Knowledge Networking for Development:
Building Bridges across the Digital Divide

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Abstract

As the dependencies between developed and developing countries increase with the globalization of the world economy, the need to access and use dispersed knowledge and skills are at a premium. As the costs of skill sets increase in the developed world, organizations are turning to the developing world to cater for their knowledge resources. The sharing and use of diverse and disparate knowledge has become a key engine for development. This paper investigates how knowledge networking can enable the digital divide to be overcome. Following a phenomenological analysis of knowledge activation through information and communication technologies, this paper provides insight into the development processes that are driven by knowledge networking. The contribution of this paper is in the discovery of the ways knowledge networking can be used to bridge the digital divide.

Keywords
Development, Digital Divide, Knowledge Networking, Knowledge Activation, Information Literacy, Talent Pools.

1. Introduction

The increasing globalization of the world economy has meant that people and organizations in different countries are becoming more dependent upon each other. In particular, access to information, expertise and knowledge is a key determinant of those able to participate in the knowledge economy. In his book the "Runaway World" Giddens (2003) suggests that information literacy is paramount for those wanting to survive in this interconnected world. He suggests that the more that science and technology intrude into our lives, the more active or engaged our relationship to it becomes. International development agencies highlight problems of exclusion from the knowledge economy where know-how replaces land and capital as the basic building blocks of growth (Norris 2001, UNDP 2003, World Bank 2003).

A World Bank study found that 90% of the world's internet subscribers are in countries whose population is 15% of the global total (Dasgupta et al. 2004). In a study of 178 nations in the world, the International Telecommunication Union (ITU) devised a set of metrics called the Digital Access Index (DAI). The DAI is determined by such factors as education, the affordability of Internet access, the proportion of Internet users with high-speed connections, and the availability of bandwidth (Minges et al 2003). International development agencies recognize that in order to bridge this digital divide between the information rich and information poor, knowledge networking needs to take place.

Queau (2002) offers compelling insight into the global digital divide. He states that internet access disparities are considerable. Although telecom privatization and deregulation have made traditional operations more efficient, they are not a guarantee for local access to the internet. The nature of the telecom industry enables it to impose revenue terms because of their advanced technology, high speed internet backbones and net-concentration. This advantage has meant that a few dominant telecommunications operators can force service providers and customers to shoulder their access costs, making it even more difficult to provide the most basic services in developing countries (Queau 2002). This limited access increases the social digital divide making it difficult to provide educational and health services to the rural poor. This excludes entire groups and countries from the benefits of information and knowledge bringing about a situation in which those who have the greatest need have the least access to the tools that can potentially help them out of their deprivation.

In addition, Queau (2002) argues that a new culture is emerging of 'information literacy' through online interactions comprised of visual representations and mental images that can potentially increase the disparities between people who are part of this culture in industrialized countries and those who are not, as well as within societies themselves. This has implications for the level of civic engagement and level of participation in knowledge networking (Norris 2001, Giddens 2003).

There is a recognition that knowledge networking is needed if sharing of this knowledge is to take place. There is a need to take current thinking on what we know about knowledge management further to encompass the need for collaboration across people living in disparate locations with different levels of access to technology. The term "knowledge networking" has been used by Seufert et al. (1999) to denote "a number of people, resources and relationships among them, who are assembled in order to accumulate and use knowledge primarily by means of knowledge creation and transfer processes, for the purpose of creating value." Seufert et al. (1999) emphasize deviating away from viewing knowledge management from an orthodox organizational perspective to a network context and in this light puts forth a framework of knowledge networks.

Knowledge networking is activated by talent pools. ICT infrastructures have generally been designed independently of talent pools (Keen 2004, Qureshi and Keen 2005). Databases, PCs and software tools may or may not be adopted and used effectively but knowledge networking capabilities are activated by people with the needed interests, access and initiative. An example is the rapid spread of blogs; bad blogs die and ones that attract talent pools continue to survive.

Now that the effects of globalization are permeating multiple facets of life, organization and society, the relevance of the effects of knowledge networking have become more apparent. Talent is distributed across space and time. This provides challenges for activating knowledge. Information systems that address talent pools are needed. Global information systems that encompass multiple geographic, cultural and functional requirements are being implemented and used to enable sourcing strategies that bridge developed countries with resources in developing countries. The key question being investigated in this paper is how knowledge networking can help bridge the digital divide?

This question is investigated by first addressing how social and economic development comes about. Following analysis of vignettes and blogs, this paper provides insight into the ways in which knowledge networking takes place. The contribution of this paper is to help shift the focus of attention in the effective use of ICT for development to include an examination of the behaviors individuals seeking to activate knowledge and to provide better guidelines as to how to maximize human, social and economic opportunities for development.

2. Knowledge Networking for Development

In working towards bridging the digital divide, development may take place through social and economic aspects needed within a country. Qureshi (2005) provides a socio-economic model of development. This model of development identifies social development by delineating the key areas in which its activities are most common: government, healthcare, the environment and education. The social perspective enables development to be investigated as a product of human activity systems. The socio-economic model of development also incorporates economic development through financing in the form of loans, aid and/or trade agreements, the use of knowledge and expertise for innovation and the sourcing of raw materials, goods and services needed for production. These in turn may create an impact on public policy, education and healthcare.

In this, the need to network knowledge is important. A common trend in conducting business today has been in forming inter-organizational networks and a shift has occurred more toward the exchange of knowledge rather than tangible goods. In the process of such knowledge exchange there is a need for shared understanding between parties in the transaction. Swan et al. (2000) mention that Heath's (1994) "zones of meaning" can be seen to exist among corporate communities. These zones of meaning can be considered as mental models that organizations share amongst one another. In addition to this, the authors point out that there is also a need to consider differences in the network structure in terms of cultural knowledge between the different zones of meaning.

Cultural differences play an important part in knowledge networking. There are four institutional types with varying degrees of cultural knowledge embodiment as outlined by Boisot (1998). They are Bureaucracies, Markets, Clans, and Fiefs. According to the properties of each of these institutional types, Boisot (1998) highlights that the high degree of cultural knowledge sharing within clans and fiefs assists in exchanging knowledge between zones of meaning. Thus, it enables a corporation to "develop an organizational capacity that reaches beyond its corporate boundary" (Boisot 1998). Swan et al. (2000) performed a case study on an inter-organizational network that was a mix of the clan and fief structures (1998). Zones of meaning were not consciously developed but rather they cropped up as a product of discourse and repeated exchanges among the network participants leading to an understanding of shared context. The shared context gave way to activities to produce specific knowledge deliverables and so reinforcing the zones of meaning and enhancing network processes. The study performed by Swan et al. (2000) allows the possibility of viewing a corporate community as a knowledge network but it does not specify the enabling factors to extract both tacit and explicit knowledge from the network participants.

Traditional notions of knowledge management fall short of enabling knowledge to be found and used. Duffy

(2001) asserts that KM tools having the capability to mine complex and rich knowledge (both explicit and tacit knowledge) should be able to support KM activities within organizations as well as between geographically dispersed communities. But unfortunately, in reality Duffy's (2001) assertion falls short. Reasons for doing so have to do with but are not limited to the existence of multiple nomenclatures for the same term (Qureshi et al 2006). Issues relating to widespread adoption of a KM tool or technology (Venkatesh et al. 2003) by knowledge workers are another consideration that plagues the KM field. An effective KM process or strategy should bring about shared understanding of both explicit as well as tacit knowledge. But a study by Cramton (2001) of collaboration among geographically dispersed people highlighted five types of problems for the failure of mutual knowledge (knowledge that people share and know that they share). The first problem is the failure to communicate and retain contextual information. Secondly, is the issue of unevenly distributed information. Third, is difficulty in understanding and sharing the salience of information. Fourth, are differences in speed of access to information and last but not the least, difficulty in interpreting the meaning of silence.

There is a sense that inter-organizational learning is needed for the transfer of knowledge. Churchman's (1971) concept of inquiring systems implies that in order for actions of an organization to result in the creation of knowledge, learning needs to take place within the organization. Courtney et al (1998) mention that through sharing associations, cognitive systems, and memories, organizational learning can take place. This notion signifies a heavy reliance on people and groups as enabling actors for knowledge transfer.

Keen and Tan (2006) define knowledge mobilization as the necessary extension of knowledge management. Qureshi and Keen (2005) highlight knowledge activation as a key component of such mobilization. Knowledge networking is the core set of processes that achieves this activation and mobilization. By contrast, knowledge management tends to focus on the supply side of the equation: infrastructure plus information. These are obviously needed for large-scale mobilization but need to be explicitly deigned with that goal in mind. Hanna (2006), a leader in many World Bank ICT initiatives for development highlights inattention to the nature of effective use by communities as a continued weakness in their planning and design. To bring about development there is a need to have access to information and expertise. Information technology and communication (ICT) can enable development processes to be achieved Qureshi (2005).

In order to develop an understanding of how knowledge networking takes place, an activation perspective is necessary in that it enables knowledge to be brought into action. Knowledge networking creates information and its exchange among talent pools. Qureshi and Keen (2005) suggest that knowledge activation is the "conversion of knowledge to action." This is central to the networking of knowledge between disparate groups and individuals. The main idea behind knowledge activation is the process of discovering people with pertinent knowledge and utilizing it effectively through their keenness to provide, access, and share it when the need arises.

This requires collaboration among people in different parts of the world. The Qureshi and Keen (2005) study has important implications for knowledge networking as the notion of knowledge activation through knowledge identities in a networked environment will enable individual's knowledge to be brought into the collaborative arena. Knowledge activation thus enables improved knowledge networking among geographically dispersed communities and attempts to reduce the gap between the information- and expertise-rich communities and those that are and poor in these resources.

3. Methodology

In order to investigate knowledge networking, this paper follows a phenomenological approach. This enables us to extract the key elements of knowledge networking from interactions carried out using electronic collaboration. This process involves the collection of vignettes and blogs from the internet. This data represents the creation of shared understanding through intersubjectivity. According to Weick, intersubjectivity has two defining characteristics: 1) it emerges from the interchange and synthesis of meanings among two or more communicating people, and 2) the subject gets transformed during interaction such that a joint or merged subjectivity develops (Weick, 2001). The creation of the life world through processes of intersubjectivity enable us to identify and explain certain behaviours, norms and traditions that develop in the distributed work environments we investigate. When the social construction of reality governed by intersubjectivity is controlled by language, according to Searle (1995), language is seen to be a tool of accessing each other's life-world.

The selection of vignettes and blogs for this study was based on the following categorizations: 1. impact on development, 2. conceptually relevant, 3. empirically predictive, and 4. having empirical coherence. In order to illustrate the effects of knowledge networking, vignettes were taken from articles and reports published on the World Wide Web and in books and articles. They reflect peoples' experiences in very different sets of knowledge

networking and development spirals. Popular search engines such as Google and Yahoo were utilized. Keywords used included, "knowledge networking", "knowledge activation", "impact of cell phones", "poverty reduction", "knowledge networking for development", Internet cafes", "digital divide", "developing countries", "African villages" and other terms relevant to the geography, demographics and occupations of the target topic areas

While the same criteria applied to blog selection. Relevant topics were selected from projects listed on the WSIS stock taking database to reflect knowledge networking aspects. These results are analyzed using a selection of transcripts that reflect comments, or vignettes from people interacting on the selected blogs. For each blog, the comments were then grouped into the basis of their comments as they related to the exchange of information, expertise and ideas. The vignettes and blogs are anecdotal and not part of any systematic survey or large-scale sampling. They do represent contours of a phenomenon that is increasingly ubiquitous but ill-understood.

4. Results and Analysis

Qureshi (2005) suggests that development activities are able to benefit from Information and Communication Technologies (ICT) implementations through: 1) better access to information and expertise, 2) increased competitiveness and access to new markets including global markets, 3) administrative efficiencies from low transaction costs, 4) increase in labor productivity through learning and 5) direct reduction in poverty. The analysis presented in this paper extends these factors to more explicitly address the payoffs from communication and conversation captured in the vignettes. These are the ICT effects on development.

Sustained economic growth helps break the shackles of poverty by first increasing average household incomes and second increasing income from individual and business tax revenues, which may lead to the provision of better services for the poor (Qureshi, 2005). When households below the poverty line share in the average rise in national income, the extent of extreme income poverty (that is, the share of people surviving on $1 a day) is directly reduced (UNDP 2003). Such an upward spiral can also stimulate additional growth through factors such as foreign direct investments in factors of production. These are the positive effects on the cyclical process through which development can take place.

The following subsections illustrate the process of bringing distributed knowledge into action. This takes place through use of information and communication

technologies to access information and expertise which brings about additional opportunities for development.

4.1. Knowledge Networking for Development

Activation of knowledge involves bringing knowledge into action. The knowledge activation framework proposed by Qureshi and Keen (2005) suggests that the demand for knowledge within a network is driven by knowledge "identities" that determine the willingness of people to communicate and share. They have many incentives to share their accountable knowledge, which is part of their responsibility and position. They are less likely to share their discretionary and autonomous knowledge, which is personal and in many instances carefully guarded. Knowledge networking processes are initiated through processes of collaboration (existence of shared spaces and support for the activation of accountable knowledge, reciprocity and relationship for activation of discretionary knowledge, and trust and personalization for activation of autonomous knowledge). The following Vignette 1 illustrates how this process takes place.

Vignette 1: Mobile phones to help fight poverty in Africa

Daniel Mashva heaves his sack of cabbages and sweet potatoes into a rickety shared taxi and travels nine hours under the scorching sun to the market in Johannesburg. By the time he arrives, half his tiny harvest is rotten and the 48-year-old father of five returns to his impoverished village just a few pennies richer. That was before new cell phone technology changed his life. Mashva now dials up to a virtual trading platform on his new high-tech phone and sells his produce direct from his small thatched hut on the fringe of the vast Kruger National Park. "I check the prices for the day on my phone and when it's a good price I sell," he told reporters from his village in the remote Northeast of South Africa. "I can even try to ask for a higher price if I see there are lots of buyers." Mashva is one of around 100 farmers in Makuleke testing cell phone technology that gives small rural farmers access to national markets via the Internet, putting them on a footing with bigger players and boosting profits by at least 30 percent. (Source: Zee News http://www.zeenews.com/znnew/articles.asp?rep=2&aid=292033&sid=ZNS)

This behavior reinforces the points made by Qureshi and Keen (2005), and Keen, Qureshi and Tan (2006) that what drives innovation in underdeveloped economies are talent pools – people such as Mr. Mashva who are able to make the connection between new tools at hand and their own growth via knowledge networks. Such use of mobile phones for the activation of dispersed knowledge to enable knowledge networking is bringing about economic development on a larger scale. Vignette 2 illustrates this impact.

Vignette 2: Mobile phone boom spurs Bangladesh's economic growth

"The mobile phone industry in Bangladesh employs 237,900 people directly and indirectly. These are well-paid jobs with salaries many times the national average," said the study by the international consultancy firm Ovum. The study commissioned by the GSM Association (GSMA), a global industry body of 690 operators, found that the mobile services industry contributed 650 million dollars to Bangladesh's GDP annually. Analysts say the boom will continue amid falling mobile phone prices. Last year alone call charges fell by 30 percent, injecting faster growth to the industry. Over seven percent of the population now has a mobile phone, up from a mere 0.2 per cent four years ago, the study said, describing the growth as "extraordinary". Due to huge investment by operators, mobile phone coverage now has been extended to 90 percent of the country, it added.
(Source:
http://news.yahoo.com/s/afp/20060510/tc_afp/bangladesh telecomstudy)

This vignette illustrates a trend in developed nations whose implications for other nations is easy to overlook: the commoditization of what was previously "high tech" but is now consumer electronics and the corresponding commoditization of many jobs that previously were "high knowledge" in the sense that they demanded advanced levels of education and were very specialized. The more that mobile phones, PDAs, PCs and Internet-based services become commodities, the greater the expansion of their use and of the jobs that surround that use. Katmandu offers good, low cost internet service and Bangladesh has after decades of failure to grow employment added a billion dollars a year to its economy plus several hundred thousand jobs.

In developed economies, this commoditization is very much a threat, cutting margins for companies such as Sun, Dell, Sony and HP and leading to the outsourcing of more and more jobs to locations such as Bangladesh. Exploiting technology commoditization has added half a billion dollars to its economy and taken away far more than that from these and other firms' profits.

Historically, nations have tended to assume that they should move to the high end of the knowledge economy, as Taiwan and Singapore have so successfully done. Europe and Japan launched multi-billion dollar programs with such lofty titles as The Fifth Generation and Esprit, all of which generated limited value. This vignette may be summarized as "the more you commoditize high technology, the more people who can afford it and the more the jobs that creates and the larger the knowledge network."

4.2. The Collaboration Component

A very common scenario is apparent in organizations: having less time available for us to grow comfortable in our own knowledge while needing to generate more knowledge. It is becoming extremely challenging and difficult, even within narrow technical professions, to stay current and updated. For example, consider today's medical profession where, despite having formal education, doctors are frequently "taught" by their patients, who have more time to review massive amounts of data related to their specific medical concern. Even more so, as we move into a knowledge-intensive economy, only rarely does any one person have sufficient knowledge to solve increasingly ambiguous and complex problems.

The following vignette is an ideal example of circumstances frequently heard when managers and executives are asked to narrate how they obtained information critical to the success of an important project. This person was successful, not solely as a result of his own knowledge, but rather as a product of being able to find and apply relevant information efficiently. And of notable importance is the role that his network played in helping him locate knowledge in a timely fashion.

Vignette 3: How employees obtained information critical to the success of an important project

"So the call came in late on Thursday afternoon and right away, I wished I hadn't answered the phone. We had received a last-second opportunity to bid on a sizable piece of work that the partner on the other end of the line really wanted to pursue. Unfortunately, I had little experience in the subject matter but happened to be the one with availability at the time. I had no clue how to even begin looking for relevant methodologies or case examples, so my first move was to tap into my network to find some relevant info and leads to other people or databases. And in fact, I relied pretty heavily on this group of people over the next couple of days. For example, Seth was great for pointing me to other people and relevant information, Paul provided ideas on the technical content of the project while Jeff really helped in showing me how to frame the client's issues in ways that we could sell. He also helped navigate and get buy-in from the client, given his knowledge of their operations and politics. And somehow in this process, we managed to pull it off…I mean the whole game is just being the person that can get the client what they need with the company's resources behind you. This almost always seems to mean knowing who knows what and figuring out a way to bring their knowledge to bear on your client's issue. Knowing who to turn to for what is ultimately the key to doing what you need to do quickly so you can go home to your family" (Cross et al. 2002).

It is becoming clear that we are seeing a subtle but consistent shift in how we work. This is a collaboration component that pervades knowledge networking and is a

key driver for development activities. Such virtual teams have become more pervasive than ever before and enable bridges to be build across different regions. It has now become easier to communicate than to cut oneself off from such knowledge networking as that described in this example.

With knowledge networking there is a shift to an etiquette that you can contact anyone as long as there is a legitimate knowledge networking need. People do not see this as an "intrusion" and it is routine to reference a colleague in explaining the reason for making the knowledge networking request.

4.3 Information Literacy

A view from the human development world provides insight into how people experience ICTs and whether there is a negative spiral that is affecting their lives. A selection of transcripts from a number of blogs connected to Blog Africa give a sense of this human experience with ICTs in Africa. Transcript 1 illustrates the stark reality of what is faced by an aid worker trying to educate orphans in Sudan.

Transcript 1: Part of Email from an aid worker in Darfur

The answers from the children living in Fata Borno were for me – very powerful. I asked them "if you had a million dinars what would you do with it?" they all said "buy food" – an uncomplicated, unselfish, very basic need. I asked "what do they think is the solution(s) to the problems in Darfur" – they said "collect and take away all of the guns" - precise, unpolitical, and astute. And, I asked them, "If I could deliver to the world a message from you – what would it be?" they said "that there is a camp in Fata Borno – we are here, do not forget us ..."

Many writers propose theories of how literacy can bridge the digital divides and have research to support this claimed link (Norris 2001, Servon 2002, and Warschauer 2004). However, when people are not free from poverty and do not have the opportunity to get out of it, implementation of ICTs may worsen the plight of the most disenfranchised. Information literacy appears to be developing but in the majority of the blogs viewed, the language and tone was not very conducive to the development of a community. The blogger in Transcript 2, is clearly frustrated by this development.

Transcript 2: Explosion of "Net Fanatics"

The explosion of local .Net fanatics continues but have you noticed the trend at dotnet.org.za of new bloggers not introducing themselves and instead just jumping headfirst into their first blog entry? Whats next? Elbows on the table? ;-) Welcome to the ZA blogging scene in any case :-D

Warschauer (2004) suggests that the value of information literacy stems not just from the use of a computer and the internet but also from a broader information society. Its ethics and norms

4.4. Knowledge Activation

There is a sense that while the causes of the digital divide is not limited to access to technology, the real cause of this gap has to do with the concept of social inclusion or exclusion (Warschauer 2004, Castells 2000). According to Warschauer 2004, social inclusion refers to the extent that individuals, families and communities are able to fully participate in society and control their own destinies. Social inclusion is enabled by the existence of demand for knowledge that can be activated through knowledge networking. Communities on the Internet enable social inclusion to be achieved and sustained through the creation of social capital.

Transcript 3 illustrates the existence of social capital among the members of this village. The concept that the internet can promote social capital has been shown to bring about more extensive social networks of support within and outside the geographic areas in which the participants reside (Warschauer 2004).

Transcript 3: Seeking Travel Advice

dear fellows, i'm kind in need for information about life in nigeria in particular kano especially for lebanese living there or moving there on work purpose i need to know as much as u can on political situatiom, security, medical situation, insects and malaria, water, food, places to go to and anything u can do to support me.

With the existence of high social capital, demand for knowledge can be activated spontaneously by people in the knowledge network. People in the community in Transcript 4 feel free to say and do as they wish; participants share and access information they need instantaneously and appear to have greater control of their lives. In her study of civic engagement on the internet, Norris (2001) suggests that digital politics serves to engage the engaged.

Transcript 4: Bank Warning

I would like to tell u all that everyone has an account in saradar bank under 5000$ or under 5000000 l.l....they r going to take 15000l.l. or 10$ everymonth without knowledge...so please pay attention and let everybody know this message ....coz if u r not putting money in ur account...it will disappear....

This is a "Virtual Village" in Lebanon ripe with discussions on politics (the cedar revolution), health, facts and personal discussions. Participants of this virtual village are members of the general public who access information and expertise on a range of subjects instantaneously.

Transcript 5 illustrates the different opportunities these virtual gatherings bring about. This has the potential for new opportunities to achieve growth in per capita incomes – as opportunities such as the one illustrated in transcript 5 come to fruition.

Transcript 5: Potential employment opportunities

i'm working on a project that could make job vacancies for about 25 mechanical engineers, here in lebanon, and anything with that result couldn't be nicer to do, anyway, among the info i need is the salaries of mechanical engineers, according to their experience in here, ….This project might be moved to INDIA, so wish me, and us all luck !!!! D.P

Within this positive spiral of internet use, this community portrays a clear sense of mutual support. This form of knowledge activation enables knowledge networking to become more pervasive and drive social and human development processes. Once initiated, this positive spiral enables income opportunities to be generated and thus economic development.

4.5. Knowledge Networking of Talent Pools

The vignettes presented this far suggest that the key factors affecting the success of knowledge networking is the use of low cost technologies for conversation and communication. These technologies enable talent pools of comprising of experts, entrepreneurs, farmers and business people to be accessed and activated through communication. In particular, mobile phones enable these talent pools to be activated towards joint effect. The following Vignette 4, illustrates the activation of talent pools through knowledge networking.

Vignette 4: Benefits of mobile phones in developing countries

Some of the biggest benefits of cell phone use are going to the world's very poorest people, who cannot even afford to buy their own phone handset. A lively rental market is flourishing across the developing world. For instance, Grameen Phone now boasts more than 100,000 "phone ladies", who buy a handset (often with the help of a loan from a micro-finance institution such as Grameen Bank) and then rent out airtime. These women are forming an increasingly influential army of micro-entrepreneurs, a new focus of business activity in their villages. And they are providing potentially global connectivity to some of the world's least connected people. There are other benefits, and potential benefits, that may not be fully captured by GDP statistics. There is the psychological benefit of being able to talk to relatives living far away, for example. And there is enormous potential for mobile telephones to transform the efficiency of healthcare provision in poor countries. In Kenya and Tanzania, the African Medical and Research Foundation (AMREF) is using phones to allow patients in remote areas to be diagnosed by specialist doctors far away in AMREF's headquarters. Another project has built a management structure based on mobile phones to enable doctors in AIDS clinics to monitor patients far away to ensure they are taking their drugs (Source: "Access to mobile phones is rocketing, along with its impact on poverty", International Development Magazine. http://www.developments.org.uk/data/issue31/loose-talk.htm)

This shows talent pools at work. In many small villages, the inestimable phone ladies are well-known and are entrepreneurs with the micro-finance loans as venture capital. The lesson here that is mobile technology has changed the economics and risks of innovation. A cell phone is immediately usable, with no need for training, does not involve complex installation and operation, nor purchases of software and peripherals. This contrasts with the risks and complexity of PCs and even PDAs: the frequency with which they are unused or underused, obsolescence, and high initial purchase price can be readily observed. A second lesson is that it is communication and conversation that have driven the entire consumer market: from AOL's chat rooms to SMS and now to VOIP (Keen and MacInitosh, 2000). The economics of communication has also changed to reflect this networking of talent pools as is illustrated in Vignette 5.

Vignette 5: Increased communication in Africa

Since the base station in Funyula started up in 2005, three entrepreneurs have started public phone booths using landline-style handsets with mobile technology. At one booth, Yuanina Juma pulled a crumpled letter from her bag and punched in her husband's number. He is away working in the capital, Nairobi. "When are you coming back?" she asked, as her one-year-old son held on to her skirt. "You have to send me money, because I am broke." At another booth beside a bus shelter, Angelina Odhuor called her son-in-law, who works in a hospital in the Rift Valley region. "My daughter needs school fees," she told him. "Can you help us?" Queueing behind her, Evelyn Anyango waited to call her uncle in Uganda: "I am calling him to come because there is a funeral. My little sister died of malaria." In a culture where people travel long distances to find work, the mobile has become the most useful and ubiquitous piece of technology since the bicycle. Just as bicycles are used in rural Africa to transport bananas or paying passengers, the mobile is changing lives in ways unimagined in the developed world. It links distant families and allows the poor to communicate. (Source: Guardian special report on Africa. http://www.guardian.co.uk/hearafrica05/story/0,15756,1569470,00.html)

Mobile payments are likely to become a massive international industry as more and more workers leave countries such as the Philippines, Indonesia, and many parts of Africa and Latin America to work in Singapore, the U.S., Dubai and elsewhere. Currently, the fees charged by currency exchange services and firms such as Western Union are high, though falling rapidly. This has meant increased work opportunities for remote businessmen as is illustrated in Vignette 6.

Vignette 6: African businessmen happy with improved work efficiency

The new technology has had a bigger impact on shopkeepers and tradesmen, who use it to keep in touch with suppliers and customers. "Before we got a signal here, I was doing five or six jobs a week," said electrician Isaac Kamande. "Now I'm doing 20 or 30 jobs a week. Before, people had to call the landline, which was not all that reliable. On rainy days, it goes off. Maybe there would be an emergency, but customers couldn't reach me - they had to send somebody with a message." (Source: Guardian special report on Africa. http://www.guardian.co.uk/hearafrica05/story/0,15756,1569470,00.html)

Vignette 6 depicts another talent pool at work. Much of the literature on ICT and economic development speaks as if all the poor are lifeless and lazy and that they need education before they can be brought into the knowledge economy. So many of the vignettes above signal the opposite: it is not an oxymoron to speak of poor entrepreneurs.

However, should ICT implementations not be appropriate to local needs, digital divides increase, and the reverse can occur and perpetuate a downward spiral. For example, lack of access to information or expertise brought about by the lack of access to information kiosks or inappropriate support for community networking, reduces the ability of a farmer or merchant to sell goods at the most favorable price, thus reducing income generated by their efforts. Given the costs of internet access compared to income, only a small segment of the population have access to the internet. Warschauer (2004) notes that the internet can lead to a narrowing of social contact as there is no assurance that people will use it for either social interaction or information.

Similarly the implementation of information systems that intend to provide better access to government services and information can bring about administrative inefficiencies by locking out citizens that have no means or ability to use the information system. In the new global electronic economy, fund managers, banks, corporations as well as millions of individual investors can transfer vast amounts of capital from one side of the world to another at the click of a mouse. As they do so, they can destabilize what might seem like rock solid economies – as has happened in Asia (Giddens 2003).

Those who are negatively affected by the information system are considered Victims in this research and may comprise people, organizations and even entire regions or countries. The ending of textile import quota by the WTO in 2005 has seen massive growth for China and India, retailers and global supply chain service providers have used ICT to streamline their entire logistics and consumers have benefited from a 40% drop in the cost of clothing (Keen and Williams, 2006). Vietnam, Honduras and other countries in which textile manufacturing was one of the largest sources of employment have seen as much as 40% of their factories close in under a year.

Only talent pools can compensate for such disruptions and only knowledge networking can fuel their innovation. From that perspective, there is much encouraging news from the vignettes and many other such examples. The talent is there. And the interest in knowledge networking infrastructures is accelerating. Africa now has 5 million internet subscribers with internet cafés springing up in many urban areas (Steinberg 2003).

5. Implications for Knowledge Networking

The discussion thus far has illustrated how knowledge networking is a process that can foster development by affecting human, social, and economic development. Through the activation of geographically dispersed knowledge, human freedoms and civil engagement, social capital and inclusion, and opportunities for sourcing expertise and innovations can be achieved. This process can lead to positive spirals that enable the digital divide to be bridged or negative spirals in which ICTs may exacerbate existing gaps in poverty, information literacy and facilitate social exclusion. This has implications for the way in which the digital divides are addressed and approaches that can be used to overcome them. These are outlined as follows:

1. Low cost communications technology, in particular, mobile phones, and payment systems enable talent pools to be activated. Information systems that address knowledge networking should address credibility, validity, accuracy and recourse.

2. Information literacy is needed to enable people to reap the benefits of digital infrastructures. There is a demand function at work in knowledge networking whereby people with limited education, poor information literacy and in many instances isolation from the mainstream of the modern economy none the less apprehend the opportunity for themselves to make a significant improvement in their lives.

3. The collaboration component is driven by the need to access dispersed talent. This need is fueling the use of information and communication technologies for the development of virtual teamwork which spans developed and developing countries.

4. The activation of knowledge is particularly prevalent in established communities in which social capital is high. Fostering social inclusion brings about a readiness with which people share information and a sense of civic engagement. These high activation communities also generate opportunities for economic development.

5. The existence of talent pools drive networking between people and in doing so extend the reach and impact of their knowledge generation, mobilization, use and impact. This suggests that governance mechanisms are needed to protect intellectual property and promote ethic conduct in the use of dispersed talent.

6. Information architectures are needed that foster activation of knowledge and the development of knowledge networks. In particular, semantic web searching tools would bring knowledge in talent pools into action and mitigate the development of knowledge networks. Such an architecture should address knowledge sources rather than information in databases.

The above implications point to a set of guidelines that may enable bridges to be build across the digital divide. This also suggests that further research is needed into the ways in which knowledge networking infrastructures may be developed to activate and protect dispersed talent pools.

6. Conclusions

The sourcing of knowledge and skills from developing countries has hastened the need to share dispersed knowledge. This paper has illustrated the need for knowledge networking and produced a model for global capacity sourcing through which organizations in the developed world are able to source the skills they need from developing countries. Following an analysis of knowledge networking among bloggers, this research has illustrated how knowledge networking can enable development to take place by bringing about positive cycles. Knowledge networking can also reduce development by bringing about negative communication cycles. Armed with insight of knowledge networking, further research should investigate approaches for stimulating positive development cycles through knowledge networking.

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