Why Institutional Partnerships Matter: A Regional Innovation Systems Approach to Making the ICT for Development Projects More Successful and Sustainable

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Abstract:

This paper examines the role of institutional partnerships in making the ICT for development projects more successful and sustainable in developing countries. Employing a regional innovation systems (RIS) perspective, I examine this issue in the context of lessons drawn from the failure of telecenters in Melur taluka of Tamil Nadu under the Sustainable Access in Rural India (SARI) project. The kiosks aimed at delivering a host of services such as email, voice chat, health, e-government, and agricultural and veterinary services to the rural community. They were operated by two sets of operators: self-employed local entrepreneurs and a local NGO. After operating for nearly three years, most of the kiosks run by the self-employed entrepreneurs had closed down by mid-2005, whereas those run by the NGO were still operating. Using primary data from interviews with the kiosk owners and operators, I argue that the failure of the kiosks to sustain themselves was due to weak institutional linkages and networking among actors in the local and regional innovation systems, and the inability of the RIS to evolve and respond effectively and quickly to the changing preferences and needs of the rural community. I conclude that ensuring a project's success and sustainability requires the presence of an effective regional innovation system with strong but flexible and dynamic linkages among relevant actors such as the state, universities, private sector, civil society organizations, the user community, and the funding organizations.

Keywords: ICT for development, developing countries, sustainability failure, kiosks, regional innovation systems, institutions, institutional partnerships

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Introduction

Information and communications technologies (ICTs) have assumed great importance during the recent years as the primary tools to foster social, economic, and political development in developing countries. Almost all developing countries have launched ICT for development projects aimed at bringing the benefits of ICTs to the rural and poor communities, which typically have low individual ownership of ICTs. However, though these projects have been in existence for well over a decade now, scholars have noted that most of these projects have either failed completely or succeeded only partially in achieving their objectives (Heeks, 2003a). The failures of these projects have typically been explained in terms of critical success and critical failure factors (CSF and CFF) (Heeks & Bhatnagar, 1999), 'design-actuality' (Heeks, 2002) or 'design-reality' gaps (Heeks, 2003a), poor economic sustainability of rural ICT projects (Best & Maclay, 2002), or political and institutional factors due to lack of commitment on the part of political leadership and public managers (Bhatnagar, 2000). A sustainability failure model has also been advanced to examine projects that succeed initially but fail to meet their objectives in the long-term (Kumar & Best, 2006).

Though the approaches noted above help us in understanding the reasons for success or failure of these projects, they fail to adequately take into account the institutional factors behind the failure of such projects. In the context of ICTs as innovations, these factors include the institutional processes and linkages among various institutions and actors, both public and private, that lead to innovation and its diffusion among the users. In this paper, I examine the institutional factors behind the failure of such projects using a regional innovation systems (RIS) perspective.

Specifically, I examine the sustainability failure of the privately owned and operated telecenters under the Sustainable Access in Rural India (SARI) project in Melur taluka in Tamil Nadu in India. Aiming at rural social, economic, and political development, this project had established 78 computer and internet kiosks in rural communities by June 2004. These kiosks offered a number of services including basic computer education, e-mail, web browsing, e-government, health, and agricultural and veterinary services mostly on a fee-for-service basis. Thirty-six of the 78 kiosks were run by rural self-employed entrepreneurs while the remaining 42 were run by a local NGO, called the Dhan Foundation. After over three years of operation, most of the self-employed entrepreneurs had closed down their kiosks. As of July 2005, 29 of the 36 kiosks run by local entrepreneurs had closed down. At the same time, the Dhan kiosks continued to operate. Based on a comparative analysis of the performance of the two sets of kiosks and employing a RIS perspective, this paper examines the institutional factors for the sustainability failure of the kiosks owned by the self-employed entrepreneurs. Lessons drawn from the sustainability failure of such projects can help us in improving the long-term sustainability of such projects in developing countries.

Figure 1 shows the location of Melur where this project was implemented.

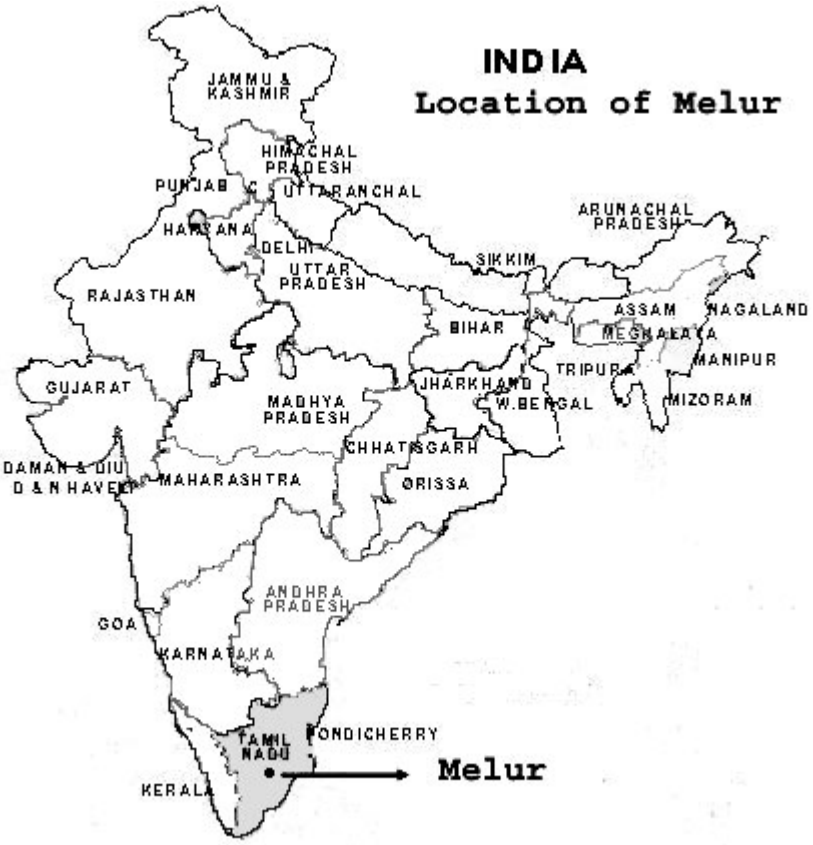

Fig. 1: Location of Melur in India
(Source: http://www.tourindia.com/htm/homepage.htm, modifications by the author)

The rest of the paper is organized as follows: first, I present a brief review of the relevant literature on regional innovation systems and discuss why institutional factors are important in the success of the ICT for development projects; then I briefly describe the overall project and discuss how it succeeded initially in meeting the objectives of its stakeholders by forging institutional partnerships with the government and other agencies (both public and private) for delivery of services; next I discuss the research methods adopted for this study; then I present the results and an analysis of the institutional factors behind the closure of the kiosks; finally I discuss the implications of the empirical results for institutional analysis of the performance of such projects in developing countries. I conclude by presenting this as an alternative framework for analyzing the long-term sustainability of such projects. In presenting the materials in this paper, I draw partly from Best and Kumar (forthcoming).

Literature Review

Before discussing the relevant literature on regional innovation systems, it is helpful to specify the meaning and the context in which I use “institutions” in this paper. Scholars have defined institutions in two principal ways. Many view them as long standing social rules and norms that influence behavioral patterns among people and organizations. Other scholars define institutions in a more formal way, meaning specific and identifiable organizations or organizational systems that have been established to perform specific tasks. The innovation systems literature has usually treated institutions in a more formal way, meaning the physical organizations such as universities, R&D institutions and agencies, firms, government agencies dealing with the industry, etc. In this paper, I use a more inclusive concept of institutions that encompasses both the “social norms and rules” that influence behavior and the physical organizations designed to perform specified tasks. The reason for focusing on an inclusive meaning of the term is to help us in

understanding how the complex interplay between the social rules and norms and the physical organizations affects the institutional behavior and the long-term outcome of ICT for development projects.

The main literature on innovation systems is very large. This body of research focuses on the role of institutions in the innovation process in an economy. Understood mainly as the complex network of institutions, both public and private, that support and foster the innovation process in an economy, the innovation systems focus on the role of interaction and networking among these institutions and the institutional peculiarities that offer distinct incentives for learning and innovation (Amsden & Chu, 2003; Lall, 2000; Lundvall, 1993; Segal, 2003; Yusuf, 2003). This literature treats innovation as an evolutionary and social process that is influenced by several actors (C. Edquist, 2004). These actors can be both internal and external to the firm. The innovation process is influenced by the collective and collaborative learning through interactions with the other institutions in the innovation system. It is this collective and interactive learning process that lies at the heart of the innovation system and places great emphasis on the role of the interacting institutions in creating and sustaining innovations.

The innovation system discussed above is usually referred to in the context of a national economy and is generally termed as a national innovation system (NIS). However, innovation systems can also be rooted or locally embedded within specific regions to take advantage of the specific local capabilities or resources (Kirat & Lung, 1999; Storper, 1997). Generally referred to as regional innovation systems (RIS), this body of literature views innovation as a localized process that emerges out of interactions among local institutions, such as universities, government agencies, firms, civil society organizations, etc. These institutions and actors derive advantages from proximity and localization economies and the region-specific norms, rules, and conventions that help in knowledge creation and dissemination (Doloreux and Parto, 2004). This is relevant here as this research focuses on the role of interactions among local institutions and actors in sustaining the kiosks in the rural communities.

A recent variant of the regional innovation systems in the context of innovations in knowledge-based economies is the triple helix model that places emphasis on the central role of universities in fostering the innovation process (Benner & Sandstrom, 2000; C Edquist, 2001; Etzkowitz & Leydesdorff, 1997; Leydesdorff, 2000). This model views networking and interactions among government, academia, and industry as the keys to creating and sustaining innovations. Though this model is helpful in understanding the systemic dimensions of the innovation process, this model largely ignores the role of other actors such as civil society organizations and users and the complex feedback mechanisms that underlie the interactions among various actors (Sreekumar, 2003).

Another body of literature that is relevant here in understanding the process of ICT-based innovations is that of international geography of innovations. This body of literature places emphasis on the role of international or cross-border knowledge flows through global value chains in creating and sustaining innovations (Gereffi, 1999; Gereffi & Kaplinsky, 2001; Gereffi & Korzeniewicz, 1994). Though this research tradition mainly refers to global production systems for goods and services, insights derived from this on the role of international linkages in knowledge flows in generating and sustaining innovations can help us in understanding their importance even for ICT for development projects in developing countries where the major collaborators or funding agencies are generally from the developed countries. This body of literature is also relevant here as the emphasis in this literature on knowledge flows through cross-border linkages is in contrast to the innovations systems literature, which emphasizes local linkages among firms and public and private institutions as the major sources of competitiveness.

Discussion in the preceding paragraphs suggests the central role of institutions in generating and sustaining an innovation. Presence of an effective innovation system within the region with efficient and effective networking and interactions among the relevant public and private institutions and actors is extremely important for creating and sustaining innovations. This

is all the more important in the context of ICT for development projects in developing countries where the innovation systems may be characterized by weak linkages among the relevant institutions or even the absence of some key institutions. This paper focuses on analyzing one such project where weak institutional linkages among different institutions and actors within the regional innovation system was the main reason for the sustainability failure of the project.

Description of the Project

Institutional collaborations have been a key feature of the SARI project right from the outset. The project is a collaborative venture of several organizations: the Indian Institute of Technology, Madras; Berkman Center for Internet and Society, Harvard Law School; Georgia Institute of Technology; I-Gyan Foundation; and n-Logue Communications Pvt. Ltd. In the initial stages, the Massachusetts Institute of Technology was also a partner. It uses a Wireless-in-Local Loop (WLL) technology developed at IIT, Madras to provide Internet connectivity to rural villages.

The Internet connectivity is offered to the local community at kiosks which are run as a self-sustained business with cost recovery through service charges. As noted before, the kiosks are operated by two sets of operators. A local NGO, called the Dhan Foundation, operated 42 such kiosks at the time of this study in July 2005. The remaining 36 were owned and operated by local self-employed entrepreneurs. These kiosks were called as 'Chirag' kiosks while the ones operated by the NGO were called as 'Dhan kiosks'. Technical support for all the kiosks was provided by n-Logue Communications. n-Logue communications also provided maintenance services to the Chirag kiosks.

It is relevant to note here some important differences in the operation of the kiosks by the two sets of operators. The first difference was in the overall objectives with which the kiosks were established by the two operators. While the Dhan Foundation operated the kiosks with the specific goal of reaching the most socially and economically disadvantaged communities in rural areas, the self-employed entrepreneurs aimed at attracting the relatively well-off sections of the rural community with the goal of achieving financial sustainability quickly. The second difference was in the financial support that the two groups of kiosks received. While the Chirag kiosks received no financial support and were supposed to become financially self-sustainable on their own, the Dhan kiosks received substantial financial support for operating expenses from the Dhan Foundation. As I discuss subsequently in the paper, this aspect crucially affected the long-term financial sustainability of the two sets of kiosks.

Achieving long-term financial and operational sustainability was one of the major goals of the project. However, after over three years of operation, most of the self-employed entrepreneurs had closed down their kiosks. As of July 2005, 29 of the 36 Chirag kiosks had closed down. At the same time, most of the kiosks run by the Dhan Foundation were still operating.

Institutional Partnerships for Delivery of Services

The project had developed partnerships with other institutions and agencies – both public and private – for delivering various services to the users. This was one of the key features of the project. The partnerships included tie-ups with the state government to provide e-government services, with the state owned Tamil Nadu Agricultural and Veterinary University for providing agricultural and veterinary services, and with a private eye hospital for providing tele-medicine eye check-ups. The state government supported the project from the beginning by offering e-government services through the kiosks for issuance of birth and death certificates, and by receiving petitions through email for a number of other services and benefits, such as income certification, copies of land and cultivation records, complaints regarding civic services, and general petitions on other issues.

It is important to note here that the scope of these tie-ups or partnerships for the partner organizations were limited to receiving petitions from the kiosks and responding to them. It didn't cover providing funding or other material support to the kiosks. It is also relevant to mention here the partnerships were not one-way, i.e., they were not meant to support only the kiosks. The partner organizations also expected to benefit in two ways: gaining additional clientele in the case of the private hospital, and providing an additional mode of sending petitions and reducing delays in providing government services to citizens in the case of the government.

Fig. 2 explains the role of these partnerships in the delivery of services.

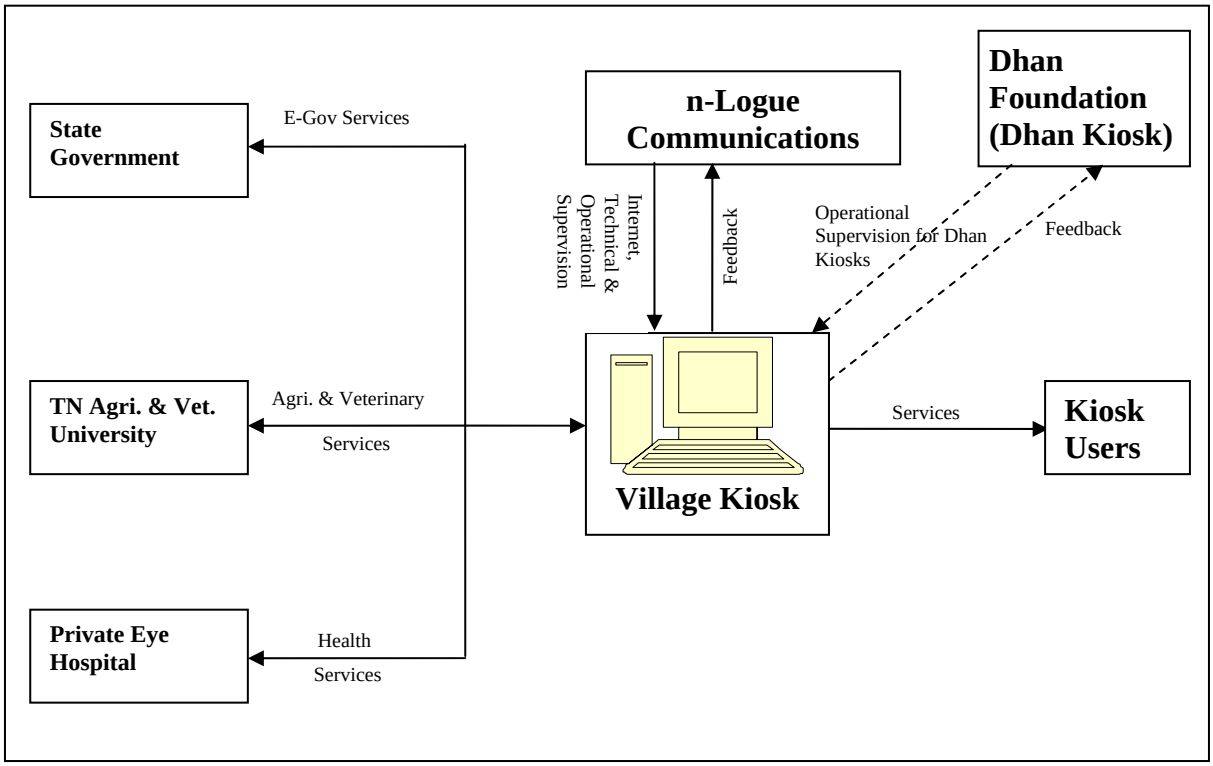

Fig. 2: SARI Project Partnerships for Delivery of Services

The partner organizations provided their services by replying to the requests of the villagers sent through kiosks through email. Follow-up face-to-face meetings were also arranged when found necessary. As I discuss later in the paper, failure of these partnerships to sustain themselves over a long term period was one of the major reasons for the closure of the kiosks.

Institutional Framework for Operation of the Kiosks

The project was launched within the broad institutional and legal framework as laid out through an executive order of the Tamil Nadu state government in Feb. 2001. This order permitted the sponsors of the SARI project to launch in Madurai district of the state. The order mentioned that the rural kiosks would aim at providing a host of services, such as agriculture, health, telemedicine, and e-government, for the benefit of the rural population. In order to ensure smooth implementation of the e-government component of the project within the district, the Madurai District Collector, the chief government administrator of the district, was asked to play a lead role.

Scope of the partnership with the government

The scope of the partnership with the government was limited to two aspects: first, it allowed the kiosks to send applications electronically to the Melur Taluk office for various e-government services, and, second, it established a coordinating mechanism for monitoring the prosecution of such applications. This coordination and monitoring was to be executed by the District Collector through regular meetings with SARI project officials. While these coordination meetings were conducted regularly till the end of 2002, they virtually stopped after the incumbent District Collector was transferred out of the district in Feb. 2003. At around the same time, the administrative head of the Melur Taluk office was also transferred out. The transfer of these two key officials was one of the major reasons for the collapse of the e-government services at the Taluk office (Kumar & Best, 2006).

Business Model of the Kiosks

The kiosks were established as self-sustained businesses based on full cost recovery through user charges for the services offered. The charges levied for the services ranged from Rs. 10 (US $0.22) for sending an email to Rs. 100 (Us $2.2) per month for a basic computer course for school children. As noted before, the kiosks offered their services in partnership with several other organizations. Though these partnerships worked well during the first year of operation of the kiosks, they failed to sustain themselves in the long term. This affected the financial sustainability of the kiosks adversely and was one of the most important reasons for the failure of the kiosks.

Research Methods

I use a combination of qualitative and quantitative methods for this research. The most important source of data was a structured survey of 27 kiosk owners who had closed down their kiosks after operating them for periods ranging from six months to three years. This survey was conducted in the months of August and September 2005. These surveys were conducted in the local language by two trained interviewers. I also collected quantitative longitudinal data from the records maintained by SARI project officials on the performance of the kiosks. The period for the data collected was from December 2001 to May 2005. Finally I conducted semi-structured interviews with other stakeholders of the project, such as SARI project officials, n-Logue officials, government officials, and Dhan Foundation managers. The officials interviewed included the then Secretary of the Information Technology Department, Tamil Nadu Government in Chennai; n-Logue officials in Melur; the District Collector and the head of the National Informatics Center (NIC) in Madurai; and the Executive Director and other officials of the Dhan Foundation in Madurai. I conducted a total of 10 such interviews. These interviews were conducted in English during July and August 2005.

Data Analysis

Active and Inactive Kiosks

A comparative analysis of the performance of the Chirag and the Dhan kiosks reveals some important differences. While most of the Dhan kiosks remained active during the period of operation of the project from December 2001 to May 2005, Chirag kiosks failed to show the same level of activity. We define a kiosk as “active” if it had used at least one hour of internet time during the month under study. Figure 3 shows the percentage of Chirag kiosks that remained active during the month for the duration of the project. The number of these kiosks had reached a peak of 36 during March 2004. As can be seen from this figure, activity levels of the Chirag kiosks started declining progressively from September 2002 and the percentage of active Chirag kiosks declined to only 11.1% during May 2005.

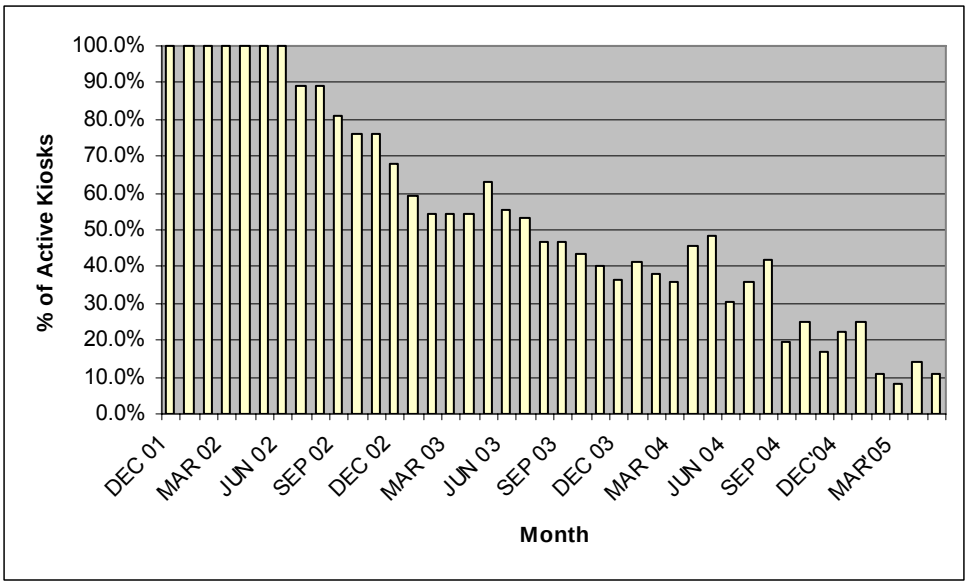

Figure 3: Percentage of active Chirag kiosks in Melur

A similar analysis for the Dhan kiosks presents a different picture. The total cumulative number of Dhan kiosks was 42 in May 2005, while the number of active kiosks was 30. As a proportion of the total cumulative number of kiosks, the percentage of active Dhan kiosks was 71.4% in May 2005 (Figure 4). Note that the absence of active Dhan kiosks from March to May 2003 is due to suspension of the Internet connections during this period by n-Logue over a payment dispute.

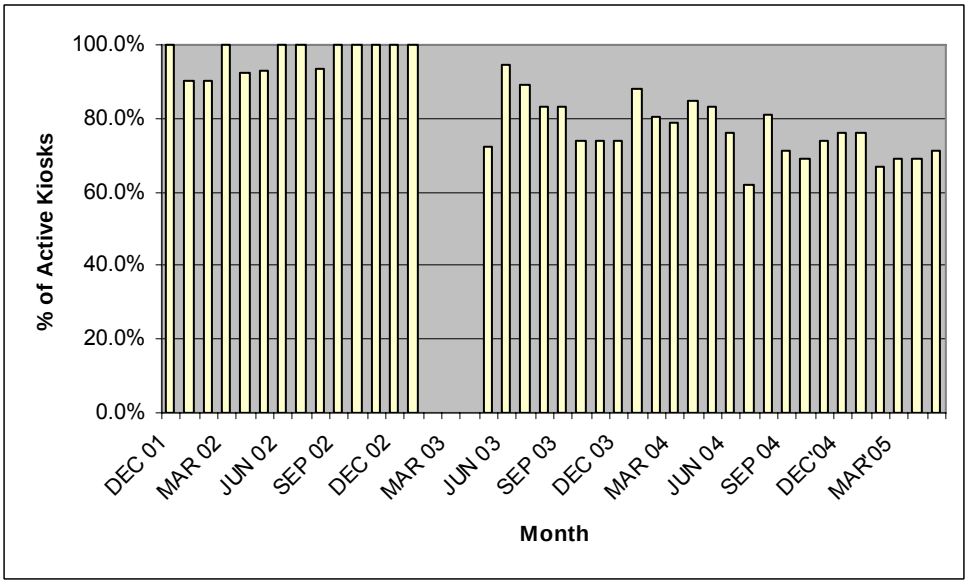

Figure 4: Percentage of active Dhan kiosks in Melur

The above analysis indicates that the Dhan kiosks have remained more active when compared to the Chirag kiosks during the research period. This is evident from the fact that while

the proportion of active Chirag kiosks was just over 10% in May 2005, over 70% of the Dhan kiosks remained active during the same month. This holds true even if we consider the entire period of operation of the kiosks (from December 2001 to May 2005). While the mean of the monthly percentages of active Chirag kiosks for the entire period was 53.7% it was 78.1% for the Dhan kiosks.

Factors Associated with the length of time a kiosk operated

As noted before, only 4 out of 36 Chirag kiosks remained active as of July 2005. The remaining 32 kiosks had either closed down or had become idle after remaining functional for varying lengths of time. Data collected on 27 of these closed or idle kiosks showed that 52% of these kiosks closed down within 12 months of starting operations, while 22% closed within 24 months and an equal percentage closed after 24 months but before 36 months of opening. Only one kiosk managed to operate for more than 36 months.

It is relevant to examine the factors that may be associated with the differences in the periods of operation of the Chirag kiosks. Based on the qualitative evidence collected during interviews with the kiosk owners, I found that the performance of the kiosks depended on a number of factors. First, the kiosks which reported receiving relatively better technical and operational support from n-Logue performed better and remained open for more days. Second, the kiosks which were operated by a different person than the owner remained open for more days. Prior training of the owners in computers and support from the elected representatives in the village were other factors that could be associated positively with the duration that the kiosks functioned. To take into account the financial sustainability of the kiosks, I also considered the difference in the actual reported monthly profits and compared this to the profits expected by the owners.

Multivariate Regression Model

To consider the above factors, I built a simple multivariate linear regression model to examine the association of these factors with the duration of functioning of the kiosks. A multivariate analysis helps in controlling for other explanatory factors and thus in eliminating any omitted variable biases. The model that I used is specified below:

Duration of Functioning of the Kiosks (No. of Days) = β_0 + β_1*(difference in the actual versus expected profits) + β_2*(Owner and Operator Different) + β_3*(Prior Training of Owners in Computers) + β_4*(Gender of Operator) + β_5*(Support from n-Logue) + β_6*(Support from elected representatives) + ε

In the above model, all the independent variables except the first one (difference in the actual versus expected profits) are dummy variables taking a value of either 1 or 0 for affirmative and negative replies respectively. For gender of the operator, I use 1 for males and 0 for females. It is relevant to note here that though the level of some of the independent variables could vary from one kiosk to another (for example, owners can have different levels of prior training in computers, the quality of support from n-Logue and elected representatives could vary from one kiosk to another, etc.), all responses indicating satisfactory or better support have been classified as 1. I believe that this method adequately captures the association of these variables with the duration of functioning of the kiosks.

Running the above model with data from 26 n-Logue kiosks that operated for various lengths of time between November 2001 and May 2005 showed that coefficients on three variables were statistically significant at 10% or higher levels. These variables are: technical and operational support from n-Logue, owner and operator being two different persons, and owners having prior training in computers. Support from n-Logue is the most significant variable. Table 1 presents the results of the regression.

Table 1: Regression results (with robust standard errors) for duration of functioning of the Chirag kiosks

Explanatory Variable	Dependent Variable: Duration the kiosks remained open (number of days)
Difference in the actual and the expected profits	0.022 (0.89)[a]
Different owner and operator	218.14* (1.94)[a]
Prior training of owner in computers	212.32* (1.75)
Gender of Operator	63.66 (0.71)
Support from n-Logue	326.60** (2.35)
Support from elected representatives	53.15 (0.29)
Constant	172.75* (1.93)
Observations	26
R^2	0.481
F-Statistic	4.30***

[a] t-statistics in parentheses
* Significant at 0.10 by the standard criteria
** Significant at 0.05 by the standard criteria
*** Significant at 0.01 by the standard criteria

As the above table shows, kiosks that received satisfactory or better support from n-Logue remained open, on an average, for 327 days more than the kiosks that reported little or no support, keeping other factors constant. Similarly, having a different operator is associated with the kiosks remaining open for 218 days more on an average keeping the other factors constant. Prior training of owners in computers is another factor that is positively associated with the kiosks remaining open for more number of days. The overall model is statistically significant and explains 48% of the variation in the dependent variable.

The results of the statistical analysis above were confirmed by qualitative evidence obtained during interviews with the kiosk owners. All kiosk owners stated that technical and operational support for delivery of services from n-Logue was crucial for the successful operation of the kiosks. The finding that kiosks having an operator separate from the owner lasted longer was also confirmed during the interviews. Most of the kiosk owners stated that having a different operator facilitated the task of coordinating with the public and private agencies for delivery of services. It also made following up for technical and operational support with n-Logue personnel in Melur easier.

If we assume that the owner self-reports are accurate, why was support from n-Logue not uniform for all the kiosks? In other words, why did some kiosks (a majority) report receiving no support while others reported receiving support? We found that while all kiosk owners reported

good technical and operational support till the end of 2003, the support declined significantly after that. The quality of support deteriorated for both technical and operational aspects. Four owners reported that failure of equipment was not rectified for over six months. This forced them to close their kiosks as they were unable to provide most of the services. Operational support also declined significantly as the number of support staff was reduced and the frequency of coordination meetings with the kiosk owners and operators declined.

Factors Affecting the Financial Sustainability of the Kiosks

As noted before, SARI and n-Logue had formed partnerships with several public and private agencies for delivery of services through the kiosks. Failure of these partnerships in the long run was among the major reasons for the kiosks becoming financially unviable. Qualitative evidence from interviews with the government and n-Logue officials at Melur and kiosk owners revealed several factors that affected the operational and financial sustainability of the kiosks (both Dhan and Chirag) in Melur.

Lack of Institutional Support for e-Government Services

The Taluk office in Melur provided good support for e-government services at the kiosks during the first year of their operation. The district administration also supported this initiative through regular meetings for monitoring the prosecution of applications received in the Taluk office. However, this support came to a virtual end with the transfer of the Tahsildar (head of the Taluk office) in January 2003 and the District Collector in Feb. 2003. The termination of this support deprived the kiosks of a vital source of revenue. The primary reason for the termination of the partnership with the government was lack of institutionalization of the initiative and opposition from the lower ranked officials due to reduction in rent-seeking opportunities. (For a complete analysis of these factors, see (Kumar & Best, 2006)

Lack of Adequate Technical Support for the Kiosks

As noted before, technical support for the kiosks was provided by n-Logue. This included maintenance of a relay base station (RBS) which delivered wireless connectivity to some more remote kiosks. Four Chirag kiosks reported lack of connectivity for over six months due to failure of the RBS and these kiosks reported this as the major reason for closing down. During July 2005, six Dhan kiosks also had no connectivity due to failure of the RBS.

Lack of Adequate Institutional Partnerships for Delivery of Services

Though SARI and n-Logue had developed partnerships with several organizations for delivery of services, these partnerships did not sustain for a long time. For example, partnerships with a private eye hospital at Madurai and with the Tamil Nadu Agricultural and Veterinary University had virtually ended by the end of 2004 and most of the kiosks (both Chirag and Dhan) had stopped using these partnerships for delivery of services. Interviews with the SARI project officials and kiosk operators indicated that the main reason for the failure of these partnerships was lack of incentives for these organizations to continue these partnerships. For example, the additional clientele that the private eye hospital had hoped to gain did not materialize as there was no regular follow up by the kiosks on the patients identified. There was no regular follow up by the SARI project officials with these organizations on the services provided by them. This indicates that the partnerships need to work for the mutual benefit of both sides for them to be successful in the long-term.

Lack of New and Relevant Content

The Chirag kiosks had to mostly limit themselves to offering the same basket of services during their entire period of operation. There was no real success in developing new and relevant content or services for the kiosks. This was primarily due to lack of adequate organizational

efforts in this direction on the part of SARI, despite continuous feedback on the need for new content and services by the kiosk operators. However, the Dhan kiosks were able to offer some new services due to the efforts of the Dhan Foundation in this direction. One example was the new weekly online video-conferencing facility offered to the farmers through which they could talk directly with the agricultural experts instead of sending an email. According to the Dhan officials, this new service proved quite successful in some villages.

Comparative Analysis of the Performance of Dhan and n-Logue Kiosks

Why have the Dhan kiosks out-lived the Chirag kiosks? Detailed interviews with the Dhan and n-Logue officials and two kiosk owners revealed a number of reasons for this. We discuss these reasons below.

Additional Financial Support for Dhan Kiosks

Interviews with the Dhan officials in Madurai revealed that the Dhan kiosks remained functional mainly due to additional financial support given to them by the Dhan Foundation. The average monthly total revenue for Dhan kiosks was approximately Rs. 1200 (approx. US $24) per kiosk, whereas the average total cost per kiosk (including the fixed and variable costs) was approximately Rs. 3000 (approx. US $60) per month. Hence these kiosks were able to recover only around 40% of their monthly costs. The balance was met through financial support by Dhan. In contrast to this, the Chirag kiosks received no similar support.

Better Institutional Support

Dhan Foundation also provided better institutional support to its kiosks in two forms: appointing kiosk operators centrally and developing its own locally relevant content for the kiosk services. The operators were then appointed to the various kiosks as per need. The operators were paid their monthly salaries irrespective of the revenues from their kiosks. This helped the operators in focusing on delivering services to the disadvantaged sections of the community rather than on generating additional revenue alone.

Dhan also focused on developing content for the kiosk services independent of the services supported institutionally by n-Logue. As mentioned earlier, one such service provided by the Dhan kiosks was the weekly online video-conferencing facility offered to the local farmers with the agricultural experts at Melur.

Sustainability Failure of the Chirag Kiosks

Comparative analysis of the performance of the Chirag and Dhan kiosks reveals a number of factors that were responsible for the sustainability failure of the Chirag kiosks. Principal among these were failure of institutional partnerships with the partner organizations to sustain themselves in the long-run, failure of the e-government services at the kiosks after a relatively successful start, lack of technical and institutional support for these kiosks from n-Logue, and lack of new and relevant content. At the same time, the Dhan kiosks performed better due to better institutional and financial support from the parent organization. Their ability to continuously respond to the changing needs of the customer and provide new content and services in collaboration with their partner organizations was also an important reason for their sustainability.

The analysis in the preceding sections points to the importance of institutional linkages and networking among the various stakeholders and actors in ensuring the success and sustainability of such projects. In this particular case, the Chirag kiosks failed due to weak institutional and technical support from the sponsor organization and the failure of institutional linkages and partnerships with the supporting and partner institutions to sustain themselves in the long-run. As noted before, the main reason for the failure of these institutional partnerships was

lack of incentives for these partner institutions to continue these partnerships. These kiosks also failed to provide new and relevant content in response to the changing needs and preferences of the rural users over time.

The local and the regional innovation system for the two sets of kiosks consisted of the network of institutions supporting them in their operation and performance. The kiosks were introduced as an innovation in their rural communities and were expected to sustain themselves operationally and financially in the long-term. However, as the analysis in this paper shows, the Chirag kiosks failed to sustain themselves due to weak institutional linkages and networking among actors in the local and regional innovation system and the inability of the RIS to evolve and respond effectively and quickly to the changing preferences and needs of the rural community. At the same time, the Dhan kiosks continued to sustain themselves due to better financial and institutional support from their parent organization and the ability of the collaborating institutions to respond effectively to the changing needs of the users.

It is also relevant to discuss further the differences in the institutions involved in running the two sets of kiosks. As noted before, the Dhan kiosks proved to be more sustainable as they had institutional support for additional funding, had responded to the changing needs of the users by developing locally relevant content, and had been able to form new institutional partnerships to provide new services. Does it suggest that only a civil society organization can provide a sustainable model for ICT for development projects in rural communities? I think the answer lies in the belief of the SARI project officials that the self-employed entrepreneurs could become financially self-sustaining relatively quickly in a relatively small market where the potential user base was low. This did not happen. Probably the Chirag kiosks needed additional financial support for some more time to sustain themselves. However, this raises a further question as to whether private sector initiatives for such projects can ever be made financially self-sustainable. I believe the answer lies in the lessons learnt from the Dhan experience, though the two projects are not directly comparable: central coordination and financial support and forging successful and sustainable partnerships with other organizations for developing and providing new content and services. The Chirag kiosks acted mostly as individual entities and lacked effective central coordination and support from SARI and the institutional partnerships had failed.

Implications for ICT for Development Projects

What lessons can be drawn from this study for the success of ICT for development projects in developing countries? This research highlights some important differences between the dominant thinking in the literature and the conclusions from this study on ensuring sustainability of such projects. I discuss these differences below and discuss how best such projects can be made successful and sustainable.

Scholars have noted the importance of institutional linkages and networking among the relevant actors in the local and regional innovation system in creating and sustaining innovations. The collective and collaborative learning through interactions with the other institutions in the innovation system greatly influences the innovation process and lies at the heart of the innovation system. As noted before, innovation systems can be rooted or locally embedded within specific regions to take advantage of the specific local capabilities or resources (Kirat & Lung, 1999; Storper, 1997). These institutions and actors derive advantages from proximity and the region-specific norms, rules, and conventions that help in knowledge creation and dissemination (Doloreux and Parto, 2004).

It is evident that the effectiveness of the local and the regional innovation system was the key to the success and sustainability of this project. As discussed before, weak institutional support and linkages among the collaborating institutions and their inability to respond effectively o the emerging challenges for the continued success of the project were the principal reasons for the failure of the Chirag kiosks. At the same time, the Dhan kiosks enjoyed relatively better success due to better institutional support and the ability to form new institutional partnerships

with the partner institutions for delivering new content and services. The Dhan operators also had much better linkages with the local community and responded quickly to the changing needs and preferences of the community.

Scholars have also noted the importance of knowledge transfer through international collaborations and cross-border linkages in global value chains in generating and sustaining innovations (Gereffi, 1999; Gereffi & Kaplinsky, 2001; Gereffi & Korzeniewicz, 1994). This body of literature is relevant for this study as some of the major funding and collaborating organizations for this project were located in the west. However, as this research shows, the key to the failure of the Chirag kiosks and the success of the Dhan kiosks was the effectiveness of the local institutional linkages. The external linkages for this project continued to be intact throughout the duration of the project.

With specific reference to ICT or knowledge based innovations, scholars have noted the central role of universities and/or research organizations in sustaining innovations through interactions with the industry and the state (Benner & Sandstrom, 2000; C Edquist, 2001; Etzkowitz & Leydesdorff, 1997; Leydesdorff, 2000). However, this model is unable to explain the sustainability failure of the kiosks in this research as the state did not play a significant role in the success of the Dhan kiosks, though failure of the state to support e-governance services was a major reason for the failure of the Chirag kiosks. Role of a university was also not significant in ensuring the sustainability of the Dhan kiosks though the technology was initially developed by an academic institution (IIT Madras) and the project had collaborations with major research universities in the US.

Discussion in the preceding paragraphs suggests the broad contours of a regional innovation system that may prove effective in ensuring the success and sustainability of such projects in developing countries. As this research suggests, the networking and the collaborating institutions in such an RIS need to include all the relevant stakeholders and actors. In the case of the Dhan kiosks, major role was played by the NGO itself in ensuring the sustainability of the kiosks. The role of funding organizations in continuing financial support in case the kiosks are not financially sustainable on their own is also very important. Thus an effective regional system for ensuring the sustainability of such projects should include not only the academic institutions, the state, and the industry, but also other stakeholders such as civil society organizations, the user community, the funding organizations, etc. These networking institutions and actors need to develop strong but flexible and dynamic linkages among themselves and need to have strong feedback mechanisms at every stage to sustain their innovations. This is all the more important in rural communities in developing countries where the individual affordability for such innovations may be low and the needs and preferences of the users may be changing relatively fast.

Conclusion

This research clearly shows the importance of an effective regional innovation system in ensuring the success of ICT for development projects in developing countries. Using a comparative analysis of the performance of two sets of kiosks under the same project, it highlights the importance of strong but flexible institutional linkages and networking among the partner institutions in ensuring the success and sustainability of such projects. The collaborating institutions within such an RIS include not only academic institutions, the industry, and the state, but also other stakeholders such as civil society organizations, the user community, the funding organizations, etc.

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