

Review of Research on Rural PC Kiosks

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Additional projects in Africa – Ghana, Kenya

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Introduction

Rural PC kiosks and telecentres are perhaps the most-discussed form of ICT4D, or “information and communication technologies for development.” Rural kiosks are shared-access computer centres, run either as community centres or as businesses, that seek to deliver services to support socio-economic development of rural areas. Proponents of rural kiosks hope that these centres can be used to support health, banking, governance, agricultural, and other applications that contribute to development agendas.

Many entities are involved in the set up of rural kiosks – governments, academia, multilateral organizations, corporations, and non-profits, and all have channeled substantial investment into rural kiosk projects around the world. Despite the attention, much remains unknown about rural kiosks, and rigorous studies that lead to generalisable conclusions are few.

Over the last three years, researchers from Researchers from Microsoft Research India, University of California, Berkeley, and London School of Economics have undertaken several formal studies of kiosks and participated in numerous informal discussions with stakeholders. With the goal of understanding social, cultural, economic, and technical aspects of kiosk projects, we have undertaken qualitative and quantitative studies involving...

- Surveys of 300 kiosks, 1000 kiosk customers and non-customers
- In-depth interviews of 100 kiosk operators
- Conversations with 60 proponents, observers, agencies, government officials,
- Site visits to 200 kiosks spanning 20 kiosk agencies
- Intensive participant observation of 30 kiosks in operation
- Software-based logging of kiosks in 13 kiosks
- Reviews of relevant literature in social science, development, and technical journals

These studies have been conducted in India, Ghana, and Kenya, with a focus on projects in India, where the most kiosk experiments have been conducted.

This document synthesizes our main findings to-date in an easily digestible format. Although we have strived for accuracy and completeness wherever possible, our broad brush strokes necessarily hide some details. Moreover, due to the diversity of approaches to kiosk projects, it is rare for generalizations to be without exceptions; even our large sample sizes do not guarantee statistical significance due to biases in the sampling process. We hope the reader will refer to the bibliography for further published results.

It is our hope that this document will be of some value to those considering or implementing rural kiosk projects. This is a living document that undergoes occasional revision. For the latest, please see <http://research.microsoft.com/research/tem/kiosks>.

Sincerely,

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Rural PC kiosks are difficult to sustain.

Rural PC kiosks face many significant challenges, and the recent research literature on kiosks is increasingly skeptical of their long-term value [Heeks, 2003; Keniston 2002; Toyama et al., 2005]. The following are just a sample of problems that are well-known to practitioners:

- Economic barriers: Kiosks often charge per transaction or per service, and these costs are often greater than many rural villagers are willing to pay.
- Social barriers: Discrimination against some customers or avoidance of the kiosk by potential clients due to caste can keep a majority of a village away from a kiosk.
- Confused branding: Many kiosks try to be all things to everyone, but *e.g.*, farmers may not seek agriculture advice from a place where children play computer games.
- Educational barriers: Many villagers will be either illiterate or without sufficient education to fully take advantage of knowledge in document or online form.
- Mistrust and overabundance of information: Farmers, *e.g.*, are bombarded with information, from salesmen, extension workers, neighbours, and so on. They can't tell sources of information apart, and a kiosk is just another – perhaps more alien – source.
- Lack of information in a familiar form: Available information is not in their local dialects, not specific to their geographic region, etc.
- Poor infrastructure: Electricity and phone lines for connectivity are not consistent.
- Frequent maintenance needs: Qualified maintenance service can be unavailable or costly.

In addition, there are other issues which are discussed in the remainder of this document: For kiosk projects which hold dual goals of both financial sustainability and social development, there are natural tensions that make it difficult to fulfill both simultaneously [Kuriyan et al., 2006]. It is often the case that the stated goals of a kiosk project differ from the desires of the local residents [Bailur, 2007a]. Kiosk operators frequently lack the talent and training required to run these challenging operations.

If individual kiosks are difficult, scaling to large numbers is a proportionately greater challenge. Despite the considerable energy and resources brought to bear by well-known kiosk agencies, estimates for the number of PC kiosks in India currently hover at a low count of only 15,000 kiosks, set up over ~7 years [Toyama et al., 2004]. ITC, a well-resourced conglomerate and the most aggressive implementer of (e-Choupal) kiosks during its expansion period, had a considerable staff of dedicated employees who set up approximately six kiosks a day. At that rate, it would require 45 years to set up 100,000 kiosks. Alternatively, 20 ITC-like giants might be able to set up 100,000 kiosks in a little over two years, but this would require the concerted effort of all 20 of the corporations in India that match ITC in overall size.

Successful rural PC kiosks fall into several categories.

Despite the difficulties faced by rural kiosk operators, there are several types of rural PC kiosks which appear to be sustainable with some consistency. These are as follows:

- **Computer-education centres:** Even in remote rural areas, computers signify wealth and upward mobility. As a result, customers are willing to pay significant amounts to learn computer fundamentals. These courses usually teach use of the mouse and keyboard, simple word processing, and basic use of office applications such as spreadsheets. Students are typically young adults or children of wealthier parents. Depending on the local demographics, entrepreneurs can make a tidy profit from running computer-education courses.
- **Regular Internet cafés:** Particularly in towns or villages straddling a busy road, some kiosks evolve to become regular Internet cafes. These have clientele and usage statistics that are very similar to the “mom and pop” non-franchise Internet cafes found in urban areas. Customers come for browsing the Internet, for minor business processes and desktop publishing, for music, games, and entertainment, and also for viewing adult content. (It should be noted that Internet cafés themselves are very difficult to make viable as businesses.) [Kiri & Menon, 2006; Veeraraghavan et al., 2006]
- **Government service centres:** Some kiosks mainly provide government services (*e.g.*, birth and death certificates) and related services (*e.g.*, paying electricity bills [Kuriyan, in prep.]). Of these, entrepreneur success is far more likely, if the government actively endorses these centres and additionally closes all other means of providing the particular service offered by the kiosks. This latter point is critical, as keeping services available through traditional channels means that the kiosks will not gain a critical mass of customers. When things go well, the kiosk operator becomes a go-between between the rural customer and the government office in a way that spans caste and income brackets; customers appreciate the efficient service, and the government benefits by effectively “outsourcing” the service.
- **Photo Shops:** There are many instances of photo shops which use computers to enhance their services. Digital still and video cameras are increasingly available, and even rural villagers will spend lavishly on special events such as weddings which are given to photo and video services [Rangaswamy, 2006]. In addition, customers will pay considerable amounts to have photographs modified by the addition of artificial backgrounds and religious themes.

Apart from these, there are few patterns of consistently successful models of rural kiosks, despite considerable experimentation by kiosk agencies in the last decade. This is not to say that other sustainable models do not exist, but they seem to be difficult to identify.

Meeting business needs and social development goals simultaneously is difficult.

If there is one thing that separates most rural kiosk projects from the isolated Internet cafés that spontaneously pop up in rural areas, it is the desire to drive socio-economic growth. Agencies that drive rural kiosk projects want to make a positive difference in society, usually beyond the simple establishment of a private business.

Thus, most kiosks are saddled with two goals: one, to contribute to the socio-economic growth of the village and one, to sustain itself as a business or community centre.

Our research finds that the dual goals of financial sustainability and social development are difficult to achieve simultaneously [Kuriyan et al., 2006]. There are natural socio-cultural tensions that occur at multiple levels. All of the following observations were made specifically in the context of an ethnographic study of Akshaya kiosks, but we feel they also apply to many other rural kiosk projects.

At the level of customers and clients, people in need of development services – usually the lower-income families in a village – are distinct from customers who will pay for more lucrative services. Those from poorer strata in rural villages are comfortable visiting certain institutions, but less comfortable where wealthy patrons might look for state-of-the-art technology; conversely, wealthy patrons are drawn to glitz and glamour and not necessarily drawn to institutions serving the poor.

That there are at least two classes of customers means tricky tradeoffs for kiosk operators. On the one hand, kiosk operators must recover their costs, which requires selling to wealthier clients who are more educated, more experienced in computer use, who expect a state-of-the-art facility with high-end services, and who are interested in more advanced offerings. On the other hand, kiosk operators are often expected also to serve the poor, who often require extensive outreach before relevant applications can be found. Doing both is a difficult task. In addition, kiosk operators face a branding decision... whether to market to higher-income consumers or to lower-income clientele; marketing to one tends to alienate the other.

Finally, these tensions propagate even up to the state level, where opponents of a particular kiosk project may rally sentiment against proponents for either failing to serve those most in need of social services or ignoring the practical considerations of long-term sustainability.

As an analogy, we imagine that similar challenges would be faced by someone trying to run a soup kitchen for homeless people in the same space as a five-star restaurant.

What is most interesting is that social goals are often imposed from outside of the village, even if they are ultimately internalised by the kiosk operator. That is, local entrepreneurs, left to their own devices, seem to downplay services to the poorest in their communities, in favour of catering to wealthier clients.

What rural villagers want and what we think they need are frequently different.

Rural PC kiosks are implemented by agencies that seek socio-economic growth of the community. Their goals are development-oriented, in the sense of increasing economic opportunities and overall well-being. Funding is often tied to the achievement of, or at the very least, the attempt to achieve these goals.

Village residents, however, often have very different ideas for how to get the most of new technology [Bailur, 2007a]. Entertainment and consumption are often sought after, despite what appear to the financially more secure as unwise expenditure. (It should be noted that a need for relevant development-oriented services definitely exists – usage of development services is relatively high at kiosks where these are offered and marketed consistently and regularly. There is consistent demand for more government services, agricultural services, computer education, and healthcare services, though these depend very much on implementation. But, this demand is frequently exceeded by demand for other applications and services.)

In research based on surveys as well as software logging tools that track user behaviour, we discovered that at some kiosks offering a range of services, development services, government services, and services addressing agriculture or healthcare together contributed to less than 10% of overall kiosk usage [Kiri & Menon, 2006; Veeraraghavan et al., 2006]. The same communities register significantly greater use of applications such as digital photography, desktop publishing, and games.

Related ethnography [Bailur, 2007a] suggests that the issues at heart are that even the poorest rural residents seek entertainment and “lifestyle” consumables. In an investigation of Namma Dhwani, a community-owned kiosk-cum-community-radio-station in Karnataka, the initial funding agency made its funding contingent on “community participation” with a strong social development agenda. Alas, community participation led to a dramatic shrinking of the “community”, as most residents desired Tamil-language music over development-oriented talk radio. Today, the funding agency has withdrawn, and the group who runs the development-oriented radio programmes is its own audience, sandwiching its programmes between more popular music and quiz programmes.

Reconciling these differences requires philosophical clarity on the intent and approach of rural development. On the one hand, stubbornly delivering services believed to be “good” can result in resources wasted on unused services; on the other hand, chasing after expressed desires could be interpreted as exploiting weaknesses in human nature for profit. The issue goes beyond questions of fact, and falls into larger questions about how best development should be addressed.

The kiosk entrepreneur plays the most critical role in the success of a kiosk.

With very few exceptions, we found that successful rural kiosks were run by energetic, enterprising groups or individuals, who are unique in their communities. Although there might be many reasons for kiosks to “fail” in one way or another, the successes were almost always primarily due to motivated, creative kiosk operators.

There are a constellation of traits that seem to occur frequently among such successful individuals: They have an entrepreneurial mindset that optimistically and courageously seeks out opportunities and solutions [Rangaswamy, 2006]. They are independent, and ultimately don’t expect anyone else to be responsible for their success (less successful kiosk operators are frequently heard to complain about poor connectivity [Kiri & Menon, 2006] or insufficient support from the government [Kuriyan et al., 2006] – while these problems undoubtedly exist, the successful operator finds success in spite of them). They are often interested in social causes or in bring technology to their rural homes [Rangaswamy, 2006]. They themselves are curious about technology, and either tinker with technology themselves or have strong contacts with people who tinker with technology. They are often willing to subsidize the kiosk with another business. They frequently have strong ties to urban centres, with many having been educated in larger towns and cities [Rangaswamy, 2006]. They have an instinct for marketing to their community, whether through casual social interaction and feedback or through door-to-door sales.

In contrast, less successful kiosk operators show little initiative, and tend to expect that an investment in a PC in and of itself will deliver a viable business. Viable businesses are perhaps even more difficult to run under the strident economic climate of rural areas; thus, one would expect that it requires even more talent and motivation to run a successful kiosk in a rural area, than it does to operate a business in the city.

All of this suggests that the investment of time and effort in identifying potentially successful kiosk operators is worth the trouble. ITC, for example, in its e-Choupal project uses a careful formula in identifying its operators, with parameters accounting for the person’s overall status in the village, their educational level, their family support structure, etc., and then performs a public initiation ceremony to invite some peer pressure for the operator to perform. Drishtee also looks for specific traits, many of which are linked to a business-savvy orientation in the candidate.

In addition, once a strong candidate is chosen, some investment in training, particularly in the fundamentals of running a small business may increase the likelihood of long-term kiosk success.

However good the technology, people still matter!

A kiosk champion can help sustain a set of kiosks.

People matter, and this is as true for a set of kiosks operating under one banner agency, as it is for an individual kiosk.

Kiosk projects appear more sustainable and profitable when there is a local champion who supports and drives the project from the beginning. Champions play a critical role in evangelizing the goals of the kiosk project to stakeholders, including local government, local village leaders, and potential kiosk entrepreneurs. They may facilitate government interaction (or be a government official themselves) and tie-ups for government services, seek out volunteer support, do fundraising activities, and so forth, all of which are critical for the long-term success of a kiosk project.

Frequently, a champion is a member of the local government. For example, in Rural eSeva [Kuriyan, in prep.], a financially sustainable kiosk project initiated in the West Godavari District of Andhra Pradesh, the project began under the leadership of the District Collector who acted as a champion in facilitating services, addressing problems, creating tie-ups with government departments, and garnering citizen support. As a result, the National Informatics Centre provided training to the entrepreneurs and there was much interaction between the centres and the government in the implementation. The entrepreneurs purchased their own equipment, chose among several services, and ran the centres. The government facilitated the loans, provides the entrepreneurs with government buildings as centres, provided training, facilitation of backend computerization and general support. The Collector's role was instrumental in the initial level of training and support the entrepreneurs received, and in ensuring the smooth implementation of the project.

Another example is the highly touted Akshaya project in the Malappuram district of Kerala, where the District Collector was also instrumental in facilitating and implementing the project. Again, here the DC played a similar role in acting as a champion for the entrepreneurs and facilitating interaction between them and the government.

In other cases, champions can be leaders of NGOs or start-up companies basing their business on kiosks. Most of the kiosk agencies we have interacted with were led by strong kiosk champions who had unshakeable faith in the value of kiosks.

(One caveat with champions is that while they are an undeniably positive force for the kiosks run under their leadership, they are understandably prone to exaggerating the impact of kiosks to external parties or to avoiding discussion of the limitations of kiosks.)

Services require attention to the entire supply chain, not only to the kiosk.

Although the computing industry is undoubtedly a powerful economic force that can boost the economies of entire countries, computers, *per se*, are not necessarily a driving force for growth. Rural kiosks appear to be implemented in the hopes that the power of computing will immediately drive local economies, but for remote rural areas, the value of information by itself is low. (It's true that access to information is one of many problems faced by rural villagers, but it is not the problem causing the bottleneck.) Computers flourish mostly where there is excellent physical and human "infrastructure" as a substrate:

- Inexpensive transportation of cash, people, and physical goods to and from rural villages, is required to take action on relevant information [Best & Maclay, 2002].
- Trust between producers and consumers must exist before meaningful interaction, and trust often requires face-to-face contact or strong intermediaries to establish [Rajalekshmi, 2006].

Thus, the most successful services are those which exist where such infrastructure also exists or where reasonable substitutes are developed. In rural kiosks, this observation means that a particular PC-based service is useful only when the end-to-end system to deliver that service is also in place.

For example, early kiosks hoped to deliver healthcare via telemedicine in kiosks. But, good medical services require paid doctors, doctor-patient trust, good medical records, delivery of drugs, surgical procedures, and the financial resources to pay for all of the above. These things are difficult to achieve in rural areas, no matter how sophisticated the computer and telecommunications system in the village. Even if communication between doctor and patient can be facilitated by kiosks, the remaining issues mean that there is a limit to the value of such remote communication without the resources to further transport the cure to the patient or the patient to the doctor. The lack of easy physical transport to remote rural areas makes these structural hurdles difficult to clear. (Incidentally, the best use of telemedicine appears to be to connect health clinics in towns with hospitals in cities.)

A similar analysis reveals challenges to many other kiosk services, including access to agricultural prices (what good is the information, if the farmer can't transport his goods to the best market?), online websites for handicrafts (orders will dry up unless there's quality control of products and good supply-chain management), or banking (transportation of cash requires armoured vehicles and well-paid employees).

These challenges are not impossible to overcome, but they usually require investment in infrastructure that goes well beyond a computer with some connectivity. For example, ITC's e-Choupal project is widely hailed as a successful PC-kiosk project, but its true innovation lies in modernized grain weighing hubs where farmers can take their crops and be paid on the spot – a system that is both more efficient and more profitable for the farmer than the traditional markets; trust is established in a single trial sale [Kumar, 2004]. The kiosks serve primarily as advertisements for these hubs, and the actual contribution of computing to the overall system is next to zero.

Focus on a single class of services increases likelihood of success.

The earliest work with kiosks quickly ran into problems of low revenue. At the time, the problem was believed to be that a kiosk based on a single service could not sustain itself financially. Thus, a “bouquet of services” became the motto for many kiosk agencies [Jhunjhunwala, 2000], where the goal was to increase income by offering a range of services. The hope was that each would contribute a trickle of income that together would form a viable stream of kiosk for the operator.

But, as other sections indicate, it is difficult enough to set up a single service properly, and there are branding challenges when multiple services are offered.

Our research suggests that, if anything, successful models of kiosks tend to focus on a single class of services. By focusing attention on one kind of service, kiosks and kiosk agencies can better meet the challenges of creating or hooking into end-to-end systems. Some examples include remote eye care in Aravind eye-hospital kiosks, accounting in Pradan’s ‘Computer Munshi’ kiosks, government services in eSeva, etc. These primary services are the primary revenue drivers of the enterprise and are characterized by the continuity in demand for them (weekly accounting service provided to SHGs, recurring payment of electricity bills every month/two months, etc.) In addition, all of the instances cited on are based on models where the kiosk supplies one main body of service, though secondary services may bring in secondary sources of relatively lesser revenue.

A corollary is that many kiosks appear to prosper when they are part of a larger local business. Successful kiosks are often added onto initial businesses offering a wide range of information and communication services (STD/ISD telephone booth, photocopying, digital photography, soil-testing, sale of stationery items, etc.). The kiosk then becomes a one-stop shop for meeting several kinds of demand. The investments in infrastructure such as UPS (power backup) or printers are then shared across devices, lowering the operator’s per-service expenses.

Kiosks do better in towns; kiosks do better in remote villages.

There is contradictory evidence about where kiosks are most likely to succeed. Some studies suggest that being in or near larger towns is desirable, whereas others imply that the more remote the village, the better. Both conclusions are supported by existing research. Thus, a single generalization about kiosk proximity to large towns and cities is not easy to make.

Some evidence suggests that kiosks in truly remote areas are not as financially successful since there are fewer wealthy customers and less demand for services [Kuriyan, in prep.]. In Andhra Pradesh, we looked at three different kiosk projects that highlight this trend: (1) Rural Service Delivery Points (RSDPs) are located in villages of pop. ~5000 and provide electricity bill payment services; (2) Times' Rajiv Internet Village kiosk projects are located in both rural villages and urban areas and offer similar services; (3) eSeva kiosks are located at the mandal level in urban and peri-urban areas and provides mainly e-governance services. Based on a survey of 50 entrepreneurs from these three projects, projects located in remote areas were not as profitable for entrepreneurs as the ones located at the mandal or district levels. Average profit in the districts was Rs. 8453 per month; the more rural kiosks were losing money on average.

On the other hand, other evidence shows that kiosks can succeed by being located in remote villages, where they can provide services that would otherwise be available only with an expensive or socially demeaning trip to a large town or city.

For example, we also examined one community-owned kiosk in Budikote - a mid-size village in Karnataka of 3000 people – which served as a local market town for neighbouring villages, while being another bus ride away to the nearest town of Bangarpet [Bailur, 2007a]. The kiosk was run primarily as a computer-training centre, and the majority of the students were from the more remote villages, rather than Budikote village itself. In contrast, residents of Budikote go to Bangarpet for computer training. Interviews reveal that this was because firstly, many of those in remote villages have no access to transport and can only walk to Budikote, which has the nearest such centre. Secondly, those from the more remote villages feel they are stigmatized and treated poorly in Bangarpet training centres. Budikote students say that “in Budikote, I am given respect ... I am given time on the computers. In Bangarpet, they tease us, saying why do you learn computers, do you think you will ever get a job? You are a village simpleton.” Many parents of the Budikote centre students are daily-wage agricultural laborers, earning Rs. 40-50 a day. But, they pay up to Rs. 1500 for three months of an IT course for their children as they feel it will help them get a better, more stable job than their own.

Drishtee provides another example of success in more remote villages. Their formula for predicting the likely success of a kiosk increases the score the further away a kiosk is from a main road. Evidence from their earlier kiosks suggests that villagers who have the most distance to travel to a town are more likely to avail of services in a local kiosk.

Kiosks in offices and schools may provide alternatives to the standalone kiosk.

There are institutions with established operations, local reputations, and infrastructure which can support kiosk activities. Using their offices as a base of operations could provide the stability and social neutrality required for a successful kiosk. Although standalone kiosks that operate as businesses have been popularized, there is scant evidence to suggest that they are the only – or even the most workable – sustainable model.

There are several options:

- Government schools could be good sites for kiosk co-location, for a couple of reasons. They are fairly non-political in nature, and they offer a community of users that does not need to be sold on the idea of using computers, since children are naturally attracted to using technology and school administrators tend to welcome computers. Piggybacking public-use kiosks with a basic morning-hour use for schools has been successfully tried, as well. The Azim Premji Foundation, currently involved actively in over 13,000 computer centres in India, found that local youth could be hired to operate school computer centres as kiosks, and they were also able to make a modest living out of it. A drawback is that operation would be restricted to evenings, after school hours.
- Post offices regularly deal with information and communication, are manned by literate, educated staff, have electricity and phone connectivity (if the village does), and are trusted by almost everyone in the village. As a result, they may provide one of the best shelters for a computer kiosk. The Jaikisan kiosks in Uttarakhand are rolled out in rural post offices, and appear to be doing well despite an unusually high up-front capital cost.
- Railway stations exist in most major towns. They are hubs of commerce and frequent points of meeting and traveling. They have excellent power and communication infrastructure, and well-educated staff. In addition, they have an excellent history of technology adoption, having been one of the first government institutions to undergo computerization.
- Local administrative offices (*panchayat* offices in India) are some times hubs of community activity. They usually have electrical and communication infrastructure, as well as literate staff. One advantage is that they may have information-processing needs which can be met (and charged for) by an embedded kiosk. Drawbacks include the intimidation factor of government offices, as well as the tendency for these institutions to fall prey to partisan politics.

These locations are all relatively neutral in their attitude with respect to caste and status. The heterogeneity of populations and the conflicting interests of many groups within a village mean that public services need to be carefully designed for universal access, offering a safe place for the entire village population. If universal access is a goal, it is critical to pick locations to minimize discrimination against disadvantaged groups while also ensuring that (usually more privileged) early adopters are not excluded.

Kiosk usage is dominated by relatively affluent, more educated young men.

Even with the intent to provide kiosks which are accessible by everyone, there are inherent social and economic reasons why kiosk use is dominated by certain groups. There seem to be two broad patterns: In the first, a kiosk agency with a strong agenda to reach out to certain groups ensures that their kiosks cater primarily to those groups. In the second, the “free market” reigns, and kiosk use tends towards relatively wealthy, better educated young men.

Kiosk agencies frequently have a social mission that targets certain underserved groups. We have seen kiosk projects that emphasize women’s empowerment (*e.g.*, Dhan Foundation), on eliminating caste inequalities (*e.g.*, MSSRF), or on educating the impoverished (*e.g.*, Datamation Foundation). The management of these kiosk agencies ensures that access to the targeted groups is easy. Usage of the kiosks may be wholly subsidized; marketing and outreach may target specific groups; or, there may be special provisions to restrict access to other groups, to ensure that the desired participants are not pushed out by more dominant groups. All of these tactics ensure participation by underserved groups, but they also take continuous monitoring and effort. Almost without exception, such kiosks are ultimately supervised by NGOs, and they rarely operate as standalone businesses. Rather, their operation is subsidized in whole or in part by external funding sources.

In contrast, when kiosks operate as regular businesses, natural socio-economic biases shape the client base. These kiosks are frequented primarily by students, educated unemployed youth, and wealthier village residents [Kiri & Menon, 2006]. Most of the users are male and have completed high school or have a bachelors degree. They often have prior exposure to computers and are often familiar with basic computer applications such as word processing.

Rural villages tend to reflect the cultural biases of more traditional societies. There is social pressure for women to remain in their homes or to be accompanied by male members of the household in public spaces. This pressure prohibits widespread use of kiosks by women, as kiosks tend to be in enclosed spaces and often operated by men.

Computers remain primarily text-based devices, despite their multimedia capabilities. They thus present a barrier to usage for people who are illiterate. In addition, complex technology has a tendency to intimidate people with less formal education. Both of these factors contribute to intangible barriers against usage by those with little formal education.

As with Internet cafés, the people most likely to frequent kiosks are those who have some sense for the value and capability of a PC. In rural communities, these are usually undergraduate students or recent graduates who have had some exposure to computers in university.

Per-transaction fees are resisted by many customers.

Most rural kiosk enterprises employ a pay-per-use model similar to that used in urban Internet cafes, with set rates for each hour of PC use or for each application-specific service (Rs. 10 per hour of PC use, Rs. 30 for a set of 4 photographs, or Rs. 15 per print-out of your land record, etc.). While this is an established way to charge for services, it is not the only one.

Interviews with non-users of kiosks suggest that they feel many of the per-transaction fees to be too high. For people who count each rupee spent, Rs. 10 for the ability to look up available jobs with uncertain results seems steep, especially when the same information can be had by word-of-mouth or a half-day trip to the nearest town. Per-transaction fees thus limit usage in the income-constrained environments of rural India and make for overly variable revenue streams for kiosk entrepreneurs based on the seasonality of rural income.

In some kiosk projects we observed, we found that an annual kiosk-usage fee, taken as part of an even larger annual expenditure often encouraged kiosk usage and payment, without invoking resistance to paying for computer-based services.

One example is the e-grama network, promoted by Gramin Mahiti Parishat (GMP) – an NGO working to establish computer kiosk enterprises in rural Karnataka. E-grama offers membership-fee-based access to basic PC-enabled services. A per-family fee allows any person from the member's family to access the kiosk at any time. Take-up figures have been encouraging - for instance, in a village of around 600 families (~3000 people), the e-grama centre has 200 families enrolled as members. E-grama encourages its members to pay the kiosk-membership dues on an annual basis, and it does so by offering additional “free” benefits with the lumpsum payments. For instance, with a single Rs. 120 annual membership fee, the primary wage earner in the family becomes eligible for up to Rs. 25000 or 50,000 in accidental death insurance for that year. In addition, the e-grama membership ID card can be used to get concessions at select hospitals and medical shops in the area.

Another example was seen in the Warana Wired Digital Village in which an agriculture cooperative used village kiosks to allow farmers to check the status of their harvested sugarcane. In this scheme, farmers were given unlimited access to the kiosks, and all of the costs of running the kiosks were provided by the cooperative, which in turn was paid cooperative dues by the farmers. Interviews with the farmers suggested that they wouldn't use the kiosks if they were required to pay a per-transaction cost, even if it were a matter of a few rupees. More interestingly, when it was explained to them that their membership fees were ultimately paying for the kiosks, and that a per-transaction fee could lessen the ultimate cost to them, they remained unimpressed.

Although these are observations from several disparate projects, it's possible that in general, by covering kiosk costs through hidden costs, customers will be more likely to avail of and pay for, kiosk services.

Mobile-phone-based kiosks offer an alternative to PC-based kiosks.

Although the PC is the device of choice in rural kiosk projects, it's not always the case that their full capabilities are necessary for the purpose to which they are put. In some cases, less expensive or less cumbersome technologies may be as effective in providing useful services. A bicycle courier carrying paper documents from village to village may be sufficient for the purposes of a particular task, and real-time communication over the Internet may not be necessary. Here, we consider the possibilities of services delivered by mobile phone.

Mobile phones penetration, even in rural areas, is significant. They are one or two orders of magnitude less expensive than PCs – at the low end, a basic handset, used, can be purchased for Rs. 500-1000 (US\$10-20). They are familiar devices due to their ubiquity and their similarity to landline phones. They are not dependent on a continuous power supply, and maintenance costs are significantly less over time.

In perhaps the first experiment of its kind, we have replaced a series of PC-based kiosks with mobile phones, with the result that the new system is cheaper, quicker, more convenient, and more desirable to the user base.

The Warana Wired Village Project is touted as Asia's first large-scale ICT project. At a cost of approximately Rs. 2.5 crore (US\$ 500K), 53 villages in the Warana district of Maharashtra were outfitted with computer kiosks, connected at the backend to a local sugarcane cooperative. The project initially intended to deliver agricultural price information and expert advice to farmers. Farmers ultimately did not use these services (for many of the reasons cited elsewhere in this document), and the cooperative shifted the use of the kiosks to provide inventory and sale information to farmers in each village. As maintenance fees of the PCs mounted, the cooperative was considering either dismantling the system or investing in an expensive replacement of PCs.

We ran a pilot with seven of the villages, where we replaced the PCs in the kiosks with mobile phones. A back-end system was set up to exchange SMS messages with these phones such that the same inventory and sale information could be delivered by mobile phone. As of the six-month mark in the pilot, we report that the mobile phone system is successful and preferred by its users over the older PC-based system. The other villages are now clamouring to convert their kiosks.

Of course, as this is a single experiment, generalized lessons must be drawn with care. Nevertheless, our conclusion is that where the primary service of a kiosk requires only small amounts of communicated information, representable as text, a mobile-phone-based solution is likely to be a less expensive and more accessible alternative. Naturally, this does not apply where a kiosk is meant to handle multimedia data or to do significant processing of digital data, as in a photo shop.

Additional Research Results

(to be written up at a later date)

- Hardware is only a fraction of the total cost of operation.
- Subsidies are difficult to wean off of, both for the operator and the customer.
- Computers have a symbolic value that goes beyond their functional value.
- Network connectivity is not a necessity for successful kiosks.
- Kiosk operators have the most to gain and the most to lose from kiosks.
- Non-computer-users have no awareness of computer functionality.
- Physical paper, stamps, and signatures remain important for official business.
- Localized content requires resources that scale with the geographic area covered.

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