

Loose Strands: Searching for Evidence of Public Access ICT Impact on Development

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ABSTRACT

Telecenters, libraries and internet cafés are often credited as being important venues for making information and communication technologies (ICTs) more widely available for people in developing and developed countries. Although numerous case studies and evaluations show the contribution public venues can make to socio-economic development within certain contexts, the body of research provides a fragmented view of outcomes and impacts of public access ICTs in general. This paper uses a broad outcomes approach to review existing research on the impacts of public access to ICTs, including the extent to which public access ICTs are used and how they contribute to socio-economic development. We find that most research adds primarily to the body of knowledge on public access ICT operational conditions, users and uses. While some insights are provided into what may be classified as outcomes and impacts, there is relatively limited hard evidence at this level.

General Terms

Measurement, Performance, Human Factors

Keywords

ICTs, Impact, Telecentres, Libraries, Cybercafés, Public Access Computing

1. 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

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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, (henceforth referred to as “public access ICTs”) are important means of making ICTs available. 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 through the teaching and learning environments they foster.

At the same time, there are debates about the continued relevance of public access ICTs, particularly models that receive public funding (see [11] for a brief overview of this debate). In fact, some critics believe 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 (ICTD). 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 research 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. Thus, 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. Furthermore, although several case studies and project evaluations have been conducted, it is not clear what these studies mean as a whole. To what extent are public access ICTs being used, what specifically do they contribute to socio-economic development, and how big or small is this contribution?

A particularly thorny issue has been that of defining what one means by impact. This challenge is not unique to public access ICT research; ICT research in general encounters multiple conceptualizations of impact and how it is generated (e.g., [33]). This paper reviews existing research on the impacts of public access to ICTs and assesses the extent to which the data sheds light on the impact question. We find that the larger proportion of research adds primarily to the body of knowledge on public access ICT operational conditions, users and uses. While some insights are provided into what may be classified as outcomes and impacts, there is relatively limited hard evidence at this level. We employ a broad outcomes approach to help us weave loose strands together—disparate findings on venue performance, users, use and impacts—to show what research has said about the impact of

providing public access to ICTs and to consider the implications for ICTD research and practice. In the following sections we describe the methodology for the research review, outline the categories of findings and discuss some reasons why data on the impacts of public access ICTs is hard to find.

2. THE REVIEW PROCESS

In this article, we discuss the findings of a review of literature on the impacts of public access to ICTs [43]. The objective of the literature review was to find out:

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 service provision?
5. What gaps are there in the existing body of research on this topic?

To identify relevant literature for the review, we conducted a broad search for literature on public access ICT and on the impact of ICTs on development. We gathered references from online databases and by continual monitoring of a dozen prominent journals on ICT and development. Research affiliates in several countries recommended resources published in languages other than English. The process returned over 500 relevant resources.

From these, we selected 150 research articles and reports focused on public access to ICTs in internet cafes, public libraries and telecenters. We then encoded, annotated and summarized the articles according to thematic areas based on development domains, research methods, research locations, and types of research findings--findings on venue performance, users, use and impact. We focusing primarily on identifying the range of findings produced, without judging quality of the research (most research articles did not provide sufficient detail to adequately comment on the appropriateness or rigor of the research design and methods).

For this paper, we examine the findings of the literature review through the lens of an outcomes approach, which involved distinguishing between findings to categorize them into inputs, activities, outputs, outcomes and impacts. Performance measurement systems often include a similar approach to help guide organizations from providing services to achieving short and long run goals [19]. This approach exists in project evaluation literature as well, such as the outcome mapping method developed by [13]. We apply an outcomes approach in a more general way to represent and reconcile different interpretations of public access ICT impacts throughout the literature. Our method captures the general path a public access venue would take, from establishment and service delivery to pervasive outcomes and impacts for users and populations (See Fig. 1 Public Access ICT Inputs-to-Impacts Logic Model). This enables us to acknowledge the various levels of activity that lead up to, or are prerequisites for impacts to

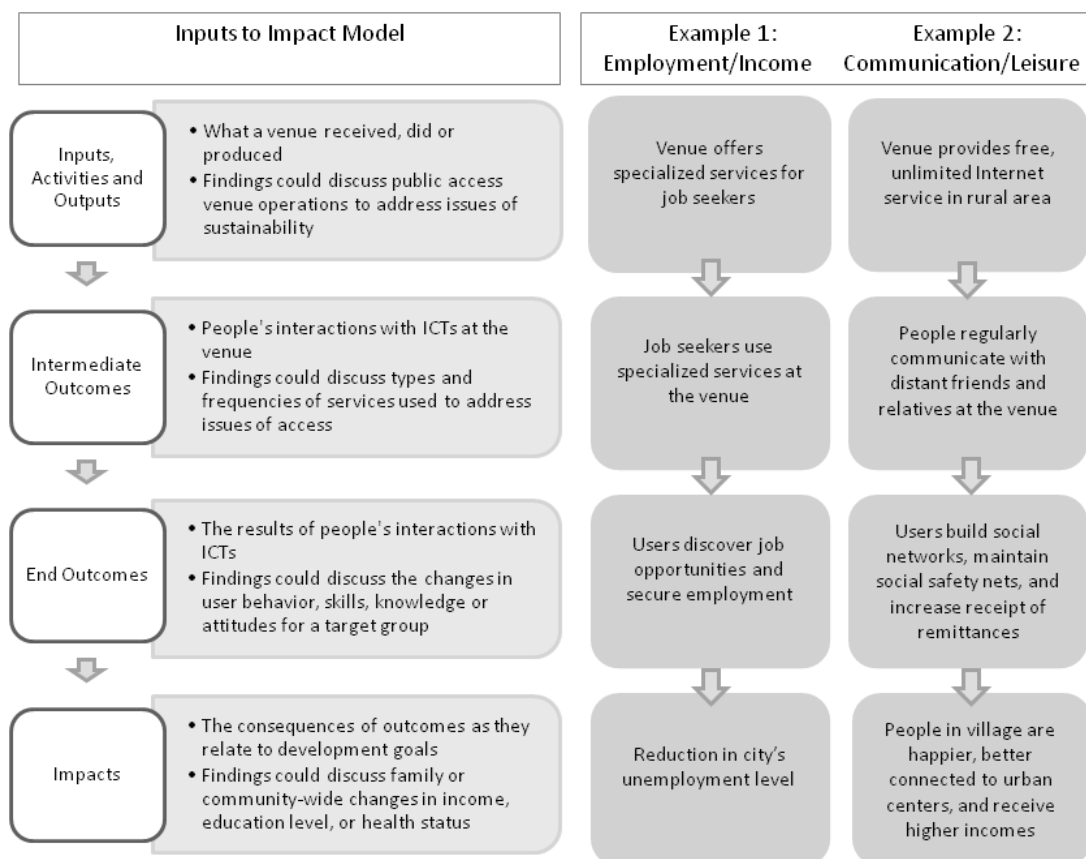


Figure 1. Public Access ICT Inputs-to-Impacts Logic Model

occur, thereby providing a means to identify the *contribution* of public access ICTs to development goals, whereas causal links are relatively intangible (or for the moment, valid means of measuring them have not emerged). For example, studies of venue sustainability are not without relevance for impact, since before a single venue can achieve any level of measurable impact, that venue must reach a requisite level of ICT availability, venue performance, user access and use. Once these are achieved, a variety of impacts could occur that would be only partially attributable to public access ICT use. The critical issue here is to begin to chart the contours of where public access to ICTs begins and ends (or becomes diffuse) in terms of impacts.

The three general categories we use to assess the literature are:

1. *Inputs, activities, and outputs*, including what a venue did or produced itself. Research here may examine the set-up and operation of public access venues and how these are associated with the viability and sustainability of public access ICTs.
2. *Outcomes*, including the activities and results of people's interactions with ICT. We distinguish two levels of outcomes: intermediate and end outcomes. Research on intermediate outcomes measures who uses ICTs and how—which services, how frequently, etc. Findings on end outcomes reflect changes in behavior, skills, knowledge or attitudes brought about by the use of public access ICT services. Essentially, intermediate outcomes include conditions required to reach end outcomes.
3. *Impacts*, including the consequences of outcomes as they relate to development goals such as changes in income, education level, or health status. Ideally impacts persist over time and have wider implications for the environment in which they occur. The line between impacts and end-outcomes is, however, a blurry one, and decisions about whether to classify a result as one or the other often have to be based on contextual issues such as venue, community or even researcher goals. In this respect, we acknowledge that there may be differences of opinion about the items we categorize as outcomes and impacts. The discussion here represents our best efforts to place the research in a coherent framework, and we deliberately avoid establishing any particular definition of impacts at this stage, recognizing a range of possibilities from narrow to broad definitions. As a first cut at laying out a model for the process of public access ICT impacts, we lean towards a narrow definition.

3. EVIDENCE OF IMPACT IN PUBLIC ACCESS ICT RESEARCH

This section presents an overview of our categorization of the research according to nature of research evidence they produced. We elected to use an outcomes perspective in part because the perspective is simple enough to incorporate findings across multiple impact assessment approaches, including project goals, Communications-for-Development, Sen's capabilities framework, the sustainable livelihoods framework, and the telecenter performance indicator approach based on an ICT4D value chain (See [20] for details on these and other frameworks). In addition, on an aggregate level, we gain a sense of how findings across studies complement each other at different phases of the logic model – e.g. research that sheds light on usage patterns

contributes to the body of knowledge about the demand for public access ICTs, knowledge that can then be built upon by other research to advance knowledge on how demand is actualized into short or long term impacts.

A. *Inputs, Activities and Outputs*

A significant proportion of literature in this category would consist of articles that present descriptions of public access ICT projects. This review does not cover that literature since our focus is on research articles. The research findings we place in the inputs, activities, and outputs category are those that deal with venue performance, particularly issues related to the financial sustainability and local relevance of public access ICTs. Findings on this issue 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. Such studies typically conclude that financial success is associated with factors such as good management, good locations, strong local demand, new service development, commercial orientation, locally relevant services, external linkages and networking [2], [3], [5], [6], [8], [14], [24]-[28], [30], [32], [34], [35], [40], [44]-[46] [48].

B. *Outcomes*

Findings that describe the levels or patterns of access for different types of populations fall into the outcomes category. These 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 largely 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. Outputs of such studies make statements about the characteristics of people who tend to use public access ICTs in terms of gender, educational levels, socio-economic status, prior access to ICTs; as well as the types of activities they perform (e.g., [1], [2], [10], [12], [14], [15], [17], [18], [21], [22], [24], [27], [31], [34], [36]-[39], [41], [42], [47], [48]).

In addition, the outcomes category includes research that provides some data on the intermediate benefits users derive from public access ICT use. This includes for example, studies reporting that users gained or enhanced ICT skills through their use of public access ICTs (e.g., [7], [16], [29], [31]), or studies that report increased user knowledge about basic hygiene practices ([4]).

C. *Impacts*

The impact category consists of findings from research that produced strong empirical evidence on the existence or non-existence of socio-economic impact (positive and negative) as a result of the changes that occur at the end-outcome level. These could be at individual, community, or higher levels. Our review unearthed only a limited number of this type of research, such as [49]'s calculation that the average household benefit from public access ICT use in rural China was about \$38. It is more challenging to derive general conclusions from the compilation of research results in this area mainly because of their limited quantity, but also because existing studies tend to have

significantly different foci and contexts. Some of the studies we reviewed reported evidence of notable positive impacts; others reported that there was essentially no evidence of any impact.

Findings on impact are usually based on the perceptions of public access venue managers and users. For this reason, we distinguish between perceived impacts and measured impacts for the purposes of the current discussion. For example, [9] and [23] reported that their respondents perceived a decrease in corruption in the delivery of government services due to the availability of such services at public access venues. Whether there had been an actual aggregate reduction in corruption is a separate empirical question. Similarly, depending on perception of impacts from the perspective of venue operators leaves one open to learning more about the intended impacts of the activities the venue undertakes, than about the impacts of people's actual use of ICT services at the venue.

Unlike research on venue operations, users and uses, where findings are beginning to congregate enough to reveal trends, studies that delve deeper into impacts have not accumulated enough evidence to make concrete claims about public access ICT impacts in terms of socio-economic development goals and visions. Since a lot of research into public access ICTs examines projects with specific objectives, e.g. to provide government, health, education, or employment services, the related findings speak to impacts within those particular development domains. The limited impacts research means that findings are even more splintered across the various domains.

4. DISCUSSION

Three notable observations emerged from this analysis of the public access ICT research literature. The first is that the research evidence is currently focused on the early to mid-stages of the public access inputs-to-impacts logic model. In other words, several reports that purport to be examining public access ICT impacts, in reality present data and conclusions on how 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) influence the usefulness and financial sustainability of public access venues. Material related to the sustainability of public access venues is particularly plentiful relative to other research. Two factors may be responsible for the prominence of venue sustainability discussions throughout the literature: one is that venues obviously have to exist and be sustained for some period of time in order to generate impacts; the second and potentially more significant factor is that while researchers may set out to identify impacts, findings of limited or no impacts lead to a focus on uncovering the causes of the apparent lack of impact and making recommendations for improved performance.

Secondly, partly because of the above point, studies have not established a clear link between public access to ICTs and socioeconomic change or impact. Researchers are beginning to go beyond anecdotal evidence of 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. 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. 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 quantitative studies attempt to measure results such as consumer surplus, reduction in unemployment or increase in literacy levels at the community level; and even fewer draw from a large enough sample to attach statistical significance to their findings. Furthermore, it is not always clear whether observed or perceived downstream impacts are directly related to public access ICT use or to other factors.

Thirdly, despite the domain-specific orientation of most ICTD interventions, there is limited empirical evidence of public access ICT impacts in particular development domains. Some of the research we reviewed identified impact findings in development domains such as governance, civic engagement, gender empowerment, social equity, education, culture and language, income, and health, but they are generally quite sparse and measures of impact tend to be vague.

The direction of public access ICT research is possibly influenced by an orientation towards project evaluation. Although program evaluation literature provides a useful snapshot of the benefits and failures of ICT projects, researchers often pursue lines of investigation of most interest to project funders. This could especially explain the tendency for research to take particular development domains as a starting point, and the attendant difficulty in defining, identifying, and measuring public access ICT impacts in those specific domains. Emerging data about how people actually use public access ICTs provide an opportunity and rationale to shift from domain-specific studies towards research that investigates the impacts of public access ICTs in different ways, for example, conceptualizing impacts in a cross-cutting manner, or acknowledging that public access to ICTs may occur in different ways and realms than expected by donors or policy interests. Indeed, the conventional wisdom that social research should be based on the values and objectives of policymakers in order to influence policy is challenged by [50] who argues that over time, even contrarian research feeds into the decision-making process at the policy level.

To move beyond the research context, and to make findings on impact more relevant to policy application may require different or more rigorous methodological approaches, both quantitative and qualitative. Local qualitative studies provide rich contextual information which could be made even more useful if, in addition to identifying impacts, they also provide indications of the breadth and depth of impact. Strong, replicable methods for quantitative and mixed-method studies could be as beneficial to the field as the findings they produce. Additionally, the general absence of longitudinal research leaves a gap in knowledge about the long-term persistence of impacts. In terms of gaining clarity on what constitutes an impact of public access to ICTs, this last point is a factor that could potentially determine whether a research observation is classified as an outcome or impact, for example.

This state of affairs is not necessarily one to lament – the body of research regarding the establishment and uses of public access ICTs has provided the foundation to begin informed investigations of impacts. In the context of ICTs for development, impact is a challenging concept to capture. 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 is defined, impact can take a variety of forms (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). The time lag between implementation of ICTs and observation of impacts (the productivity paradox) applies as much to public access ICTs as it does to other forms of ICT use.

5. CONCLUSION: WHAT IS PUBLIC ACCESS ICT IMPACT?

In this paper we have presented an overview of our assessment of how existing research on public access ICTs addresses the issue of impact within the framework of an outcomes approach. Depending on one's perspective, any finding from a study could play out at different spots on the inputs-to-impacts logic model, given different assumptions and expectations of ICTs. What we consider an output or intermediate outcome could very well be an end outcome or impact to venue operators, policy-makers, or researchers. Studies addressing access issues, particularly around the digital exclusion or the digital divide, often take this position. For example, the U.N. Millennium Development Goals included widespread access to ICTs as a means to promoting social inclusion. In other situations, access may be seen neither as an intermediate or end outcome, but simply as a service delivered. In the case of this review of literature, for instance, we conceptualize "access" not only as a result of infrastructure, but as a venue's ability to identify and overcome barriers to use, such as income, education level, and perceptions of users and non-users. In other words, by making ICTs and related services accessible and usable by target populations, public access venues generate an impact – that of making it possible for previously excluded populations to reach for the offerings of information and communication technologies. Thus, for public access ICTs, one could parse impacts into those that derive from the presence and activities of public access ICT venues in a particular location (these are the impacts of public access ICT venues on availability and use of ICTs) and those that derive from the actual use of public access ICT facilities (these are the direct and indirect impacts of use on users and non-users).

We believe using this approach leads to a sharper focus on the extent to which, and mechanisms through which, public access ICTs, as distinct from other models of ICT provision, do or do not play a role in socio-economic development. Reflecting on this in the broader context of ICTD, the more research accumulates systematically along the inputs-to-impacts continuum, the closer we should come to understanding the added-value of ICTD interventions, including how and where particular types of interventions feed into the socio-economic development process—tying together loose strands of research efforts and findings in this field.

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