the farmers' community. While they may not collude in pricing, they do collude in establishing the practices of the trade that uniformly favor agents and exploit the farmers' situation. The farmers also bear the cost of bagging and weighing the crop, which is done by *mandi* laborers—part of whose compensation is the sale of spilled produce. Needless to say, these laborers ensure that some portion of each lot is spilled.

Farmers feel that the weighers consistently under-weigh their produce by applying practiced and timely nudges to the scale. Historical intimidation and long queues waiting behind them dissuade the farmers from protesting. To add to this exploitation, the farmer is never paid the full purchase price up front but is paid a partial amount and asked to return to the *mandi* later for the remainder. Farmers are not paid interest on the remaining sum—although crushers pay agents usurious rates for the privilege of delayed payment—and repeating the trip to the *mandi* costs farmers time and money. Since the crop has already been delivered, however, the farmers are at the agents' mercy.

Apart from the exploitation of the farmer, there are other inefficiencies in the system. The multiple points of handling in the supply-chain require the produce to be bagged, which takes four to five times longer to be unloaded at the processing plant than unbagged produce. Traders generally do not have the capacity to store and manage different qualities and grades of produce, inhibiting efforts to produce better crop grades. Pricing is set locally at the *mandis*, and is not reliably tracked or reported nationally, resulting in a lack of information that reduces the opportunity for arbitrage and leads to market inefficiency. In addition, regulatory restrictions tend to limit arbitrage to small geographic areas.

The *mandi* system also does not serve trading companies such as ITC well; its inefficiencies make the *mandi* far from an optimal procurement channel. From the company's point of view, the key problem is the agent's control of the market and the resulting distortions of price and quality. Agents purchase grain on a trading company's behalf. Some of the produce they buy is of good quality and therefore commands a premium price, while other crops are of poor quality and therefore sell at a discount. In any given day, an agent purchases produce with a range of crop quality at a range of prices. The agent often mixes the different quality crops together and charges the trading company a single price near the higher end of the price spectrum.

Not only does the agent inflate the price to trading companies, he also inflates the price at the *mandi*. As we have seen, high-quality produce is used to make an entire lot of lower quality produce acceptable. Because of its value to agents, agents pay an inflated premium for high-quality produce, which drives up

the high crop price at the *mandi* for the day. Very few farmers actually get the price for top-quality produce, but this price acts as a benchmark for the next day's pricing, thereby inflating the *mandi* price over a period of time and increasing costs for trading companies.

Additionally, the trading company establishes a daily price range for its agent to buy within. If the agent's average buy price that day is lower than the low end of the established price, the agent sells the grain to the trading company at the established low price and pockets the difference. If, however, the average buy price is higher than the trading company's established high price, the agent will still buy the produce but will report to the company that since its price was not high enough, no grain could be bought. The agent will store the grain and sell it to the trading company the next day when the established price has been raised to make-up for the previous day's procurement shortfall. Commission agents therefore capture the entire benefit of intra-day price shifts. The agents therefore operate without risk of loss of profit. Officially, the agents' commission is 1% of ITC's price. In reality, ITC estimates that the agents' operating margin is around 2.5-3%.

As a result of the commission agent structure in the traditional *mandi* system, ITC had no direct interaction with the farmer. This gap created a range of supply-chain issues, including limiting ITC's knowledge of its crops, suppliers, and supply risks, as well as limiting the company's ability to improve crop quality and quantity by bringing modern agricultural practices to the farmers.

The company developed its e-Choupal strategy as a way to communicate directly with the farmer and to bypass the inefficiencies arising out of the agents' intermediation, thereby achieving "virtual vertical integration."

VISION AND PLANNING BEHIND THE E-CHOUPALS

Implementing and managing e-Choupals is a significant departure from commodities trading. Through its tobacco business, ITC has worked in Indian agriculture for decades, from research to procurement to distribution. ITC's translation of the tactical and strategic challenges it faced and its social commitment into a business model demonstrates a deep understanding of both agrarian systems and modern management. Some of the guiding management principles are:

Re-engineer, Not Reconstruct

The conventional view of transforming established business systems begins with the failures of the current system and develops means to change it. ITC took a different approach by looking at the successes of the current system and identifying what they could build on. ITC not only retained the efficient providers within the *mandi* system but also created roles for some inefficient providers. This philosophy has two benefits. First, it avoids "reinventing the wheel" in areas where ITC would not be able to add value through its presence. Second, it recruits and engages members of the rural landscape thereby making their expertise available to ITC while preventing their expertise from being shared with ITC's competition. A good example of this in action is the role created for the commission agents as discussed later.

Address the Whole, Not Just One Part

The farmers' various activities range from procuring inputs to selling produce. Currently, the village trader services the spectrum of farmers' needs. He is a centralized provider of cash, seed, fertilizer, pesticides, and also the only marketing channel. As a result, the trader enjoys two competitive benefits. First, his intimate knowledge of the farmer and village dynamics allow him to accurately assess and manage risk. Second, he reduces overall transaction costs by aggregating services. The linked transactions reduce the farmers' overall cost in the short term, but create a cycle of exploitative dependency in the

long-term. Rural development efforts thus far have focused only on individual pieces rather than what the entire community needs. Cooperatives have tried to provide agricultural inputs, rural banks have tried to provide credit, and *mandis* have tried to create a better marketing channel. These efforts cannot compete against the trader's bundled offer. Functioning as a viable procurement alternative, therefore, must eventually address a range of needs, not just the marketing channel.

An IT-Driven Solution

From the conception of the model, an IT-based solution was recognized as fundamental to optimizing effectiveness, scalability, and cost. Information technology is 20% of all the effort of ITC's e-Choupal business model, but is considered the most crucial 20%. The two goals envisioned for IT are:

- Delivery of real-time information independent of the transaction. In the *mandi* system, delivery, pricing, and sales happen simultaneously, thus binding the farmer to an agent. E-Choupal was seen as a medium of delivering critical market information independent of the *mandi*, thus allowing the farmer an empowered choice of where and when to sell his crop.

- Facilitate collaboration between the many parties required to fulfill the spectrum of farmer needs. As a communication mechanism, this goal is related to the commitment to address the whole system, not just a part of the system.

It should be noted that ITC did not hesitate to install expensive IT infrastructure in places where most people would be wary of visiting overnight. It is a manifestation of the integrity of rural value systems that not a single case of theft, misappropriation, or misuse has been reported among the almost 2,000 e-Choupals.

Modularity of Investments, in Size and Scope

ITC managed its investments modularly along the scope and scale axes in what it terms "rollout-fixit-scale up" and "pilot-critical mass-saturation." This incremental control of investment levels along with the clarity of revenue streams and the social import were critical in getting board approval for the initiative.

Risk Assessment and Mitigation

ITC identified the following risks as it designed the business model:

- Radical shifts in computing access will break community-based business models.

- The *sanchalaks* are ITC's partners in the community, and as their power and numbers increase, there is a threat of unionization and rent extraction.

- The scope of the operation: the diversity of activities required of every operative and the speed of expansion create real threats to efficient management.

Managing Bureaucracy

When the e-Choupals were conceived, they faced a fundamental regulatory obstacle. The Agricultural Produce Marketing Act, under whose aegis *mandis* were established, prohibits procurements outside the *mandi*. ITC convinced the government that e-Choupals would operate according to the spirit of the Act and thus e-Choupal procurement was in line with its goals. Since ITC would not be using the *mandi* infrastructure for its procurement, and would have to incur its own costs with the e-Choupal infrastructure, the government offered to waive the *mandi* tax on the produce procured through the e-Choupal. However, ITC recognized that the tax was a major source of revenue for the government and local *mandis* and, as ITC's competition was also subject to the tax, the tax itself was not making ITC uncompetitive. ITC therefore chose to continue paying the tax rather than risking the relationships with the government and the *mandis*.

THE BUSINESS MODEL

The model is centered on a network of e-Choupals, information centers equipped with a computer connected to the Internet, located in rural farming villages. E-Choupals serve both as a social gathering place for exchange of information (*choupal* means traditional village gathering place in Hindi) and an e-commerce hub. A local farmer acting as a *sanchalak* (coordinator) runs the village e-Choupal, and the computer usually is located in the *sanchalak's* home. ITC also incorporate a local commission agent, known as the *samyojak* (collaborator), into the system as the provider of logistical support.

ITC has plans to saturate the sector in which it works with e-Choupals, such that a farmer has to travel no more than five kilometers to reach one. The company expects each e-Choupal to serve about 10 villages within a five kilometer radius. Today its network reaches more than a million farmers in nearly 11,000 villages through 2,000 e-Choupals in four states (Madhya Pradesh, Karnataka, Andhra Pradesh, and Uttar Pradesh), and the network is expanding rapidly. Of the e-Choupals in Madhya Pradesh, the one in Khasrod services about 500-700 farmers in 10 villages; another e-Choupal in Dahod services 5,000 farmers in 10 villages. The average usage is about 600 farmers per e-Choupal in the soy cropping area, with fewer in wheat, coffee, and shrimp.

The critical element of the e-Choupal system, and the key to managing the geographical and cultural breadth of ITC's network, is the *sanchalak*. ITC channels virtually all its communication through the local *sanchalak*. Recruiting a local farmer from the community for this role serves several purposes:

- For generations, the Indian farmer has been betrayed by individuals and institutions. Trust is the most valuable commodity in rural India. No transaction will happen without trust, irrespective of the strength of the contract. The *sanchalak* is selected to provide this vital component in ITC's system.

- ITC need not invest in building and securing a physical infrastructure such as a kiosk for housing the e-Choupal computer.

- The *sanchalak* is trained in computer operation and can act as a familiar and approachable human interface for the often illiterate farmers and other villagers.

- ITC expects to leverage the profit-making power of the small-scale entrepreneur.

Sanchalaks indicate three equally-weighted motivations for assuming their role: a means to help their community, a profitable business for themselves, and a means of getting access to a functional computer. The *sanchalaks* receive a commission for every transaction processed through the e-Choupal and also benefit from increased social status that accompanies the position—a significant advantage in rural Indian life. ITC insists that *sanchalaks* should not give up farming, for this would compromise the trust that they command. To help ensure that *sanchalaks* serve their communities and not just themselves, ITC projects the role as a public office: hence the title "*sanchalak*," and a public oath-taking ceremony where the *sanchalak* takes an oath to serve the farming community through the e-Choupal. Successful *sanchalaks* usually have a number of common characteristics, including risk-taking ability and the willingness to try something new, ambition, and the aspiration of earning additional income through the e-Choupal. *Sanchalaks* are usually of median wealth and status in their communities, able to read and write, and are part of an extended family large enough so that they can find time to service the e-Choupal.

Sanchalaks undergo training at the nearest ITC plant. They receive education on basic computer usage, the functions of the e-Choupal Web site, basic business skills, as well as quality inspection of crops. For the sale of products through e-Choupal, the *sanchalaks* receive product training directly from the manufacturer with ITC involving itself only in product design and facilitation. Nonetheless, their role requires considerable entrepreneurial initiative and entails some operational costs, between US$60 and US$160 per year, for electricity and phone-line charges; the latter of which are gradually declining as ITC replaces phone-based Internet connections with a VSAT system.

Selecting and training the *sanchalaks* is just the first step. Most do not have retail experience and may lack motivation to actively promote ITC products. ITC employs a variety of motivation techniques to encourage sales. One technique is to hold a ceremony where *sanchalaks* are presented with their annual commission checks and public announcements of earnings are made. Stories how *sanchalaks* spent past commissions serve to demonstrate the income potential and spurs non-performers to work. The zeal to perform sometimes leads to territorial disputes, but ITC does not interfere in their resolution because it encourages *sanchalaks* to better serve their customer-base.

A secondary, but still important, role is played by the *samyojaks*, or cooperating commission agents. Samyojaks earn income from ITC by providing logistical services that substitute for the lack of rural infrastructure, by providing information and market signals on trading transactions to the e-Choupal system. In effect, ITC uses agents as providers of essential services, not as principals in a trading transaction. They play an especially important role in the initial stages of setting up the e-Choupals, because they know which farmers grow soya, what kind of families they have, what their financial situation is, and who is seen as "acceptable" in the villages and might thus make a good *sanchalak*. ITC is strongly committed to involving *samyojaks* in the on-going operation of the e-Choupal system, allowing them revenue streams through providing services such as management of cash, bagging and labor in remote ITC procurement hubs, handling of *mandi* paperwork for ITC procurement, and as licensed principals for the retail transactions of the e-Choupal.

Since the e-Choupal system by-passes the agent-controlled *mandis* and has considerably reduced commission income, why do agents agree to cooperate with ITC? First, the company has made it clear that they will continue to buy produce through the *mandis*. Second, the company offers significant commissions for *samyojak* services. Finally, the agents are fragmented and fear that if they do not agree to work with ITC, another agent will gain the promised e-Choupal revenues. One *samyojak* reported that he saw globalization as an irresistible trend, and although he saw loss of revenue in the short-term, his long-term interest lay in cooperating with an international company.

THE E-CHOUPAL SYSTEM

The re-engineered supply chain looks very different from the existing system and has the following stages:

Figure 3. E-Choupal Supply Chain

Pricing

The previous day's *mandi* closing price is used to determine the benchmark Fair Average Quality (FAQ) price at the e-Choupal. The benchmark price is static for a given day. This information and the previous day *mandi* prices are communicated to the *sanchalak* through the e-Choupal portal. The commission agents at the *mandi* are responsible for entering daily *mandi* prices into the e-Choupal. If and when the Internet connection fails, the *sanchalak* calls an ITC field representative.

Inspection and Grading

To initiate a sale, the farmer brings a sample of his produce to the e-Choupal. The *sanchalak* inspects the produce and based on his assessment of the quality makes appropriate deductions (if any) to the benchmark price and gives the farmer a conditional quote. The *sanchalak* performs the quality tests in the farmer's presence and must justify any deductions to the farmer. The benchmark price represents the upper limit on the price a *sanchalak* can quote. These simple checks and balances ensure transparency in a process where quality testing and pricing happen at multiple levels.

If the farmer chooses to sell his soy to ITC, the *sanchalak* gives him a note capturing his name, his village, particulars about the quality tests (foreign matter and moisture content), approximate quantity and conditional price.

Weighing and Payment

The farmer takes the note from the *sanchalak* and proceeds with his crop to the nearest ITC procurement hub, ITC's point for collection of produce and distribution of inputs sold into rural areas. Some procurement hubs are simply ITC's factories that also act as collection points. Others are purely warehousing operations. ITC's goal is to have a processing center within a 30 - 40 kilometer radius of each farmer. There are currently 16 hubs, but there will eventually be 35 in the state of Madhya Pradesh.

At the ITC procurement hub, a sample of the farmer's produce is taken and set aside for laboratory tests. A chemist visually inspects the soybean and verifies the assessment of the *sanchalak*. It is important to note that this is the only test assessment before the sale. Laboratory testing of the sample for oil content is performed after the sale and does not alter the price. The reason for this is that farmers, having historically been exploited, are not immediately willing to trust a laboratory test. Therefore pricing is based solely upon tests that can by understood by the farmer. The farmer accepts foreign matter deductions for the presence of stones or hay, based upon the visual comparison of his produce with his neighbors. He will accept moisture content deductions based upon the comparative softness of his produce when he bites it.

ITC is working to change farmer attitudes towards laboratory testing. It is developing an appreciation of better quality by using the subsequent lab tests to reward farmers with bonus points if their quality

exceeds the norm. At the end of the year, farmers can redeem their accumulated bonus points through the e-Choupal for farm inputs, or contributions toward insurance premiums.

After the inspection, the farmer's cart is weighed on an electronic weighbridge, first with the produce and then without. The difference is used to determine the weight of his produce.

Hub Logistics

After the inspection and weighing are complete, the farmer then collects his payment in full at the payment counter. The farmer is also reimbursed for transporting his crop to the procurement hub. Every stage of the process is accompanied by appropriate documentation. The farmer is given a copy of lab reports, agreed rates, and receipts for his records.

Samyojaks, who are adept at handling large amounts of cash, are entrusted with the responsibility of payment, except at procurement centers near large ITC operations where ITC is handles cash disbursement. *Samyojaks* also handle much of the procurement hub logistics, including labor management at the hub, bagging (if necessary), storage management, transportation from the hub to processing factories, and handling *mandi* paperwork for the crops procured at the hub. For his services in the procurement process, the *samyojak* is paid a 0.5% commission.

Farmer Gains

Prior to the introduction of e-Choupal, farmers' access to agricultural information was incomplete or inconsistent. The only sources of information were word of mouth within the village and the commission agent. E-Choupal allows farmers daily access to prices at several nearby *mandis*. Some e-Choupal *sanchalaks* have taken this a level further by accessing external pricing sources such as prices on the Chicago Board of Trade, in order to track global trends and determine the optimum timing of sales. Moreover, through e-Choupal, farmers have access to prices and make the critical decision of when and where to sell his crop. Both factors work together to provide the farmers a better price for their crops.

Under ITC's system, farmers no longer bear the cost of transporting their crops to the *mandi* and are instead reimbursed for transport to the procurement hub. The transaction at the ITC hub is also much faster than at the *mandi*, usually taking no more than two or three hours. Moreover, ITC's electronic weighing scales are accurate and not susceptible to sleight of hand like the manual weighing system at the *mandi*. The system also does not require produce to be bagged, which avoids the associated loss of produce by intentional spillage. Thus the e-Choupal system has logistical and transaction efficiencies. Finally, the ITC procurement center is a professionally run operation where the farmer is treated with respect and served as a customer. The dignity accorded farmers by the professional process of the e-Choupal cannot be understated. ITC's recognition that farmers are not simply agricultural producers, but integral partners in the supply process has elevated the level of respect paid to them. Simple provisions such as a shaded seating area where farmers can sit while waiting for their paperwork serve as indicators of ITC's respect for farmers and their produce. Though intangible, the self-confidence created by this professional treatment is affecting the way farmers conduct themselves. *Sanchalaks* and even commission agents have noted a change in farmer attitudes.

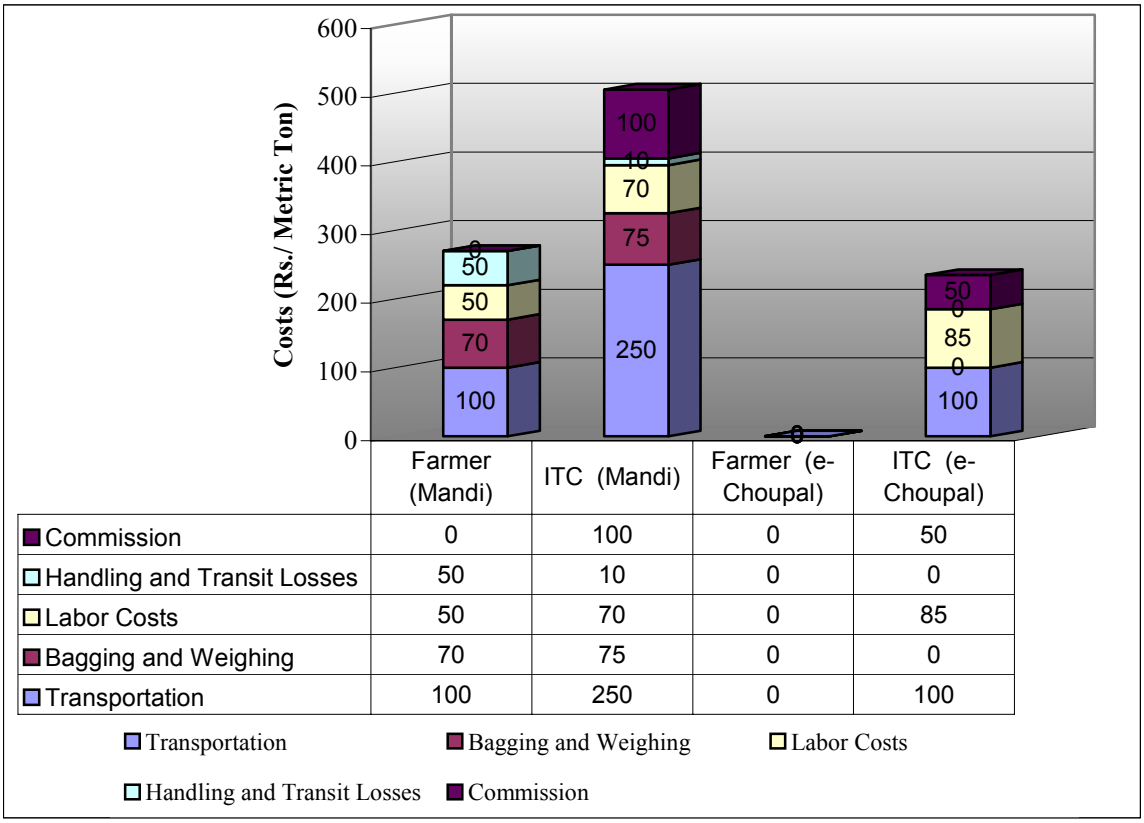
The incremental income from a more efficient marketing process is about US$6 per ton, or an increase of about 2.5% over the *mandi* system. Farmers also can make use of the information available to them through e-Choupal to improve yields. Moreover, the seed, fertilizer, and consumer products offered them through e-Choupal cost substantially less than through other local sources such as village traders. Thus there are meaningful net economic benefits to farmers, and it is having a measurable impact on what farmers choose to do: in areas covered by e-Choupals, the percentage of farmers planting soy has increased dramatically, from 50 to 90% in some regions, while the volume of soy marketed through *mandis* has dropped by as much as 50%.

ITC Gains

The commissions paid to the agents under the *mandi* system were not excessive, but because of the inefficiencies discussed earlier, the true cost of intermediation through the *mandi* system was between 2.5 and 3% of procurement costs. While retaining commissions paid for the *sanchalaks'* services, the 0.5% commission paid to them is significantly less than the costs associated with the *mandi* system. Direct reimbursement of transport costs to the farmer is estimated to be half of what ITC used to pay the commission agents for transport to their factory. Removal of intermediary manipulation of quality and the ability to directly educate and reward quality in the customer base results in higher levels of quality in e-Choupal procurement. This results in higher oil yields, which, in turn, lead to higher profits for ITC.

E-Choupal also allows ITC to develop long-term supplier relationships with farmers and attain some degree of supply security over time. Risk is also managed in the e-Choupal system by a far stronger information infrastructure. *Sanchalaks* and *samyojaks* working on behalf of ITC provide excellent bottom-up information on pricing, product quality, soil conditions, and expected yields. This allows ITC to better plan future operations.

Figure 4. Transactions Costs Under the *Mandi* and E-Choupal Systems



In the *mandi* system, there was a mark up of 7-8% on the price of soybean from the farm gate to the factory gate. Of this mark up, 2.5% was borne by the farmer while 5% was borne by ITC. With e-Choupal, ITC's costs are now down to 2.5%. Figure 4 shows transaction costs incurred by the farmer and ITC per metric ton of soy procured in the *mandi* and e-Choupal. In absolute numbers, both the farmers and ITC save about US$6 (Rs 270) per metric ton.[6]

[6] Calculations based on an exchange rate of 45 Rupees:1 US Dollar. Source: Yahoo Finance. Available: http://finance.yahoo.com/m5?a=1&s=USD&t=INR&c=0

Sustaining Commercial Volume

"Virtual vertical integration" can only work if there is a continuous flow of information between the e-Choupals and ITC. Because of the number and physical dispersion of the e-Choupals, this communication must be initiated by the *sanchalaks*. If their motivation to communicate with ITC diminishes, the channel will still function for procurement, but will lack the vitality to supply risk management, distribution, or product design. Maintaining continuous commercial flow keeps the *sanchalak* motivated to spend time and money calling the ITC representative to ask about new products, convey village demand, and providing ITC with local updates. An example of the power of local information was seen early in e-Choupal implementation. A competitor attempted to divert produce coming to the ITC factories by stationing representatives on the roads leading up to the plant. This person would stop farmers on their way to the ITC hub and offer them a price higher than the ITC rate at the competitor's plants. Farmers alerted the *sanchalaks* and they in turn provided ITC with the information necessary to address the situation. *Sanchalaks* thus provide an essential role in the chain of communication.

ITC maintains commercial volumes by sequencing procurement and sales year-round, thereby securing the continuous flow of commission checks through e-Choupals. Purchases and sales have been arranged so that *kharif* (the cropping season that coincides with India's monsoon, July through October) and *rabi* (winter cropping season in irrigated areas) inputs and procurement maintain a steady stream of revenue for *sanchalaks*.

Scaling the Model

Profitable re-engineering requires the unambiguous understanding of value provided, the circumstances in which they are applicable, and the revenues they are capable of generating. ITC's model identifies three sources of value for the company that can help scale the model:

- *Crop Specific Intervention*. ITC recognized that agrarian systems vary by crop. This means that the inefficiencies in the supply chain, the correction required from e-Choupal, and the magnitude and timing of the resulting revenues will differ by crop. For example, the systems, and consequently the e-Choupal models and payback streams, for coffee and shrimp are very different from those for soy. ITC's goals for soy intervention reflected this nuanced analysis and the project was targeted with recovering the entire cost of infrastructure from procurement savings. This is contrasted with the coffee and shrimp efforts where the source of e-Choupal value is such that the investment recovery horizon is much longer.

- *Low-Cost Last Mile*. The same system of physical and information exchange that brings produce from the village can be used to transfer goods to the villages. As infrastructure has already been paid for by procurement, it is available at marginal cost for distribution. This ties in nicely with ITC's larger goal of transformation into a distribution super-highway. ITC's current channels reach areas with populations of 5,000 and above. E-Choupals allow penetration into areas with populations less than 5,000. Products such as herbicides, seeds, fertilizers, and insurance policies, as well as soil testing services are sold through e-Choupal. E-Choupal as a distribution channel begins in agriculture but extends well into consumer goods and services. In the traditional channel, comprised of mobile traders and cycle-based distributors, farmers lack the resources to make informed purchasing decisions. More often than not, traders and distributors do not understand the farmers' issues and end up selling them products and services that do not satisfy their needs. With many larger companies hesitating to serve the rural market, farmers often do not have variety in their choice of products and services. This lack of choice means that not only are farmers forced to buy whatever is available, they often must pay a premium for those products.

- *Intelligent First-Mile*. The global resources, best practices, and remunerations that the e-Choupal brings to farmers have encouraged innovation and provided an avenue to see their ideas realized. This illustrates ITC's vision of using e-Choupal as the "intelligent first mile." Farmers are now coming up with products and services that ITC could provide to further improve operations. Farmers are demanding that ITC certify and make available the "*Samrat"* variety of seeds that is preferred over the currently certified JS300 variety. Some farmers have urged ITC to bring its resources to bear on onion and potato crops. Responding to the fact that the Indian onion crop is regarded as inferior to the Chinese crop in the world market, farmers recognize that this is due to the lack of availability of high quality seeds and information. They have approached ITC with a suggestion to create e-Choupals for these crops, pointing to the mutual profitability of such an effort.

ITC's objective is not to be a platform provider for sale of third-party products and services but rather a network choreographer who orchestrates bi-directional demand and supply of goods through a collaborative business model. ITC intends to differentiate itself by serving only those products and services to which it can add value. ITC's core asset is its knowledge of the customer. By transforming the value chain and setting up a platform for procuring commodities from them directly, they now have a foundation for forging a close relationship with the farmers. This relationship leads to a better understanding of the issues plaguing farmers. Through e-Choupals, hubs, and processing centers, ITC has the ready infrastructure needed to implement an alternative channel for distribution of goods and services to rural India. E-Choupals can double as storefronts and hubs as centers for stocking inventory. In the long term, ITC sees vast opportunities from its e-commerce platform and low-cost distribution system. Company officials have expressed the ambition to become "the Wal-Mart of India," and ITC chairman Y.C. Deveshwar told the media recently that "The e-Choupal network will serve area where nearly 70% of the country's population resides…(including) villages with populations of less than 5,000 people where most businesses never venture."[7]

In addition, the information infrastructure implemented by ITC can be used to enhance its business decision-making, better manage risk, and identify opportunities for cross-selling and up-selling. The company can leverage detailed transactional data and transform it into actionable knowledge. Data mining and data warehousing will help company executives to better understand the behavior of their customers, identify unfulfilled needs and ways to serve them efficiently. The communication infrastructure compensates for the lack of physical infrastructure needed for marketing products and services in rural India. It enables rapid, low-cost information dissemination and a trusted brand for introducing new products, while minimizing the need for a traveling sales force. Online ordering and order management eliminate the need for physical storefronts. And the IT infrastructure and local *sanchalak* provide customer intelligence, thus maximizing customer satisfaction and profitability.

Additional Services: Credit and Insurance

Farmers' low income and difficulty in accessing credit severely limits their capacity to pursue opportunities within and outside the agriculture sector. Access to credit has long been considered a major poverty alleviation strategy in India. Demand for rural credit is estimated at US$31.6 billion (Rs 1.43 trillion). The Indian government has implemented a number of subsidized credit-related programs. Among such programs, the Integrated Rural Development Program (IRDP), started in 1978, was a major national rural poverty alleviation program with a large credit component. Under the IRDP, nearly 53 million families were assisted with bank credit of US$684 million (Rs. 31 billion) and subsidy of US$231 million (Rs. 10.5 billion). But its impact had not matched the resources expended. The loans were not tailored to meet individual needs and it lacked the support systems necessary to help farmers.

[7] ITC Wants to do a Wal-Mart, BS Bureau in Kolkata, July 26, 2003; cited on Rediff (URL TK)

Many financial institutions are hesitant to serve rural India due to lack of credit history, high delivery, transaction, and administration costs, and a perception of high risk that leads to high borrowing costs imposed on farmers.
ITC proposes to address these problems through e-Choupals and partnerships with financial institutions to capture needed information and offer new products:

- *Capturing Credit History.* Farmers in rural India borrow money from local moneylenders, through government incentives, friends, relatives, or traders. Local moneylenders and intermediates are aware of farmers' creditworthiness and are therefore willing to loan money, albeit at a high interest rate. Through e-Choupal, ITC now has the capability to manage credit risk through its *sanchalak* network which can be used not only to verify creditworthiness of individual farmers but also to continuously monitor credit risk. ITC will be able to create a consolidated farmers' database with information pertaining to their holdings and transactions that can be used as a source of credit report profiles.

- *Transaction and Administration Costs.* For major financial institutions, transaction costs involved in servicing the rural market have been high because of the difficulty in reaching the market. E-Choupal can help overcome this problem by leveraging the IT infrastructure and the *sanchalak* network, thereby lowering administrative costs.

ITC plans to partner with larger banks such as ICICI to design products for rural India. Some of the products being designed include:

- *Non-cash loans for farm inputs*. Instead of giving cash to the farmer directly, the financial institutions will purchase farm inputs on behalf of the farmer. Farmers are expected to pay back loans for the purchase price to the financial institution.

- *Loans to sanchalaks*. Instead of giving loans directly to farmers, loans will be given to *sanchalaks* who, in turn, will loan money to farmers. *Sanchalask* can manage credit risk better than financial institution because they have better access to the farmer, and therefore more accurate information.

- *Direct loans to farmers based on sanchalak recommendations*. In this case, *sanchalaks'* commissions are based on the loan recovery and therefore the have incentive to monitor the risk on a continuous basis.

- *Insurance and Risk Management Services.* Insurance products have been designed to deal with rural cash-cycles. There is recognition that in bad years, farmers may not be able to pay the insurance premium. Rather than penalize the farmer when his policy, ITC allows for catch-up payments in later years or, as an alternative, the reduction of the final payout. ITC uses the e-Choupal Web infrastructure to set up and issue electronic reminders for premium payments. This addresses a major weakness of the current insurance system. The agents currently selling insurance have little incentive to encourage renewals and the lapse rate among policy is high. A system of interlocking instruments has been set up so that insurance premiums can be credited with quality bonus points from the farmer's soy sale. The *sanchalak* is assisted in making the sales pitch by informational Web-casts and video presentations.

TECHNOLOGY

Characteristics of the Operating Environment

Understanding the constraints imposed by the physical and social environment in e-Choupals operate is necessary to provide the context for understanding the system design.

Overcoming Power Constraints

Power availability in rural India is unreliable and the quality of power is sub-standard. As power is usually available for only a few hours a day and at on a sporadic schedule, the e-Choupal computer cannot always be accessed when information is needed. Access to information in a timely manner is critical to the success of the business model. ITC has overcome the problem of local power supply by providing a battery-based UPS (uninterrupted power supply) backup. With the reliability of a battery backup, the *sanchalak* can use the system at least twice a day—in the morning to check the prevailing *mandi* prices, and again in the evening to check the rate ITC is offering the next day. While the battery backup addresses the power supply issue, insufficient line power during the day poses the challenge of not having enough power to charge the backup battery. This has caused ITC to explore other power sources and ultimately ITC decided to use solar battery chargers. One full day of sunlight is enough to charge the battery for 70 to 80 minutes of computer usage.

The second problem with power is quality. Voltage fluctuations are endemic. The UPS unit is the most affected component. As a result of the erratic power supply, fuses are susceptible to being blown. To overcome this problem, ITC plans to install specially designed UPS units that remain effective between 90V and 300V. In order to control voltage spikes, they have introduced spike suppressors and filters. Phase imbalances, which lead to damage of equipment, have been addressed through the use of isolation transformers to correct neutral voltages.

Transportation

Most e-Choupal villages lack proper roads, limiting vehicle access. As such, public transportation access to many of the villages is infrequent. Some villages are served only once or twice a day by rural taxis. The population relies on two-wheeled bicycles and motorbikes and bullock carts as the main means of transportation. Moving equipment into and out of the villages is not an easy task. Providing system support and maintenance requires the technician to travel from outside areas to visit the e-Choupal. For these, and other reasons ITC initially placed e-Choupals in villages that are within a ten to fifteen kilometer radius of a city.

Telecom Infrastructure

Telecommunication infrastructure in villages is poor. Telephone exchanges are subject to sporadic power supply and have limited battery backup. When power is lost, phones cease to function. In addition, there is no local support staff to maintain or troubleshoot telephone exchanges. The support team at the main exchange typically is responsible for eight to ten villages and is short-staffed. The turn-around time for fixing problems is often measured in days, not hours. Overhead telephone lines are exposed to the elements and run alongside high voltage power lines which can cause transmission quality problems. Currently, village telecommunication infrastructure is designed to carry voice traffic only and transmission speed is so slow that it renders Internet access impractical.

Customer Base

Before the arrival of e-Choupal, most villagers had never seen a computer. ITC realized the importance of appropriate user interfaces. They organized meetings and focus groups of farmers to gather information about potential user groups. The main focus of these meetings was to determine what information farmers wanted to see, how the information would need to be presented (graphics or text), and how often each page would need to be refreshed. The feedback that was collected from these focus groups was used in the design of the functionality and user interface of the application.

System Specification

The IT infrastructure can be comprehensively understood in the four layers outlined in Figure 9.

Figure 9. E-Choupal System Technology Specification

1. Organization Architecture – Training, support, planning, people, and processes
2. Information Architecture – Data gathered and managed
3. Application Architecture – Applications, goals, resources occupied, performance metrics
4. Technical Architecture – Servers, Clients, Network, System Software

The four layers are distinct but deeply interconnected and share goals and constrains.

Technical Architecture

From dial-up to VSAT: Connectivity Evolution in e-Choupals

ITC realized very early that the existing telecom infrastructure was not capable of supporting data traffic. Working with C-DoT (Center for Development of Telematics), they determined that that lack of synchronization between the village exchange and the main exchange was a major issue. C-DoT proposed the installation of RNS kits in the village exchanges. Even after the installation of RNS kits, however, the data throughput was a mere 12 Kbps. This is not sufficient to support their application requirements. With the help of C-DoT, ITC made modifications to the RNS kit which helped them achieve 40 Kbps throughput.

Despite achieving a significant improvement in the throughput rate, sporadic power supply in the village exchanges meant that the dial-up solution was not reliable. Even if the e-Choupal had power, the telephone exchange might not, thereby rendering the system inoperable.

As the e-Choupal model has progressed, ITC has realized that dial-up connectivity is not sufficient to drive proposed future applications. In order to support transactional capabilities and multimedia applications, the company needs reliable connectivity with better throughput. They therefore have decided to adopt a satellite-based technology (VSAT) which enables a throughput rate of up to 256 Kbps. This is, however, an expensive solution, costing about US$2,650 (Rs. 120,000) per installation.

Technical Equipment

Figure 5. Hardware

Power	Solar battery charger, UPS, (isolation transformer, spike suppressor)
Connectivity	Dial-up: Dial-up modem VSAT: Solar battery charger, VSAT modem, antennae
Computer Hardware	PC with Intel Celeron processor, printer

Figure 6. Software

Operating System	Windows 98
Word processor	Ankur (Hindi word processor)
Other	Sunera Kal – Short movie on e-Choupal Video Clips – Soil testing

Application Architecture

The application layer represents the logical muscle that rests atop the skeleton of technical infrastructure. Understanding the application architecture gives us a view of the functions enhanced by information technology and also illustrate how business processes may be adapted to deal with constraints upon the IT infrastructure.

The Web site www.soyachoupal.com is the gateway for the farmer. The Web site is protected and requires a user ID and password to login. As of now *sanchalaks* are the only registered users. Immediately after recruitment, an account is created for the *sanchalak* and he is given a user ID and password to access the system.

Figure 7. Features of the E-Choupal Web Site

Feature	Description and Operational Goals
Weather	Users can select their district of interest by clicking on the appropriate region of a map. Localized weather information is presented on regions within a 25 kilometer range. Typically 24- to 72-hour weather forecasts are available along with an advisory. Advisories are pieces of information directly related to the farmer—information he can put to use. For instance, during the sowing season, a weather forecast for days following heavy rains may include an advisory that instructs the farmer to sow seeds while the soil is still wet. Weather data is obtained from Indian Meteorological Department, which has a presence even in small towns and can provide forecasts for rural areas.
Pricing	The e-Choupal Web site displays both the ITC procurement rate and the local *mandi* rates. ITC's next day rates are published every evening. The prices are displayed prominently on the top of the Web page on a scrolling ticker.
News	For the soyachoupal Web site, relevant news is presented from various sources. In addition to agriculture related news, this section also includes entertainment, sports, and local news.
Best practices	Best farming practices are documented by crop. Here again, the information presented is action-based. For instance, this section not only highlights what kind of fertilizers to use but also how and when to use them.
Q & A	This feature enables two-way communication. Here a farmer can post any agriculture related question he needs answered.

The *sanchalaks* and others who use the system have learned that there now is a wide variety of information at their fingertips that they can access and benefit from. The following table lists just a few popular Internet destinations.

Figure 8. Other Internet Resources Accessed at the E-Choupal

News	Dainik jagran, Web Dunia
Market Prices	One *sanchalak* actually followed Chicago board of Trade (CBOT) prices for a month and arrived at a correlation with the local market prices. He used this information and helped other farmers decide when to sell.
Entertainment	• Movie trivia • Rent CDs to watch movies on the computer • Music downloads from the Internet
Sports	Cricket related news
Education	Students use the Internet to check their exam results and grades online
Communication	E-mail • The *sanchalaks* have e-mail accounts on Yahoo Chat • Some *sanchalaks* use chat rooms to chat with other *sanchalaks* and ITC managers
General interests/ Other	Information about cell phones

Information Architecture

The e-Choupal system is designed to gather customer information over time. The sources, structure, management, and use of this data are addressed within the information architecture. The technical details are routine, but the data itself and its potential uses are exciting. Data about the rural customer such as their location, creditworthiness, consumer preferences, financial position, and spending patterns represent the first link between this vast untapped market and urban commerce. Such information will eliminate the "unknowns" of rural engagement and enable planning, marketing, and sales of a range of products.

The information gathering is currently semi-automated. Information on each *sanchalak* is gathered during user registration. The *sanchalak* also keeps a record of farmer visits, inquiries, purchases, etc. The Q & A section of the Web site allows for two-way transport of data that is then stored in a database. The Web site does not currently process live transactions, but ITC has plans to do so in the future.

The Web database tracks the Internet usage patterns at e-Choupals. From this database, ITC has gathered information such as peak usage periods, preferred Internet destinations, information most sought after, information least sough after etc. ITC intends to leverage the information gathered to help better understand the behavior of their customers, identify unfulfilled needs, and develop ways to serve them efficiently.

Organizational Architecture

The hardware and software infrastructure captured in the first three layers cannot exist in isolation. They need people, processes, and services to setup, maintain and run them. In the e-Choupal, training, system support (repairing technical problems), and application support (usability query resolution) would provide the most unique information.

Training

Training the *sanchalaks* to use a computer effectively is deemed vital to the success of e-Choupal. *Sanchalaks* function as the human interface of the e-Choupals and therefore must be able to both operate the computer and access the information requested by farmers.

The computer installed in the e-Choupals is usually the first computer in most villages. Immediately after *sanchalaks* are recruited, they are invited to the nearest ITC plant for a day-long training program. The majority of this training is centered around getting the *sanchalaks* comfortable with the equipment. This first phase of training is comprised of the following:

- The fundamentals: What is a computer? What is its purpose and practical applications?
- Basic equipment training: Turning the computer on and off, using the mouse, keyboard, printer etc.
- Software training:
    - Word processing:
        How to use Ankur
        How to type in Hindi
        How to open, close, and save files
        How to create and edit document
    - Web Browsing: How to use a Web browser and find information on the Internet.
    - e-Choupal Applications: How to use the soyachoupal Web site. What information is available on the Web site and how can it be accessed?

At the time of installation, a coordinator usually accompanies the vendor who installs the system. The *sanchalak* is given some of the same basic training by the vendor. ITC then leaves allows the *sanchalak* to experiment with the computer for about a week. During this time, typically the younger members of his family also get to use the computer. ITC has observed that children are quick learners and are eager to learn more.

After the first week, the *sanchalaks* are invited to the hub or the plant for the second phase of training. In order to gauge their level of comfort, they are asked to operate the computer. Based on observation, customized training is then provided to raise each user's comfort and competency level. *Sanchalaks* may also bring their children or other members of the family that are interested in learning about the computer. During this phase *sanchalaks* are trained use the e-Choupal Web site and to access information from the site. *Sanchalaks* are given the opportunity to voice their concerns and ask questions during training. *Sanchalaks* are generally enthusiastic about learning the computer skills required to carry out their work.

After a month, trainees are brought in for a third and final phase of initial training. By this time, *sanchalaks* are usually fairly familiar with operating the computer and accessing information. The goal of this session is to learn to troubleshoot common problems. ITC hopes that improving the troubleshooting capacity of *sanchalaks* will significantly reduce maintenance and system support costs. *Sanchalak* are

taught about the importance of other devices such as the UPS and the battery backup. They are given guidelines on what to look for when there is a problem. For instance, they are instructed on the significance of the display lights on the devices. When *sanchalaks* call for technical help, these details help the support staff identify and resolve problems, perhaps even over the phone, without the necessity of a site visit.

ITC considers training to be a continuous process, and one that requires a concerted effort from all field operatives, not just the support staff. All field operatives are encouraged to provide technology assistance when they visit e-Choupals. When the local coordinator visits an e-Choupal, he may be required to help with usability issues, even though this is not his primary job.

System Support

ITC has about 15 engineers who provide field infrastructure support to the e-Choupals. They average about one or two calls a day. Each e-Choupal is visited about twice a month for infrastructure support. In order to overcome transportation problems, ITC purchased a fleet of approximately 25 motorcycles for its support staff. The support cost is estimated at US$6.60 (Rs. 300) per visit.

A majority of the issues reported are software-related. Users' lack of familiarity with the operating system has led to software issues. For instance, some users inadvertently delete desktop icons and then have to call for help. On other occasions, failures have occurred when users download and install untested or unapproved software.

Another issue encountered by the support staff has been the malfunctioning of equipment due to voltage fluctuations. About 20-30% of the calls to support staff are related to a blown fuse in UPS units. *Sanchalaks* have now been provided with replacement fuses and have been trained to change fuses on their own. Support for hardware failures is provided by the vendor.

In the future ITC proposes to improve service and lower costs of infrastructure support through remote help desk tools and network automation.

THE SOCIAL IMPACT OF E-CHOUPAL

A major impact of the e-Choupal system comes from bridging the information and service gap of rural India. Agricultural research centers (such as the Indian Council for Agricultural Research), universities, and other agencies in India have developed several practices and technologies to improve productivity and crop quality. The impediment to implementation has been affordable, large-scale dissemination of this knowledge. The e-Choupal system leverages technology that can reach a wide audience literally at the click of a mouse. The constant presence of *sanchalaks*, who themselves are farmers who apply these techniques, ensures that the practices actually make their way from the Web site to the field. Some areas about which information and services are provided by the e-Choupal Web site and e-commerce system include:

- *Weather.* This is a very popular section on the Web site because it provides localized weather information at the district level. Other public sources generally provide only aggregated state-level weather information. E-Choupal's weather information is intelligently coupled with advice on the activities in the agricultural lifecycle. One farmer observed that prior to e-Choupal, unreliable weather information would result in prematurely planted seeds that would be washed out by early rains. The availability of accurate rain information has cut losses due to weather by more than half.

- *Agricultural Best Practices.* Scientific practices organized by crop type are available on the Web site. Additional questions are answered through FAQs and access to experts who respond to e-mails from the villages.

- *Customized Quality Solutions.* After sale of a crop is completed, ITC performs laboratory testing of the sample collected. Based on these results, farmers are given customized feedback on how they can improve crop quality and yield.

- *Intelligent Product Deployment.* Inputs such as fertilizers and pesticides are not generic in their application. The optimal application is relative to the soil and crop. Determining these parameters requires services such as soil testing. Past providers brought inputs but not the information and services required to make them effective. ITC's "full-service" approach corrects this by coupling the input sale to the information on the Web site and services such as soil testing.

The collective impact of better information and new services can be gauged by the fact that prior to e-Choupal, soy cultivation was on the decline. Productivity was stagnant and farmers saw no future in it. In Khasrod, soy production declined from a high of 100% to 50% of farmers planting soy and was expected to decline further. Since ITC's involvement, soy is seen as profitable again and nearly 90% of farmers are planting the crop.

A second major area of impact stems from the ability of the e-Choupal system to open a window on the world and thus impact the future of the villages in which they operate. Computers are bringing the same resources to villages as they brought to urban India, and their impact is no less dramatic. This, coupled with higher incomes and changes in farmers' attitudes, is causing several shifts in the social fabric of village life.

Some accounts from villages include:

- Children are using computers for schoolwork and games. A particularly poignant story is that of Khasrod, where 2,000 local students used the local e-Choupal to print their grade sheets, saving them days of waiting and travel time.

- *Sanchalaks* use the Internet to chat extensively among themselves about the status of operations and agriculture in their villages.

- Villagers access global resources to learn about agriculture in other parts of the world and are taking action to compete in the world outside, not merely in the local *mandi*.

- Youngsters in the village use computers to research the latest movies, cell-phone models, and cricket news.

Winners and Losers

Not everyone has benefited from the introduction of e-Choupals. Indeed, lost income and jobs is directly connected to the overall increase in efficiency in the e-Choupal system. Some of the players in the *mandi* system have suffered loss of revenue. They include:

- *Commission agents*. Despite ITC's best efforts to maintain *mandi* volumes and compensate commission agents for lost income, there is little doubt that on the whole they have lower incomes as a result of the introduction of e-Choupals.

- *Mandi laborers*. The workers in the *mandi* who weighed and bagged produce have been severely impacted by the drop in volume. In the Sonkach *mandi*, for example, some 28 *tulavatis* and 300 laborers have been affected. ITC's long-term vision is to employ many of these people in the hubs in much the same functions as they perform in the *mandi*.

- *Bazaars near the mandi*. When farmers sold produce in the *mandi*, they would also make a variety of purchases at local bazaars. This revenue has now been diverted to shops near the ITC hubs. This, however, can be considered a diversion of revenue rather than elimination.

- *Some mandi operations*. ITC still pays *mandi* tax for all the crops procured through e-Choupals but it now pays the tax to the *mandi* nearest to the procurement center. As a result, taxes are being diverted from several *mandis* to the few *mandis* near procurement hubs. The result of this is that regional *mandis* have lost taxes that contribute to maintaining their infrastructure.

- *Competing processors*. Even before the advent of the e-Choupal, the soya crushing industry suffered from severe overcapacity (half of all capacity was excess). The efficiency pressures imposed by e-Choupal has spurred industry consolidation.

CHALLENGES

The e-Choupal system faces multiple continuing challenges. The first is the possibility that radical shifts in computing access could fundamentally alter community-based business models. That is one of the reasons ITC seeks to build and control its own ICT infrastructure. Second, as the number and power of the *sanchalaks* increase, there is a threat that they will unionize and extract "rents" – unwarranted additional payments based on their increasing influence on the system. Third, ITC's relationship with the *samyojaks* seems to be uneasy, and competitors with the financial muscle to invest for scale could conceivably use discontented *samyojaks* as the base to obtain market share. Fourth, the scope of the e-Choupal operation, the diversity of activities required of every operative, and the speed of expansion create real threats to execution management.

ITC has awakened the aspirations of farmers. If ITC fails to fulfill these aspirations, the farmers will look elsewhere for satisfaction. As an example, in our conversation with a *sanchalak* about the potential for Indian onions to succeed in the global market, he also understood what the key to succss was – better seeds. He half-complained that he had told ITC several times to begin selling better onion seeds, but he had not heard back from them. In a competitive environment, ITC would have to provide faster and more responsive customer service to maintain its distribution system.

The computer in the village is no doubt revolutionary, but there is also no doubt that the villages we saw were stratified to the point where not everybody can walk up to the *sanchalak* and ask to be shown the computer. There are clearly some segments of village society, including the entire adult female population, that does not have access to the computer—although this may not be true in all regions. The presence of the computer by itself will not transcend this barrier unaided. This is not a reflection on ITC, but rather the nature of society in rural Madhya Pradesh. The solution might lie in observing where the system has driven social change. Village farmers belong to many social and economic strata. Yet the *sanchalaks* are servicing all of them equally. In this case, the potential for commerce has broken a barrier that society has built. Similarly, engagement with poorer segments of society and women may be possible through the active distribution of products tailored specifically to them.

STRATEGY FOR THE FUTURE

ITC recognizes the limitations of today's e-Choupals as a vehicle of procurement efficiency. Not every crop lends itself to such an intervention. In crops such as soy where value can be maximized, followers will soon imitate ITC and eliminate the company's competitive advantage. ITC's vision for e-Choupal extends many generations as e-Choupal evolves into a full-fledged orchestrator of a two-way exchange of goods and services between rural India and the world. The soy e-Choupal is "Wave 1," with several more to follow.

- *Wave 2.* The source of value in this generation will be identity preservation through the chain. This is a significant source of value in crops such as wheat, where the grade of the grain determines its end use. The ability to separate different grades from field to consumer will command a price premium. E-Choupals in Uttar Pradesh have already started wheat procurement.

- *Wave 3.* This wave takes identity a step further by building the concept of traceability into the supply chain. This is vital for perishables where traceability will allow ITC to address food safety concerns and once again provide a value that the customer is willing to pay for. Shrimp is a good example of a crop for which Wave 3 will be important. ITC's intervention in such products will occur level of production. ITC will define standards that producers must adhere to and work with farmers to ensure product quality. Farmers in turn will get the best price from ITC because ITC commands the traceability premium.

- *Wave 4.* The first three waves fill institutional voids while Wave 4 creates institutions. The first three waves apply to environments in which ITC is the sole buyer in the e-Choupal channel. In commodities where the underlying markets have reached a high degree of efficiency, such basic sources of value will not exist. In crops such as these, e-Choupal will serve as the market-place where multiple buyers and sellers execute a range of transactions. A good example of this is coffee. ITC's source of value will be the sunk cost of the IT infrastructure and the transaction fees.

- *Wave 5*. While the first four waves related to sourcing from rural India, the fifth wave elaborates the rural marketing and distribution strategy. This is not the same as the rudimentary distribution of agri-inputs that is being done today. ITC plans to bring together knowledge of the customer, knowledge of the business, deployed infrastructure, its reputation, and experience gained over the first four waves, with an organization of people, processes, and partners. This base will allow ITC to bring value-added products and services to rural India.

- *Wave 6.* After the sourcing of goods from rural India, ITC's last wave has the ambitious vision of eventually sourcing IT-enabled services from rural India. Telemedicine, eco-tourism, traditional medicine, and traditional crafts are some of the services that can be sourced from rural India. While still a ways off, it is an agenda that inspires scale of the vision and potential impact on development in rural India.

SUMMARY

The e-Choupal model shows that a large corporation can combine a social mission and an ambitious commercial venture; that it can play a major role in rationalizing markets and increasing the efficiency of an agricultural system, and do so in ways that benefit farmers and rural communities as well as company shareholders. ITC's example also shows the key role of information technology—in this case provided and maintained by a corporation, but used by local farmers—in helping to bring about transparency, to increase access to information, and to catalyze rural transformation, while enabling efficiencies and low-cost distribution that make the system profitable and sustainable. Critical factors in the apparent success of the venture are ITC's extensive knowledge of agriculture, the effort ITC has made to retain many aspects of the existing production system, including retaining the integral importance of local partners, the company's commitment to transparency, and the respect and fairness with which both farmers and local partners are treated.

APPENDIX 1. Analysis of Technology Costs

Figure 10. Cost Allocation of Technology Requirements

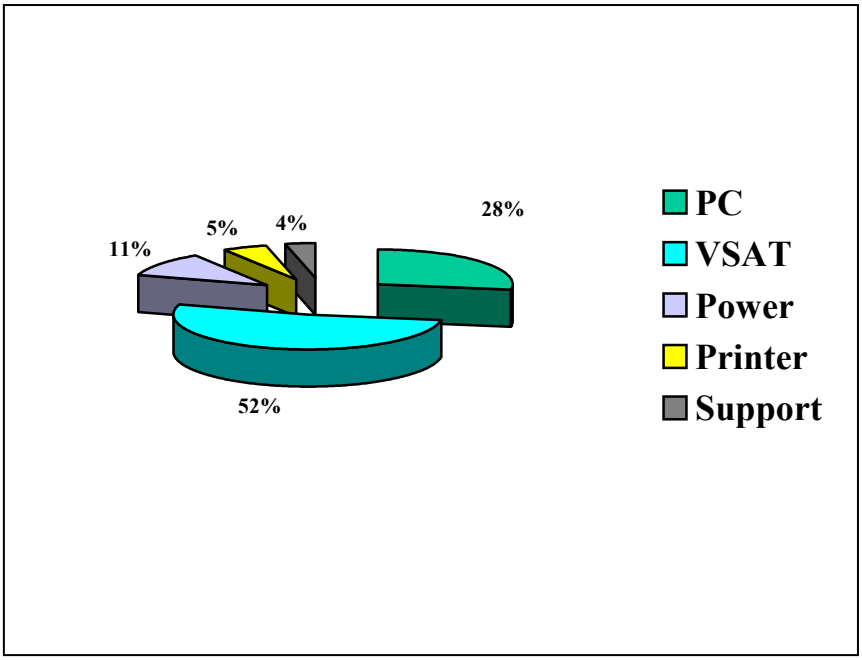


Figure 11. Fixed Costs of Equipment at E-Choupals (In Rs.)

	Printer	*Power-related*	*VSAT*	*PC*	*Total*
2001-02	7,000	19,000	90,000	39,000	155,000
2002-03	7,000	15,000	70,000	30,000	122,000
2003-04	7,000	15,000	70,000	30,000	122,000
2004-05 (projected)	6,000	14,000	60,000	27,000	107,000
2005-06 (projected)	6,000	12,000	50,000	24,000	92,000

APPENDIX 2. Usability Observations

The initial assumption was that computer literacy and usability would be a major issue of system deployment. In the course of the study, it became clear that people apparently master any tool as long as it functions well and adds value to their life; the computer is no exception. Usability is a non-issue to the *sanchalaks*.

Usage and Return

ITC believes that e-Choupals with VSAT connections have significantly higher usage, activity, and commercial volumes. Despite higher setup costs incurred by the VSAT installation, these e-Choupals recover investment faster than non-VSAT e-Choupals.

"Hinglish"

ITC has worked hard to create interfaces in the farmers' native language, Hindi. They also have provided software that has made it possible to type Hindi characters using a standard English keyboard. The preferred language for writing e-mail and other electronic communication however is "Hinglish," Or Hindi typed with English characters. The reason for this is that combining vowels and consonants to create Hindi letters is a very cumbersome affair on a keyboard. It sometimes takes three keystrokes to render one letter. Many *sanchalaks* agree that this is the only aspect of computer usage they have not been able to master.

APPENDIX 3. Glossary Of Terms

Adatiya	A commission agent in the *mandi* who buys produce from farmers and resells them to large buyers
Choupal	A Hindi word meaning village gathering place
Crores	An Indian term for the number 10,000,000
De-oiled Cake (DOC)	The residual meal leftover in the process of crushing oilseeds
Ghani	A small local crushing plant where farmers get a part of their oilseed produce crushed to extract oil for use in their homes
Inputs	In an agricultural context, this refers to the range of seeds, fertilizers, pesticides, etc. that are used in the farming process
Kharif	One of the two sowing seasons of Indian agriculture. It refers to the season that coincides with India's southwest monsoon rainfall (July to October). The kharif crop is therefore entirely rainfed.
Lacs	An Indian term for the number 100,000
Madhya Pradesh	A state in central India
Mandi	A government mandated market-yard where farmers sell their crops
Metric Ton	1,000 kgs
Paise	One hundredth of a Rupee
Quintal	One hundred kilograms
Rabi	One of the two sowing seasons of Indian agriculture. It refers to the winter sowing season in areas that have irrigation.
Rupee (Rs.)	Official Indian currency
Samyojak	The commission agent in his role as a collaborator in the e-Choupal model
Sanchalak	The village farmer who runs the e-Choupal and acts as ITC's representative in the village
VSAT	Very Small Aperture Terminal (VSAT) is the technology used in the e-Choupal to achieve Internet connectivity