

KNOWLEDGE NETWORKS AND THE INTERNET

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Summary

Increased access and more affordable connectivity to advanced ICTs and especially wireless and Internet services enhances the ability of development professionals and an increasingly diverse range of citizens of developing countries to access the world's storehouse of information – the Internet. Proper management of the knowledge networks is required to ensure that the Internet will be a tool to reduce, rather than enhance, the digital divide between developed and developing countries. This way the world will be enriched as the exchange of information leads in all directions, that is, within communities, regions, and nations; within firms and industries.

1. Introduction

Information and Communication Technologies (ICTs) play a significant role in economic, political and cultural development. The discovery, publication and application of new knowledge, the dissemination of information concerning best practices and the exchange of views and opinions are essential elements of development work, all effectively facilitated by ICTs. In the area of economic development, ICTs can create new jobs, new industry and service sector opportunities and a more educated work force. They make possible the cross-border flow of information and promote international trade, particularly in high technology. The creative use of ICTs, particularly the Internet, in the areas of health care, education, environmental protection and in other important fields can substantially contribute to the advancement of developing societies.

The global economic significance of ICTs is clearly demonstrated by the example of the software industry. Programmers in, for example, India, Israel, Russia and its former Eastern European allies can work and prosper as regular employees of multinational corporations without leaving their country or even their home. These programmers write computer code on their own computer and communicate with their employers via the Internet or a proprietary Intranet. They are able to participate in the Information Economy not because they live in an industrialized country or because they have access to the latest high technology but because they have the appropriate education and skills – and access, via their employer, to the Internet. This example highlights many of the major issues and opportunities of the information age as it relates to the developing world.

This chapter analyzes the role of information and communication technologies, and in particular the Internet, in enabling the creation and application of knowledge networks. The chapter draws examples from wealthier nations, but focuses on the implications of these technological trends for the socio-economic development in developing nations and transition economies. However, the same issues and approaches identified in this chapter are also relevant and possibly applicable across the ‘digital divides’ that can be found across and within regions, even in the wealthiest societies. In this chapter, the concept of knowledge networks and their increasingly significant role in socio-economic development is highlighted and the term, “knowledge networks”, is defined more precisely. Scholarship from academics and development professionals is then reviewed to show the importance of ICTs, the Internet and Knowledge Networks in development work. Next, the chapter analyzes requirements for the successful application of ICTs in the developing world and concludes that the primary critical issue in this regard is the availability of Internet access (equipment, connectivity and skills) by the general population.

2. Defining Knowledge Networks

The Internet is particularly well suited to facilitate and support a new and increasingly more popular approach to development, the creation and utilization of so called Knowledge Networks. These networks bring together institutions and people, possibly from all parts of the world and from all strata of society. Knowledge Networks in the arena of development are dedicated to the discovery of new knowledge and its application for the advancement of developing nations and regions. The key to their popularity and initial success is the realization that all participants, people and institutions in the North, South, East and West, can and should learn from each other and should acquire the technology and the capacity for knowledge creation, aggregation and exchange.

In our fast moving, dynamically changing information society, it is difficult to precisely define a complex and multifaceted concept like Knowledge Networks because the participants constantly shape and extend the activities of these networks in response to real needs and challenges. Howard Clark defined communications networks as [interaction] “of people, dispersed over geographically separate sites, [equipped] with appropriate communications technology”. In defining Knowledge Networks he differentiated four types of entities: 1. Informal, 2. Information Access, 3. Open and 4.

Development Networks. Informal networks represent casual, *ad-hoc* interactions, they are without structure and the knowledge they create often does not get disseminated. Information access networks are exemplified by university or government libraries; they are the repositories of existing knowledge, but according to Clark they create no new knowledge. Open networks exist to conduct research in science, technology or on policy related issues and are not very much concerned about the practical applications of their research results. They have a well-defined structure and governance and disseminate their finding through publications. Participation in open networks is by invitation based on merit and past performance.

Development networks focus on a well-defined theme around which their various projects converge. These networks exist not only to create new knowledge but also to accelerate its application. Development networks are highly structured, have strong governance and participation is by invitation based on merit. Besides exhibiting the above-discussed characteristics, Knowledge Networks, according to Clark, also have to possess certain other attributes. They must be optimized for maximum rate of knowledge creation and sharing so as to lessen rather than enlarge the gap between developed and developing nations. They certainly must create knowledge faster than other approaches can. A Knowledge Network must also be cost effective and efficient and must provide direct and tangible benefits to all its participants in order to sustain itself; this usually means financial support for the academic participants and applicable research results for the industrial and government sponsors. And very importantly, a Knowledge Network should involve several sectors of the economy, such as industry, finance, universities and government to synthesize diverse point of views.

Clark stated that of the four types of networks discussed above, only the last two, the open and the development networks, can be classified as formal Knowledge Networks. It should be noted, however, that some of his reservations about informal and information access networks have been since positively addressed by the Internet. In today's environment, the often hidden knowledge discoveries of informal networks are readily yet informally publishable, using web servers and electronic mail. An interesting exchange of ideas between two individuals can be transformed to text and disseminated to hundreds of interested people without difficulty. In the case of information access networks, modern Digital Libraries provide more than access to information. They allow data mining, that is to say, the processing of information in such a manner that new correlations and new knowledge may be discovered within the existing information.

More recently, the meaning of the term Knowledge Network has been further broadened to encompass any type of network operation aimed at the management, organization and sharing of knowledge. Thus corporations and government, non-profit or civic organizations of all kind designate the people and computers networked for the purpose of accumulation, organization, management and sharing of a specific body of knowledge as a knowledge network. One group of researchers [at SUNY, Albany NY] for instance, define Knowledge Networks in conjunction with their investigation of "Knowledge Networks in the Public Sector" in a very broad manner: "a combination of inter-organizational relationships, policies, information content, work processes and

technology tools and architectures brought together to achieve collectively defined purposes.”

At any rate, no matter how they are defined, Knowledge Networks, in general, and development oriented Knowledge Networks in particular, are expected, by their purpose and nature, to shift organizational culture towards collaborative activities within and among institutions. This often means multidisciplinary, multi-sector and multinational participation and non-adversary relationship with government and industrial sponsors. Development related Knowledge Networks must also operate within the spirit of sustainable development, that is to say, they must consider factors of economic development and harmonize them with environmental protection, social development and the standard of living and well being of the population involved. It is axiomatic that development related Knowledge Networks are most effective when they transcend national boundaries and involve participants from both developing and developed nations. This requires the availability of efficient and compatible communications networks for all participants. The Internet has served as such an all-purpose communications network admirably well. In addition to facilitating ready interactions among participants, the Internet also became an integral part of Knowledge Networks by serving as an important tool of knowledge acquisition, sharing and application. In the balance of this paper we will examine the importance of the Internet in the functioning of development related Knowledge Networks.

3. Knowledge Networks and the Internet

The significance of the Internet as a powerful tool for sharing knowledge was emphasized by Joseph Stiglitz, former chief economist of the World Bank, at the First Development Network Conference, which took place in Bonn, Germany in December of 1999. He pointed out that in development work, this immense network of networks presents both risks and opportunities. On the risk side, the growth of the Internet has been much greater in the United States and in other developed countries than in the developing world. This may make the Internet a tool to enhance rather than narrow the gap between developed and developing nations. This factor, however, is counterbalanced by the opportunities provided by the greater and more readily accessible knowledge pool the Internet makes available to those with access to it. “Today, a child anywhere in the world who has access to the Internet has a modern Alexandria Library at her fingertips.” Said Stiglitz. Indeed, according to a 1999 report, at that time, there were 800 million web pages representing 6 terabytes of data over 3 million servers.

Stiglitz advocates “Scan Globally, Reinvent Locally” as the approach to development related utilization of the Internet. In other words, the global knowledge acquired from the existing repositories, such as major libraries, databases and other sources of knowledge made available on the Internet, must be internalized, rediscovered and translated to local conditions if it is to be usefully applied in development. An example of this principle in action has been described by Robert Chassell, a co-founder of the Free Software Foundation, at a Global Knowledge Conference in Nepal. He explained how he ran simplified free software, or more accurately, open source applications on old IBM 486 machines, available at low prices in the developing world. By translating the

software and hardware requirements to a locally affordable level, Chassell has made global knowledge accessible locally.

Stiglitz's "Scan Globally, Reinvent Locally" thesis may explain why the Internet is a particularly useful network in the development arena; even more useful than the traditional telephone or broadcast networks. One might argue that the Internet itself is predicated on the same "global and local" principle. In an enlightening paper Isenberg compares the telephone network and the Internet. The telephone network is a hierarchical entity, subject to rigid, automated internal controls. Basically the telephone network is optimized for one application: the transmission of voice (data is transmitted as voice) over real or virtual circuit paths. To introduce any new service, approval must be obtained from the telephone company, which must also do the implementation of the proposed new service. The user has no input into network planning or service creation. A similar situation exists with broadcast networks: there is little or no direct user input into programming.

By contrast, the Internet is an essentially uncontrolled network, void of central authority. To be sure, the fundamental technologies of the Internet, network of networks connections, packet switching, TCP/IP software and client server architecture, are the same globally. The various network elements, however, are configured by the users according to their needs and desires and not by a central controlling authority. Perhaps most importantly, the Internet is capable of running many different applications such as electronic mail, file-transfer, the World Wide Web, Internet Telephony, Internet Video, MP3 music (audio streaming), MPEG4 video (video streaming) conferencing, multicasting, and interactive media services. All these drastically different applications are created and installed locally by the users without any involvement of the (non-existent) controlling authority. The intelligence of the telephone network resides in the center of the network with the telephone company while the intelligence of the Internet is at the edges of the network with the users. (For the sake of completeness it should be mentioned that, at least at this point, the rigid control of the telephone network results in high quality, reliable, albeit expensive and limited service; while the total lack of controls over the Internet yields essentially free and application rich but spotty quality service based on "best effort").

The global technology of the Internet and the local innovations and contents created on it are mirroring the global-local principle of development related knowledge acquisition and application discussed by Stiglitz. Consequently, the Internet, as the embodiment of the "global – local" principle, may be used by any country or region to collect global knowledge and translate it to local conditions. It is largely up to the users in the developing countries to create applications capable of carrying out the task of localization in a fashion optimized to their needs.

4. Internet Access

The importance of the ICTs has been fully recognized by the development community for some time. In 1980 the UNESCO General Conference initiated the international Programme for Development of Communications. In 1982, the International Telecommunications Union's Plenipotentiary Conference established an independent

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Biographical Sketches

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