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Successful ICT Initiatives for Rural Development in Indian Context: A Beneficiary Centered IS Approach

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ABSTRACT

Rural ICT initiatives in India are not a new phenomenon. Identifying the performance attributes of these initiatives and preparing a road map for e-governance projects is essential. Any successful ICT initiative should undergo "user-centered design" process. But the real task is to create a useable "demand driven" ICT initiative for the rural sector. Scaling up of these chosen initiatives is an issue that requires support from the beneficiaries in order to reach them in larger scale. Policy with appropriate strategy may lead to better "citizen-centered design" and it is essential for these initiatives to involve beneficiaries in this process. In order to make citizen-centered design responsive, peoples' perspectives have to be incorporated into the design. PRA is an effective tool to elicit information for ICT initiatives that are truly "demand driven". In this paper we compare two cases related to e-governance and evaluate these through a citizen-centered design process based framework.

Keywords

ICT Initiatives, Rural Development, Beneficiary, User Centered Design, e-Governance, Demand-driven Process.

INTRODUCTION

The Information and Communications Technology has shown the way for doing things productively and its benefits are well discoursed. However, one of the most but critical needs for leveraging the full potential of the ICT is to identify and provide the right type of services to the users. ICT as a technology comes as a bundle of hard and soft components. Hard components are mostly technology driven that might include the hardware, communications, power and software which are abundant with variety of deliverables and users do not have any control over its evolution. Soft issues relate to canalize deliverables offered by hard components and it depends on the capability of the users to leverage these services. A synergic effect is possible only when the soft components are taken care of, but supported by the right kind of infrastructure in the supply-chain. Availability of "services on demand" is a part of the management of soft issues. Understanding and identifying the right types of services with user perspective is probably the important part of the process to make an ICT initiative successful.

Though there is phenomenal growth in IT-enabled processes, falling cost of computing, increase in acceptability of e-business, e-commerce and m-commerce activities; failures plague the projects. Research reveals that despite having a good method, many projects fail due to less involvement of users at the appropriate phases (Flynn (1998c); (Herron (2002)). In the business process domain, it is estimated that 80 to 90 percent of software projects does not meet performance goals, 80 percent of them are delivered late and over budget, 40 percent of developments fail or are abandoned, less than 25 percent of systems properly integrate business and technology objectives and only 10 to 20 percent meet their success criteria. Therefore, there is a growing concern over evaluating, managing and measuring effectiveness of IT infrastructure created. Any technology-enabled process goes through a cycle and ICT initiatives are no exceptions. ICT initiative with a focus of development imperative makes the situation more critical, just not because it involves the rural infrastructure, but the very complexity of the process that involves the rural citizens. Therefore, projects selected for intervention through ICT initiatives in rural areas do not guaranty success either. Though ICT initiatives in rural areas face a daunting task to manage the right kind of supporting infrastructure for its effective deployment and use, it does not dilute the user involvement in the process and a participatory approach is still relevant.

ICT INFRASTRUCTURE IN INDIA

Very often the state of rural infrastructure in general and ICT infrastructure in particular has received attention from view points of the policy makers as well implementers. Globalization and privatization in the infrastructure sectors has not changed the pace of progress. There have been debates on role of Information and Communication Technology (ICT) in developing a connectivity backbone in rural India to address urban-rural divide. ICT has been recognized as an infrastructure in developed countries and its use has shown the path of rapid socio-economic development. However, in developing countries, especially in India, ICT interventions are still on learning stage. Many pilot projects are experimented in isolation and scaling up strategy is yet to be formulated. Alike formal ways of connectivity in terms of Rail, Road, Air, Water, ICT can also be termed as a medium of connecting people, places beyond geographical boundaries. However, ICT as an infrastructure demands support of electricity, basic telephony and related networks. Unlike other general purpose technology like agriculture, energy, transport, support for accepting ICT as a technology in rural India is needed from all stakeholders especially government, people. Though of late Ministry of IT in India has a national e-governance plan for providing kiosk-based converged services, the supporting infrastructure is yet to gather momentum. Mere provision of hardware, software components will not help the rural population draw benefits from this technology. Rather a systematic and convergent approach of policy makers, business drivers would be necessary for its success.

ICT is referred to as one of the major contributors to the infrastructure in many developed countries. As per the Global Information Technology Report (Dutta et al 2004), ICT is fast emerging as a tool for making a society networked and network readiness is believed to be one index that encompasses three important stakeholders i.e. the individual, business and the government, within the context of a nation's economic policy. Despite many initiatives taken up, India stands as per the report, 45th among 102 nations with network readiness index (NRI) as 3.54 (7 Point scale), 70th for ICT infrastructure which indicate that a lot of improvement is needed in the national scenario. However, there are genuine reasons for not achieving desired growth in developing countries like India. The reasons attributing to the situation are often discussed to be the geographical spread we have, cultural barriers and literacy coupled with poverty. Policies at the national level also do affect the growth in this sector. India has now population of over 1 billion and rural population is approximately 70%. As on date still 40% of the population in India is below poverty-line. Many of them do not have access to common infrastructure like connectivity, electricity, health and drinking water while many migrate to the cities for survival. The most complex characteristics of rural India are the inaccessible terrain, geographically dispersed hamlets/villages. Out of approximately 6,60,742 villages there are 4,59,465 villages having population less than 1000; 58,029 villages have population between 1000-1500 and 1,43,248 villages have population over 1500. Sub-optimal utilization of resources, lack of extension of adequate privileges and services to rural population compared to the urban has remained as a detrimental factor for the socio-economic imbalance in India.

INSEAD reports (Dutta et al., (2004)) suggest that ICT diffusion in developing economies has been increasing, but there still remains a daunting task to increase in access to ICT. It suggests four policy imperatives which are "having a right framework", "increase human capability to enhance ICT access", "government intention to prioritize ICT diffusion" and the fourth is "liberalized trade policies to have access to better products/components". India has been focusing on these imperatives and lot of developments has taken place in prioritizing ICT diffusion in the country. There has been an increase in tele-density in rural areas having 1.55, urban tele-density of 20.79[1] with a national overall Figure of 4.2[2], internet use. However, the disparity among urban, semi-urban, peri-urban and rural users still exists. Today the international bandwidth in India is around 1670.3 Mbps which is not encouraging (I4D, (2004)). Access of internet which reflects indirectly access to ICT has also remained prohibitive in rural areas though intra-city internet bandwidth is becoming cheaper in India[3]. Apart from this ICT infrastructure that centers on the communication systems in India, there is high degree of disparity in power availability and use in rural and urban areas which is major influencing factor in ICT access. Whereas in India the national coverage of villages[4] electrified is around 84 percent, average availability of power (quality is not considered) is of around 3-6 hours a day. Therefore, supporting infrastructure for ICT access is not conducive in rural areas in India.

> "As INSEAD in its report describes …. there is a potentially large market for more and new affordable technologies as well as applications that are more relevant and user friendly. Clearly there are opportunities to innovate and improve upon existing technologies. It is necessary to study the demand and take-up patterns in order to anticipate future requirements. It is also necessary to craft the right framework in terms of policy and regulatory requirements.

[1] www.indiastat.com accessed on 13.10.2004.

[2] I4D, May 2004, pp.42

[3] The Hindu, October 6, 2004

[4] A village is stated to be electrified if the village in its revenue limit has electricity for any purpose whatsoever.

> Beyond establishing policy and frameworks, governments must also promote the use of technologies either by examples of e-government or through local content."

In Indian context, the scenario is not very different from what is observed by INSEAD report. Policies formed are not implemented to its full spirit. Content development also is not attempted in a concerted manner. State governments and national level projects do not converge to meet the requirement of user.

RURAL ICT INITIATIVE PROJECTS FOR INTERVENTION

It is a fact that a satisfied user of any product or services is the best thing for the product/service provider. E-Governance projects are no exceptions. ICT initiatives in India are evolving for quite sometime now. One of the major advantages of ICT initiative is reaching the rural population where the other infrastructure relating to connectivity like rail, road is limited can be made possible through ICT. However, ICT initiative on a sustainable manner needs the support of related infrastructure as discussed above. Innovations are necessary for adoption of any technology since it can be viewed as a tool to improve the efficiency and effectiveness of the process that exist. This can be applicable for the development of rural population and economy as well. Such processes could be providing basic information to the public for good governance, creating an atmosphere of transparency in pricing, marketing products, providing education and addressing disaster mitigation issues etc. Many ICT initiatives in India are based on these issues and taken up mostly by government agencies, NGOs (Bhatnagar, 2004). Success of these initiatives therefore, depends on its effective use and the beneficiary is the rural habitation.

AN EVALUATION FRAMEWORK

In this paper participatory rural appraisal (PRA) exercise along with metrics based ICT deliveries considered an effective tool to prepare citizen charter and their priorities for sustenance. This exercise leads to a metrics based measurement system which is an important stage for ICT acquisition life cycle (Pandian, 2003). The goal-question-metrics (GQM) methodology (Basili, Caldiera, and Rombach, 1994) strongly fits in to the deliverables of PRA exercise since it quantifies appropriate deliverables through metrics and these metrics are related to the long term aspirations of the rural citizen. A framework is presented in Figure 1, which discusses the causal flow among various stages of the development process involving stakeholders and eliciting various ICT options that can be generated for interventions. In this PRA based model, role of government is best understood when these exercises are taken up in their presence and e-government options are explored with a view to including these in ICT policies.

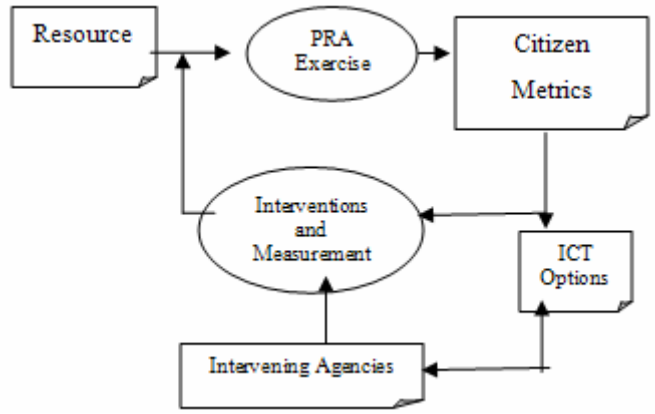

Figure 1. PRA Based IS Planning Framework

As explained in Figure 1, citizen metrics are developed through PRA exercise which is conducted through their active participation. Usually in Indian context, PRA is conducted in villages which have the common resources for livelihood, agriculture, irrigation, education, communication, power, transport etc. Besides, each household in the village also owns its resources for sustenance. Each household and village receives infrastructure oriented benefits and services from the government. All these resources form the basis of support for the village and household and therefore, requirement analysis is quite essential for understanding the role of ICT applications. Understanding these ICT options, choosing the right

intervention models and establishing a right measurement approach can be based on this PRA technique effectively since villagers participate in the process actively.

PRA Exercise

Each village and household has its problems, preferences, strength as well as priorities and PRA exercise captures these in a participatory mode as explained in previous section. Through the PRA exercise, various common issues related to village, household and individuals are listed. These abstracted versions are the metrics and these form as the basic input for measuring the deliverables of the IS planning process. The metrics are supported by measurement criteria set by the citizen themselves to determine its critical success. Metrics developed by the village, household and individuals in the village are studied by the agencies involved in addressing the issues gathered through PRA (Chambers, 1992). While exploring the options, the critical success factors are listed for consideration. During PRA exercise a series of options are generated for interventions and providing services to the citizen as well as augment infrastructure. Besides, measurement criteria are also indicated by the citizen. Agencies involved in the development process therefore, are now equipped with the required indicators for interventions, measuring the possible outcomes. ICT enabled services at this stage are selected and provided. PRA exercise is a continuous process. The feedback is therefore, an important factor for evaluating the interventions and this needs PRA exercise.

A CASE ON e-GOVERNANCE INITIATIVE

Mahiti Shakti[5] project was undertaken with the initiative of the Collectorate of Pnachmahals in Gujarat State (Patel, Modi, and Mehta, (2003). Indian Institute of Management (IIM-A) developed the proof of concept in October 2000 and professional version of the portal of Mahiti-shakti came up in December 2001. This project is based on internet-enabled platform with the help of an Internet Solution Provider, Aditi Microsys Pvt. Ltd. with the support of Gujarat Informatics Limited (GIL), Government of Gujarat; National Informatics Centre (NIC), GSFC, RESECO and GSLAA. This has been labelled as a "self sustaining model" and "web-enabled" project with an initial capital cost of Rs. 0.5 million rupees and funded by UNDP. Later UNDP provided 1.3 million rupees. Sustainability is based on the model in which Mahiti-shakti Kendra (MSK) is the nucleus and would act as an interface with the government agency and the common user. These MSKs will be set up and run primarily by private agencies. An e-Governance trust would look after maintenance costs and fund would be raised form the MSK owners.

The operating model is as shown in Figure-2 below. The most prominent objectives are:

i) Making available various government forms (around 200)
ii) Providing information on various government schemes
iii) News letter featuring medical help, legal help etc.
iv) Grievance recording and redressed forum
v) Employment registration

These objectives are based on the assumptions that ICT would reduce transaction time, transaction cost and provide transparency to the rural and urban citizen. Besides, it was expected that MSKs would provide an able interface between the government machinery and the citizens.

The MSK being the interface for the citizen and the e-governance service agencies its viability and operational efficiency need utmost importance. This project aims at a ROI of 25 percent and it is envisaged that a successful MSK will earn about Rs. 4,000 per month. The action plan included a scaling up strategy and the road map reads that by end of 2004, there would 10 MSKs per taluka in the state and by the end of 2006 it would be scaled up to 50 MSKs per taluka. MSKs in private partnership and with cooperative initiatives have been operating in Panchmahals district[6] and the status as in 2003 is as shown in Figure-3. It may be seen that out of 77 numbers of MSKs in the district around 41 percent of the MSKs are in urban areas, 32 percent in dairy cooperatives and 21 percent in private partnerships.

[5] Visit http://www.mahitishakti.net

[6] Evaluation Report of IRMA pp.9.

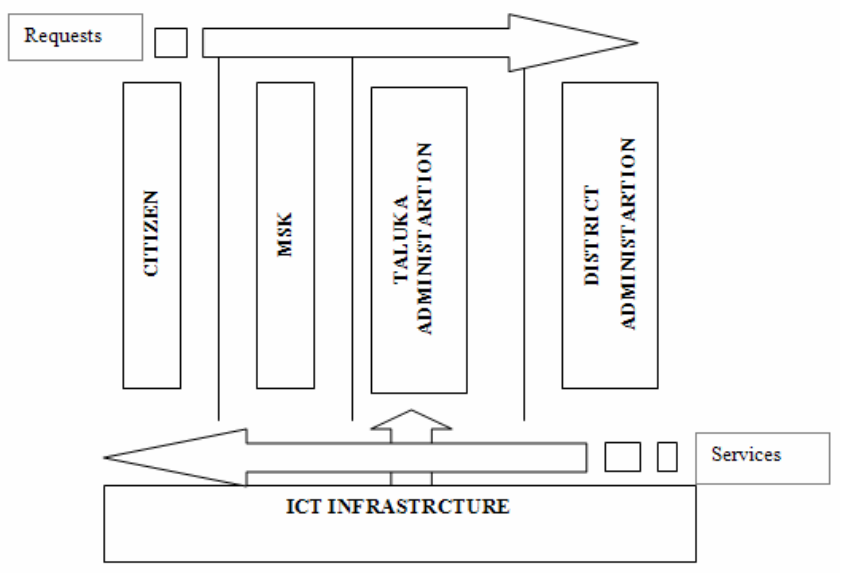

Figure 2. Operating Model of Mahiti-Shakti

The evaluation done by the Institute of Rural Management Anand (IRMA) reports that the project has not taken off well as envisaged because of following reasons (Patel et al., (2003):

- Poor capacity building of government employees and MSKs
- Lack of proper process re-engineering
- Poor ICT infrastructure (especially connectivity)
- Poor awareness among citizen to use the services available
- Lack of ownership and participation of citizens

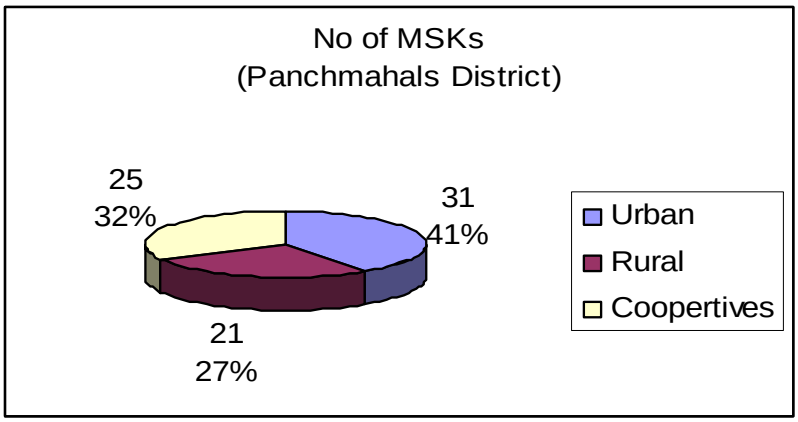

Figure 3. MSKs in Panchmahals District

Analysis of the Case

Analysis of the case describes following findings:

1. The project is "supply driven" at the conceptualization stage as most of rural development projects are. However, participatory rural appraisal (PRA) was used for sample villages to elicit requirements of the villagers. The project on its implementation stage has not been able to transform itself to "demand driven mode". Portal is mostly targeted at the middle strata of the society.

2. Users' intention to use is not reflected in the project adequately. Mostly the rural villages are agriculture oriented and many villagers are even landless. PRA could have been more strategically formulated for finding a better interface mechanism and to understand the prioritized intents of the villagers. Therefore, intention to use information technology probably is not a priority either.
3. Usability as per the evaluation study does not provide any encouraging indications and as such is low. Poor ICT infrastructure and electricity in the rural areas have made many MSKs dysfunctional. Besides, poor content management style with no attempt to update the content with the latest information is a problem within the administrative set up.
4. Community rooted ness as an indicator depends on the "demand driven" nature of the project. Since the transformation is in process this aspect cannot be tested. Perhaps the very nature of PRA conducted would be an indicator to understand the degree of reflections in the system. Evaluation study revealed involvement of many NGOs during PRAs in sample villages to include the requirements. However, the actual practice does not reflect the usability.
5. Front-line acceptability is an indicator that applies to then MSK operators, Mamalatdars[7] and the back-end service providers for the portal those support its updating/maintenance. Ensuring "services on demand" depends on their attitude and capability to support the scaling up strategy formulated. In this case the capacitating strategy is not adequately addressed. In some cases the time lag to get the services is even more than formal procedure in place.
6. Respectful trust needs to be established between the Taluk offices and the MSK operators; citizen and the MSK operators in terms of providing quality information, services. In this case due to lack of establishing a mechanism to continuously monitor the process the very usefulness is at stake. It is not known whether the project would deliver the result on a sustainable basis.

A CASE ON MIGRATION INFORMATION CENTRE

Dahod district in Gujarat State belongs to the semi-arid region inhabited predominantly by the tribal population. Majority of the farmers are small and marginal category. The land holding per household 2.12 acres, which is extremely low considering the requirement of a household. Nearly all farmers typically grow a single crop (maize, during Kharif season). The income from the crop and the probability of taking a second crop depends on the rains as the entire area is rainfed and the extent of irrigation infrastructure is minimal. The rains are inadequate in two out of five years leading to food insecurity. With increasing population pressure on land and land degradation over time, it has not been able to provide food and livelihood security to rural households. Whatever food they produce, feeds the family for 8-9 months of the year. For the remaining months, people migrate seasonally to distant towns and cities to supplement their food requirements and meet other expenditures. Around 65 percent of households have to migrate for 3-4 months to find work in the dry season including single men, couples, couples with children. Around 80 percent cash income comes from migration that is essential if poor households have to meet their basic needs. Seasonal migration is one of the most important sources of income for the tribal poor. The pattern and process of migration is not uniform across the households. For better off households who migrate out of choice, it is a source of supplementary income. They are well networked and they are a very small proportion of the total migrants. The majority of the poor migrate in distress, as they are hard-pressed either due to the issue of food security or due to the issue of indebtedness. Typically, they are unskilled and have very little networking. Due to this, migration becomes extremely painful and unavoidable.

Application of the Framework

We applied the framework to this case through which metrics were developed during a general participatory appraisal exercise in one of the villages in Dahod. In Table 1 below the metrics are explained along with the priorities set by the beneficiaries. It can be observed from the metric Table that migration is ranked highest in the beneficiaries' perspective. We therefore, studied the migration information centre which is working in the village and attempted to map the PRA results with its objective.

[7] Mamlatdar is government administrative official

Goal	Metrics	Measurements	Options for Support	Demand on ICT Options	Remarks	ICT Option Ranking[8]
Sustainable Livelihood Security	Food Security	Sufficiency on food	Migration	Income Generating Opportunities	Kiosk based services for citizen	Ia
		Sufficiency on fodder	Fodder Banks			
		Availability of work opportunity locally	Grain Banks	Demand for Information on employment opportunities	e-Government applications	
			Food for Work Programme	Demand for Information on employment opportunities from government and other agencies	e-Government applications	Ib
	Health Security (Human)	Public Health Service	Health Services through Government Agency	Providing opportunities in the village	e-Health Services	IIIa
		Health Education		Creating Opportunities in the Village; Maintaining Records	e-Health Services	IIIb
		Immunization Services		Providing Information on Immunization details and history	e-Health Services	IIIc
		Accessibility to Health Infrastructure		Providing Information on Doctors, Interaction with Doctors, Receiving advice from Doctors	e-Health Services	IIId
	Livestock Security	Clinical Service	Health Services through Government Agency	Maintaining Health Records	e-Health Services	IIa
		Artificial Insemination		Providing facilities in the village, access to information on availability	e-Health Services	IIc
		Availability of Medicine		Providing facilities in the village, access to information on availability	e-Health Services	IIb

Table 1: Identification of PRA Based ICT Options

Analysis on Migration and ICT Option

It was evident that migrants faced many hardships including humiliation and loss of self esteem. Further investigations with the people revealed that for majority of the poor who migrate in distress, there is very little assurance of employment for they are not skilled workers. They undergo interim periods of unemployment during their stay in the urban areas, which deplete their meager savings. Once they leave their villages, there is no communication with their homes. In the absence of communication, transmission of messages happens only when either the migrant returns to his/her village or someone from same the village returns. This results in losses in wages and cost of transportation. In addition, if remittances are to be made to the family, it is through some acquaintance. Often this has led to money not being delivered by the person resulting in a major loss to the migrant. The poor migrants are also perceived as thieves in the urban areas and so are they are unnecessarily harassed by the police and others. Frequently the migrants are cheated at the worksite by contractors where and suffer losses of wages due to the lack of awareness of legal recourse, mechanisms for redressal and lack of documents of the work in which they were engaged. Migrants lack knowledge about travel routes, modes of travel, timings and other details of transportation increasing their cost in terms of time, money, and effort. The migrants do not have risk compensating mechanisms like insurance and therefore they are deprived of the benefits in case of an accident.

It is in this context that Gramin Vikas Trust (GVT), a non governmental organization (NGO), in consultation with the people, envisaged the formation of Migration Information Centres (MIC - locally known as *Palayana Suchana Kendras*). GVT then started a multi-pronged approach to address the problems faced by migrants by organizing and increase their awareness of their rights, reduce the costs of migration by providing communications, loans, information on jobs, increase the returns from

[8] Suffix a, b, c, … denotes intra-group prioritization

migration by skill training, easier transfer of funds; tackling non-payment cases influence the perceptions of government officials and urban communities about migrant workers. As regards ICT options, GVT explored the viabilities among land line communications, and wireless-in-local-loop (WLL). The NGO settled for the later since villages are in a hilly terrain. However, the NGO adopted this option because of its least cost of operation, high availability of the connectivity in the area. The idea was to provide connectivity among the migrants, their family, the labor contractors and the employing agencies. This network benefited the migrants in many ways as listed in Table 2 below.

Beneficiaries	Derived Benefits
Migrants	1. Information on possible employment (Location specific) 2. Information on Labor demand (Location specific) 3. Information on wage rates (Location specific) 4. Information on their family members, their needs 5. Timely presence in village for seasonal farming activity 6. Quicker monetary transactions 7. Trust among the contractor, wage earner and employer
Migrants' Family	1. Emotional security 2. Ability to contact migrant in emergency situations
Labor contractors	1. Information on assured labor availability (Location specific) 2. Mutual trust among the contractor, wage earner and employer
Employers	1. Information on assured labor availability (Location specific) 2. Mutual trust among the contractor, wage earner and employer
Migration Information Centre	1. Wage recovery for the migrants in case of disputes and non-payment 2. Liaison with government agencies such as labor department, police etc. 3. Wage negotiations 4. Maintenance of records on migrants' whereabouts

Table 2. Derived Benefits from ICT interventions

THE SCALE-UP STRATEGY

GVT initiated the work in Jadah village six years ago and today there are twelve MICs operating successfully. In general, each MIC covers a five kilometer radius encompassing 3-4 villages. The MICs have proved to be a successful initiative and are fully accepted by the citizens. One MIC has come up on its own in one of the nearby villages based on citizen' initiative and is proving to be a self replicating model. All MICs are managed by self-help groups and are financially viable and sustainable because of "user-pays" concept. It should be mentioned that GVT made the initial capital expenditure.

The local district administration has now made provisions in their annual budget for scaling up of the ICT initiatives. GVT has been given the responsibility of establishing 30 Community Resource Centers in first phase in which one component is establishing MICs.

CONCLUSION

A comparative analysis of the two cases reveals that in the case 1, the project was government sponsored and supply-driven without much involvement of the beneficiaries which led to government representatives' poor performance in meeting the desired expectations. In second case however, the metrics were well captured during the PRA exercise, beneficiaries discussed and prioritized their options leading to correctly choosing the ICT options which proved to be cost effective,

financially viable and sustainable. It also provided an ambience for self replication thus making it demand-driven. In our research, we have demonstrated the opportunities and challenges in choosing right kind of options for adopting ICT successfully, no matter what is the degree and operability of the infrastructure. In any case, metrics based assessment through participatory methods for such endeavors would provide a better result and would lead to a better project life-cycle. In this paper, we have concentrated on one metrics of the goal set for the villages (Table 1). We would like to expand the horizon of the research by covering all the possible metrics for the village community and providing comprehensive e-government options.

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