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Literature Review on the Impact of Public Access to Information and Communication Technologies

CIS Working Paper No. 6

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April 2009

This document summarizes preliminary findings of a literature review of research on the impacts of public access to information and communication technologies. The report was prepared by Araba Sey and Michelle Fellows for the Global Impact Study.

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Literature Review on the Impact of Public Access to Information and Communication Technologies

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ABSTRACT

Information and communication technologies (ICTs) are widely acknowledged as important resources for socio-economic development. Due to resource constraints, shared access forms the dominant mode of access to these technologies in most developing countries. Governments, non-governmental institutions and business entrepreneurs have invested significant amounts of human and financial resources in public libraries, telecenters, internet cafés and other forms of public access, without clear evidence on what the ultimate outcomes will be and the actual costs. This report presents a review of empirical research on the impacts of public access to ICTs in order to document what is known about this approach to ICT service delivery.

The results show that there is limited conclusive evidence on downstream impacts of public access to ICTs. The evidence that does exist suggests that the public access ICT model is not living up to the expectations placed on it. This is not necessarily because public access has had no impacts, but because its impact is particularly difficult to identify and measure. As a model, public access to ICTs has experienced success and failure, leading to both reinforcement of the belief that the model should be expanded and strengthened; as well as claims that public access ICTs are ultimately ineffective or even counter-productive from the development perspective.

Four main types of evidence are identified – evidence on venue performance and sustainability, users, usage patterns and downstream impacts. Assessment of this evidence indicates that trends are most apparent in the first three areas, while evidence of downstream impacts remains elusive. Most studies show that sustainability is a critical challenge especially in low resource, low income environments where commercial services are not viable. They also show that users are primarily young males with relatively high socio-economic status and prior access to the Internet. Users tend to engage in social and personal activities as opposed to economic activities, for example. Findings on downstream impacts fall on both sides of the equation – some studies conclude that impacts are high in a variety of areas – development of ICT skills, job creation, civic engagement etc; others find limited impacts.

Ultimately there is as yet no definitive evidence-based statement on the impacts of public access to ICTs. A research agenda is required that shifts from individual case studies and nominal level impact claims, to lines of enquiry that not only cut across contexts, but also utilize methodologies that (whether quantitative or qualitative) enable some quantification of identified impacts.

INTRODUCTION

Information and communication technologies (particularly computers and the Internet) are widely acknowledged as important resources for socio-economic advancement in both developed and developing countries. This is doubly so against the backdrop of the global economy which is driven by the “information age”. Developing countries, however, face enormous challenges in their ability to utilize these resources for their growth and development agenda. Limitations range from infrastructural constraints to an individual’s ability to convert access to information and communication technologies (ICTs) into tangible benefits in light of other environmental constraints. In this context, shared use models of access such as telecenters, libraries and internet cafés, are important means of making ICTs available.¹ Not only do they bring the technology closer (physically and financially) to people who would otherwise have no access, but they may also provide additional value in the teaching and learning environments they foster.

Despite the fairly long history of the deployment of public access ICTs around the world, there is still no definitive word on the utility of this approach. To what extent are they being used, what specifically do they contribute to socio-economic development, how big or small is this contribution, and perhaps most critically, is this contribution worth the investment (in monetary terms but also in terms of potential negative impacts)?

On the other hand, there is an ongoing debate about the continued relevance of public access ICTs, particularly models that receive public funding (see Coward, December 2008 for a brief overview of this debate). This is partly due to the reality that a significant number of such public access ICT initiatives have fallen out of use. Additionally there is the recognition that these initiatives are serving social needs more so than the economic or other high priority welfare goals usually associated with public access ICT projects. Indeed, the argument for the redundancy of publicly funded ICT access is often based on observations of the proliferation of internet cafés, which although also providing “public” access, have a commercial orientation – the logic being that if the 100% commercial model is serving the same needs as the development-oriented models, there is no need for public investment in this area.² In response, some have argued that under the right conditions, public access ICTs can deliver significant benefits to communities (e.g., Fillip & Foote, 2007; Roman & Colle, 2002) and in some instances may offer benefits

¹In the context of this discussion, “public access” is defined as computer and internet services that are open to the general public. Thus “public” here does not refer to the source of funding or the business model. Both privately and publicly owned ICT venues can be considered public access venues as long as their services are open to the general public. An internet café is therefore a public access venue, while a school library that can only be used by students and staff is not.

² This argument overlooks the fact that internet cafés are subject to a high degree of turnover, often due to the same sustainability challenges that other types of venues face.

over and above those possible with other types of ICT access (e.g., Bar & Best, 2008). A second factor contributing to the general sense of disillusionment is the difficulty in identifying the precise benefits (particularly at the macro level) of providing and using public access ICTs. It is challenging enough to try to measure the impacts of ICTs, and perhaps more so to do the same for this particular type of access, i.e., public access. Thirdly, the popularity of mobile technologies has cast a shadow on some models of public access (especially telecenters) as the perception grows that individual access to data will soon be widely available in developing countries via mobile phones. For these reasons there is a growing expectation that the public access ICT model will soon have run its course, and will do so without leaving any significant achievement on the landscape of ICTs for development (ICT4D).³ If such judgments are to be made about public access to ICTs, however, they should be based on solid evidence. While acknowledging the importance of existing efforts, it has to be said that there is both an abundance of commentary on public access ICTs, and a relative dearth of empirical evidence upon which such commentaries are based. Furthermore, while several case studies and project evaluations have been conducted, it is not clear what these studies mean as a whole.

Objectives of the Review

In view of the debate about the role of public access ICTs in socio-economic development, and as a starting point to launch a detailed investigation into the impacts of public access to ICTs,⁴ we set out to review and analyze what is known about this mode of access. The review focused on the following issues:

1. What is the nature of existing research on the impacts of public access to ICTs?
2. In which development fields of interest has this research been undertaken?
3. What does the existing research evidence tell us about the impacts of public access to ICTs?
4. Is there any evidence that distinguishes the impacts of different types and models of public access ICT provision?
5. What gaps are there in the existing body of research on this topic?

This review presents findings on the second to fifth issues.⁵

³ Another strand in the debate concerns the distinctions made between ICT implementations with specifically development-oriented goals (ICT4D), and ICT implementation with a view to facilitate technology appropriation, i.e., leaving people to use technology as they see fit (ICT and development). Because public access to ICTs discussions are usually couched in terms of socio-economic development, we focus on the ICT4D perspective in this paper, without expressing a preference for either perspective.

⁴ *The Global Impact Study of Public Access to Information and Communication Technology* is a five-year, CAD \$7.2-million research project sponsored by Canada's International Development Research Centre (IDRC) and the Bill & Melinda Gates Foundation. The project is managed by telecentre.org in partnership with the Center for Information & Society at the University of Washington Information School.

⁵ See Sey (2008) for an overview of findings on the nature of existing research.

The Review Process

This review is the result of a targeted search for literature on public access ICT and the impact of ICT on development, which returned over 500 resources. From these, we selected and reviewed approximately 145 research articles and reports focused on public access to ICT via internet cafés, public libraries and telecenters.⁶

Our initial search for ICT4D literature involved several key sources: Major sources included a bibliographic database developed for this project by researchers at the Center for Information & Society, as well as the archives and continual monitoring of a dozen prominent publications on ICT for development, including electronic journals and websites.⁷ Members of the Global Impact Study also directed us toward articles they found relevant to their work in the field.⁸

The review also included a language-based inquiry to capture research published in languages other than English. The languages included in this review were French, Spanish, Portuguese, Arabic and Chinese. Reviewers fluent in these languages were asked to identify the most important references in their language and provide thorough summaries. This exercise largely confirmed the general dearth of empirical research (in all languages, including English) in this area. Findings from the foreign language reviews are intertwined with other references throughout this review.

After this preliminary search for ICT4D literature, we identified articles and reports on public access ICTs as defined by this study. The latter resources were encoded, annotated and summarized according to thematic areas based on a selection of development domains, types of research conducted (quantitative/qualitative, theoretical frameworks, methodologies), location of research (countries, regions, local/national/cross-national), and types of research questions (venue operation, usage, impact). This report focuses on research findings on venue operations, usage and impact.⁹

FINDINGS

⁶ The review does not include documents that only describe particular projects; only discuss public access typologies, definitions, or policy; or that critically comment on public access strategies. It also excludes documents that focus on the socioeconomic impact of ICTs in general.

⁷ The building of this extensive database of relevant literature was coordinated by Ricardo Gomez, Elizabeth Gould, Rucha Ambikar, and Chris Rothschild at the Center for Information and Society.

⁸ These included members of the project's research teams, International Advisory Committee, sponsors and partners.

⁹ At this point we do not assess the quality of the research or discuss impact assessment methodologies.

This section summarizes the research evidence on the impacts of public access to ICTs. The first thing to note here is that while several studies are framed as investigating the impact of public access to ICTs, the results they produce generally relate to how the usefulness and **financial sustainability of public access venues** are influenced by a variety of factors (e.g., business models, management/operational issues, technical/technological issues, location, community participation, community characteristics, content/service relevance, cost, awareness levels, training and skills, demographics). Findings in this area are mixed but lean towards conclusions that due to any combination of these factors, public access venues are not fulfilling their potential in terms of achieving self-sustainability, reaching disadvantaged populations and bringing about noticeable socio-economic change – in other words, that public access ICTs have limited impacts. Other studies focus on identifying **types of public access users as well as the level and types of uses**. Taken together these studies generally identify public access ICT users as young, male and of relatively high socio-economic status. Users are found to be inclined towards personal and social uses of public access venues, although economic and political uses also occur. To a more limited extent, a third set of studies investigate **downstream changes in people's lives** as a result of public access use. It is more challenging to derive general conclusions from the compilation of research results in this area mainly because there are so few of them, and they have such different foci and contexts. Some of these studies find evidence of notable positive impacts, others do not. Overall, although the research is still producing scattered results, there are some areas in which trends are becoming apparent.

Venue Performance: Sustainability, an Ongoing Challenge

The research literature classified here as dealing with venue performance mostly focuses on issues related to financial sustainability and local relevance of public access ICTs. Findings indicate that public access venues generally struggle and often fail to achieve financial sustainability. All conclusions point to the fact that financial success is associated with a variety of factors including good management, good locations, strong local demand, new service development, locally relevant services, external linkages and networking (e.g., Benjamin, 2001; Etta & Parvyn-Wamahiu, 2003; Latchem & Walker, 2001; Roman & Colle, 2002).

Some models of public access, such as internet cafés are sometimes presented as more financially sustainable because of their commercial orientation (e.g., Bell, 2006; Oestmann & Dymond, 2001). This applies especially to the non-commercial variety of service delivery, although it is by no means limited to these. There is, however, no agreement on one best model. A study by Kumar & Best (2006b) found that access to financial subsidies enabled NGO-run kiosks to stay operational while a significant proportion of private kiosks had closed down. Benjamin (2001) concluded that less than one-third of Universal Service Agency telecenters in South Africa had the potential for sustainability. According to Mayanja (2006), venues targeting middle and upper class populations (the enterprise business model) demonstrate greater potential for sustainability. Mayanja (2006) states that the social development model fosters social capital, the enterprise model is stronger on financial sustainability but weak on

social capital, and suggests that a social enterprise model may be a workable compromise (also Siochrú & Girard, 2005). On the other hand Kuriyan and Toyama (2007) note that it is difficult to meet business needs and social development goals simultaneously (also Arora, 2005; Kuriyan & Ray, 2008), while Sheppard (2001) and Kumar (2004) observe that support from public sector service providers facilitates public access ICT sustainability by providing a source of revenue (Richa Kumar, 2004; Sheppard, 2001). In a critique of the focus on financial sustainability as a measure of success, Simpson, Daws, & Pini (2004) recommend that public access points be reconceptualized as essential community infrastructures like schools and libraries, and deserving of government funding: “This would mean re-defining the sustainability of a public access only in terms of the outcomes it produces in terms of social and community betterment rather than only in terms of economic gain.”

Public access ICT venues face the challenge of generating demand for their service (Amariles et al, 2006; Best, 2007; Blattman, 2003; Parkinson & Lauzon, 2008). As Best (2007) states, “commercial Internet centers in smaller towns and villages face a significant challenge in terms of limited pre-existing user base and the necessity of convincing the local population of the utility of ICT-related services.” Also, for older people, or people who are content with their current livelihood, there is generally little incentive to use computers and the Internet (Parkinson & Ramirez, 2006).

In trying to identify what works in public access ICT delivery, a few studies have examined the issue of physical location. Some have come to the conclusion that standalone venues attract fewer patrons and/or are more difficult to maintain than centers attached to other development-related institutions (Parkinson, 2005; Strover, Chapman, & Waters, 2004). Kuriyan and Toyama (2007) state that kiosks in offices and schools may provide good alternatives to the standalone kiosk and that mobile phone-based kiosks offer an alternative to PC-based kiosks. Other contributions in this area are observations that the location of a public access venue has an impact on the services provided and the way it is used. For example, (Sheppard, 2001) found that being located in a healthcare institution led the public access facility to focus on health services. Miller (2004) also found that infoplazas inside a library were more likely to be used for study and information-seeking purposes, while those in other locations were more likely to be used for entertainment and social interaction.

Education is considered to be a key determinant of public access ICT use, coupled with a general perception that such services are targeted at elite members of society (Etta & Parvyn-Wamahiu, 2003). Indeed Colle and Roman (2002) suggest that locating telecenter services in libraries may hinder adoption among those who consider the library to be a place for intellectuals. However a study in China produced different results – there was no relationship between educational level and use of a community internet access program (Ulrich, 2004).

Knowledge workers, “infomediaries” and/or local champions (formal and informal) have been found to be important contributors to the viability and sustainability of a public access venue, (particularly in the case of libraries) helping to attract users to the site (Rajendra Kumar & Best, 2006b), and providing guidance and guiding users unfamiliar with ICTs (Bailey, 2009; Kiri & Menon, 2006; Rajalekshmi, 2007; Ulrich, 2004). For example, (McClure, Fraser, Nelson, & Robbins, 2000) found that one result of ICT services in libraries was that library staff gained recognition as important community resources. A related issue is that of trust – according to Rajalekshmi (2007), trust between citizens and intermediaries at various levels affects the way e-governance services are delivered through telecenters, although the achievement of trust in one public access service area will not necessarily transfer to other service areas.

Types of Users: Young, Male, Higher Socio-Economic Status

Research in this area generally evaluates access levels/patterns and attributes them to a variety of contextual factors. In most cases there is a sense that public access venues in rural locations are underutilized, especially by those considered most disadvantaged or those who could benefit the most. In western economies such as the US, UK and New Zealand, this has been attributed to low awareness levels (e.g., Kaiser, 2005), lack of interest (e.g., Crump & McIlroy, 2003), or the higher profile of private forms of access (e.g., Eve & Brophy, 2001; Selwyn, 2003). In developing countries low patronage has been attributed to affordability barriers (e.g., Parkinson, 2005), or the perception that public access venues are appropriate places for highly educated people (e.g., Etta & Parvyn-Wamahiu, 2003). However, overall, the central explanation given for observed low levels of use is the failure of public access venues to make their service relevant to the community.

The research reviewed overwhelmingly indicates that in comparison with the general population, the primary users of public access venues are young, male, relatively well-educated, of relatively higher socio-economic status, not physically disabled, and have usually had prior access to the Internet at some other location (e.g., Adomi, 2007; Amariles, Paz, Russell, & Johnson, 2006; Chisenga, 2004; Etta & Parvyn-Wamahiu, 2003; Eve & Brophy, 2001; Gitta & Ikoja-Odongo, 2003; Haseloff, 2005; Hudson, 2001; Rajendra Kumar & Best, 2006b; R. Kuriyan, and Toyama, Kentaro, 2007; Mercer, 2006; Parkinson, 2005; Parkinson & Ramirez, 2006; Proenza, Bastidas-Buch, & Montero, 2002; Robinson, 2004; Selwyn, 2003; Stewart, 2000). Use of these venues by students (high school and college) is particularly noticeable. The overall trend is seen as a disappointing result by most commentators, however at least one author notes that the importance of public access venues to middle class society should not be discounted (Haseloff, 2005). There are some contrasting findings though, such as Hudson (2001) whose review of projects in three African countries found, in addition to the above, that at some sites, NGO staff, medical staff and farmers were major users. Kaiser (2005) found that underrepresented groups (in terms of education, race and income) were the main users of community technology centers in the US. An evaluation of the Biblioredes program in Chile found a marked reduction in the proportion of users accessing the Internet for surfing, chatting and other

recreational goals between 2003 and 2005, leading the authors to conclude that activities had shifted to education and communication (Román & Guerrero, 2005).¹⁰ While Proenza's (2008) survey of telecenter users in Sri Lanka revealed a youth profile, he also found a higher proportion of female users.

The occurrence of proxy usage, that is, people using a public access venue on behalf or at the request of another person is worth noting here, especially since it introduces indirect use into the picture, potentially ameliorating the dominance of particular populations at public access venue. Ulrich (2004) found high levels of proxy use in rural China, such as a child getting information from the center for a semi-literate parent.

Types of Use: Social and Entertainment Uses Dominate

The dominant finding here is that public access venues are used primarily to meet personal and social needs such as communicating with friends and family, entertainment, doing homework, and developing computer skills (e.g., Etta & Parvyn-Wamahiu, 2003; Eve & Brophy, 2001; Gamage & Halpin, 2007; Gitta & Ikoja-Odongo, 2003; Haseloff, 2005; Lengyel, Eranusz, Füleki, Lőrincz, & Siklós, 2006; Mercer, 2006; Pal, Nedeveschi, Patra, & Brewer, 2005; Parkinson, 2005; Parkinson & Ramírez, 2006; Robinson, 2004; Stewart, 2000; Strover et al., 2004). This is not to say that economic, political and other such services are not patronized; only that their use is outstripped by personal and social activities (R. Kuriyan & Toyama, 2007). Additionally there are signs that the use of public access venues for computer skills development is linked to users' perception that exposure to computers and the internet will enhance their current and/or future employability (e.g., Kaiser, 2005; Parkinson & Ramírez, 2006; Parkinson & Lauzon, 2008) – pointing to an indirect link with employment, one of the primary development goals associated with public access ICT services.

It is thus not surprising to find that demand tends to be high for services such as email, internet browsing and computer training (e.g., Etta & Parvyn-Wamahiu, 2003; Eve & Brophy, 2001; Gitta & Ikoja-Odongo, 2003; Haseloff, 2005; Lengyel et al., 2006; Mercer, 2006; Parkinson, 2005; Parkinson & Ramírez, 2006; Robinson, 2004; Stewart, 2000; Strover et al., 2004). Cybercafes and fee-based telecenters that profit from the popularity of game playing, e-mail use and internet browsing and, in some cases, simple desktop publishing may further promote these services (Menon, 2006; Rangaswamy 2008). On the other hand, particularly in Africa, there are indications that traditional services such as videos, photocopying, telephony and print periodicals are often the dominant services sought (Parkinson, 2005). Ulrich (2003) observed a very limited use of free e-mail services by telecenters users in rural China, in contrast to villagers' pervasive telephone use. Similarly, Samarajiva (2007) found that telephone use is more popular than internet/computer use amongst low income earners in a number of East Asian countries.

¹⁰ Resolving study problems, email, web surfing, and reading online newspapers were still cited as the most important uses.

Although it is widely believed that localized content and services can increase ICT usage and diffusion (Rajendra Kumar & Best, 2006b), the results of some studies show that demand for communication services overshadows region-specific services, especially among marginalized communities (Pal, 2005; Haseloff, 2005).

In terms of uses more related to traditional “development” goals, the evidence so far is mixed. For example, while Menon et al (2006) found that e-government, veterinary and healthcare services constituted less than 10% of the use of rural PC kiosks in India, they also concluded that use of such services is high at locations where they are offered consistently. Bhatnagar and Vyas (2001) also found relatively low usage of Gyandoot kiosks in rural India. However, 95% of the usage that did occur was related to agricultural produce rates, land records and grievance services. Conversely, in their study assessing the impact of a telecenter in Colombia, Parkinson and Lauzon (2008) found that just about 15% of telecenter users used it for business purposes, and few unemployed users used public access internet in their job searches. In fact, most considered it inappropriate for that use (Parkinson & Ramirez, 2007). Furthermore, self-employed people rarely used the internet in support of their business needs.

Nevertheless, these venues were used (albeit to a limited extent) for a variety of short and long term financial goals, mostly related to reducing travel costs and improving employability options. Library users also made limited use of government websites accessible through the library according to Román and Guerrero (2005). Users of telecenters in Sri Lanka reported higher use of computers and the internet for learning and communicating with government offices (Proenza, 2008).

The utility of public access venues may be more evident in some situations than in others. For example, in times of crisis such as natural disasters and other emergency situations, public access venues have provided critical services to communities. In addition to finding safety and shelter in libraries and telecenters, people have used public access ICT for seeking aid and attempting to locate missing people in Jamaica (Bailey, 2009), in the U.S. (Bertot, 2006) and in Africa (Etta & Parvyn-Wamahiu, 2003). The use of certain types of services also ebb and flow with external life events such as tax season (Gibson, 2009).

Where public access venues offer a wide range of services, users typically only access a few. Parvyn-Wamahiu (2005) found that though telecenters offered more services than cybercafés, these additional services received little to no use. A possible reason for this is that users requiring help from infomediaries may trust them to mediate a limited number of services, regardless of the infomediaries’ qualifications, thus deterring the use of other services (Rajalekshmi, 2007). Some studies therefore suggest public access venues might increase usage by focusing on a single class of service, arguing that by providing a limited number of primary services, they can create or hook users into end-to-end systems, driving up revenue and demand (Kuriyan & Toyama, 2007). However, the range of services used likely varies by user. A study by Best, et al (2007) surveyed participants of a coupon program in Kyrgyzstan and identified three types of telecenters visitors by frequency of their visits: (1) minimal users who

do not engage frequently with any service, though desktop publishing and game playing are the most common; (2) new users who use the Internet, online course papers, phone cards, and FAX services on average of once a day; and (3) super users who regularly used nearly all of the twenty-four services offered, especially Skype for voice communication.

Downstream Impacts

There is a limited amount of research output that strongly demonstrates this type of impact. Such findings are usually based on the perceptions of venue staff/management and users. In addition, any findings relating to impact can be said to flow from the benefits of access to ICTs in general. That is, they generally do not reveal unique contributions of public access as a development strategy. By extension however, the most obvious impact of public access ICTs is that the availability, and for some populations, accessibility of ICTs within the community is enhanced making it possible for those users to benefit from ICT use – always depending on other conditions in their environment. Beyond this there is no clear convergence of results on downstream impacts of public access ICTs in general or in particular areas. This section outlines findings in specific development domains where we could locate empirical research.

Education

Research evidence indicates that public access ICT use has led to increase in IT knowledge and aspirations (Bailey, 2009; Best, Kolko, Thakur, & Aitieva, 2007; Fedotova, 2008; Lengyel et al., 2006; Mercer, 2006). Some reports highlight the importance of IT training services, while others suggest that such training may not be critical. Using an index composed from library users' self-perceptions of ICT competence, Román and Guerrero (2005) reported an increase in the index from 7.1 percent in 2003 to 9.4 in 2005, indicating a rise in perceptions of competence. However they link this more to the availability of computers and the Internet at home than to the program's training services. One study demonstrated that computer literacy can be achieved without formal training (Dangwal, Jha, Chatterjee, & Mitra, 2005) - this study of the hole-in-the-wall computer showed that children had the ability to teach themselves computer skills. In a slightly different context, Lengyel, Franusz et al (2006) found that resource expanding activities (e.g., teleworking, job search, learning) were more evident in home/private use than at public access venues in a Hungarian community (Lengyel et al., 2006). They concluded that network-based IT learning was as effective as institutionally organized learning, and was possibly more likely to be beneficial for the adult population. That is, computer learning through an individual's social network is at least as effective with this population as training programs housed at public access venues.

Governance and Transparency

Kumar and Best (2006) have found that the availability of e-government services at public access facilities is positively associated with use of certain services. Use of these services leads to lower levels of corruption in service

delivery (Rajendra Kumar & Best, 2006a). In this study the researchers found increased use of birth certificate and old age pension services when residents became aware of the lower cost involved in accessing them at the internet kiosk, including people who would otherwise not have availed themselves of the service through the traditional means. Looking at public libraries in the US, Bertot, Jaeger, Langa, & McClure, (2006) concluded that library computing and internet services played an important role in the providing access to government services (also Gibson, 2008).

On the other hand, at least two separate studies of the Gyandoot e-governance project in India concluded that despite its award-winning status, the project had had limited impact on communities.¹¹ While Bhatnagar & Vyas (2001) wondered whether the commodity prices service could not be as effectively provided through radio instead of the Gyandoot kiosk; Jafri, Dongre, Tripathi, Aggrawal and Shrivastava (2002) determined that in the short term, use of the project by poorer groups was limited. Most users (80% of respondents) of the project's complaint service were satisfied with the service, as over 60% of complaints were usually acted upon within one week (Jafri, 2002), while the grievance redressal system was less appreciated because ultimately most complaints were responded to but not resolved (Cecchini & Raina, 2004). Nevertheless, Cecchini & Raina (2004) also reported reductions in corruption and harassment in the provision of some public services via the Gyandoot kiosks.

Income/employment

While some researchers have found limited evidence of employment-related benefits (Lengyel et al., 2006; Mercer, 2006; Parkinson & Lauzon, 2008; Parkinson & Ramírez, 2006), others do identify some impacts in this area. McClure et al (2000) found perceptions of improved financial wellbeing (personal and business) as a result of access to financial, business and job-related information; career support; technology training and other IT resources. Users also enjoyed cost savings from having access to information resources that they would otherwise have had to purchase. Likewise Fedotova (2008) found that 89% of participants in a job skills training course believed that the IT skills they had acquired would help in their job search, and 94% felt it would help them to gain a promotion. An assessment of UNESCO's community multimedia centers also identified a range of economic and social benefits from creation of new livelihood opportunities to the removal of social barriers (Creech, 2004).¹² Best, Kolko et al (2007) reported that about 15% of eCenter users surveyed had acquired a job as a result of the skills they gained at the computer center. Additionally, some users created new businesses, while those who were already businesses owners said use of the eCenter brought direct benefits to their business. A study that attempted to measure actual magnitude of financial benefits from public access use calculated that the average

¹¹ Both however remained fairly optimistic about the potential of the project.

¹² This program includes both digital and broadcast technology services so some of the benefits are not related to computer and internet use.

household benefit in rural China was about \$38 (Ulrich, 2004).¹³ In addition, Ulrich's (2004) respondents reported a variety of economic benefits from public access use – improved farming practices (86% of respondents), better price information (62%), business contacts (28%), and found work (19%).

The role of public access ICTs in supporting the remittance economy has been noted by Parkinson (2005), Parkinson and Lauzon (2008) and Robinson (2004). Mostly the venues are seen as facilitating the communication and coordination needed for the flow of remittances, although Robinson (2004) believes that internet cafés play a negative role in this respect in that they prepare the grounds for people to migrate out of their communities.

At the institutional level, Best et al (2007) note that subsidized computer centers in Kyrgyzstan experienced economic benefits in terms of increased clientele, and contributed to economic growth by creating up to 31 new jobs. On the other hand, they also found that other computer centers that were not benefiting from the subsidy program closed down, possibly as a result of competition.

Institutional Capacity

Another way in which public access ICTs have been found to benefit institutions is by improving the organizational capacity of the telecenter host – a result of their access to ICTs, IT training, and resultant changes in working practices: Amariles et al (2006) found that these impacts were more notable than community and user impacts, leading them to propose that it may be advisable to think of public access ICT impacts in terms of their potential to strengthen local institutions as against the tendency to focus on micro level end-user benefits.¹⁴ Stronger local institutions are expected to contribute to the development of stronger communities and a stronger sense of community. For instance, studies show that an outcome of ICT service provision in libraries was that people began to see libraries as an important aspect of quality of life in their community, and that there was an increase in positive attitudes towards public access ICT venues (Bertot, McClure, & Ryan, 1999; McClure et al, 2000). Others conclude that community status was enhanced due to the presence of ICT facilities (Bertot et al 1999; Eve & Brophy, 2001; McClure et al., 2000; Mercer, 2006; Sheppard, 2001). A related observation by Mercer (2006) was that access to and/or use of public access ICTs in Tanzania has led to the construction of “modern subjects” pursuing global culture, and for whom familiarity and use of the internet becomes a marker of their level of development.

Social equity and trust

¹³ Ulrich considered this figure to be on the low side.

¹⁴ The authors were not certain though, that the same type of benefits would accrue to non-telecenter host organizations.

Public access to ICTs does not appear to have noticeably contributed to social equity. In fact some studies have concluded that aside from having no effect, public access ICT facilities may rather maintain or increase social inequity by enhancing the social exclusion of non-users (Mercer, 2006; Parkinson & Ramírez, 2006; Rajendra Kumar & Best, 2006b). Lengyel et al (2006) found that alongside failing to raise already low levels of community sociability and trust, instances of envy developed in the community. Robinson (2004) argued that public access ICTs could not break through cultural and economic barriers to community networking. Conversely, Román and Guerrero (2005) concluded that the Biblioredes library project had contributed to social inclusion since most users are from the lowest socio-economic strata in Chile, while Parkinson (2005) stated that the use of public access ICTs enhanced maintenance of extended family networks in southern and eastern Africa. Some studies have also found evidence of collaboration across social and cultural lines, such as young people helping older users (Bailey, 2009), youth and tribal rivals working together (Bailey, 2009), low caste youth training upper caste users (Creech, 2004) and a general convergence of people from a wide range of backgrounds (Stewart, 2000).

Civic Engagement

A small number of studies have concluded that public access to ICTs has facilitated civic activity. This has been achieved through the provision of both physical and informational resources, for example by providing access to meeting rooms, and assisting with voter registration etc (Ashton, 2007; Creech, 2004; Finkelievich, 2004; McClure et al, 2000). In some locations, public access ICT users have been found to develop leadership characteristics, becoming more active in local and national politics, as well as the public access centers themselves acting as meeting grounds for civic activity (Etta & Parvyn-Wamahiu, 2003; Pal et al, 2005).

Health

Anecdotal evidence from a telecenter project in Bangladesh indicates that through public access ICTs, community members gained knowledge on basic hygiene practices (Ashraf, 2008).

Culture and Language Preservation

There is limited empirical evidence on this topic. Two studies make reference to the effects of public access ICT use on culture, one positive, the other negative. On the positive side, Wheeler (2007) asserted that by enabling women to have access to information and communication across gender, national and cultural borders, internet cafés had enabled new forms of political and social awareness. Robinson (2004), on the other hand, came to the conclusion that internet cafés use had the result of perpetuating social control by the media, promoting consumption of “taboo” content by the youth, and contributing to migration out of communities.

Gender Empowerment

There are gender-specific usage patterns and perceptions of ICTs (Best & Maier, 2007; Wheeler, 2007; Sharma 2008). Best and Maier (2007) found in their study of female internet kiosk users and non-users, that while there was no systematic inhibition of women's ability to use public access facilities, there was also no indication that access to the internet had made any contribution to gender empowerment (see also Subramanian, 2006). Wheeler's (2007) ethnographic study found that female internet users in Egypt had benefited in three ways – increased information access and professional development (e.g. improving English language skills), expansion/maintenance of social networks and social capital (e.g., online dating), and transformation of social and political awareness (e.g., thru cross-cultural communication). Wheeler (2007, p.100) concludes that, "the Internet, if it does empower, does so through the small windows of opportunity created by the technology and its users as they work in tandem or isolation to subvert norms and social orders. Until a critical mass of people has access to Internet technology and uses the tool to interrupt existing power relations, empowerment will remain contextualized in everyday life."

Sharma, Sharma and Subhedar (2008) investigated the impact of a community multimedia center training program and identified increased computer skills, income and confidence as primary benefits accruing to female participants. Similarly, Amariles et al (2006) concluded that a telecenter program had enabled women to play a more active social and political role in their community.

Discussion and Conclusions

A number of observations can be made about existing research on the impact of public access to ICTs. They include the following:

1. Most of the literature leans toward process evaluation as opposed to downstream impact evaluations. In other words, several reports that purport to be examining downstream impacts, in reality present data and conclusions on venue set-up, operations, access, and usage patterns. Two factors may be responsible for the prominence of sustainability discussions in the literature: one is that venues obviously have to exist and be sustained for some period of time in order to bring about impacts; the second and potentially more significant factor is that while researchers may set out to identify impacts, findings of limited or no impacts leads to a focus on uncovering the causes of the apparent lack of impact and making recommendations for improved performance.
2. As a result of the above situation, research conclusions generally still speak to the potential rather than actual impact of public access to ICTs. In this respect, despite the tendency for most studies to find that public access ICTs are underperforming, the perception that they are an important means of bridging digital gaps remains strong.

3. Studies have not established a clear link between public access to ICTs and socioeconomic change/impacts. Researchers are beginning to go beyond anecdotal evidence of downstream public access impacts on end-users, but are still limited in their ability to make definitive statements about impacts. This is probably not for want of trying considering the challenges involved in trying to identify and attribute specific impacts to specific ICT usage. There is a trend toward the view that the impacts of public access to ICTs are so highly tied to contexts that generalizability may be impractical. This is an area in which much work remains to be done. In particular, the use of uniform or consistent impact indicators for public access ICTs is almost non-existent.¹⁵ Some studies provide general measures of impact such as statements about the percentage of people who got a job after completing a training program. Few attempt to measure outcomes such as consumer surplus, reduction in unemployment or increase in literacy levels; and even fewer attempt to attach any kind of statistical significance to their findings. Furthermore, it is not always entirely clear whether observed or perceived downstream impacts are directly related to public access ICT use or not.

Gaps in the literature

Gaps in the literature include the following:

- i. *Systematic impact analyses* - Notwithstanding the fair amount of research that has already been conducted, a significant amount of additional work is required in order to get a full and accurate representation of the public access phenomenon in the context of development. What is lacking is a clear, comprehensive and deliberate research agenda that covers multiple locations and models, spans significant timeframes, and consciously builds on previous research.
- ii. *Macro level impact analyses* – this is understandably a difficult task and few scholars have tried to link individual public access use to community or national level impacts.
- iii. *Analyses of the impact of public access vs. private access, or other investigations to identify the value added by public access ICT facilities* – So far we have not encountered any studies that attempt to elaborate a role of public access to ICTs that sets it apart from other types of access. As already noted, one could argue that the impacts observed from public access ICT use are simply the impacts of access to ICTs regardless of the source of access. While this would not be a negative outcome, the distinction is important for a proper understanding of how public access ICTs fit into development plans.
- iv. *Measurement of the magnitude of impacts* – the gap in this area is huge. Oftentimes categories of impacts are indicated without necessarily obtaining a measure of the magnitude of those impacts. Additionally, because a lot of these are qualitative studies, they are not associated with indications of size of impacts.

¹⁵ Although some impact frameworks have been developed (see Appendix A), these are generally tailored towards program evaluation, and there is little indication that researchers are drawing on these for academic investigations.

- v. *Cost-benefit analyses of public access provision* – Not surprisingly, in the absence of data on magnitude of impacts, there is also limited analysis of the relationship between costs and benefits of providing and using public access ICTs.
- vi. *Determinations of impact timeframes* – this is another area that begs for more attention in order to draft a model of public access evolution and to answer questions such as when to expect visible impacts from public access ICT use.
- vii. *Impact of public access on specific sectors (health, education, civic engagement, etc)* – this review has identified investigations in some of these areas, but they are generally quite sparse and measures of impact are usually vague.
- viii. *Impact of “development” vs. leisure activities at public access sites* – a growing area of interest, it is becoming more and more important to have research that explores the role of social, personal and entertainment uses of public access. Is the dominance of these types of use a sign of failed investment? Or are the ultimate outcomes of these behaviors being overlooked because the activities do not fit traditional notions of development?
- ix. *Comparison of different public access types and business models* – few studies have explicitly set out to compare and contrast the provision of public access ICTs through different venue types and business models.
- x. *Examination of libraries as public access ICT venues (in developing countries)* – the library literature is somewhat challenging to assess partly because researchers often focus on the impact of libraries in general and not just an ICT-access related component. In addition, there is almost no published research on the impact of ICT access in developing country libraries.¹⁶
- xi. *Examination of telephony in particular and technological convergence in general* – despite significant evidence to suggest that telephony (especially mobile telephony) remains the primary means of communication and information acquisition for poor people, little has been done to investigate these trends in the context of their actual consequences for and/or potential synergies with public access ICT use.

Conceptualizing Public Access ICT Impact

In the context of ICT for development, impact is a challenging concept to capture.¹⁷ Changes brought about as a result of the use of information and communication generally occur through indirect processes, making it difficult to identify causal relationships. Debates rage about what constitutes impact and when it happens. And however it

¹⁶ This could be because there is in fact no ICT access in these libraries (Chisenga, 2004).

¹⁷ See for example, OECD (2007). *Measuring the impacts of ICT using official statistics*. <http://www.oecd.org/dataoecd/43/25/39869939.pdf>.

is defined, impact can take a variety of forms (e.g., direct and indirect, micro and macro, short-term and long-term, intended and unintended, positive and negative), occur in a variety of areas (e.g., health, education), and affect a variety of populations (e.g., individuals, organizations, communities). There is however a tendency to view impacts in binary and/or linear terms – ICT is used, and as a result an impact occurs or no impact occurs. In reality the process through which ICT impacts may or may not occur is more complex, and an apparent absence of impacts could be misleading, just as identified impacts could have occurred through a more circuitous route than is obvious.

This review has focused not on the impact of ICT access in general, but on the impact of a particular type of ICT access – *public* access. There is obviously a link between the two; however our interest is in isolating the dynamics around public access ICTs. As is the case with ICT impacts in general, *public access* ICT impacts can be conceptualized as occurring on a variety of levels from availability of ICTs to changes experienced by individuals, communities and nations. The full range of impacts is of interest – depending on the pre-existing state of infrastructure, public access ICTs have an impact on the *availability* of ICTs by expanding the locations at which ICTs can be accessed; they have an impact on the *accessibility* of ICTs depending on how and where they are deployed; they also have a direct impact *on users' behavior and life situations*; and indirect impacts on *users and nonusers* through their association with users, as well as on the larger community. On one level the availability of public access venues can be considered a prerequisite for impact, or as other authors have conceptualized it, an “input” which would then generate certain “outputs,” “outcomes” and finally downstream “impacts”.¹⁸ This is a useful way to attempt to tease apart the processes that occur on the path to impacts. Alternatively, from a broader perspective, the mere introduction of a public access venue into a community with no ICT access constitutes an impact (on availability). Other impacts could then flow from this availability.

When impact is defined broadly to include the range of possibilities from ICT availability to indirect impacts on non-users, it becomes possible to *separate the impacts of ICTs in general from the impacts of public access to ICTs*. From this perspective, evidence on public access venue performance provides information about the impact of public access on the availability and accessibility of access to ICTs – a venue that achieves sustainability and provides relevant services to its community has the effect of moving residents from a state of no access to ICT infrastructure and/or services, to a state of having mere and/or meaningful access to this resource. Evidence on user characteristics as well as the level of patronage of public access ICT services provides information about the impact of public access on people's information and communication resources and the range of ICT-related activities they are able to engage in, as well as any special added-value deriving from public access use. And evidence on downstream impacts provides information about how the information and communication resources

¹⁸ See for example, Brophy, P. (2002). *The evaluation of public library online services: Measuring impact*. http://www.mla.gov.uk/resources/assets//P/pn_impact_issue_paper_pdf_4218.pdf.

used at public access venues lead (or do not lead) to specific types of changes in the achievement of specific socio-economic welfare goals. These changes may be related to the use of ICTs in general or to the use of public access ICTs in particular.

Although the research conducted so far has provided important insights into the dynamics surrounding public access ICTs, several gaps remain, especially in the area of identifying downstream impacts, measuring them and making valid and reliable linkages to public access. It is likely that both investment and research efforts will continue in an effort to understand and reap benefits from public access ICTs.

REFERENCES

- Adomi, E. E. (2007). Overnight Internet Browsing Among Cyber Café Users in Abraka, Nigeria. *The Journal of Community Informatics*, 3(2).
- Amariles, F., Paz, O. P., Russell, N., & Johnson, N. (2006). The Impacts of Community Telecenters in Rural Colombia. *Journal of Community Informatics*, 2(3).
- Arora, P. (2005, December 31). Profiting from Empowerment? Investigating Dissemination Avenues for Educational Technology Content within an Emerging Market Solutions Project. *International Journal of Education and Development using ICT* [Online], 1(4). Available: <http://ijedict.dec.uwi.edu/viewarticle.php?id=74>.
- Ashraf, M., Swatman, P., Hanisch, J. (2008). An Extended Framework to Investigate ICT Impact on Development at the Micro (Community) Level. *16th European Conference on Information Systems*. Galway, Ireland.
- Ashton, H. & Thorns, D. (2007) The Role of Information Communications Technology in Retrieving Local Community. *City & Community*, 6(3).
- Bailey, (2009). Issues Affecting the Social Sustainability of Telecentres in Developing Contexts: A Field Study of Sixteen Telecentres in Jamaica. *The Electronic Journal on Information Systems in Developing Countries*. 36(4).
- Bar, F., & Best, M. (2008). From the Editors: Assessing the Impact of Public Access to ICTs. *Information Technologies & International Development*, 4(3), 2.
- Bell, T. (2006). *Village computing: A State of the Field. Reflections on the Village Computing Consultation*. Grameen Foundation.
- Benjamin, P. (2001). Telecentres in South Africa. *The Journal of Development Communication Telecenters & ICT for Development - Critical Perspectives & Visions for the Future*, 12(2).
- Bertot, J., McClure, C. R., & Ryan, J. (1999). *Importance of California Public Libraries in Increasing Public Access to the Internet: Final Report*. San Mateo, CA: Peninsula Library System.
- Bertot, J. C., Jaeger, P. T., Langa, L. A., & McClure, C. (2006). Public Access Computing and Internet Access in Public Libraries: The Role of Public Libraries in E-government and Emergency Situations. *First Monday*, 11(9).
- Bertot, J. C., McClure, C. R., & Ryan, J. (1999). *The Importance of California Public Libraries in Increasing Public Access to the Internet*. Sacramento, CA: California State Library.
- Best, M., Kolko, B., Thakur, D., & Aitieva, M. (2007). *Assessment of Economic Growth Impacts of the eCenters Project in Kyrgyzstan*: AED.
- Best, M. & Maier, S. (2007). Gender, Culture and ICT Use in Rural South India. *Gender Technology and Development*, 11(2).
- Bhatnagar, S. & Vyas, N. (2001). Gyandoot: Community Owned Rural Internet Kiosks. World Bank.
- Blattman, C., Jensen, R., Roman, R. (2002). Assessing the Need and Potential of Community Networking for Development in Rural India. *The Information Society: An International Journal*, 19(5).
- Cecchini, S. & Raina, M. (2004). Electronic Government and the Rural Poor: The Case of Gyandoot. *Information Technologies and International Development*, 2(2).

- Chisenga, J. (Ed.). (2004). *The Use of ICTs in African Public Libraries. A Survey of Ten Countries in Anglophone Africa*. Oxford: International Network for the Availability of Scientific Publications (INASP).
- Coward, C. (December 2008). Why Do Telecenters Deserve Ongoing Attention? *Telecentre Magazine*.
- Creech, H. (2004). *Evaluation of UNESCO's Community Multimedia Centers*: UNESCO Internal Oversight Service; International Institute for Sustainable Development.
- Crump, B., & McIlroy, A. (2003). The Digital Divide: Why the "Don't-Want-Tos" Won't Compute: Lessons from a New Zealand ICT Project. *First Monday*, 8(12).
- Dangwal, R., Jha, S., Chatterjee, S., & Mitra, S. (2005). A Model of How Children Acquire Computing Skills from Hole-in-the-Wall Computers in Public Places. *Information Technologies and International Development*, 2(4), 41-60.
- Etta, F. E., & Parvyn-Wamahiu, S. (Eds.). (2003). *Information and Communication Technologies for Development in Africa. Volume 2: The Experience with Community Telecenters*. Ottawa: CODESRIA/IDRC.
- Eve, J., & Brophy, P. (2001). *The Value and Impact of IT Access in Public Libraries: Final Report*. Centre for Research in Library & Information Management: Manchester.
- Fedotova, E. (2008). E-Skills: Catalyst to Opportunity. *Baltic IT&T Review*, 2008(3).
- Fillip, B., & Foote, D. (2007). *Making the Connection: Scaling Telecentres for Development*. Washington, DC: Information Technology Applications Center (ITAC) of the Academy for Education Development.
- Finquelievich, S. & Martinez, S.L. (2004) Mujeres en América Latina y el Caribe. ¿Son las tecnologías de información y comunicación un arma efectiva para luchar contra la pobreza?. (Women in Latin America and the Caribbean. Are information and communication technologies an effective tool to fight poverty?) *Revista Venezolana de Estudios de la Mujer*, 9(2).
- Gamage, P. & Halpin, E. (2007). E-Sri Lanka: Bridging the Digital Divide. *The Electronic Library*, 25(6).
- Gibson, A. N., John Carlo Bertot, Charles R. McClure, Lauren Mandel. (2008). Florida Public Libraries and E-Government: Services Issues, and Recommendations. *Information Use Management and Policy Institute*.
- Gitta, S., & Ikoja-Odongo, J. R. (2003). The Impact of Cybercafés on Information Services in Uganda. *First Monday*, 8(4).
- Haseloff, A. M. (2005). Cybercafés and Their Potential as Community Development Tools in India. *Journal of Community Informatics*, 1(3), 53 - 65.
- Hudson, H. E. (2001). *The ACACIA Programme: Developing Evaluation and Learning Systems for African Telecentres*. Vancouver.
- Jafri, A., Dongre, A., Tripathi, V., Aggrawal, A., & Shrivastava, S. (2002). Information Communication Technologies and Governance: The Gyandoot Experiment in Dhar District of Madhya Pradesh, India. London: Overseas Development Institute.
- Kaiser, S. (2005). Community Technology Centers and Bridging the Digital Divide. *Knowledge, Technology & Policy*, 18(2), 83-100.
- Kiri, K. & Menon, D. (2006). For Profit Rural Kiosks in India: Achievements and Challenges. *i4d Magazine*.

- Kumar, Richa. (2004). e-Choupals: A Study on the Financial Sustainability of Village Internet Centres in Rural Madhya Pradesh. *Information Technologies and International Development* 2(1), 29.
- Kumar, Rajendra, & Best, M. (2006a). Impact and Sustainability of E-Government Services in Developing Countries: Lessons Learned from Tamil Nadu, India. *Information Society*, 22(1), 1-12.
- Kumar, Rajendra & Best, M. (2006b). Social Impact and Diffusion of Telecenter Use: A Study from the Sustainable Access in Rural India Project. *Journal of Community Informatics*, 2(3).
- Kuriyan, R., & Ray, I. (2008). Information and Communication Technologies for Development: The Bottom of the Pyramid Model in Practice. *The Information Society: an international journal*, 24(2), 93-104.
- Kuriyan, R., & Toyama, K. (2007). *Review of Research on Rural PC Kiosks*.
- Latchem, C., & Walker, D. (2001). *Perspectives on Distance Education: Telecenters: Case Studies and Key Issues*. Vancouver: The Commonwealth of Learning.
- Lengyel, G., Eranusz, E., Füleki, D., Lőrincz, L., & Siklós, V. (2006). The Cserénfa Experiment: On the Attempt to Deploy Computers and Internet in a Small Hungarian Village. *Journal of Community Informatics*, 2(3).
- Mayanja, M. (2006). Rethinking Telecentre Sustainability: How to Implement a Social Enterprise approach - Lessons from India and Africa. *Journal of Community Informatics*, 2(3).
- McClure, C. R., Fraser, B. T., Nelson, T. W., & Robbins, J. B. (2000). *Economic Benefits and Impacts from Public Libraries in the State of Florida. Final Report*.
- Mercer, C. (2006). Telecentres and Transformations: Modernizing Tanzania Through the Internet. *African Affairs*, 105(419), 243-264.
- Menon, D., Kiri, K., Toyama, K. (2006). *Rural PC-Kiosks: Who Benefits and How?* New Delhi: Indian Telecentre Forum.
- Miller, N. (2004). Measuring the Contribution of Infoplazas to Internet Penetration and Use in Panama. *Information Technologies and International Development*, 2(2).
- Oestmann, S., & Dymond, A. C. (2001). *Telecentres — Experiences, Lessons and Trends*. Vancouver.
- OECD (2007). *Measuring the Impacts of ICT Using Official Statistics*.
<http://www.oecd.org/dataoecd/43/25/39869939.pdf>
- Pal, J., Nedeveschi, S., Patra, R., & Brewer, E. (2005). A Multi-disciplinary Approach to Studying Village Internet Kiosk Initiatives: The Case of Akshaya. *Policy Options and Models for Bridging Digital Divides*. University of Tampere, Finland.
- Parkinson, S. (2005). *Telecentres, Access and Development: Experience and Lessons from Uganda and South Africa*. Warwickshire, UK: ITDG/Fountain/IDRC.
- Parkinson, S., & Lauzon, A. (2008). The Impact of the Internet on Local Social Equity: A Study of a Telecenter in Aguablanca, Columbia. *MIT Press Journals, ITID*, 4(3), 18.

- Parkinson, S., & Ramírez, R. (2006). Using a Sustainable Livelihoods Approach to Assessing the Impact of ICTs in Development. *Journal of Community Informatics*, 2(3).
- Proenza, F. J. (2008). *Towards Sustainable Telecenters in Sri Lanka*. World Bank.
- Proenza, F. J., Bastidas-Buch, R., & Montero, G. (2002). Telecenters for Socioeconomic and Rural Development in Latin America and the Caribbean. Inter-American Development Bank (pp. 17). Washington, D.C.: Inter-American Development Bank.
- Rajalekshmi, K. G. (2007). E-Governance Services Through Telecenters: The Role of Human Intermediary and Issues of Trust. *Information Technologies and International Development*, 4(1), 19-35.
- Robinson, S. (2004). *Cybercafés and National Elites: Constraints on Community Networking in Latin America*. London: Community Practice in the Network Society.
- Roman, R., & Colle, R. D. (2002). *Themes and Issues in Telecentre Sustainability* (Development Informatics Working Paper No. 10): Institute for Development Policy and Management.
- Román M., & Guerrero, A. (2005). Impact Evaluation of the “Biblioredes Abre tu Mundo” Project, September 2005.
- Samarajiva, R. (2007). Telecenters or Mobiles? Connecting Sri Lankan Families at the Bottom of the Pyramid.
- Selwyn, N. (2003). ICT for all? Access and use of Public ICT Sites in the UK. *Information, Communication & Society*, 6(3), 350 - 375.
- Sey, A. (2008). *Public Access to ICTs: A Review of the Literature*. Seattle, WA: University of Washington Center for Information & Society (CIS). Available at <http://globalimpactstudy.org/wp-content/uploads/2009/02/ipai-lit-review-10-08.pdf>.
- Sharma, C., Sharma Sarita, & Subhedar, U. (2008). Putting ICTs in the Hands of the Women of Kanpur and the Chikan Embroidery Workers of Lucknow. *Information Technologies & International Development*, 4(2), 6.
- Sheppard, K. (2001). *The Remote Community Service Telecentres of Newfoundland and Labrador, Canada*. Vancouver.
- Simpson, L., Daws, L., Pini, B. (2004). Public Internet Access Revisited. *Telecommunications Policy*, 28(3-4).
- Siochrú, S. Ó., & Girard, B. (2005). *Community-Based Networks and Innovative Technologies: New Models to Serve and Empower the Poor*: UNDP.
- Stewart, J. (2000). *Cafematics: the Cybercafe and the Community*. Edinburgh: University of Edinburgh.
- Strover, S., Chapman, G., & Waters, J. (2004). Beyond Community Networking and CTCs: Access, Development and Public Policy. *Telecommunications Policy*, 28, 21.
- Subramanian, S. (2006). ICT Learning: Is it More Valuable for the Young? *International Journal of Education and Development using ICT*, 2(1), 11.
- Ulrich, P. (2004). Poverty Reduction through Access to Information and Communication Technologies in Rural Areas. *Electronic Journal of Information Systems in Developing Countries*, 16(7).
- Wheeler, D. (2007). Empowerment Zones? Women, Internet Cafes, and Life Transformations in Egypt. *Information Technologies & International Development*, 4(2).

Van Belle, Jean-Paul & Trusler, Jonathan (2005) An Interpretivist Case Study of a South African Rural Multi-Purpose Community Centre. *The Journal of Community Informatics*, 1(2), pp. 140-157.

APPENDIX A

Recommended Reading: Research Reviews

Kuriyan, R., & Toyama, K. (2007). *Review of Research on Rural PC Kiosks*. Available at <http://research.microsoft.com/research/tem/kiosks/>.

A summary of a comprehensive review of research on rural Internet kiosks.

Latchem, C., & Walker, D. (Eds) (2001). *Perspectives on distance education: Telecenters: Case studies and key issues*. Vancouver: The Commonwealth of Learning.

A collection of accounts of telecenter projects around the world. Provides an early assessment of the state of the telecenter movement.

Paul, J., Katz, R., & Gallagher, S. (2004). *Lessons from the field: An overview of the current uses of information and communication technologies for development*. World Resources Institute.

<http://www.digitaldividend.org/pdf/lessons.pdf>

An analysis of data on ICT projects in the Digital Dividends Clearinghouse database. One chapter focuses on telecenter projects.

Proenza, F. J. (2008). *Public Access to ICTs: What do we want to know? What do we already know? Where do we go from here?*

APPENDIX B

Evaluation Frameworks:

Ashraf, M. M., Swatman, P., & Hanisch, D. J. (2007). Some perspectives on understanding the adoption and implementation of ICT interventions in developing countries. *The Journal of Community Informatics*, 3(4).

Brophy, P. (2002). *The evaluation of public library online services: measuring impact*. In The Peoples Network, 2002 Workshop Series Issue Papers no.1.

http://www.mla.gov.uk/resources/assets//P/pn_impact_issue_paper_pdf_4218.pdf

Eve, J. & Brophy, P. 2001. The Value and Impact of IT Access in Public Libraries: Final Report. Library and Information Commission Research Report 102. <http://www.cerlim.ac.uk/projects/vital/>

Gomez, R. and Reilly, K. (2002). Comparing approaches: Telecentre evaluation experiences in Asia and Latin America. *International Information & Library Review*, 34, 57-78.

Hudson, H. E. (2001). The ACACIA programme: Developing evaluation and Learning systems for African Telecentres. In D. Walker and C. Latchem (Eds.), *Perspectives on distance education: Telecenters: Case studies and key issues* pp. 159-168. Vancouver:

Rothenberg-Aalami, J. & Pal, J. (2005). *Rural Telecenter Impact Assessments and the Political Economy of ICT of Development (ICT4D)*. Berkeley Roundtable on the International Economy Paper 164.

<http://repositories.cdlib.org/brie/BRIEWP164>

Rutkauskiene, U. (2008). Impact measures for public access computing in public libraries. Vilnius University.

Whyte, A. (1998) *Telecenter research framework for Acacia*. http://www.idrc.ca/acacia/ev-10197-201-1-DO_TOPIC.html

Whyte, A. (2000). *Assessing Community Telecentres: Guidelines for Researchers*. Available from http://www.idrc.ca/en/ev-9415-201-1-DO_TOPIC.html