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The internet and social capital: experiences of openness in remote and rural areas in least developed economies

Authors:
Professor Tim Turpin
Centre for Industry and Innovation Studies, University of Western Sydney, Locked Bag 1797 Penrith South DC NSW 1797 AUSTRALIA
(t.turpin@uws.edu.au)

And

Mr Atma Ghimire
Center for Industry and Innovation Studies, University of Western Sydney, Locked Bag 1797 Penrith South DC NSW 1797 AUSTRALIA
(ghimire.atma@gmail.com)

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ABSTRACT

This paper offers a conceptual analysis of two aspects of openness: *open feed-back* and *open spill-over*. These concepts are discussed in the context of their applicability for extending debate about ICT4D. *Open feed-back* is defined as the capacity of national agencies, responsible for development, to learn and share learning about the practices, ideas and information demands of people accessing internet technologies for which they are responsible. *Open spill-over* is defined as the capacity of users to access and share information and to communicate with national institutions and structures about their use and interpretation of ICT based information. Essentially the concepts refer to social action through horizontal and vertical social networks. Using these two concepts we seek to explain how ICT can potentially enhance social capital and development in Mozambique and Nepal.

Our hypothesis is that the capacity of ICT networks to promote social capital depends on whether there is open feed-back at the institutional level; and whether there is the potential for broader information spill-over at *both* local and central levels. The paper concludes by identifying some potentially robust indicators for monitoring and evaluating 'open feed-back' and 'open spill-over' at the centralised agency level.

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Introduction

There is considerable variation in the ways ICT is becoming embedded in national systems for development (Warschauer, 2003 and Wilson, 2004). A key question is whether ICT offers enabling opportunities for development among remote and rural communities or whether it is leading to their further marginalisation. The problem of marginalisation is compounded in countries where there are weak links between local communities, policy makers, and agencies responsible for transferring information, knowledge and skills.

Applying ICT for development is fundamentally a social process whereby electronic technologies are differentially institutionalised and applied in particular social settings, with very diverse effects. Structures, institutions, politics and policies provide the focus for analysis and key individuals are the drivers of structural change (see for example Wilson, 2004). Waurschauer (2003) argues that the problem of the digital divide is not technological but an issue of how to mobilise resources to enable ICT to contribute to making social structures more democratic, equitable and socially inclusive.

> The starting point for a progressive consideration of ICT in any institution should not be the digital divide and how to overcome it but rather the broad social structures and functions of the institutions and how ICT might be used to help make them more democratic, equitable, and socially inclusive. (Waurschauer, 2003, p.209)

An interesting and so far promising perspective on the development of inclusive structures has been developed by Smith *et al*. (2008). The crux of their argument is that the benefits of ICT for development can best be realised when the technology is introduced, adapted, utilised or disseminated through 'open processes' (Smith et al., 11). Openness, they argue, can spur development but there is a need to build this capacity in a way that overcomes information and knowledge disadvantages for people in remote communities while at the same time delivering capacity to access and *use* new information (Heeks, 2008)..

In this paper, drawing on our work in Sub Saharan Africa and Nepal, we investigate two aspects of openness: *open feed-back* and *open spill-over*. In Mozambique regional Reflection Groups connected via ICT networks were established to generate a flow of ideas from rural areas for directing policy investments in science and innovation. They were also set up to generate a flow of knowledge and information on key development topics (such as biotechnology for agricultural development) from policy makers for discussion in local areas (Turpin and Martinez, 2006). This ICT4D model, in principle, allowed for what we call 'open feed-back'. A limiting factor in the Mozambique case, however, was the minimal capacity at both central and regional locations to generate what we are calling 'open spill-over'. There was only limited capacity for central agencies to learn from and act on the information and knowledge generated at the local level. Similarly, there was only limited capacity at the local level to utilise and more importantly disseminate innovative ideas or practices. In short, there were inherent openness limitations, both centrally and locally.

Following these insights we are investigating these conceptual ideas further through the implementation and uptake of telecenters in Nepal. There have been contradictory outcomes regarding the impact of telecenters in rural economies (Rajalekshmi, 2008, Soriano, 2007). Our hypothesis is that the capacity of telecenters to bridge the gap between centralised/institutionalised knowledge and information and rural communities and economic development depends on two key factors. Firstly, whether there is open feed-back at the institutional level; and secondly, whether there is the potential for broader information spill-over at *both* local and central levels.

Our paper explores the dynamics underlying these factors and puts forward some analytical measures for monitoring progress through ICT for development. The first part of the paper discusses some key issues and concepts concerning ICT for development. The second part of the paper, drawing on recent experiences from Sub-Saharan Africa and Nepal, develops the argument that open feed-back and open spill-over are essential features for directing ICT for development. In these cases the development objective has been to use ICT to create channels of communication between central agencies and the rural poor. Achieving this, however, requires careful planning and implementation. Central to this is the need for appropriate methods and indicators for monitoring and evaluation. The paper concludes by identifying some potentially robust indicators for monitoring and evaluating 'open feed-back' and 'open spill-over' at the centralised agency level.

Issues concerning ICT for Development

Some general observations and experiences from the third world

ICT investment in general and increased use of the internet is argued to have had a major impact over the last fifteen years on global economic development. For example, the internet by reducing costs and improving market efficiency, has changed market structures and affected the mark-up margins of firms thereby influencing relation between costs and output prices. The diffusion of the internet as a cost saving technology is introduced in a model with network effects and dynamic market structures. (Meijers, 2005). Many analyses support the view that ICT does contribute to economic growth. However, this is not necessarily the case in developing countries. Lower levels of ICT investment, and importantly, lack of complimentary investments such as education, telecommunication and human resources conspire to leave developing countries less able to benefit comparatively from these broader global changes.

In 2001 Castells drew attention to the unequal pattern of development emerging through the 'information revolution'

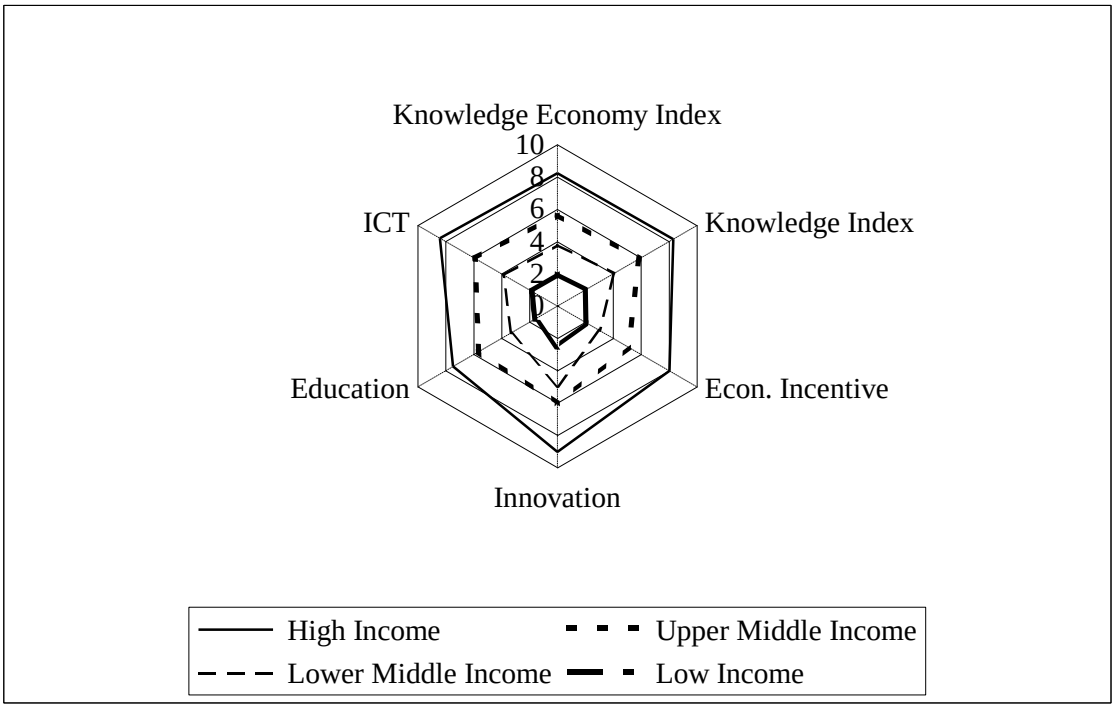
> There is a new economy, expanding throughout the world, unleashing productivity and creating prosperity, but in a very uneven pattern (Castells, 2001; 152)

Indeed, since Castells assessment in 2001 many developing countries have fallen further behind in terms of building knowledge based economies. According to the World Bank's Knowledge Economy Index most of the world's least developed countries (LDCs) have since 1995 slipped further behind the rest of the world in their capacity for 'knowledge to be used effectively for economic development' (World Bank, Knowledge for

Development, 2009). Moreover, in spite of the global growth in ICT two countries discussed in this paper (Mozambique and Nepal) continue to lag well behind the rest of the world in terms of access to and use of ICT as well as knowledge development.[1]

From Castell's perspective 'informational productivity and competitiveness are based on knowledge and information, powered by information technology' (Castells 2001, 153). However, for the two countries noted above access to and use of ICT is leading to even greater disparities between the high income and low income countries. Figure 1 below illustrates the current diminished prospects for the low income countries.

Figure 1: Knowledge Indicators for Global Income Groups



Source: Prepared from data retrieved from World Bank, KAM, Knowledge for Development data base (2009)

For Mozambique and Nepal the situation looks even more bleak when considering they lag further behind the low income countries on almost all of the KAM indicators with the exception of economic incentive and institutional regime[2] (see Table 1).

The Millennium Project Task Force on Science, Technology and Innovation has pointed out, failure to 'urgently and meaningfully' exploit the means for narrowing the gap between least developed and the richer economies … 'may consign many developing countries, …to harmful and possibly permanent exclusion from the network revolution' (Calestous Juma and Lee Yee-Cheong, 2003). However, as Wilson (2004) points out, what complicates things for governments in the south is that the 'divide' is as great *within* their

1 The World Bank's K4D program measures ICT according to: telephones per 1000 people; computers per 1000 people; and internet users per 10,000 people.

2 The indicators used for this indicator are calculated from the existence of tariff and non-tariff barriers; regulatory quality and rule of law (World Bank, KAM, Knowledge for Development data base).

societies as it is between them and the north. Policies for overcoming the 'exclusionary' nature of IT diffusion are thus urgently required for the sake of these countries' long-term social and economic sustainability. Institutional change is required to improve the capacity to extend networks globally through ICT.

Castell's argument is that the intensification of inequality, poverty and social exclusion is not a product of technology or even globalisation *per se*, but to the institutional conditions under which globalisation proceeds and the associated expansion of the information technology 'revolution' (Castells, 2001, 157). On a similar tack, Atkinson has argued that it is not the amount of human or financial capital that is critical for development, but how that capital is used to gain access to and integrate with the world economy. Yet, as the data presented in the economic incentive column of Table 1 suggest, even with institutional regime improvement at the national level some countries are still falling even further behind global knowledge economies.

Table 1: Knowledge Indicators for Global Income Groups, Nepal and Mozambique

Global Income Group and selected country	Knowledge Economy Index (KEI)	Knowledge Index (KI)	Economic. Incentive	Innovation	Education	ICT
High Income	8.23	8.3	8.02	9.02	7.47	8.42
Upper Middle Income	5.66	5.85	5.08	6.03	5.63	5.89
Lower Middle Income	3.78	4.04	3.01	4.96	3.32	3.85
Low Income	2	1.98	2.05	2.52	1.61	1.82
Nepal	1.74	1.62	2.11	2.27	1.79	0.8
Mozambique	1.58	1.08	3.06	1.67	0.3	1.27

Source: World Bank, Knowledge for Development data base (K4D), 2009.

Wilson (2004) describes the global IT revolution as operating quasi-independently from other international forces and poses unique social problem for the south that must be confronted with equally unique policies. International development programs directed toward least developed countries have often underemphasized the unique role that indigenous knowledge can play in introducing, adapting and exploiting new technologies. One of the most interesting aspects of Wilson's analysis is his documentation of the local nature of the IT revolution and the importance of specific individuals and cultures of knowledge in steering the national response. Wilson puts forward a Strategic Restructuring (SRS) perspective to explain how the information revolution has produced different outcomes in different societies. In contrast to the technology determinist perspective that assumes simply supply and access to more phones or computers will reduce inequality he portrays the information revolution as being institutionally as well as technologically driven.

ICT for Rural Development

Chapman and Slaymaker (2002) focused on strategic application of emerging ICT to address the challenges faced by rural areas in developing countries, particularly new solutions provided by ICT to rural development problems. Their analysis suggests that ICT has the potential to address unequal distribution of technical knowledge and overcome information barriers to rural development. The study found that many development agencies underestimate the flexibility of current technologies to accommodate specific developing country problems and failed to effectively mainstream strategies to harness the potentials of ICT for rural development.

Hudson (2006) also tried to analyse the potentials of ICT in rural areas to foster a wave of regional development. This study examined strategies and techniques for affordable access to internet and to share the information. His rather optimistic findings suggested new developments in telecommunication had the potential to set a new standard for the life of rural people in areas such as education and health and suggested further research on how ICT investment in could return improved social outcomes among low-income people in rural areas (Hudson, 2006). So while potential seems to be there many countries, according to the data presented above, are not improving their comparative advantage from the technology. One of the obvious reasons for failure in rural areas is that access to the technology is limited or restricted.. Similarly, the content and delivery of information may also be restricted and less open.

These perspectives are consistent with the idea of openness (Open ICT4D) as formulated by Smith *et al*. (2008), where openness is conceptualised as a way of 'organising social activities. In particular the concept is concerned with the way 'access', 'participation' and 'collaboration' are organised. Critical questions for analysis and assessment that follow include 'who produces the good; who owns the good; and, who can access and use the good? This brings into sharper focus the network of social relations that exist (and persist) at each end of the flow of knowledge through ICT rather than the technology that carries the message or the content of the message itself. Thus, the social organisation and institutional arrangements in place among senders and among receivers as well as between senders and receivers are important determinants of Open ICT4D.

ICT Openness and Development: feed-back and spill-over

Open feed-back

In order to explore these social processes in more depth we have put forward the concepts of *open feed-back* and o*pen spill-over*. Our proposition is that in using ICT for development open feed-back is necessary in order to enable learning to occur at an institutional level among national agencies concerned with national development strategies. This need is particularly acute in rural areas. For example, experiences in promoting grass roots innovation have shown that many agricultural problems are solved not just from public investments in R&D through public research institutions but through interaction they have with practitioners on the periphery (Lakhani et al , 207). Jain (2003) has documented the way that grass roots innovations can be developed in marginalised areas of India creating what he calls a 'digital provide', rather than a digital divide'. To illustrate his point he refers to the *Honey Bee Network'* that has provided an institutional structure for linking

existing technologies to village based production processes. He contrasts this approach with the dominant policy response that seeks to reduce the digital divide simply by expanding ICT infrastructure (Jain 2001).

From a development perspective there are two important openness preconditions: first is the capacity for agencies communicating with communities on the periphery to learn from the information flow as well as to deliver information. The second is to interact with and share their learning with, and learn collectively with, agencies responsible for different development strategy components. Such agencies are likely to include those responsible for agriculture, health, education, financial institutions and rural development.. In both cases this is an issue of delivering *social capital* through expanded networks and potentially the flow of economic capital, As Bourdieu, 1986: 8) has noted:

> [S]ocial capital is the aggregate of the actual or potential resources which are linked to possession of a durable network of more or less institutionalized relationships of mutual acquaintance and recognition – or in other words, to membership in a group … The volume of the social capital … depends on the size of the network of connections he (sic) can effectively mobilize and of the volume of the capital (economic, cultural or symbolic).

Bourdieu in 1986 probably underestimated the role of virtual networks in forming institutionalised relationships. The pervasive nature of the internet to perform this role leads us to extend his notion of social capital into this domain. Consequently the value of networks created through the internet become just as important as the information conveyed.

More recently, Lundvall has argued that social capital is a critical precondition for the development of a learning society., and consequently, innovation and growth (Lunvall, 2002, 99-101). As we argue later in this paper, open ICT .has the potential to enhance social relationships, build regionally based social capital and consequently serve as a spur for development. Open feed-back and open spill-over in ICT are an important components of this enabling process.

Open spill-over

Among rural communities there are social limits as to who can access the internet and when. There are very practical limiting factors such as distance from the nearest telecenter or computer access point. There are limits to the amount of time that is available during periods of pressing work commitments. There are educational and literacy limits, prevailing gender, class or caste inequalities or simply lack of familiarity with the sorts of information that might be accessed or used. We see the concept of open spill-over as being the ways information is accessed, used and *shared* at a community level as an essential feature of OpenICT4D. What are the structures in place or the social limitations to the sharing of information for knowledge? Moreover, and in the context of providing opportunity for appropriate open feed-back; how can locally based ideas, questions and propositions be shared, discussed and conveyed to the agencies responsible for delivering information.

An example of open spill-over is the case of the Honey Bee Network that has established ‘information kiosks’ in villages around the cooperative sugar factory in Warana, a poor

region in the comparatively rich state of Maharashtra. ICT was brought to the area by the Warana 'Wired Village project'., to 70 villages around Warana. This was achieved by establishing a series of 70 'Village Kiosks' each with a PC and printer connected to the sugar factory providing business, farming and educational information as well as receiving and making payments (Jain, 2003). The initiative has since expanded enabling village based farmers to connect to the internet independently to access a broader range of information about their harvesting and fertilizer costs. Jain argues that while many such successful initiatives contributing to a digital provide the more successful cases are those where information is shared horizontally among information 'user groups. Similarly, Smith et al have drawn attention to the so called 'green road' to sharing scientific information that:

> …encourages researchers and academics to make digital pre-print or post-print copies of their research work or publication available in open access repositories or archives (Smith et al, 24).

In essence this is a development that facilitates 'open spill-over' through the wider community of information users. In the following section we offer examples from our work in Mozambique to illustrate how these concepts (open feed-back and open spill-over) can be used to reveal strengths or weakness in the way open ICT can lead to enhance development outcomes. Social capital can generated at both ends of the information flow through expanded social networks and institutions (Bourdieu, 1986). Information flows can thus be delivered bi-directionally both vertically (ie between agencies and communities) and horizontally (ie between agencies and within communities). In the following section we offer examples from our work in Mozambique to illustrate how these concepts (open feed-back and open spill-over) can be used to reveal strengths or weakness in the way open ICT can lead to enhance development outcomes.

Linking the rural poor to central information networks

ICT for open science policy in Mozambique

Mozambique has had one of the lowest rates of per capita GDP, the most precarious school enrolment rate, and one of the lowest life expectancy levels in Southern Africa. Social and economic indices combine to present enormous challenges for the country. Clearly the country faces immense infrastructure rebuilding tasks and development depends on improving core areas such as education, transport, communication and health.

At the close of the twentieth century, there was no strategy for S&T development or an agency with specific authority for developing a coordinated and cohesive plan for S&T. At that time S&T in Mozambique was best characterised as a range of loosely coupled institutions and government agencies rather than a 'system'. Various Ministries supported research institutes but there was limited coordination between ministries in terms of overall priority setting and long-term planning. The institutions were also weakly connected to production sectors and overall strategies for socio-economic development. Further, while government budgets support the general infrastructure for these institutions, project funding was primarily driven by the availability of international funding. Consequently, planning and development utilising science and technology was neither comprehensively coordinated nor structurally linked to other R&D-performing institutions.

Through the first decade of the 21st century universities and research institutions had a growing presence in the provinces outside the capital Maputo. However, financial, human and infrastructure resources remained heavily concentrated in Maputo. Thus, research and technology planning, the application of research outcomes and the diffusion of technologies and knowledge were limited by weakly developed links to local practices, traditions and knowledge systems in rural areas as well as weak links between government agencies responsible for various elements of development..

The ministry responsible for science and technology policy recognised that S&T policy and practice required connections across a wide range of sectors and between researchers and the rural poor. Essentially this meant developing a coordinated approach to the 'capture' of new knowledge and skills and linking knowledge development to production practices.

In 2001 the government implemented a networked S&T information process that led to the production of a draft plan and strategy for the country's first national S&T policy (MESCT, 2003). A strategy underpinning the approach was to encourage the involvement of a wide cross-section of society and institutions. The process comprised of four elements:

1. generating broad and inclusive policy debates;
2. identifying gaps in the system, the status of S&T in the curriculum and the role of technology in production sectors;
3. drawing together traditional and scientific knowledge systems in order to build a comprehensive knowledge base that has meaning for all Mozambicans;
4. establishing structures for providing continuous policy advice and feed-back on the system.

The process involved four steps. The first initiative was to establish provincial 'reflection groups' in each of the country's twelve provinces. The task of these groups was to stimulate debate at provincial levels on key areas of science and technology from the point of view of contemporary local need, potential supply, and potential social implications. These debates were defined to include areas such as maintaining food security, access to safe drinking water, options for alternative energy, health and healing, managing natural disasters, and the delivery of safe and affordable housing.

The provincial reflection groups were each led by small group of 'provincial leaders'. Their major task was to ensure that a wide range of community perspectives from city, village and across different sectors contribute to on-going discussion and debate about the role of science and technology in their day-to-day lives. The debates were intended to provide a platform on which future S&T initiatives could be built.

Thematic reflection groups' discussions were intended to lead debates in key areas and to stimulate further discussion in the provinces. These groups involved a different set of people from the provincial groups and were usually specialists in a particular field. The role of the thematic reflection groups was to provide specialised and informed advice on the potential development across a range of selected key scientific areas such as energy, housing, health and medicine, and food production. In essence they were an attempt to generate horizontal communication linkages and a structure to stimulate what we have called open spill-over. The two sets of reflection groups through national debates provided

a mechanism for informed dialogue across knowledge systems. An ICT system provided the technological mechanism for achieving this.

A networked system for open debate

Drawing on international development aid a networked and web-based communication system was set in place to support this transmission of ideas. The reflection groups via the communication system integrated ideas and comments and contributed to debates concerning national policy options in key areas. Through the network reflection groups could gain access to significant data and to government ideas for new initiatives as well as communicating the ideas and responses of local communities in the regions.

Many countries claim to engage in collective policy-making process but in the final analysis it is often more a process of community consultation following decision-making. While in addition there are many examples where intensive national discussion has been generated around key issues, these have tended to involve principally groups of informed experts brought together through 'foresight' or 'scenario studies' that are then disbanded. They are rarely embedded in an on-going policy development and evaluation process and rarely designed to cross the boundaries of knowledge systems.

In the Mozambique case the policy process appears to have intentionally sought to integrate the ideas and expectations from different knowledge systems through the use of an open ICT network. The intent appears to have been to encourage the open-spill-over of ideas. For example in the health and medicine area both traditional healers and medical practitioners were engaged in the policy debates. In so doing, ideas about both forms of knowledge were transmitted. The important issue was not the superiority of one form of knowledge over the other. Rather, it was about the process through which the value of each could be transmitted and debated.

Figure 2 below illustrates the rather fragmented approach that tended to dominate the Mozambique (and many other developing country) knowledge systems. Government is centred as the driving force for development. And, in this context, institutions operate largely independently in terms of policy development, with separate responsibilities allocated to separate ministerial portfolios. Education remains a separate activity developed with consideration of science and technology but not as a central part of national S&T policy. The various knowledge systems are (in simplistic form) illustrated by the elliptical figures. Other systems could also be envisaged. Some may remain closed, such as with traditional healing systems. Others may be more open such as industrial production systems. The main point, however, is that in this formal model, policy for knowledge and responsibility for its production, transfer and transmission (and sometimes its disuse) tends to be segmented among specific portfolio responsibilities. *There is limited capacity in this system for effective open feed-back. In short feed-back learning capacity at the institutional level remains a closed system.*

Figure 3 presents an organising system where cross-cutting initiatives can potentially link different and largely segmented knowledge systems and consequently allow for more open feed-back. In this model all agencies concerned with the production, transfer and transmission of knowledge are assumed to be part of the S&T policy process – not just science funding or implementing agencies. The knowledge-producing and transmission

functions of these agencies, and the divisions between them, are interlinked by a national approach to knowledge-based development. While government is still central to the process, it adopts an integrative role that seeks to build productive interaction between knowledge systems rather than building science institutions or managing the links between them. This is an important diversion in S&T policy for developing economies because in their situation there are often formidable barriers between the knowledge systems identified in Figure 2. Figure 3 shows an idealised model but is offered to illustrate the intention underlying options for open fed-back. Potentially there is open spill-over from national policy debates and international science within the local knowledge system encouraged through ICT networked reflection groups. There is also the potential for open fed-back through cross cutting debates between government agencies.

Only time will tell just how effective these strategies have been for promoting development. The interesting aspect of the story, from our perspective is that the approach builds on the idea that social networks can serve as the base for generating and acquiring social capital. In order for information to be openly distributed and negotiated through ICT for development there is a need to generate the potential for open spill-over and open feed-back. In this context the two concepts offer a means for analysing and theorising about OpenICT4D. We return to this issue in the concluding section of this paper.

Figure 2: The policy process segmented into different government agencies with responsibilities for different knowledge producing and using segments in society[3]

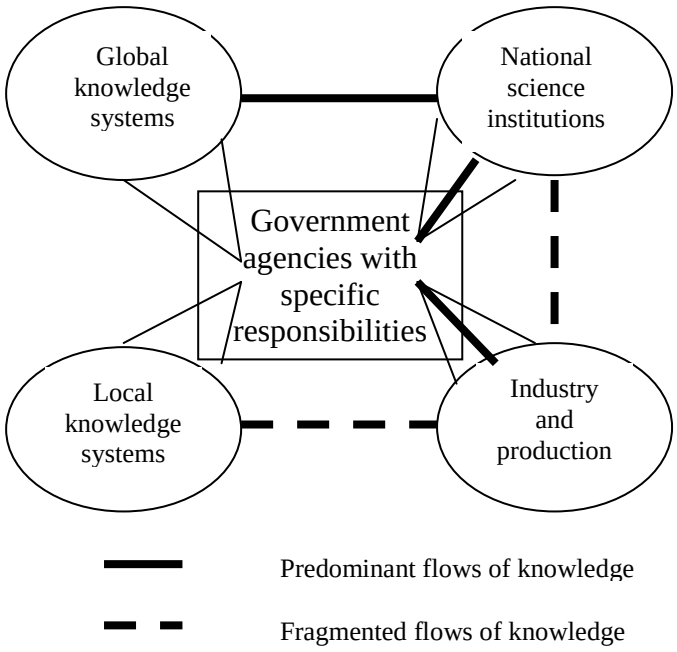
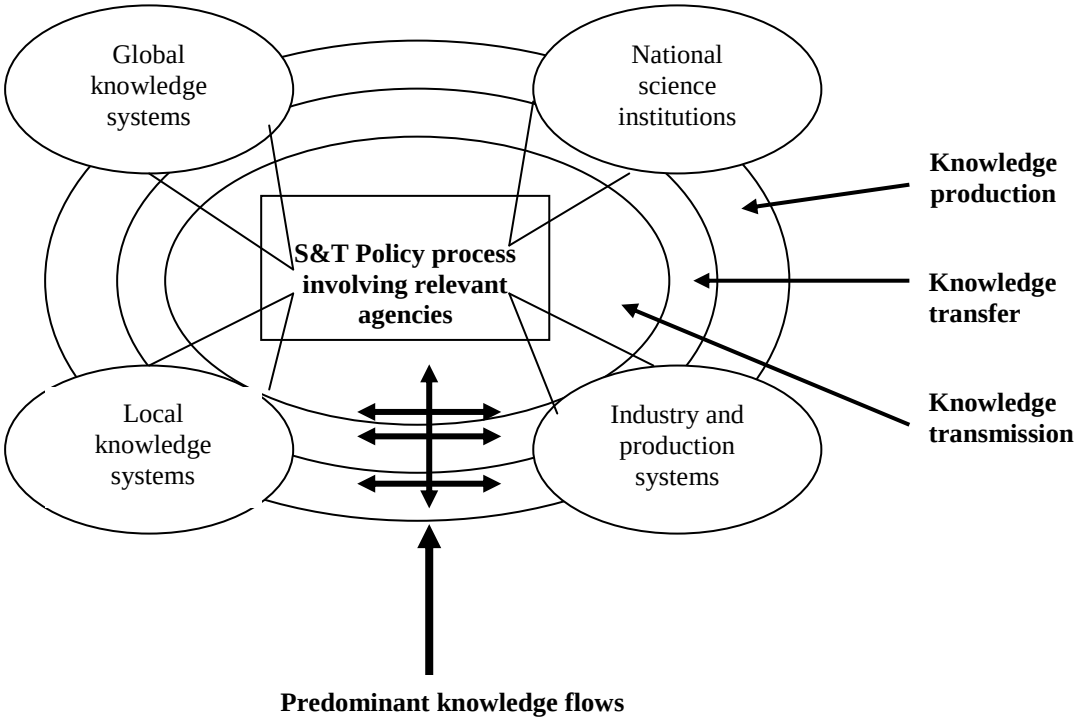


Figure 3 The policy process linking knowledge systems through the integration of local networks and government agencies



[3] Figures 2 and 3 are reproduced from Turpin and Martinez, 2006.

Telecenters as Open ICT Networks

The concept of the *telecenter* has delivered ICT into some rural and remote areas where it was previously unavailable (Harris et al., 2003, Corea 2007). Telecenters are public places with computers, internet and auxiliary services with human interaction in rural places. They offer an innovative approach for extending access to ICT enabled services in rural areas in developing economies. In some countries they are called rural information centers (Chapagain, 2006), multimedia centers (Jalali, 2006), 'telecottages' or 'information shops', (Harris, 2002). They can be a public place like post office, school, health post, or any physical place that provides affordable access to the internet for variety of reasons. Roman (2004) describes telecenters as local information and communication resource centers established for bringing benefits of new technologies to the rural poor. Rural Telecenters have informed and benefitted rural poor through affordable access to ICT enabled services (Chapagain, 2006).

> The introduction of a telecenter into a typical rural community in a developing country represents a substantial innovation for that community. For many rural dwellers, a community telecenter will be their first encounter with a computer. (Harris, 2002, p. 74)

Telecenters were established for different purposes in different countries. Some telecenters are aimed for e-governance services and to serve ultra-poor in rural areas in India (Rajalekshmi, 2007) and to deliver internet access to rural areas in Mongolia (Goransson, 2005). In the Philippines they were introduced to develop and test communication and information system to support rural communities. In Malaysia, they were introduced as a community resource for internet and ICT to achieve sustainable human development in remote area and to create opportunities and reduce poverty by connecting rural communities in Laos (Harris 2001). In Colombia they were introduced to create local information systems that offer vital business support for rural agro-enterprises; and for diffusion of innovations (Roman 2004).

According to a Chinese study the social and economic factors which facilitated access to and use of information centers in rural China could not be sustained because they adopted the top down approach. It was perceived that it helped local farmers in gaining access to information and knowledge but failed to incorporate development needs (Soranio, 2007). A case study of DWESA project in South Africa argued that financial sustainability is not a sufficient condition for the success of a telecenter. Other different types of sustainability issues like social and cultural sustainability, technological sustainability, and institutional sustainability are important for telecenters in rural area. The study concluded that ICT telecenters are useful for rural development- aimed to promote e-commerce in tourism (Pade et al 2006). Alami and Pal (2005) dealt with rural telecenter evaluation methodologies with evaluation tables containing question, key indicators, approach and summary. The research contained appendices with various existing telecenter models, measurement indices and a questionnaire. Roman (2004) used diffusion theory to provide the conceptual theory for research and practice. 'perceived attributes of Innovation', 'communication aspect of diffusion process' and 'consequences of innovation adoption' three important aspects of diffusion were focused to conclude that the first requisite of telecenter research is understanding their multilayered nature..

Jalali (2006) analyzed the impact of telecenters in Iranian villages specifically on youth and women looking at social and economic impacts. The study concluded that there is a positive social impact in terms of education and information, acceptability, culture and health factor. But the study could not explain the complex social issues of community behavioural parameters and innovations associated with the diffusion of technology. In an Indian case-study Rajalekshmi (2007) found that personal trust between the people and the intermediary is important, but for making e-government services successful, it was institutional trust in government that was critical.

All cases are in one way or other concerned with social networks and the flow and use of information across them. This raises many questions about whether telecenters can establish information networks within and between rural communities and other development agencies responsible for delivering key development services.

The Case of Telecenters in Nepal

An ICT development review of Nepal recommended appropriate policy interventions to promote ICT enabled services in rural areas by promoting public private partnership modalities (Chapagain, 2006). With qualitative methods of Interactions and interviews and a group discussion this study was completed only in one month and within the perimeter of the capital city Kathmandu. As such the results may not reflect the true picture for policy intervention. Although the study accounted for telecenters as a means of ICT enabled services in rural area it failed to analyse its overall role and impact to suggest policy intervention in public private partnership model.

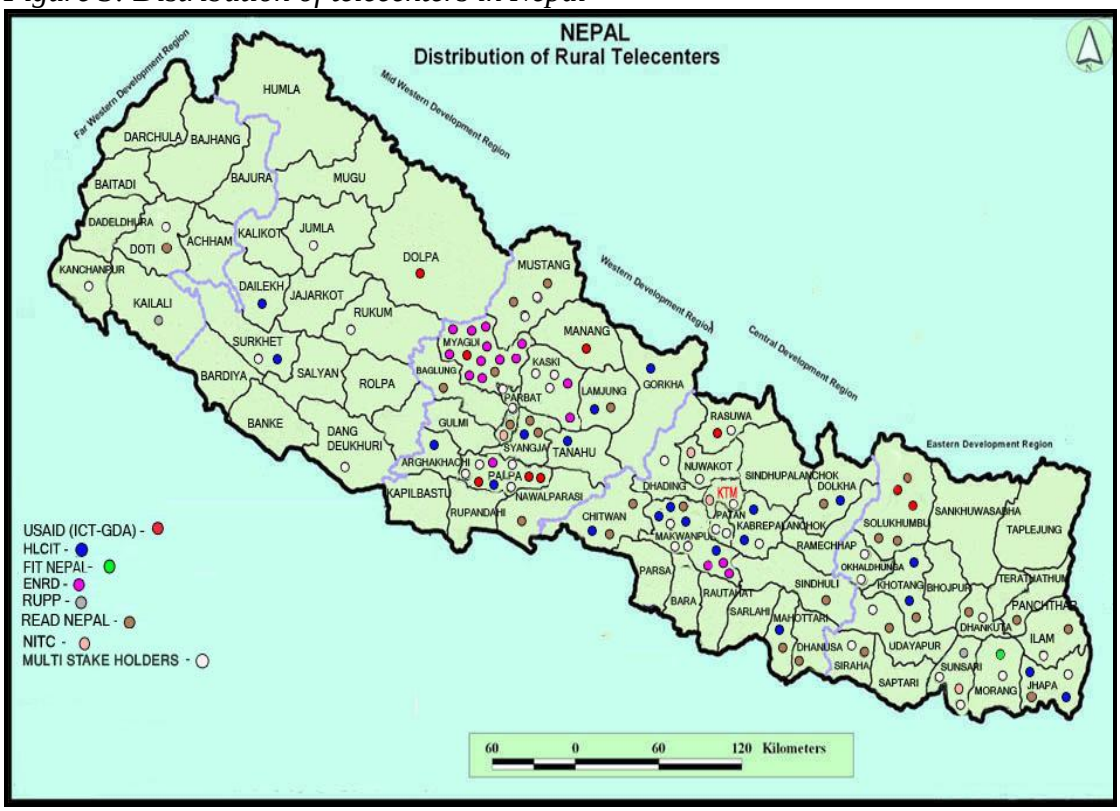
Nepal is one of the poorest countries in the world with a high incidence of poverty and low levels of human development (Deraniyagala, 2005). Knowledge capacity is low (See Table 1) and in terms of human development Nepal is at 142nd place in the World (UN HDR 2007/08). The Nepalese government entered the digital world when an IBM 1410 computer was delivered as aid for undertaking the population census in 1971. Subsequently a national computer center was established in 1974; the first foreign investment for an IT company occurred in 1982 and the Computer Association of Nepal established in1992 paved the way for an ICT national strategy. The formation of Ministry of Science and Technology Ministry in 1996 and the formulation of IT Policy emerged in 2000.

IT Policy 2000 mainly addressed infrastructure, research and development, human resources, e-governance and inclusivity. The key objective was to connect Nepal to the emerging ICT global map. The rural telecenter network' was initiated as a strategy to network rural communities to this broader network. In its tenth development plan (2002-2007) the government aimed to establish 1500 telecenters to serve rural areas. The community owned telecenters were established through government, donor supported initiatives and ICT based rural development programs initiated by non-government organizations. Government expected that these telecenters would at least provide access to information, basic exposure to technology and assistance in delivering some government services. The information from the National Information Technology Center on agricultural information, health, distance learning, productive economic activities, environment protection and natural disaster mitigation was to be developed and delivered online to rural telecenters. The central government website www.hmgnepal.gov.np was created to provide all required application forms and information on government services. This

website was later changed to www.nepalgov.gov.np . Telecenters were expected to bring positive cultural changes for development. S

The people in rural community were already demanding telecenters for their villages. But the national roll out plan of 1500 telecenters was slow. Despite the target of 1500 only 63 telecenters were established. (see Fig 3)

Figure 3: Distribution of telecenters in Nepal



Source: derived from HLCIT website www.hlcit.gov.np

The map in Figure 3 shows that the most of established telecenters were in central and western development regions rather than in the less developed mid-west and far west regions. Implementation in the more remote areas was hampered by the additional cost in these areas as well a political instability.

At the operational level, a telecenter manager was central to operations. This person supported by a management committee was responsible for the development of local content. Two 'social mobilizers' were appointed to assist him/her in operations and improve access among the rural poor. Financial support was provided by government to cover the cost of equipment, training and staff salaries for the first year. The management committee was responsible for raising finance for operational costs and 50 per cent of the internet cost from the second year. The model allowed in the first year for three to five computers, a printer, a fax machine and a photocopy machine. Implementation of the telecenter program has been varied. This has partly been due to coordination between the numerous organizations involved, such as NGOs, private companies, local communities. All had different expectations of an operational model

Experiences through the first phase of telecenter development suggest the programs weakness was an excessive focus on the technology rather than the development of locally relevant content (Rai, 2007). A project, named ICT global development alliance was launched in 2007 to establish 18 rural telecenters by March 2008, providing connectivity through VSAT in remote mountainous areas. The project partners are extending ICT and ICT based services emphasizing what they describe as equitable distribution of services, innovations in technology, financing mechanisms, information dissemination and capacity development. Successful installation results indicate replication and scaling up by other agencies using the same model (Sharma, 2007).

Assessing the development of social capital through telecenters in Nepal

A research study is now being carried out to examine the socio-economic impact of telecenters in rural and remote areas of Nepal. There government policy on telecenters called for the establishment of pilot telecenters and a subsequent national roll-out plan. Village meetings and minutes of discussions prior to the establishment of the centers suggest that there is the potential for both open feed-back and open spill-over as a consequence of the telecenter experience. The implementation process and rationale for their development is well documented in government archives and this information will be used to assess the ex-ante expectations of government and communities in setting up the telecenters. Further the experiences and social networks that have followed the implementation will be assessed through a series of case-study and interviews through 2010.

Following the analysis presented above, a set of indicators for assessing 'openess' has been developed. These indicators will be used as variables for the ex-ante and ex-post analyses of telecenter managing agencies and their networks and telecenter users and their social networks. The variable list is presented in Table 2.

Conclusion: Open ICT, Social Capital and Development

Expectations have continued on the part of developing countries and international development agencies that new modes and decreasing comparative prices of information technologies will spur development opportunities among rural communities in developing countries. While there is some evidence that the diffusion of ICT in some locations is producing valuable results the overall position of least developed countries in terms of transforming to knowledge based economies remains bleak. In this paper we have attempted to explain how ICT diffusion into remote and rural areas in these countries might better lever social and economic development. Our analysis focused on the experiences of ICT as a development tool in Mozambique and Nepal.

The Open ICT4D proposition proposes that ICT can provide a useful tool for development. The proviso, however, is that the structural arrangements under which information is prepared and transmitted and the institutional arrangements through which the technology is accessed must be *open*: that is the information transmitted must be widely accessible and shared. One of the problems in testing this proposition is that the concept of 'openness' covers many variables. Some may be more important than others in different social contexts. For example, access to web-based information might well be extremely open but the information delivered might be tightly controlled with only limited input from a select

group of people or agencies. Conversely, information input might be broadly canvassed and drawn from a wide variety of sources, but access to the information restricted by logistic factors or limited literacy skills. Yet, in this latter case, if local institutional networks or structures openly allow for the broader distribution of the information, is the system then open?

In this paper we have sought to extend the conceptual analysis of ICT openness by defining the concepts of open feed-back and open spill-over. We have argued that in order to maximize development potential in least developed economies there is a need for both open feed-back and open spill-over. We have argued that both forms of openness are necessary conditions for effectively using ICT for development. Moreover, both forms are required between and within institutions concerned with the delivery of information and, within and between community based social networks.

From this perspective it is not the technology that is critical for development, nor the information conveyed. Rather, we propose that it is how together they can offer an open system that extends networking *capacity* into social spaces previously unreachable that can drive development. Enhanced networks provide conduits to useful and relevant information, knowledge and experiences and serve to enrich social capital. We argue that it is this enhanced social capital that provides a springboard for development. As Lundvall commenting on the Danish case has put it:

> Small countries have amassed a form of social capital that enables citizens to cooperate and participate actively in learning processes that promote growth and competitiveness more easily. … it is interesting that while the learning economy is characterized by increased competition , it is also characterized by an even more close collaboration between firms and their customers and suppliers (Lunvall, 202, 100)

In the rural and remote regions of developing countries it is not so much the collaboration between firms, customers and suppliers that is critical for learning, but collaboration agencies, institutional structures and community networks. But the argument is the same: we are concerned with social capital that can potentially be enhanced through extended social networks

In an effort to operationalise the concepts discussed in this paper we have developed a set of variables for assessing the degree of openness. These variables are currently providing the basis for collecting new data concerning the development and use of telecenters in Nepal for investigating the propositions presented above. At this stage we are not seeking to reveal direct links between the introduction of ICT and rural development. Rather, we are focusing on the impact of the former in expanding social networks. The relationship between social networks and development has been a focus of interest among social scientists for some time (see for example Gross Stern et al, 2000). We hope that our analysis of telecenter development and use in Nepal will offer some useful new insights for this broader social network project as well as for the role of ICT for development.

Table 2: Variables for assessing open feed-back and open spill-over

Variable Type	***Agency networks***	***Local User Networks***
	Ex-ante analysis	
Spill-over	Number of agencies involved in providing content	Extent of community involvement in discussion.
Feed-back	Breadth of community involvement during telecenter design.	Articulation of community interests during design phase – breadth of community involvement
Spill-over	Extent of agency sharing of meeting notes and community expectations	Extent of sharing across community of government expectations and potential for telecenter development and management
	Ex-post Analysis	
Spill-over	Information flow between agencies: eg how many agencies, how often communicated and content communicated. Is the information flow for delivery mechanism or content of delivery?	Transmission and dissemination of information through community networks. Nature of groups communication ie family only, economic producer group, health/medical group network, education group network.
Feed-back	To what extent is feed-back solicited from users? Does the feed-back have impact on any areas of government policy?	Is information from users conveyed to national or regional agencies?
Spill-over	How is the feed back shared ie within one agency (eg health or IT Ministry)? Or, what other agencies are informed with feed-back?	If information is conveyed to national or regional agencies, who is involved in compiling th information (ie single user, community group, other family, school or medical group, NGO?
Feed-back	Is feed-back information used in developing future information content, new targets for information or new areas of information?	Do areas of information (ie agricultural product market prices) transfer to other community based areas (eg education and training for crop management).

Source: Ghimire, 2009

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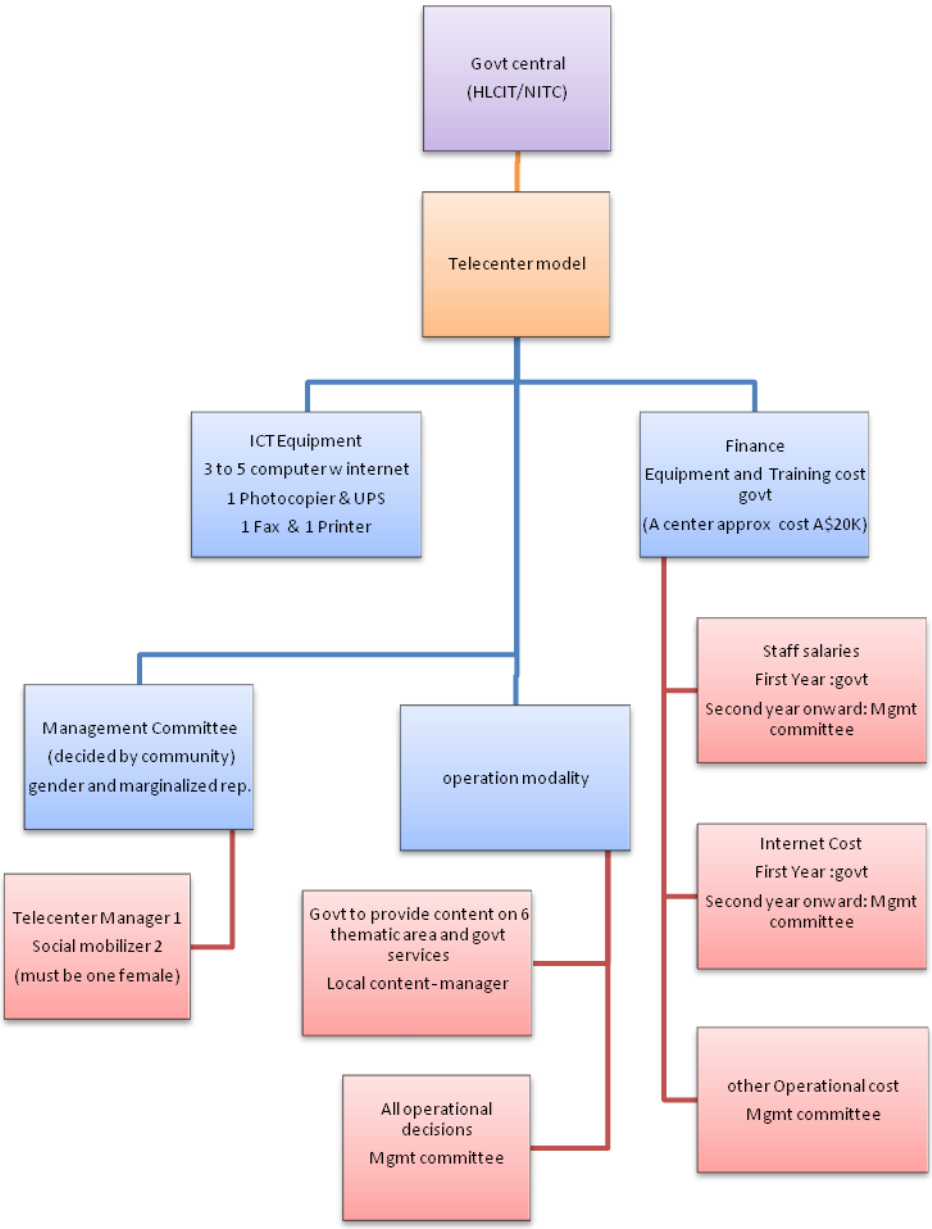
Govt central
(HLCIT/NITC)
Telecenter model
ICT Equipment
3 to 5 computer w internet
1 Photocopier & UPS
1 Fax & 1 Printer
Finance
Equipment and Training cost govt
(A center approx cost A$20K)
Staff salaries
First Year :govt
Second year onward: Mgmt committee
Management Committee
(decided by community)
gender and marginalized rep.
operation modality
Internet Cost
First Year :govt
Second year onward: Mgmt committee
Telecenter Manager 1
Social mobilizer 2
(must be one female)
Govt to provide content on 6 thematic area and govt services
Local content-manager
other Operational cost
Mgmt committee
All operational decisions
Mgmt committee