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Information technology and mass poverty

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Abstract

If information technology (IT) is to have a mass impact on those living in rural areas of developing countries, it cannot occur on the basis of ownership (as it does in rich countries). Instead, it is to institutional innovations in and for developing countries, that one needs to look at. Two basic forms of innovation are identified: one which allows use of IT without ownership and the other which permits the benefits of IT to reach those who make no individual use of it. Either way, however, successful institutional innovations require a thicket of interactions between local actors, rather than interventions from foreign agencies (at least in the initial phase). Three case studies were used to illustrate these components of what I feel is an emerging paradigm of IT and rural development.

1. Introduction

Based partly on the projects that have won prestigious international prizes in recent years and partly on a massive effort to scale up a successful pilot project by an influential UN institution, my contention in this paper is that a new paradigm is emerging in the area of information technology (IT) and rural development. It is a paradigm, I suggest, that is best able to bring the benefits of IT to a wide range of those living in the rural areas of developing countries and it is based on the following syllogistic reasoning:

- i) Projects should be capable of extending their impact beyond the level of a village, or, more generally, the local rural level (involving, say, hundreds of people), to a level, involving, at a minimum, hundreds of thousands of beneficiaries.

- ii) If impact on such a large scale is to be achieved, the developed-country mode of access based on individual ownership of IT, is grossly inadequate in the context of rural areas in developing countries (especially in the least developed parts of the Third World).
- iii) Institutional innovations that replace the developed country model of ownership are therefore essential. Two basic forms of change can be identified: one which allows use of a technology without ownership and the other which permits the *benefits* of the technology to reach people who make no personal use of it whatsoever. Using the concept of a user capability gap, I show that some forms of information technology fall unambiguously into one or the other of the polar categories, while yet other intermediate cases are more difficult to assess. Moreover, since there are numerous institutional variations *within* each of the two polar cases (representing mobile phones on the one hand and the Internet on the other), I develop a taxonomy which captures and classifies some of the most important mechanisms now operating in developing countries.
- iv) If they are to have the kind of impact described above, institutional changes have to emerge from and involve indigenous actors in an essential way. For, in my view, it is only such actors that possess the deep knowledge of rural areas that institutional change inevitably demands. Equally, because it needs to fit in with institutional change that is itself so closely related to local circumstances, any associated technological change will usually also need to be generated indigenously. As such therefore, the emerging paradigm departs sharply from the approach based on importing institutions and technologies from the developed countries (an approach that has often been adopted, with only a limited degree of success, by aid donors)¹.

After having explained and where necessary, defended these recognitions, I devote the section thereafter to case studies which best exemplify the main directions taken by the emerging paradigm (as identified in iii). The final section is addressed to the implications of our findings for those concerned with policies to deliver the benefits of new information technologies to the rural masses in developing countries.

¹ There is a vast literature on this topic that predates the emergence of IT. See, for example, Stewart (1977).

2. Components of the new paradigm

a) Achieving mass impact

It has never been difficult to find authors or practitioners who express scepticism about the ability of IT to reach large numbers of people in rural areas of developing countries (especially members of this group who can be described as living in poverty). In many cases, the skeptics are implicitly assuming that ownership of the technology is the only way in which its benefits can be extracted. This, in turn, leads to a misconceived view of the role that IT can play, because it raises, all too often, misleading questions such as whether the poor can afford, say, a mobile telephone, when their more basic needs have barely been met. (The correct question, as will soon become apparent, is whether the poor can afford to purchase small units of the services that mobile telephones provide).

In any event, the existing literature on IT and development does little to counteract the sceptics, because it deals, to a very large degree, with applications of IT to a particular village or group of villages. Increasingly, however, examples of projects with an impact extending well beyond the village, involving hundreds of thousands or even millions of those living in rural areas, are emerging to challenge the view that IT yields only marginal or localized benefits to the rural population in developing countries (and, as such, cannot purport to be an emerging paradigm composed of the elements described below). And since the vast majority of these projects with mass impact embody the components noted above, they strengthen the claim that a new paradigm is emerging (based, most distinctively, on bringing the benefits of IT to the rural areas by means of institutional forms other than ownership).

What has done perhaps the most to bring high impact projects to the attention of those concerned with IT and development, is the award of prestigious international prizes to innovations that, among other things, reach large numbers of beneficiaries (primarily, but not exclusively, in developing countries). I am referring here mainly to the Petersberg Prize (now the Development Gateway Award), that has so far been granted for the years 2004 and 2005, on the basis, mainly, of the following criteria for success/impact.

Criteria:

- Number of people benefiting from the success for which the person/organization is nominated.
- How readily the initiative can be or has been adopted for use elsewhere.
- Geographic area covered.

Success/Impact:

- How the initiative has improved people's well-being and livelihoods.
- The magnitude of the benefits received per person.
- Relevance of those benefits to poverty reduction.
- Relative importance of the nominee's contribution to achieving that success (Development Gateway, 2003).

Unfortunately, in its choice of the finalists and winners of the Prize, the Development Gateway does not provide much information about the differential extent to which these projects actually meet the specific criteria cited in the quotation (and indeed in some cases provides no information at all). Nevertheless, because of its prominence and the resulting publicity that surrounds the annual awards, even the data that the Development Gateway does provide, focuses the attention of the international community on what the ultimate purpose of projects in IT and development should be. From my particular point of view, moreover, it is fortuitous that the first and only two winners of the Prize so clearly illustrate the two major directions in which I think institutional change has to take, when ownership is rejected as a feasible means of bringing the benefits of information technology to the rural masses in developing countries. [See especially b) and c) below and the case studies of the Grameen Telecom and 'e-choupals'].

b) The limits of ownership in poor, rural communities

Among the group of countries classified as being 'high-income', ownership is the primary institution that has served to bring the benefits of information technologies to the majority of its citizens. In the United Kingdom, for example, "The proportion of households owning a home computer rose from

58 per cent to 62 per cent between 2003-04 and 2004-05. The percentage of households with an internet connection also rose to 53 per cent in 2004-05. There was also a considerable increase in the proportion of households with a mobile phone since 1998-99 (from 27 per cent to 78 per cent' (UK Government, 2006). In a more 'connected' developed country such as Singapore, government data for 2004 suggest that as many as 74 per cent of households own a computer (IDA, 2005), while household ownership of mobile phones.

Even in the absence of any income constraint imposed on ownership, moreover, many forms of IT (as indeed with technologies imported from developed countries in general), require a host of other complementary inputs that are rarely available in sufficient quantities (if at all) in rural areas of developing countries. The general problem, as stated by Stewart (1977, pp. 6-7), is that:

There are technological linkages between different parts of the system, which mean that much of technology comes as a package, which cannot be separated and introduced bit-by-bit, but which goes together. The requirements of a technique extend beyond the material inputs directly involved in the productive process to managerial inputs and infrastructural services. ... The required labour input, in terms of energy, concentration, punctuality and literacy are related to the technology ... This is not to argue that each technique imposes a unique set of requirements, and can only be operated if these requirements are met. ... But any variation tends to lead to variations in the productivity of the techniques, and sufficient deviation from the sort of inputs for which the techniques are designed may lead to a total breakdown.

Thus it is that even if information technologies were freely available, their owners in the rural areas of developing countries would generally lack the required complementary inputs, such as infrastructure, education and user capabilities, needed to operate them². Such technologies, differ, however, in the degree to which they depend on these inputs, in order to function. They differ, very markedly, for instance, in the complexity of the user skills that they demand (Think here of the difference between mobile phones on the

² One study of telecentres in Africa, for example, found that the Internet was barely used in the more rural areas of Uganda, Mozambique and Mali (Etta, 2002-3).

one hand and the Internet on the other). For this reason, the discussion in the following section, on the basic directions that institutional change needs to take in order to replace ownership, is bound to take into account the relationships between various forms of IT, the demands they make on user capabilities and the extent to which these can be supplied.

c) Denoting the direction of institutional change: a simple taxonomy

In total contrast to the developed-country model of extracting benefits from IT, ownership plays no role whatever in the emerging paradigm. This fundamental change in the institutional context is accomplished by deviating from two principal assumptions of the ownership model, namely, that,

- i) use derives entirely from ownership, and
- ii) the benefits from IT are derived from individual or household use.

Institutional change, that is to say, can take basically two different directions, depending on whether it deviates from one or the other of these two assumptions. In the case of the first assumption, institutional change needs to replace ownership as a means of gaining use of the new technologies, whereas in the second case the task is to find ways of gaining benefits from these technologies without any individual use of them whatsoever. In general, the latter alternative will be more relevant the larger is the gap between required and actual user capabilities, while precisely the opposite relationship holds true for the former. In the limiting cases, of course, the size of the gap will be zero or infinity, with intermediate possibilities falling somewhere in between. Given the highly circumscribed capabilities that typify the rural, low-income, population in most countries, it is the varying demands associated with different types of IT, that are most influential in determining whether and to what extent a user capabilities gap arises in specific circumstances.

Taking again the two extreme possibilities, one can reasonably argue that these are best exemplified by mobile phones and the Internet, respectively. The argument is summarized in Table 1, which also specifies the direction of institutional change that each of the two technologies demands (see the last row of the Table 1).

If the polar cases point so unambiguously to the basic directions that institutional change needs to take as a substitute for ownership, intermediate

cases are far more difficult to assess (cases, that is to say, where the capability gap lies somewhere between zero and 'infinity'). For the problem is then the capabilities gap *could* in some circumstances realistically be closed and in others not. It might be the case, for example, that the user requirements of a given form of IT can be reduced enough by technical change, to eliminate the gap and make shared usage the suitable institutional model. Or, in the opposite scenario, technological rigidities, in an engineering sense, preclude any such possibility and force one to adopt the second form of institutional change described in Table 1 (assuming, of course, that the available supply of capabilities cannot be increased enough to close the gap).

Table 1
User capability gaps and the direction of institutional change:
mobile phones vs. the Internet

	Mobile phones	The Internet
User capabilities required	Virtually none	Advanced [*]
User capabilities available to the rural majority in developing countries	Highly limited ^{**}	Highly limited ^{**}
Deficit between supply and demand of user capabilities for the rural majority	Practically non-existent	'Infinitely' large
Implied direction of Institutional change	<i>Extend number of users beyond the limits imposed by ownership, using sharing mechanisms of one kind or another</i>	Find ways of bringing the benefits to the rural majority that circumvent the capabilities deficit i.e. <i>without any need for individual use of computers or the Internet</i>

Notes: ^{*}High literacy/language skills, computer literacy, technical competence (Pigato, 2001, p. 7)

^{**}Basic literacy or illiteracy, highly limited number of those in possession of basic computer literacy or technical competence.

In order to illustrate how such an overall taxonomy might look, when it is filled with actual examples, I provide some detail, with concrete cases, to the broad directions of institutional change indicated in the last row of Table 1. This illustrative classification is contained in Table 2.

Table 2
Illustrative cases of institutional change in the three possible categories

Institutional change to expand users	Intermediate case	Institutional change to derive benefits without use
<i>Mobile phones</i> i) <i>Non-commercial</i> Sharing a mobile phone by the friends and family of owners ii) <i>Commercial</i> – Buying time from vendors situated in villages, small towns, roadside kiosks – People who cannot afford a mobile phone use prepaid cards to make calls from a handset belonging to someone else – Renting prepaid cards (users provide the code belonging to a card in order to make a call at a payphone and pay the vendor for just the number of units that were used. The vendor, in turn, provides the code to another client and the process continues until the card is depleted).	Where a moderate gap in user capabilities is overcome, enabling former non-users to benefit from IT. Where the capabilities gap cannot be overcome and benefits from IT have to be extracted without individual use.	<i>The Internet</i> i) <i>Face-to-face intermediation</i> Rural Internet kiosks that are operated by people familiar with the technology and the local community (enabling poor, illiterate rural inhabitants to have e-mails sent and government documents received). ii) <i>Distance intermediation</i> Community radio stations that transmit, translate and contextualize information from the Internet for the benefit of listeners (even those living in remote, rural areas)

The examples presented in Table 2 are in no way meant to represent all the institutional changes that have emerged in relation to mobile phones, the Internet or intermediate cases. They do, however, enable one to draw the conclusion that the changes associated with mobile phones, differ strikingly from those that bring the benefits of the Internet to poor, illiterate communities in the rural areas of developing countries. In particular, whereas those in the former category are simply sharing mechanisms of one kind or another, those in the latter all involve an *intermediary*, who operates in between the technology on the one hand and the community on the other. Such a person serves in effect, to overcome the 'infinitely' large user-capability gaps that were referred to in Table 1 as impediments to the use of Internet by the majority of those living in the rural parts of the Third World. (Note, however, that it is impossible in practice entirely to separate sharing from the other category of non-use. For instance, text messaging by mobile phones often takes place through an intermediary who can translate the messages for illiterate users).

d) Indigenization of IT projects in rural areas

As correctly emphasized by a Report prepared by the Information and Development Programme of the World Bank (2000), if IT projects are to be successful in making a sizeable impact on rural poverty alleviation, they need to reduce the role of outsiders and to increase the role of indigenous actors³. In particular, under the heading of rural ICT access programmes, the Report concludes that:

Whenever possible, ICT initiatives should attempt to be directed from the bottom-up rather than the 'top-down', and strive to fulfill the needs and demands of their users, rather than those of their donors. Initiatives which neither meet the needs and demands of their communities, nor involve these communities in the project planning and implementation phases, are unlikely to succeed in contributing to sustainable development. Projects which successfully contribute to rural poverty alleviation and rural socio-economic development are more often than not those that are demand-driven. In following this

³ The need for 'bottom-up' approaches has long been recognized in the literature on agriculture in developing countries.

demand-driven philosophy, ICT proponents should incorporate user-friendly technologies to ensure that potential users will not only be comfortable with the ICTs, but also have an interest in what they can reasonably provide for them.

Moreover, rural ICT initiatives should make efforts to include the participation of intermediary organizations, which have the capacity to utilize ICTs and serve as linkages between the technology and rural inhabitants. These intermediary organizations are able to use ICTs to assist rural communities in meeting their information needs, without the communities having to learn the technologies themselves (World Bank, 2000, pp. 23-24).

Useful though this citation is, however, it could go further in specifying the need for, and the role of local change agents in IT projects. The successful generation of so-called 'user-friendly technologies', for example, has almost necessarily to be undertaken by local institutions which possess the requisite degree of 'local knowledge' for the task and much the same holds true also for the generation of technologies designed to overcome the specific and often acute problems of rural infrastructure (such as the lack of electricity, or options for Internet connectivity). Then, as regards the intermediaries (who, in our scheme, operate in relation to the provision of Internet services), much more needs to be said about the nature and closeness of their relationships with the communities they purport to serve. Much depends, for example, on the degree of trust that the intermediary managers are able to gain in communities where this factor can often have a decisive influence on the outcome of personal and business relationships. The more so, it seems, when an entirely new technology is being introduced in a community that could scarcely be less similar to the society in and for which it was originally designed. So pronounced a discrepancy between developed countries and rural areas of developing countries also means, moreover, that the task facing the intermediary – of bringing the benefits of the Internet to poor, illiterate people – is the more difficult and challenging, requiring as it then does, an ability to translate, contextualize and present information that will be locally accessible and relevant. The conclusion is thus that since intermediation is for us a major form of institutional change, so too must be the indigenous component of the emerging paradigm.

3. Case studies

In the first part of the paper, I suggested that, in the area of IT and rural development, an emerging paradigm could be identified, one that takes as its point of departure the need for IT projects to have a substantial impact on rural poverty alleviation. In order for this to occur, so the argument runs, different forms of institutional innovation need to replace ownership (the Western model) as a means of extracting the benefits from IT; that the nature of these alternative institutions is heavily dependent on what was described as a 'user-capabilities gap'; and that in any event, institutional and associated technical change have necessarily to be rooted in local inputs and the behaviour of local actors. In this part of the paper, the purpose is to describe actual case studies that embody these distinguishing aspects of the new paradigm.

More specifically, my goal is to identify and describe such cases in relation to each of the three main forms of institutional change set out in Table 2, namely, sharing arrangements to extend the number of users of existing mobile phones, using intermediaries to bring the benefit of the Internet to the rural poor, either on a face-to-face basis or at a distance (the intermediate category is excluded not because it is unimportant, but rather because it is less easy to identify in practice). Still more precisely, the following projects have been chosen to represent these three categories: 'Grameen Telecom' (mobile phone sharing); 'ITC-choupal' (face-to-face Internet intermediation), and 'Radio Kothmale' (distant Internet intermediation). As will become clear below, all these projects have had a substantial effect on the poor majority in rural areas. Indeed, the first two projects, Grameen Telecom and ITC e-choupals, are the only two existing winners of the Petersberg Prize, which, as noted above, uses impact as a major selection criterion. Evidently therefore, both forms of institutional change described in this paper are capable of effecting significant change in the lives of rural inhabitants and it will also quickly become apparent that they do so in the predicted form of a new sharing system (for mobile phones) and innovative forms of local intermediation (in the case of the Internet). What is much less apparent about these cases, from my point of view, is the role played by what was referred to above as the indigenization of IT projects. The discussion that follows, accordingly, is addressed largely to this more neglected aspect of the three case studies.

a) *Grameen Village Phone*

In 2004, the first Petersberg Prize was awarded to this project,

For creating a class of local women entrepreneurs using Village [mobile] Phones to connect isolated communities to the rest of the country and the world. Grameen Bank, which provides microcredit to poor people, established a program called Village Phone, through which women entrepreneurs can start up a business providing wireless payphone service in rural areas. The phones provide easy access to phone services in areas where access is severely limited (Development Gateway, 2004).

By June 2005, the Village Phone (VP) program is said by one source (Knight-John, *et. al*, 2005) to have covered more than 64 million Bangladeshis or 45 per cent of the country's population, in some 50 per cent of all villages in Bangladesh (from where both the Grameen Bank (GB) and the Grameen Phone (GP) innovations originated, from purely indigenous sources, with the explicit goal of reaching the isolated rural poor communities in the country). It is true that the number of people covered by village phones is not the same as the number of those who actually used them, but even so, the program must surely have reached (and helped) tens of millions of those who formed part of the target group. Of the many reasons that have been used to explain this remarkable achievement, I am here concerned, as noted above, only with those that have to do with indigenization.

Under this heading, much has to do with the innovative ways in which the project draws on local knowledge of various kinds. Not the least of these, is the manner in which the local knowledge acquired by the original Grameen Bank initiative, bore on the Village Phone innovation. Indeed:

(w)hat becomes apparent when reflecting on the move by Grameen to initiate the VP [village phone] program, is that GB's years of interaction with its clients as a microfinance institution (MFI) *with deep roots into rural communities*, contributed to a more informed perception of these clients as a valuable source of revenue and even profit base. (Knight-John, *et. al*, 2005, emphasis added).

Once the VP project had begun, moreover, the *local knowledge* gained by the GB was imparted, among other ways, by the important choice of the VP operators (VPO) themselves, who, one should note, are drawn from among the larger group of GB borrowers and as such have already undergone a screening process. To become a VP operator, certain additional requirements are imposed, such as, that she must have been a member of the GB, that she must have a good repayment record (I use the word 'she', because all GB borrowers are women). In the selection process, the particular advantages bestowed on the VP project by the local knowledge already gained by the GB are very telling, as the following citation clearly indicates. Thus,

(t)he selection process is run by GP at the village level, and ensures that reliable borrowers are selected to operate the village phone. ...The detailed information for selection (for e.g. whether the borrower's husband is a criminal) would be near impossible to ascertain by GP ... at the level they work at. As such, through its relationship with GB, GP is able to tap into a reliable pool of borrowers, and moreover, the selection process ensures that only borrowers with good repayment records become VPOs. (Knight-John *et. al*, 2005)

The central role played by local knowledge in the GP project, is apparent also in the relationship between the VPO and the villagers to whom she sells phone time. For example,

an operator of a cell phone is required to relay messages to the concerned persons in the village; handle information of different types, assimilating it in the process, before relaying it to the concerned person; and also handle finances. These activities increase an operator's familiarity with new areas and people. The fact that operators are privy to the conversations that take place over the phone has led to women gaining functional knowledge in areas such as currency markets, health problems, and so forth, as these are typical topics of phone conversation. All these enhance a woman operator's self confidence and efficacy when dealing with unexpected situations (Bhatnagar *et. al*, nd).

The closeness of the contacts thus forged between the VPO and the community, and in particular, the willingness and ability of the former to assimilate and deliver messages to the latter, imbues the GP project with

some of the features of individual phone ownership. Villagers, that is to say, are able not only to make outgoing calls, but also to receive timely notification when incoming calls are received by the VPO. 'Village payphones, on the other hand, bear little or no such resemblance since incoming calls are likely to just go on and on ringing, unless, by good fortune, the call is answered by another villager, who is prepared to contact the intended recipient via a string of verbal messages in the village' (James, 2004, p. 69).

Indigenization, one should note, is not only apparent with respect to the institutional features of the VP project described above. On the technical side as well, certain infrastructural problems were met by a local, rather than, as is so often the case, a foreign product or a Western firm operating within the country. In the case of villages without electricity, for example, solar power was provided by an enterprise from within the Grameen family itself, in a form that seemed well suited to the circumstances of the VP operators. Thus, with normal sunshine', the installation in question,

can support the power requirement of (i) a VP continuously and ii) the tube light for over 4 hours in each 24 hour period. The VP itself consumes 6 to 7 watts at 9 volts. Consumption of power can be kept up at this rate-even if sunlight is blocked by clouds-for a continuous period of up to 3 full days, and only if the cloudy situation persists for longer, consumption must be cut down (Telecommons Development Group, 2000).

b) *The e-Choupal initiative*

An initiative of ITC Ltd., India, the so-called e-Choupal project, was the second winner of the Petersberg Prize for,

Improving the livelihoods of poor farmers by providing access to market information. ITC Ltd. is an agribusiness that has increased the income of farmers in Indian villages through a network of local kiosks called e-Choupals. Through the e-Choupals, farmers can receive up-to-date information on pricing, markets, soil-testing techniques, etc., to improve their productivity, pricing and sales, meanwhile avoiding costly middlemen (Development Gateway, 2005, emphasis in original).

There can be no doubt that the Prize was awarded at least partly because of the 3.5 million farmers who are thought to have benefited from the project (including many of those who can be described as living in rural poverty). Yet, the e-Choupal itself is a remarkably simple arrangement, armed technologically only

(w)ith a computer connected to the Internet. A local farmer called the *sanchalak* (coordinator) runs the village e-Choupal. The commission agent has been incorporated into this process as the provider of logistical support. He is known as the *samyojak* (collaborator). The e-Choupal, which physically consists only of a computer with an Internet connection, is established in a village. It resides in the local *sanchalak*'s living room (Prahalad, 2005, p. 335, emphasis in original).

The complexities of this arrangement, on which the success of the project ultimately rests, have to do (as in the previous example), with the relationships among the actors and more specifically with the role played therein by local knowledge and beliefs. Consider, first, in this regard some of the reasons for recruiting the *sanchalak* from within his own local community. Thus,

For generations, institutions, individuals and often the weather have betrayed the Indian farmer. *Trust is the most valuable commodity in rural India*. No transaction will happen without trust, regardless of the strength of the contract. The *sanchalak* is selected to provide this vital ingredient to ITC's message. ... Then *sanchalak* is trained in computer operation and can act as *a familiar and therefore approachable human interface for the often villagers*. (Prahalad, 2005, p. 336, emphasis added).

In another attempt to foster and maintain the trustworthiness of the *sanchalak* in the eyes of the community, ITC demands that he continue to farm, rather than act only as an agent running a business purely for his own ends. Indeed, in order to symbolize the *sanchalak*'s role as a *public* official, a formal oath-taking ceremony is held, during which his duty to serve the local farming community is duly confirmed. (World Resources Institute, 2003). When it comes to the selection of particular farmers to act as *sanchalaks*, one cannot but be struck by the similarity of the process that was adopted in the previous example of Grameen VPs. For, in both cases, local

knowledge obtained previously in the parent organization, was brought to bear on a decision that would have otherwise have been difficult, if not impossible to make.

More specifically, just as the Grameen Bank brought its accumulated knowledge of rural societies to bear on the selection of VP operators, so too was ITC able to draw on the long experience of *samyojaks* (collaborators) in making its selection of *sanchalaks*. In particular, '(b)ecause of their long association with the business samyojaks knew village dynamics. They knew who grew soya, what kinds of families they had, what their financial situation was, and who was seen as acceptable in the villages. *There is no other source with such information on rural India*' (Prahalad, 2005, p. 339, emphasis added). I have italicized the last sentence in the quotation, because it captures so well how institutional change designed to use complex technology for the benefit of vast numbers of people, heavily depends on detailed, local, rural knowledge, embodied (in this case), in relatively unskilled human capital. With specific relation to the Internet, however, the derivation of its benefits depends ultimately on what occurs in the e-Choupals themselves. For, '*Given the low levels of literacy in the rural sector*', the role of the Choupal *Sanchalak*, the lead farmer of the village, in facilitating physical interface between the computer terminal and the farmers is central' (ITC, nd).

If, then, the institutional innovations that, underlie the e-Choupal project draw heavily on local knowledge and systems of beliefs, so too were the technical changes induced by the inadequacies of rural infrastructure in India. And in this respect as well, a close parallel with the previous case (of Grameen Telecom) will become apparent. This is not a coincidence. It is due rather to the effects of introducing, in both cases, modern technology into the infrastructurally backward nature of agriculture in relatively poor developing countries. In the e-Choupal project, what this meant was that PCs installed in the villages,

had to work under conditions unthinkable in the West. For example, the voltage fluctuated between 90 and 350 volts against a rated 220-volt transmission. Sudden surges in the current were quite the norm. Early installations were burned out and rendered useless in a very short time. Furthermore, the supply of electricity was very uneven, often available for only two or three hours per day. ITC engineers had to add to the installation an uninterruptible power supply system,

including surge protectors and solar panel that would allow at least three to four hours of uninterrupted, quality electricity to operate the system. For communication, they had to depend on the satellite network rather than regular landlines (Prahalad, 2005, p 42)

What is important for my purposes is not that a local firm carried out a technological innovation. It is rather that the innovation was designed specifically to solve a technical problem in isolated rural areas. It is these areas, in the opinion of many observers, which have suffered especially acutely from a lack of attention in India's technological system. Indeed, even the public institutions that are charged specifically with the task of generating appropriate technologies for these areas, have generally achieved precious little. Privately owned firms, it has long been assumed, have little or no interest in producing for those with low incomes. It is all the more remarkable therefore that the technical changes described above were undertaken by ITC, a large private corporation in India. According to Prahalad, (2005), however, this example forms part of a new, broader pattern of corporate behaviour that recognizes the profitability of producing for large numbers of poor consumers in developing countries. As yet though, the number of examples that he is able to adduce is far from compelling.

c) Kothmale Community Radio: the Internet project

Whereas the previous example dealt with face-to-face intermediation between the Internet and the community, Kothmale Community Radio in Sri Lanka well represents what was described earlier as intermediation at a distance. I am referring here, in particular, to the notion of 'radio web browsing', and although there had already been a serious attempt 'to convey locally-relevant information in context and with a degree of interactivity between listeners and programme makers', (Hughes, 2003, p. 43) it is the relationships that attended the Internet project on which I shall focus (though, of course, what occurred earlier, also bore on the outcome of 'radio web browsing' at Kothmale. What is meant by this innovative form of blending old and new technologies is a programme in which the staffs at the radio station search the Internet live on the radio. But whereas this might seem like a top-down flow of information from the station to the community, nothing could in fact have been further from the truth, as the following citation hopefully helps to indicate. In particular, as conceived originally by Michael David, a Sri Lankan Communications expert,

The community radio station broadcasts a daily "Radio Browsing the Internet" programme for one hour (19-20 h.) In this programme, the broadcasters, supported by resource personnel, browse the Internet on-air *together with their listeners and discuss and contextualize information in local languages*. ... listeners request the broadcasters to surf the WEB on their behalf and the programme transmits information in response to their requests. This information is explained and contextualised with the help of the studio guests, for example, a local doctor may explain data on a health website; an agriculturalist and a local farmer will discuss information about crops. ... The radio station develops its own information database based on requests from the listeners. ... The community members contribute to local production of content (UNESCO, nd).

What actually occurred at Kothmale, therefore, was a strongly communal endeavour, with essential contributions made by recipients as well as intermediaries (especially the most skilled members of the society, such as doctors, teachers and lawyers). The expressed information needs of the recipients were met directly by 'on-air' responses, on the part of the volunteer group of experts, who, in turn, were equipped for the task, among other reasons, by virtue of being deeply embedded in the life and culture of the community. These interactions all clearly contributed to what is widely regarded as an ingenious and successful (see next paragraph) form of institutional innovation (the technical requirements of which, one should note, were simplified by the nature of the project, consisting essentially of gaining Internet connectivity for the daily radio broadcast. This was provided to the radio station by the government in the form of a dedicated 64 KB line).

With a listenership of some 250,000 people, Kothmale has had by no means the largest impact of similar types of blending projects in the Third World. In Nepal, for example, two radio stations have each enjoyed a coverage of over a million listeners. (James, 2004) What sets the original Radio Kothmale formula apart, however, is that its radio browsing model has been and continues to be widely replicated on an unusually large scale in other developing countries. The replication effort was initiated by UNESCO in 2001, but it was not until 2003 that a massive scaling-up endeavour was formulated in conjunction with the Swiss Agency. This followed an explicit recognition of what was soon to be emphatically emphasized in the

Petersberg Prize criteria, namely, that IT projects should be judged to a large extent, by the extent of their impact on rural communities. The scaling-up endeavour was thus based on an ambitious goal of setting up 50 CMCs (community multimedia centres) in each of three African countries, namely, Mali, Mozambique and Senegal, but an intermediate target of 20 CMCs per country was set and by mid-2005 the first of these were installed in Mali. (Digital Opportunity, 2005) Quite how many extra listeners have by now been reached in this intermediate phase of the endeavour is a matter of pure speculation, but it does not seem unrealistic to suppose that the initial impact of the original blending program in Kothmale, has been multiplied many times over.

4. Conclusion

It is only on the basis of indigenous institutional innovations, I began by suggesting, that IT is able to have a major impact on rural areas of developing countries. The developed country model based on household ownership of this form of technology is simply inadequate in countries with relatively low levels of income, literacy and user capabilities (Even IT designed specifically for ownership by the rural poor in developing countries, one should note, has generally failed to reach anything like a mass impact). Two basic forms of institutional change were identified, one (corresponding to mobile phones) which permits use of technology without ownership and the other (corresponding to the Internet) that allows the benefits of the technology to reach rural inhabitants, who, themselves, make no personal use of it at all. The former employs some form of sharing arrangement to extend the number of mobile phone users, whereas the latter makes use of an intermediary (or intermediaries) who comes between the Internet and the rural community. Either way, however, the process is an intensely social one and needs to exploit the many forms of local knowledge that are available, rather than foreign interventions (which, in the form, for example, of rural telecentres, have generally had only a very limited degree of success).

In the second part of the paper, I chose three case studies that best seem to reflect these components of the emerging paradigm (as they relate to mobile phones, face-to-face Internet intermediations, and intermediation at a distance). Table 3 contains a summary of the main findings for the cases that were reviewed, namely, Grameen Telecom, ITC's e-choupals and Kothmale

Community Radio in Sri Lanka (with particular reference to its Internet browsing innovation).

Especially since the alleviation of poverty on a large scale is so central an element of the emerging paradigm it is unfortunate that most measures of IT available at the country level, fail to capture the estimated benefits shown in Table 3 (or, for that matter, the vast numbers that would be involved if one were to include all the projects under each of the categories shown in that table). The existence of these millions of 'missing beneficiaries' is due, basically, to the fact that the existing measures are heavily based on developed country assumptions about ownership, use and benefits from IT, whereas the institutional innovations I have described above are based on totally different assumptions. With regard to mobile phones in developing countries, the problem is that ownership (as measured say by the number of subscribers), is only a relatively minor means of gaining the use of and benefits from, the technology. As regards the Internet, on the other hand, the problem is that its benefits can be reaped without individual ownership or indeed use (so that not only total connections, but also the number of users, are inadequate measures of the actual number of beneficiaries). These 'missing beneficiaries' of IT in developing countries can, of course, also be regarded as a crude measure of the extent to which the digital divide is currently overstated, since in the developed countries, (according to existing measures) those who benefit are in principle all counted. Thus far, however, one tends to find recognition of this important point, either in the context of mobile phones or the Internet⁴, rather than, as here, different expressions of the same basic phenomenon. The point is that if both forms of IT are considered together, rather than separately, the stronger will be the case to develop measures that reflect developing, as well as developed country, circumstances.

⁴ James (2005) has discussed some of the available literature in the case of the Internet. Given the unexpectedly rapid growth of mobile phones in Africa, as in many other developing countries, it is likely that the overstatement of the digital divide is higher in the latter than the former technology.

Table 3
Summary of case studies used to illustrate basic forms of institutional innovation

	Grameen Telecom	ITC e-Choupals	Kothmale Community Radio
Form of IT	Mobile phones	Internet in Kiosks	Internet in radio station
Impact	80 million villagers covered ¹⁾	3.5 million farmers ¹⁾	Hundreds of thousands, perhaps a million listeners covered ²⁾
Direction of institutional innovation (ownership excluded)	Sharing to extend use	Intermediation to bring benefits without individual use (face-to-face)	Intermediation to bring benefits without individual use (at a distance)
Forms of local knowledge employed	Prior knowledge of rural areas acquired by Grameen Bank; interaction of village phone owners with community served by Grameen Telecom. Selection of village phone operators based on local knowledge.	Reliance on detailed knowledge of farmers, already acquired by coordinators; relationship of trust fostered between intermediaries in e-choupals and the local community increasing the ability of the former to bring benefits of the technology to the latter	Experts on Internet browsing programmes, who translate, internet and contextualize information for the radio listening community. Interaction between radio listening and highly skilled guests on the Internet browsing programmes eq. sending and answering of questions by listeners.
Indigenous technological changes	Solar panels provided by domestic firm to provide energy for mobile phones in rural areas.	Uninterruptable power supply system, including surge protectors and solar panels, provided by ITC.	Not applicable

Notes:

- 1) taken from Petersberg Prize estimate.
 2) depends heavily on how many CMCs have been installed, as part of the major UNESCO-Swiss Agency scale-up effort in Africa. The original Kothmale Internet browsing programme in Sri Lanka itself had a coverage of 250,000 listeners.

References ('nd' stands for 'no date')

- S. Bhatnagar *et. al* (nd). *Grameen Telecom: the Village Phone Program*, available at <http://www.poverty2.forumone.com/titles/> (accessed December 10, 2005)
- Development Gateway (2003). *The Petersberg Prize 2004: Criteria/Eligibility*, available at <http://home.developmentgateway.org/prize/> (accessed July 25, 2005).
- Development Gateway (2004). *The Petersberg Prize*, available at <http://www.developmentgateway.org/prize> (accessed June 3, 2005).
- Development Gateway (2005). *The Development Gateway Award*, available at <http://www.developmentgateway.org/prize> (accessed 4 December, 2005).
- Digital Opportunity (2005). *Unesco Installs First CMCs in Mali Scale-Up Initiative*, available at <http://www.digitalopportunity.org/article/> (accessed November 12, 2005).
- F. Etta (2002-3). *The Trouble with Community Telecentres*, available at <http://www.acacia.org.za/telecentres-etta.html> (accessed 20 March 2003).
- IDA (2005). *Annual Survey on InfoComm Usage in Households and by Individuals*, available at <http://www.ida.gov.sg> (accessed March 1, 2006).
- ITC (nd). *ITC e-Choupal*, available at <http://www.itcportal.com/> (accessed January 25, 2006)
- J. James (2004). *Information Technology and Development*, London, Routledge.
- J. James (2005). 'The Global Digital Divide in the Internet: Developed Countries Constructs and Third World Realities', *Journal of Information Science*, 32 (2).

- M. Knight-John *et. al* (2006). *Replicability of a Microfinance Approach to Extending Telecommunications Access*, available at <http://www.lirnesia.net/projects/> (accessed December 23, 2005).
- M. Pigato (2001). *Information and Communication Technology, Poverty and Development in sub-Saharan Africa and South Asia*, Africa Region Working Paper Series Number 20, The World Bank.
- C.K. Prahalad (2005). *The Fortune at the Bottom of the Pyramid*, Wharton School Publishing.
- F. Stewart (1977). *Technology and Underdevelopment*, London: Macmillan.
- Telecommons Development Group (2000). *Grameen Telecom's Village Phone Programme: A Multi-Media Case Study*, available at <http://www.telecommons.com/villagephone/> (accessed 13 May 2005).
- UK Government (2006). *National Statistics Online, Consumer Durables*, available at <http://www.statistics.gov.uk> (accessed February 12, 2006).
- UNESCO (nd). *ICT in the Hands of the Poor: Pilot Project: Kothmale Community Radio and Internet*, available at <http://ictpr.nic.in/paper/kotmale.htm> (accessed March 20, 2006).
- World Bank (2000). *Rural Access to Information and Communication Technologies: The Challenge for Africa*, Washington D.C.