

Information Technology and Africa's Development Needs: Does the Center-Periphery Gap Still Matter?

Getachew Felleke

情報技術はアフリカの開発に対処する際に有望な切り札の手段になると言える。情報技術による利益が期待される開発領域は極めて広く、通商、金融、製造、農業、教育、医学、娯楽や自然環境にまで及ぶ。その状況からは開発途上国発展のために行われている努力に比して情報技術の際立った貢献がうかがえるが、本稿はその可能性を開発経済学的視点から詳細に論じようとするものである。

Information technology (IT) can be seen as the latest in a long list of instruments of promise to address Sub Saharan Africa's development needs. The fields of development that are expected to benefit from the IT revolution are quite broad, and they include trade, finance, manufacturing, agriculture, education, medicine, entertainment and the environment. This has lent IT a special significance with respect to its potential contribution to the on-going effort to bring development to poor countries. This paper seeks to take a closer look at the potential of IT from the perspective of development economics.

Introduction

There is a growing debate on the role that IT can play in the economic development of countries. There are those who regard this new technology as a potent force for modernization that is both readily accessible and bears tangible social and economic benefits across all boundaries. As one expert at a US Congressional joint hearing indicated, "Targeted investments in key technologies can help move Africa from an aid-based economy to a trade-based economy and into the mainstream of international economic prosperity—a benefit for everyone."¹ What this translates into is this: Sophisticated telecommunications infra-structure would boost Africa's² economy, create trade and investment opportunities for multinational firms and enhance the competitiveness of African nations by giving them "access on an international basis to technology, markets, transport, finance and information about products and resources."³

The argument appears to be that telecommunications make IT possible and IT, in turn, makes the world's information resources easily accessible. Once Africa achieves such access to information, the road will be cleared for the region to reach its economic potential. The focus here is on the singular promise of information as a force behind social and economic transformation. What is being assumed also is that IT's capacity to circumvent geographic, social, and cultural barriers will cause a surge in the flow of information into, and out of, the continent. This tide of information will lift up the circumstances of even traditionally disadvantaged groups and regions. This, of course, is a promise that has much appeal for those that have been engaged in the search for the cure for Africa's persistent social and economic ills.

The argument that urges Africa to join the IT revolution has been building up steadily. This is often combined with equally insistent warnings of dire consequences for the continent if it does not quickly embrace IT. As one observer points out:

1 International Telecommunications Union, Press Release March 8, 1995

2 Note: Throughout this paper, Africa refers to Sub-Saharan Africa.

3 International Telecommunications Union, Press Release March 8, 1995

The centrality of the Internet in many areas of social, economic, and political activity is tantamount to marginality for those without, or with only limited, access to the Internet, as well as for those unable to use it effectively. Thus, it is little wonder that the heralding of the Internet's potential as a means of freedom, productivity, and communication comes hand in hand with the denunciation of the "digital divide" induced by inequality on the internet.⁴

However, the search for some form of technical fix for Africa's social and economic problems is hardly new and has been in effect for at least a good half century. It is a search that has introduced and touted the merits of numerous models and strategies to achieve economic development. Development administration, structural transformation, the Green Revolution, mobilization of domestic and international capital, education and manpower development, import-substitution industrialization, and trade or external oriented strategies are just a few among those proposed and tried in the past. More recently, strategies of market-oriented reforms and structural adjustment measures have been advanced by groups such as the World Bank and the International Monetary Fund (IMF) to breath new life into the region's ailing economies. The search for an effective model that can respond to Africa's conditions has not stopped. But it has also been a search that has yielded more recurring frustrations than measurable successes. A number of factors lie at the root of these frustrations. Some of these factors are of domestic origin, and some others are not. These include:

- a. The gulf that separates the African context of social and economic problems from the Western origin of many of the proposed solutions that are advanced to deal with these problems;
- b. The persistent and widening gap in social and economic conditions between urban and rural Africa that is both brought about by, and results in, a dualistic pattern of development;
- c. The disproportionate influence of the modernized elite on the directions of national policies and programs and the resulting tendency to divert new and modern measures of promise to serve the particular needs of the urban elite as opposed to those of the numerically far larger rural masses;
- d. The absence of a tradition of countervailing political capital and influence among Africa's large rural population to protect and advance its social and economic interests;
- e. Africa's persistent and growing disadvantages resulting from its subordinate position in global trade, finance, technology, etc.
- f. The predilection of several of Africa's insecure governments for applying technology for the purpose of policing and controlling—as opposed to informing and empowering—their citizens.

Each of the constraints in the list above can present a serious challenge to any attempt at the effective application of IT. Together, they constitute formidable obstacles that may blunt any meaningful effort at bringing the benefits of any development enhancing technology to the continent. In the light of these historical experiences, it must be asked whether the expectation that IT is set to bring positive net benefits to Africa is fully warranted. This paper will explore the promises and pitfalls present in the expectations for an IT-driven development for Africa.

⁴ Castells, Manuel. *The Internet Galaxy*, Oxford: Oxford University Press, 2001 p. 247

Specifically, it will critically examine how practical and widespread the benefit of IT application in Africa is going to be, given the particular nature of the region's social, economic and cultural environment. The goal of this study is to examine the extent to which the current high-flying expectations for IT to serve the continent's developmental needs are justified given the current African realities on the ground.

Africa and IT

Much of the current literature on IT and Africa has mainly been concerned with issues like the pace of acquisition and use of the technology, the development of infrastructure and support, cost, market versus government initiatives, pace of growth in Internet use, etc. Anecdotes and selected illustrative cases of the rapid spread and popularity of IT among individual or group of African states abound. Various comparisons are also made with respect to various countries' access to computers and Internet service. This, of course, is quite proper and right. By-and-large, these are the more visible and immediate measures of "success" that easily attract the interest of researchers. But, when all is said done, the Internet is just one type of technology, albeit the latest and arguably the most influential. As a technology, it is a means to other ends and not an end in itself. That being so, it seems appropriate that a preoccupation with access and accessibility must first be preceded with a careful assessment as to whether this particular technological means is best suited for realizing the ends of social and economic progress that Africa has long sought to achieve. Is it equipped to respond to the continent's priority of needs? And is it suited to be the object of so urgent a pursuit now, as opposed to at some point in the future?

Beyond issues such as the pace of acquisition and use, accessibility should also be about the availability of opportunities for Africans at different income levels and in different geographic locations to make meaningful use of the Internet. This may include both the physical distribution of Internet devices as well as the affordability of Internet use. Questions of who in Africa has been making, and can continue to make, use of the Internet do matter for any meaningful assessment of the technology's potential impact. Clearly, this is an important area to look into as the region is being urged to embrace IT.

One way or another, the introduction of the Internet into Africa is bound to make its impact. An important question that remains to be addressed is what exactly that impact is and what ramifications it is going to have. And it does matter a great deal if ways can be found to ascertain that the benefits of the technology will in the end justify the underwriting of its considerable costs.

The technology's impact does depend on its rapid and widespread accessibility on at least at some superficial level. Internet cafes that draw a growing number of the urban youth are examples of such an impact. But accessibility is surely only one among several factors that will determine the technology's deeper and more meaningful impact – the kind of impact that brings the desired social and economic transformation of African societies. And it may be that IT's success or failure in living up to its promise may ultimately rely on how it interacts and functions in the context of these other factors that characterize Africa's social and economic conditions.

Accordingly, an important area of concern for students of development is how to bring into greater focus the issues that relate to the long term and multi-

layered impact of IT on Africa. We need to initiate a healthy debate on both the promises and pitfalls of proposing this new technology to solve Africa's enduring problems. We need to ask how the social and economic lives of Africans will be influenced in both the long and the short term. What will it do to Africa's already precariously diminished position in the global distribution of economic power? Will IT inject new turbulence and susceptibilities that will further weaken the continent's position *vis-à-vis* the rest of the world? As Castells pointedly asks:

Is it really true that people and countries become excluded because they are disconnected from Internet-based networks? Or, rather, it is because of their connection that they become dependent on economies and cultures in which they have little chance of finding their own path of material well being and cultural identity?⁵

This is not to pre-judge and predict negative outcomes if and when IT gets widely disseminated throughout the continent. Rather, these questions should be regarded simply as notes of caution against the kind of prejudgment and prediction that asserts that Africa stands to harvest only positive outcomes from IT. The outcome in the end depends on a) what precisely the nature and requirements of the IT technology is and b) how this technology interacts with and functions within the context of the prevailing social, economic, cultural, and political characteristics of African societies.

At one level it is possible to argue, as many have, that IT is a mere instrument, a tool or just a means to some end. As such, it should be viewed as being threat-free and benign in its implications to the interests of its African users. Any goods or "bads" that may flow from its use are not inherent to the tool itself but, as in the case of all other tools, are results of the deliberate aims and decisions of those who make use of the tool. In other words, it is with the formulation and implementation of policies of IT use, and not with the selection of the IT option itself, that problems are likely to arise. What is needed to ensure IT benefits is thus to ascertain that such policy related measures are correctly addressed.

What is of importance, it is argued, is that any technology, including IT, affords the user an enhanced and more efficacious tool with which to expedite activities and accomplish the tasks that one wishes to pursue. This, it is pointed out, IT promises to do for users in Africa as it does for users anywhere else in the world. As earlier debates on the subject would assert, technology is value neutral. What determines the outcome of technology use is the choice made by those with privileges to make use of technology.

In other words, technology augments effort, but it neither designs nor directs it. Given this perception, IT can only offer Africans great benefits with little or no risks. Accordingly, the more Africa succeeds in accelerating the acquisition and application of IT, the better its capacity to manage and overcome its social and economic problems.

At another level, and given the fledgling stage of IT application in the continent, and, indeed, around the world, a lot of this thinking should be subjected to some skepticism as it tends to be highly speculative and often sketchy and anecdotal. These observations tend to originate mainly from IT enthusiasts who are

⁴ Castells, p. 247

already sold on the great promises of the technology. But the thinking itself remains speculative in the sense that it implicitly assumes that both the applications and benefits of IT in the developed countries (DCs) can be replicated in the African context. It suggests that if we just get the quantity of devices, the number of users, and the quality of the infrastructures up, then there will be no reason why IT will not do for Sub-Saharan Africa what it has already been doing for the DCs. But this is a proposition that need not and cannot be taken at face value.

The range and depth of Africa's social and economic ills have been such that it is easy to be infected with the enthusiasm of those that see IT as the latest answer to the region's desire for accelerating its development. It may still be possible that IT will offer new opportunities and open new avenues for tackling Africa's numerous problems. But we should also remind ourselves that there is an inherent weakness with placing hopes on technical fixes to address complex socio-economic conditions. Without rejecting the potential benefits of IT for Africa outright, it must be proposed that there are a number of questions that should be addressed if a more realistic view is to emerge regarding the potential benefits of IT for Africans. Following is a list of some of the issues to explore with respect to the transfer of Internet technology to Africa:

1. African Problems and IT based Solutions – Does Africa risk chasing false promises?
2. Sender – Receiver Mutuality of Interests – Common solutions for uncommon problems?
3. Resource Misallocation – Does IT divert scarce resources from more urgent needs?
4. A Culture of Secrecy – Can Information Technology function in a sparse information environment?
5. Targeted use versus the “ability to pay” approach: Will there be under-used tools and unattended needs?
6. Needs driven technology vs. technology driven needs – Will the technique set the priorities?
7. Computers for the people – How high the barriers of maintenance and operation costs?
8. Electricity and Down time – Can IT empower without reliable power?

1. African Problems and IT based Solutions: Does Africa Risk Chasing False Promises?

The developmental challenges that face Africa are both severe and numerous. But they are also unlike those that societies in the West have faced for at least several generations now. In several respects, Africa's problems today are worse today than they were at the time when many of these African states won their independence from colonial rule. This point is worth noting because such deterioration in social and economic fortunes continued to occur even as a multiple of development models were being designed and tested on the continent.

Table 1 offers a brief overview of Africa's painful social and economic situations. These situations contrast strongly with those in the world in general and the High Income Economies in particular. The data represented in the Table have a direct bearing on the on-going discussions regarding the potential impacts of IT in Africa.

Table 1. Africa's Social and Economic Conditions in a Global Perspective

Region	Population Millions 2000	Gross National Income		Life Expectancy at birth years (1999)	Under 5 mortality per 1000 (1999)	Adult illiteracy % of people 15 & above (1999)
		\$ Billions 2000	\$ Per capita 2000			
Africa	659	313.0	480	47	159	39
High Income Economies	903	24,828.8	27,510	78	6	—
World	6054	31,171	5,150	66	78	N/A

Source: Figures are compiled from World Development Report, 2002

At the onset of the 21st Century, Sub-Saharan Africa accounted for more than ten percent of the world's population but only one percent of the world's gross national income. Its average per capita income of \$480 was less than 2 percent of that of the high-income economies and just 9 per cent of the world average. The region's life expectancy is a full 40 percent less than the average for the high-income countries. Its child mortality rate is by far the worst of any region in the world. Almost two-fifths of the region's adult population could neither write nor read. There is a recurring specter of food shortages and famines on a massive scale that continue to dog its people almost every decade.

The implications of Sub-Saharan Africa's relatively bleak social and economic standing on decisions on technology choice are subject to widely divergent and even conflicting interpretations. One interpretation may be that the region is ripe for acquiring and applying huge amounts of information that can help it emerge out of its daunting problems. IT makes such information acquisition fast and more affordable. If the stores of global knowledge and experience from which Africa can benefit were a bit pricey and out of reach before, IT has now placed them within reach of people in the region. It is indicated that from agriculture to medicine, from education to environment, and from industry to commerce, etc., answers and solutions for much of Africa's problems are there for the asking. What is left is for Africans to quickly appreciate the benefits of IT and invest in building the requisite infra- and super-structures. As one African official observed, "We have finally understood that one of the major handicaps to international cooperation lies in the lack of communication and reliable information regarding our societies and culture, the structure of our economies and our reciprocal political objectives."⁶ This comment by President Konare of Mali resonates well with many IT enthusiasts both in and outside of Africa.

Does Africa suffer from a lack of communication and reliable information? Of course it does. Are there areas of African endeavors that can be assisted by improvements in communication and reliable information? There is little doubt that there are. Is IT, in its present form of development and dissemination, slated to meet Africa's needs head-on as President Konare and others envision? This is a more

⁶ Address by President Alpha Oumar Konare of Mali to the UN Economic and Social Council, in "Africa Makes Plea for Technology Funding at UN", The New York Times, July 6, 2000

difficult question that requires a careful study. Only a close scrutiny of both IT's range of various applications as well as a detailed examination of Africa's unique yet disparate needs can help determine the merits and demerits of applying IT to the region's developmental needs.

Any consideration of the application of technology, including IT, is about deciding on and selecting the best available means for overcoming existing challenges to accomplish desired outcomes. It is also about reconciling the original built-in purpose of the tool with a specific and locally originating task at hand. There are numerous examples from Africa's recent past of "turn-key" technology projects that proved disappointing "white elephants." Ill-conceived in their selection, poorly handled in their implementation and lacking the network of technical support and maintenance, they were quickly reduced to useless rusting structures.

Issues of where and why the technology was designed and developed cannot be ignored if the locale and purpose of use represent a significant departure from the local and purpose of original design. If significant differences exist between the environment of design and that of its use, a technology may trigger consequences that are neither anticipated nor even desired. Any benefits that accrue may, in the end, fail to justify the costs incurred in acquiring it. Many challenges present themselves. Given a growing access to a world of abundant and low cost information, will Africa figure its own effective ways to benefit from IT and not be overwhelmed by it? Will Africans employ the flood of IT information resources to irrigate their economic development and avoid being swept away by it? How can such resource be channeled to benefit all layers of African societies? How must Africans approach use of the resources so as to make them relevant and responsive to local African needs? There may be satisfactory answers to all of these questions. But answers must be forthcoming, and these answers will have to clear up and put to rest the concern whether Africa is about to fall victim to yet another false promise.

2. Sender-Receiver Mutuality of Interests: Common Solutions for Uncommon Problems?

IT is a technology whose stock-in-trade is information⁷ generation and transmission. As such, its utility lies in what added value it brings in a sender-receiver interaction. A key feature of IT is the flow of communication between multiple sender-receiver points that it facilitates for its users. What exactly will be the content of the information being communicated between the developed Center and the less developed Periphery⁷ be? And what value will be created as a by-product of these interactions?

With respect to IT and Africa, the communication points can be aggregated to two groups, the IT-rich developed world origin of the technology and the economically and technologically lagging region of Sub Saharan Africa. A two-way communication between these two groups will be greatly advanced by the spread of IT in Africa. But what will be communicated, and how genuinely "two-way" will

⁷ The terms "Center" and "Periphery" were applied in the past to refer to the developed west and the 3rd World, respectively.

the communication be? A casual survey of IT use around the world shows that the similarity or compatibility of problems faced as well as the solutions sought by users on both ends of the IT medium do matter. For instance, much IT communication in the Center takes place between clusters of individuals with professional, social, cultural or other interests that they share in common.⁸ To borrow a terminology from American football, IT provides a platform for such groups to huddle and connect. This clustering of communication takes place because these individuals are drawn to each other by the particular nature of the common concerns felt, the goals subscribed to, the methods pursued, and the specialized languages applied. They share common problems, and they seek common solutions. They have access to resources and they enjoy an extensive array of technical and institutional supports. It is these shared values of groups in a supportive environment that animates and sustains the use of IT. A question to ask here is: Whose information cluster does Sub-Saharan Africa belong to? What communication huddle can it join? Once it acquires the means for surfing the web, whose data bank will it use and whose research needs will that accommodate?

When one considers the sources of current IT materials and the purposes for which they have been developed, they are mostly by, for, and about one or two countries at the Center. A UN report indicates that only 0.02 of the contents of the World Wide Web originate in Sub-Saharan Africa (excluding South Africa).⁹ There should be no surprise here. But the implications of this should not be overlooked. It means that so much of the information developed and transmitted by IT is just by that one side only, and the information so generated is mostly intended to meet the needs of that one side. As Castells observes, "The fact that the rise of the internet took place in conditions of social inequality in access everywhere may have lasting consequences on the structure and content of the medium, in ways that we still cannot fully comprehend".¹⁰ In this context, one should ask whether the goal specific content and form of information designed for use in the Center is transferable for use in the Periphery. The question carries significance because "...first users may have shaped the Internet for the latecomers, both in terms of content and of technology, in the same way that the pioneers of the Internet shaped technology for the masses of users in the 1990s."¹¹ Being the latest of the latecomers, Africa will be forced to contend with trying to use a tool that is ill suited for its own needs. And given the theme in this paper of the impact of IT on economic development, it is important to explore whether the promises attributed to IT are realistic or just mere wishful thinking. Is it possible for this promise to be blunted by the real divergence of needs and interests of the Center that developed the technology from that of the periphery that belatedly receives it?

Here of course one encounters another problem in defining need in the context of the Sub-Saharan Periphery. IT enthusiasts have been pointing to the growing popularity of email and Internet cafes in several parts of Africa. And such popularity can be interpreted as a measure of IT meeting the needs of people on the

⁸ See Appendix

⁹ <http://www.un.org/ecosocdev/geninfo/afree/voll3no4/17eca2.htm>

¹⁰ Castells, p. 255

¹¹ *Ibid.*, p. 255

continent. If so, the point about the divergence of needs between the Center and the Periphery can be dismissed as being no point at all. And the only thing that stands in the way of IT fulfilling its potential to assist development in Africa is the failure to carry out its dissemination and widespread use. More hardware and better infrastructure is all that is needed for that potential to be realized. Seen in this light, it is easy to understand why leaders like President Konare proposed that a debt relief scheme be introduced in which 15 percent of Africa's debt to the international community be applied to develop the region's Internet capability¹².

The sense of urgency for Africa to adopt IT stands against a stark backdrop of crushing poverty and major social crises. The latest WHO report indicates that over 29 percent of the population is infected with HIV or AIDS. According to the latest World Bank report seventy percent of Africans still live in the rural areas. A full 40 percent of African adults can neither read nor write. So much of the region's population lives in grinding poverty, and an end to these problems is no where in sight. (See Table 2)

Table 2. National Poverty Lines in Africa: Population Below the Poverty Line (%)

Country	Survey Year	Rural	Urban	National
Cameroon	1984	32.4	44.4	40.0
Chad	1995-96	67.0	63.0	64.0
Guinea	1994	...	...	40.0
Kenya	1992	46.4	29.3	42.0
Lesotho	1993	53.9	27.8	49.2
Madagascar	1993-94	77.0	47.0	70.0
Malawi	1990-91	...	...	54.0
Mauritania	1989-90	...	...	57.0
Niger	1989-93	66.0	52.0	63.0
Rwanda	1993	...	...	51.2
Sierra Leone	1989	76.0	53.0	68.0
Tanzania	1991	...	...	51.1
Zambia	1993	...	...	86.0

Source: *World Development Report 2002*. Pp.234-35

Eighty-six percent of Zambia's population lies below the national poverty line, and several countries, including Cameroon, Chad, Guinea, Kenya, Lesotho, Madagascar, Malawi, Mauritania, Niger, Rwanda, Sierra Leone, and Tanzania have 40 to 70 percent of their citizens below the national poverty levels.

The social and economic conditions prevailing in these countries point to problems and challenges that are at variance with those found in the IT advanced countries. Given that, the preceding indicators should raise issues regarding IT and Africa at least at two critical levels. First, how relevant is the library of information at the Center to addressing the long list of problems that Sub-Saharan Africa currently faces? Second, how well can Africa, with all its social and economic ills, afford to acquire and then maintain an effective use of a technology designed to support, and be supported by the relatively advanced institutions and infrastructures of the prosperous Center?

¹² *The New York Times*, *op.cit.*

3. Resource Misallocation: Does IT Divert Scarce Resources Away from More Urgent African Needs?

Africa's dire economic situation makes it especially important that the continent's scarce development resources should be carefully allocated with the aim to generate optimum social and economic benefits. Each dollar spent must produce the greatest possible gains, whatever the area of investment may be. As an example, the goal of developing Africa's agriculture may be pursued along a range of different methods and paths. But adopting a capital-intensive course of agricultural development may not be justified because that will end up displacing labor and adding to the already serious problem of unemployment while the import of costly machinery will worsen deficit and debt situations. Such choice of technology will also tend to serve the interests of a few large farmers at the expense of the many. Likewise, the goal of providing better transportation in Africa is itself defensible. But building multi-lane expressways that serve a limited number of users may not be the most effective use of precious scarce funds. In addition, such a misplaced priority will lead to the diversion of funds and the crowding out of other critically needed projects. Both will have resulted in setting-back the goals of development instead of advancing it.

The above observation is equally applicable to the IT issue as well. If IT's potential for Africa lies in its promise of placing the region on the information highway, we need to inquire how exactly that can be accomplished on a continent beset by severe educational deficits, unreliable telecommunications system, and intermittent power supplies. And assuming that the region somehow succeeds in getting on the information highway, where does it get its skilled IT drivers in sufficient numbers to make an effective use of the technology? How can Africa benefit when so much of its population may not have the ability to read and understand the instrument panels of the fast moving vehicle that IT is and will become?

The real constraint to knowledge and skills dissemination in Africa may just turn out to be more the dearth of schools and basic school supplies and less the continent's humble standing on the digital divide. As Africa Recovery, A UN Publication, observes:

By virtually any standard, education in sub-Saharan Africa lags far behind most other developing regions. One obvious reason is that the continent is the poorest. Without large and growing economies, governments have very limited tax bases to finance public school systems, while the bulk of African families cannot afford the high fees charged by private schools.¹³

In addition to being afflicted by endemic poverty, the region also faces more than its share of income and wealth inequalities. Some of the world's highest Gini indices (a measure of income inequality) are claimed by Sub-Saharan African states. Accordingly, Africa finds itself in a situation in which the vast majority of its population may not afford to pay for its children's schools and schoolbooks. This simple fact is significant for at least two reasons. First, if schools are currently too

¹³ *Africa Recovery Special Report 14, 2* (July 2000)

much of a luxury for Africans to afford, IT should be doubly so since both its acquisition and maintenance require far more resources, well established infrastructures, and advanced skills. Second, the low level of education means that there are far too few people in the region who are able and prepared to make a meaningful use of IT to exploit any potentials that the technology may have for development.

This, however, does not mean that IT as a product will not find a market niche in Africa. Just as it is obvious that widespread and severe poverty has dogged the people of the region, it is also equally obvious that there is a small, but affluent, minority of Africans that can and will buy even top of the line IT products and services. But it is important to explicate a key point here. If IT's prospects in Africa concern its commercial viability as a luxury consumer product for the wealthy elite, there can be no issue or controversy at all. Of course IT can enjoy popularity within this group of consumers in Africa as it has elsewhere around the world. However, if the issue of IT viability in Sub-Saharan Africa concerns, as it should under the perspective that is adopted here, its contribution to the region's economic development, that becomes a wholly different question.

Economics draws a distinction between purchasing a product for consumption and acquiring it as a tool for investment. This distinction, it may be argued, is especially important in a situation where production, employment and income generation take place within one economy while consumption spending occurs within another. It is also doubly important if the situation involves a lopsided trade relation in which one party to trade has persistently enjoyed trade surplus at the expense of the other. Here IT becomes just the latest imported product whose relatively high share of the family or national budget crowds-out spending on other more urgently needed items. Yet, for all its cost and crowding-out effect, the benefits that IT brings either to the family or the nation are still less than clear. This, it may be argued, is the situation regarding IT and Sub-Saharan Africa today.

The issues that arise regarding national priority setting, rational use of resources and IT in the context of development are somewhat reflected in the contrasting experiences of Sub-Saharan Africa and the sub-continent of India. The former has generally approached IT from a fear of being left behind and becoming a victim of the latest developmental deficit or consumption fad, in the "digital divide." The latter country has become an important player not as a consumer of IT, but as a contributor to the development of IT itself. As Africa is urged to spend what ought to be its education budget on acquiring IT resources for some ill-defined goal, India mobilizes its large educated manpower to develop its own IT industry and profit by it.

Fundamental to the differences between the two experiences is the historical record of development of schools and education in the two regions. India has made extensive and far-sighted investment in its education system going back to its early days of independence. With its large population of college graduates educated in science, mathematics, and engineering, India found itself well positioned to benefit from the IT revolution. For this segment of India's population, IT has facilitated production, employment, and high income. It is also interesting to note that India did not go out seeking IT; IT came seeking India. In the case of India at least, IT's distinction is not so much for facilitating the sub-continent's development but for making a more efficient use of an already well developed resource, India's educated young. It is thus noteworthy that India's education helped develop IT, and not the

other way around. It appears that a nation needs a well-developed national knowledge base to make an effective use of IT more than it needs IT to build its national knowledge base. This is an important point that has implications for national priority setting in Africa. Bangalore and Hyderabad command the respect of the IT industry around the world because IT *needs* their assembled brain power. And such brainpower is the product of an established and well-managed education system.

The point that needs to be emphasized is this. Having the sizable educated population that is capable of both producing and making full use of IT, there is little risk that India will be saddled with inappropriate technology whose costs outweigh its benefits. Lacking such an educated population in large enough numbers, there is a great likelihood that Sub-Saharan Africa will run such risk. The risk is that its returns on IT investment will fall far short of justifying the unavoidable sacrifices in scarce resources—which resources are desperately needed to develop its rudimentary system of education.

One argument that is often mentioned is that IT will help accelerate the development of education in Sub-Saharan Africa. But there has been little or no evidence to support this. The point also ignores the problems associated with accessibility of the technology. Even in the developed countries, entire school systems have been locked out of IT because their education budgets are too limited to sustain the large outlay needed to equip their schools with the required technology. Their students find themselves falling through the cracks of the digital divide right in the middle of the IT revolution that goes on all around them. It is likely that IT in the African context will inject greater discrepancy in access to education and knowledge between the affluent few and others. It will, in the process, divert resources away from providing the benefit of basic and essential education that the majority of the region's school age children desperately need.

4. A Culture of Secrecy: Can Information Technology Function in a Sparse Information Environment?

The difficulty of getting information out of government ministries and other agencies in Africa is all too common. An observer of the African IT scene points out, "People and organizations are not in the habit of sharing information."¹⁴ Such difficulties often arise even with respect to data that the public is entitled to have access to. There seems to exist a culture of secrecy that prevents the flow of information even between the various agencies of the government itself. Academic researchers and other members of the public must contend with even less access to a wide category of information that is readily accessible in many of the developed countries.

There are several factors that give rise to this culture of secrecy in Sub-Saharan Africa:

- a. Government officials treat their agencies as personal fiefdoms, and they exercise proprietary control over agency related information;

¹⁴ B.M. Chivhanga. An Evaluation of the Impact of the Internet in Africa. *Aslib Proceedings*. London, Nov/Dec 2000, p.5

- b. Control of information permits "economic rent" seeking behavior in which functionaries demand payments (bribes) for allowing access to information;
- c. There are no sunshine laws requiring government agencies to release information about their activities to interested members of the public;
- d. Information does not often exist in assembled and organized form to be made readily available upon request by members of the public;
- e. There are political and career risks to agency officials from releasing embarrassing information;
- f. There is a tendency to classify information because access to it may result in discontent, dissension, challenge to authority and political instability;
- g. The lack of a tradition of a free and independent press discourages investigative journalism and removes an important information intermediary between government agencies and the public;
- h. The absence of an extensive network of civic organizations means limited pressure for accountability and transparency on the part of government and its various agencies.

Not all of these obstacles to information flow are unique to Sub-Saharan Africa. For example, withholding information to avoid embarrassment to high-placed persons or an agency is a problem that affects even the most advanced countries. But all of the obstacles above represent severe barriers to the flow and exchange of information among various groups and sectors in Africa. This results from a general perception of information as a potentially harmful weapon instead of a tool for enlightenment. As a result, African journalists, academics, writers, social and political activists, and others who are in the business of seeking and producing information have to watch their steps because they risk offending powerful authorities.

For these and other reasons, information flow is quite restricted in practically all of the countries in Sub-Saharan Africa. Given the fact that governments in the region enjoy near monopoly control over social and economic data, the restriction places a chokehold on availability and use of information. This is another important point that has serious implications to the viability of IT and its instrumentality for development. As an observer points out, "...people place less reliance on local information resources, preferring instead to use external sources...Government departments increasingly refer to overseas sources on information about local conditions."¹⁵ A question that must be asked is where these overseas sources obtain their information about local conditions in the first place. How can the reliability of such information be established? Will IT in Sub-Saharan Africa be able to provide service beyond a mere capacity to download information of doubtful value from "overseas sources"? Or, can we just accept that what the Center knows and chooses to know in terms of information about the region is adequate to make IT a still viable instrument of development in Africa?

There is an old caveat from the field of information management: "Garbage in, garbage out!" Given the paucity of information flow that will satisfy the public's need to know, IT may end up becoming an information technology without information. Is there now a need to ponder a new caveat: "Nothing in, nothing out"?

¹⁵ Chivhanga, *ibid.*

5. Targeted Use vs. the “Ability to Pay” Principle: Will there be Underused Tools and Unattended Needs?

A recurring theme in the field of development has been whether the process of economic development should be carefully managed and directed or whether it should simply be left to guidance from the more subtle and invisible hand of the market. The theme gains in added controversy when the approach of directed development is linked to issues of government influence and control. But this controversy need not muddy up an important matter that ought to be looked at carefully. When considering the role of IT in development, the issue simply becomes whether optimum results could be obtained if the technology is carefully directed and applied in those sectors where returns on IT investment are expected to be the highest. In other words, should IT for Sub-Saharan Africa follow a principle of “targeted investment”?

A targeted investment strategy involves the identification and selection of key or leading sectors of the economy to be favored with a generous injection of finance and other needed resources. This approach of selective nurturing of favored sectors is not uncommon, and it is especially appropriate when the resources that a society can mobilize are severely limited – as they are in Sub-Saharan Africa today. There are examples of successes from recent history. The most successful of these is the experience of post World War II Japan. There, the important Ministry of International Trade and Industry (MITI) systematically picked winner industries that were intended to pull behind them the rest of the economy on a path of rapid growth. These leading industries were slated to receive massive injections of resources, finance and technology to ensure their accelerated development. South Korea followed a similar path during the early stages of building up its economy. While both the context and scale of IT strategy in Africa are different from those represented in these two countries’ experiences, there are still some useful lessons for the region on how to make the most use of the resources that are in short supply.

There clearly are both advantages and disadvantages to a targeted IT investment approach. The advantages are that a carefully selected target list of IT applications will yield the maximum use and benefit. Such targeting will take into account such things as:

- a. Knowledge/information-intensity of work done by an agency
- b. Availability of skills relevant for the full utilization of IT resources
- c. Frequency of necessary cross-boundary agency contacts both within and outside of the country
- d. Where possible, a rational approach with a prior determination of quantifiable streams of returns on IT investment

Any or all of the above criteria can justify an agency being a targeted beneficiary of IT investment. An academic or research institute will qualify on the basis of more than one criterion. What is important about such a method is that IT resources in Sub-Saharan Africa will be channeled to areas of their maximum possible use. It will also help prevent the kind of rancor and rivalry among agencies that will result in too much money spent on the purchase of too many IT resources that will see too little actual use.

There is no doubt that such intrusive manipulation of the flow of any resource will encounter disfavor in some quarters. Some arguments against this

approach can be legitimate in that they can be based on an understanding of the very nature of the technology itself. This has to do with the fact that IT's potential as an information highway is directly related to the increase in the number of IT users that are connected to each other. This is true for its global application, as it is true for its application regionally and within individual countries. But such a selective and targeted use approach is bound to leave many gaps in the IT network of Sub-Saharan African countries. These gaps will mean sub-optimal use and reduced benefits of the technology. A targeted use will thus end up giving rise to one form of problem even as it seeks to circumvent another kind of problem. Targeting sectors for IT use is also likely to run into another type of disfavor. In the conventional economic wisdom, what will enjoy favor is the unhindered mechanism of the market to settle questions of who or what has access to how much resource, including IT. The preference will thus be for the market to deal with the dissemination of IT in Sub-Saharan Africa.

Under the logic of the market, the dissemination of IT will be governed not so much by who makes the best use of the technology, but by who has the ability to pay. This often works out well where the product in question is a consumer good like a pair of shoes or even a luxury car with no potential to contribute to productivity and development. It also works well in societies where income distribution is not severely skewed and rational decisions on investment spending are the norm. But in the context of IT and Sub-Saharan Africa, the ability to pay principle may run the risk of placing the entire IT resource in the hands of those with the least inclination to put it to development use. If that happens, a precipitate and headlong jump on the IT bandwagon may lead the region further down the road of harboring under-utilized tools along side numerous unattended needs. And the new technology will end up becoming yet another status symbol for a status-conscious African elite.

6. Needs-Driven Technology vs. Technology-Driven Needs: Will the Technique Set Africa's Priorities?

Perhaps a unique dimension of IT that sets it apart from most other products is that it can be both a consumer product as well as an investment good. It can also be a symbol of status as well as a means of production and productivity. A director of personnel in a large agency may benefit greatly from use of computers to organize and manage a large volume of data. On the other hand, a government official may prominently display a computer on his desk more for the aura of modernity and authority that it bestows than for the practical benefits that it renders. There is a sense in which these dual roles of IT may end up competing or even being in conflict with each other. A computer-illiterate official who obtains a computer to decorate his desk will deprive a computer-savvy employee of the use of the equipment. Potentially useful and productivity enhancing equipment will lie idle because its utility as a status symbol overshadows its role in production. At the same time, costs incurred in acquiring it will use up funds that should be allocated for other agency needs.

It may be argued that such problems have less to do with IT itself and more with work place culture and the quality of organizational management. This clearly is indeed about the region's work culture and management style. But culture also describes the context in which IT will have to be employed. As such, work culture and management style are not beside the point. They are very much about the point

that institutional idiosyncrasies will interfere and hamper the effective application of IT in Africa. Increasingly, several categories of modern technology products are being sought as status symbols for the image conscious as for the practical benefits that they produce. This is especially the case in developing countries such as those in Africa. From high priced cars that bounce on on rutted streets, to cell phones that rarely work, and to national airlines whose revenues fail to pay for their keep, one sees examples of glitzy technology that spark desire and give rise to new needs. Instead of the technology being developed in response to existing needs of people, people's needs are being developed in response to existing technology. In other words, we have technology inspired and technology driven needs.

Where a computer system is acquired as a status symbol, it represents a technology driven need. It is the symbolism that goes with owning the technology that gives rise to the need for acquiring it. In itself, such attachment to symbols may not be harmful. It also has its own utility in offering psychic rewards to the owner of the computer. But a computer that is employed for such purpose will be of limited value to society. It will mean a thin layer of users, and an even thinner use of IT. In such technology driven need, IT becomes more a toy for amusement than a tool for progress. It will have fallen far short of its promise as a means for solving existing social or economic problems.

7. Computers for the People: How High are the Barriers of Maintenance and Operation Costs?

The desire to bring IT to Africa perhaps runs into its most daunting challenge when the issue of cost is introduced. Bridging the digital divide will not be a low cost venture. It is all too familiar by now that the cost of acquiring and maintaining IT facilities involves the allocation of considerable sums of money. The lifecycle of both hardware and software products are such that constant up-grades must occur at regular intervals. System breakdowns are all too common, and a budget for a stand-by army of well-paid technical experts is an essential element in the IT bill. Once agencies come to depend on the technology, unattended problems can mean a major loss in work time, production, and income.

A significant aspect of any advanced technology is that it entails some trade-off for its users. It raises the efficiency of work thereby greatly enhancing the productivity of labor. This is good. But it also induces greater dependency of humans on technology. And this can be bad because technology cannot be relied upon all the time. Breakdowns occur, and disruptions may come from numerous quarters. With respect to computers and IT, down times are present even with the best-maintained systems. Attacks by hackers are frequent occurrences, as are virus and worm infections. This raises the cost of maintenance and operation as it will require a great deal of resources, both money and manpower, if a system is to be kept in operation. In other words, IT use is resource intensive. If the resources for keeping it in operation are not forthcoming, the benefits will quickly evaporate and the large outlay for acquisition would have proved to be a waste.

Poor maintenance will have an even greater and adverse impact once IT use is allowed to spread in various walks of life. For, it is in the nature of such technology to foster dependence. It is easier to find alternative methods of doing things if the technology in use is relatively simple and uncomplicated. For example, there can be numerous substitutes to the bicycle mode of transportation, but there is

hardly any suitable substitute for transportation by air. The more advanced the technology, the more specialized its functions and, therefore, the more difficult it becomes to find substitutes for it.

The benefits of speed, convenience, and productivity that advanced technologies make possible are the very cause of a special type of dependency that grows among users. While this dependency is amply rewarded so long as the technology is up and operating reliably, it can leave its users immobilized and with very limited options when it is not. Once a society becomes dependent on such advanced technology, the consequences of breakdowns are often incalculable. In other words, such technology cannot be permitted to fail.

With respect to Africa's LDCs, this presents two equally unpalatable choices. Either all necessary resources get committed as and when needed to ensure proper maintenance and the smooth operation of all systems, or the society will have to tolerate the frequent breakdowns and work interruptions that improper maintenance entails. The first would lead to diverting the precious scarce financial and skill resources of the region from other development enhancing projects. Instead of being used to build schools and hospitals, funds will be tied-up in endless maintenance of fast depreciating IT assets. The second presents no better choice as unattended system breakdowns will generate cascading costs in lost businesses and disrupted services. The choice becomes between the impossibly high bill of maintenance and the damaging results of breakdowns. It is a choice that the African LDCs would do well to avoid.

8. Electricity and Down Time: Can IT Empower without Reliable Power?

A common aspect of developing countries such as those in Africa today is that their infrastructure sectors are undeveloped and their operations unreliable. This is especially so regarding the availability and reliability of electric power generation. Power supplies are down for long hours and frequently. The further one moves away from the major city centers, the less likely that any power supply exists at all. This presents a major obstacle to efforts to introduce IT beyond the urban confines of many African states. But the problem of power failures and business disruptions are severe even in the major cities. The following observation in an African journal points to both the problem and some of its causes.

Even the current power shading which puts users two days a week in darkness is not being implemented according to the schedule. In many areas, users have noticed frequent power interruptions outside the announced power-sharing schedule. Strangely enough, power failures and blackouts have started happening more frequently.

Rundown electric power plants gasp and die at peak power load (usually when the lights are turned on at dusk). And it is also difficult for many households to bake injera any time they want.

Sometimes the lights come on again after a few minutes, while the waiting could last for hours. A blown fuse in a transformer may mean days before overworked maintenance crews attend to problems. A fractured bearing somewhere in a hydroelectric installation may mean no electricity for days.

Continuous stealing of electric poles and wires contributes to the perennial disruption of power in different towns.

In a nutshell, the existing electric power shows rampant problem of efficiency as well as distortions in the consumption pattern of the entire system.¹⁶

It is clear that dependence on hydro-based electric generation in Africa has many problems. There is frequent drought and the attendant drop in reservoir water. Deforestation causes widespread erosion, sedimentation, flooding and a dwindling capacity to conserve water. River channels and reservoir beds are allowed to silt up, thus rendering existing power generating capacity ineffective. Turbines sit idle even as the demand for electric power goes unmet.

It may be possible to circumvent the power crises by introducing the use of alternative sources of energy. Once a reliable power supply is secured, then IT use in Sub-Saharan Africa can still be feasible. However, alternative energy resources bring with them other problems, including availability and cost. Such energy sources often cost too much for individual users to acquire by their own means. Government subsidies to facilitate the provision of alternative energy projects runs into the usual problem of extracting new funds from impoverished national treasuries. There may be a role here for non-governmental organizations (NGOs) and bilateral agreements to intervene to supply the needed funds for alternative energy projects. There are a few examples of developed country programs targeting the funding of such projects. But these are few and limited in scope. External assistance to develop IT in Africa can neither be expected nor relied upon over the long haul. After all, Africa's needs for IT are far less compelling to potential donors than are the many other persistent problems that are far more basic and urgent.

Conclusion

The term "digital divide" is widely used in any discourse involving the IT revolution and Africa. It has come to convey at least three separate but related messages. One message is simply descriptive; it recognizes the current state of IT development in Africa, which places it far behind the rest of the world. A second meaning has a normative message attached to it. It suggests that the divide is a matter for concern for Africans and others who wish to see the continent get itself on the information highway. The third message comes mostly, from African IT enthusiasts, and it is embedded with somewhat dire warnings about the continent's future if it does not jump on the IT bandwagon as soon as possible.

The discussion in this paper is mostly in reply to the kind of IT advocacy that is represented in the third message above. In its singular emphasis on treating IT as a panacea for the continent's ills, this advocacy tends to overstate the benefits and fudge the costs of launching Africa on to the information highway. But the continent can ill-afford not to first carefully examine the costs and benefits of any major investment decisions that it undertakes. It is difficult to ignore the many benefits that IT has brought to modern societies. But it is equally difficult not to see that these benefits are best realized in a context. This context calls for the presence of several elements conducive to the effective application of IT. These include frequent and growing needs that are receptive to IT use, expanding and accessible supply networks, affordable provider/maintenance services, and functioning power and

¹⁶ http://www.ethiopianreporter.com/eng_newspaper/Htm/R352/r352eco1.htm

communications infrastructures. In the absence of such a context of use, the benefits of investment in IT by African LDCs will remain a virtual dream. While the benefits fail to be realized, the costs of such investment can be real. Given the severe shortage of investment funds that these countries continue to face, spending on IT projects is certain to crowd out other investments in more urgently needed fields such as education, health, transportation, environment, etc. Given these considerations, the widespread introduction of IT into Africa must first await the further development of those enabling infrastructures that are indispensable for its effective application and use.

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Appendix

Examples of IT communication clusters from Yahoo web site

Business & Finance

Employment, Investments, Industry

Computer & Internet

Cyberculture, Internet, User Groups...

Entertainment & Arts

Movies, TV, Books...

Family & Home

Gardening, Genealogy, Parenting...

Games

Cards, Computer, RPGs...

Government & Politics

Law, Military, Parties

Health & Wellness

Beauty, Fitness, Support...

Hobbies & Crafts

Antiques, Collecting, Models Music, Rock & Pop, Rap, Country...

Recreation & Sports

Travel, Cars, Outdoors

Regional

U.S.: States, Countries, Regions...

Religion & Beliefs

Christianity, Islam, Judaism, Paganism

Romance and Relationships

Anniversaries, Heartbreak, Marriage...

Schools & Education

Classmates, High Schools, Colleges...

Science

Astronomy, Biology, Pets...