ICTs as Tools for Poverty Reduction

By

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Abstract

Tanzania is one of the 191 United Nations Member states that have pledged to meet the eight (8) UN Millennium Development Goals (MDGs) by 2015. The first goal of these UN-MDGs is on eradication of extreme poverty and hunger. In response to this pledge, Tanzania restated the UN-MDGs and came out with its own nine (9) TZ-MDGs, the first of which is correspondingly on eradication of extreme poverty. Targets for achieving this first TZ-MDG are articulated in the National Poverty Eradication Strategy (NPES). The set timeline for the goal is to halve extreme poverty (measured by income and expenditure) by 2010 and eradicate it by 2025, which corresponds to the articulation of the goals of the National Vision 2025. It is also acknowledged that the new opportunities that Information Communication Technologies (ICTs) is opening up can be harnessed to meet the goals of the Vision 2025 as well as the TZ-MDG on poverty reduction. In addition to creation of new opportunities for prosperity, ICTs within networked environment embody enormous knowledge for empowering people and can massively reduce business transaction costs, change the structures of markets and of public services and institutions, integrate global and local markets, un-trap human resources and immediately increase the potential of the human capital. The framework for appropriating ICTs for national development and poverty reduction is articulated in the National ICTs Policy.

This paper attempts to enhance the understanding and knowledge of ICTs in relation to the National ICT Policy and explores the evolving frontiers of this pervading technology as it impacts on education, commerce, social, cultural and economic life of the poor Tanzanian people. The paper also attempts to show case examples of ICT national projects in Tanzania to demonstrate how the Government of Tanzania, entrepreneurs and some of the rural communities are appropriating ICTs to fit into their needs. Attempt is made to stimulate debate to reflect on perspectives, trends and potential of using ICTs to develop innovative approaches and methods for poverty reduction. Since these ICTs are not solutions to social problems by themselves, they must be carefully chosen and implemented for each appropriate purpose. For this reason, the engineers, as technologists and social experimenters, have an important role to play to help the Tanzania society in the appropriation of ICTs for development and poverty reduction.

1. INTRODUCTION

Tanzania is one of the 191 United Nations Member states that have pledged to meet the eight (8) UN Millennium Development Goals (MDGs) by year 2015 [1]. These goals are: (a) *Eradicate extreme poverty and hunger*, (b) *achieve universal primary education*, (c) *promote gender equality and empower women*, (d) *reduce child mortality*, (e) *improve maternal health*, (f) *combat HIV/AIDs, malaria and other diseases*, (g) *ensure environmental sustainability and* (h) *develop a global partnership for development*. In response to this pledge, Tanzania restated the UN-MDGs and came out with its own nine (9) development goals, herein to be referred to as TZ-MDGs, namely [1]:

(a) ***Extreme poverty*** - Halve the proportion of people living below the national poverty line by 2015.

(b) ***HIV/AIDS*** - Halt and reverse the spread by 2015.

(c) ***Hunger*** - Halve the proportion of underweight, under-five year olds by 2015.

(d) ***Basic amenities*** - Halve the proportion of people without access to safe drinking water by 2015.

(e) ***Primary education*** - Achieve universal primary education by 2015.

(f) ***Gender equity*** - Achieve equal access for boys and girls to primary and secondary schooling by 2015.

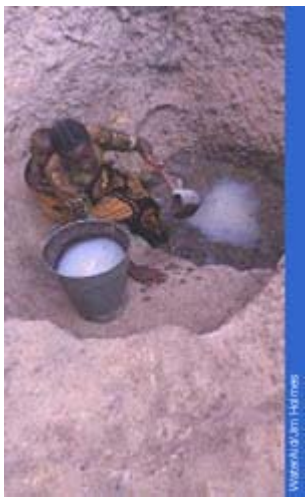
(g) ***Reproductive health*** - Reduce maternal mortality ratio by three-quarters by 2015.

(h) ***Under-five mortality*** - Reduce under-five mortality by two-thirds by 2015.

(i) ***Environmental sustainability*** - Reverse loss of environmental resources by 2015.

The focus for this learned discourse is on the first TZ-MDG, which is on eradication of extreme poverty. Poverty in Tanzania is characterized by low income and expenditure, high mortality and morbidity, poor nutritional status, low educational attainment, vulnerability to external shocks like natural disasters (e.g. drought, pests, diseases and floods), and exclusion from economic, social and political processes. Poverty is particularly widespread in the rural areas, but is not insignificant in urban areas. There are also important regional and district differences in the levels and specific dimensions of poverty. Those most at risk of being trapped to live under poverty are young children and youths, the elderly, women, those in large households and those involved in subsistence agriculture, livestock production and small-scale fishing (see Figs 1 and 2).

Figure 1: Subsistence farming is characteristic of Poverty in Tanzania.



(a) **(b)**

Figure 2:: (a) Small-scale fishing and (b) lack of access to clean water are also characteristics of Poverty in Tanzania.

Targets for achieving the first TZ-MDG on poverty eradication are articulated in the National Poverty Eradication Strategy (NPES) [2]. The set timeline for this TZ-MDG, which is more ambitious than the international one (2015), is to halve extreme poverty (measured by income and expenditure) by 2010 and eradicate it by 2025, which corresponds to the articulation of the goals of the Tanzania Development Vision 2025 [3]. The Development Vision 2025 aims at guiding Tanzania to achieve five goals by year 2025, namely: (1) *high quality livelihood*, (2) *peace, stability and Unity*, (3) *good governance*, (4) *a well-educated and learning society*, and (5) *a strong and competitive economy capable of producing sustainable growth and shared benefits*. Overall, the Vision foresees that by the year 2025: "*Tanzania should have created a strong, diversified, resilient and competitive economy, which can effectively cope with the challenges of development and, which can also easily and confidently adapt to the changing market and technological conditions in the regional and global economy*". The challenge is therefore to mobilize massive resources towards the realization of the Vision 2025 goals.

Let it be stated at this point that the Government of Tanzania has already acknowledged that Information Communication Technologies (ICTs) can be harnessed to meet the goals of the Vision 2025 as well as that of the TZ-MDG on poverty reduction. The framework for appropriating these ICTs for national development and poverty reduction is articulated in the National Information Communication Technologies Policy [4]. In the policy framework, it is clearly shown that ICTs are cross-cutting in nature. It is timely to note that this cross-cutting nature is also an attribute well shared with poverty. As such therefore, ICTs can indeed be appropriated as tools for realizing effective communication processes to achieve, among others, distribution and sharing of knowledge and information for supporting poverty reduction initiatives. In broad terms, ICTs refer to any technique or knowledge used to create, store, manage and disseminate information. They include simple information centres with notice boards, books, brochures, posters and newspapers, simple content systems running on cheap (safely disposable) hardware, e.g. audio and video cassettes, disconnected mailing systems, to locally browse-sable content accessible through a range of electronic technologies such as telephone, fax, television, and radio. Modern ICTs include the Internet, email, computers, mobile phones, digital cameras, on-line databases and portals.

In a sense, ICTs enables communication, a process that links individuals and communities, governments and citizens, in participation and shared decision-making. This is done through use of a variety of ICTs to engage, motivate and educate citizens of opportunities for development and poverty reduction. In this way promoting changes in peoples attitudes and behaviours and thus increasing their participation in the development or poverty reduction processes [5].

This paper attempts to enhance the understanding and knowledge of ICTs and explores the evolving frontiers of this pervading technology as it impacts on education, commerce, social, cultural and economic life of the poor Tanzanian people. The paper also attempts to show case examples of ICTs national projects that demonstrate how the Government of Tanzania, entrepreneurs and some of the rural communities are appropriating ICTs as tools to fit into their needs and empower themselves to fight poverty. Further, attempt is made to stimulate debate to reflect on perspectives, trends and potential of using ICTs to develop innovative approaches and methods for poverty reduction. An old adage states that knowledge acted upon is power, but only if shared! In line with this understanding, the paper intends to demonstrate that ICTs is a set of tools for knowledge sharing, which is a proven powerful means for poverty reduction.

2. What is Poverty and What Really Causes it?

Widespread and persistent poverty in Tanzania is the main development challenge since the 1990s. Currently, about 40% of the population lives below the basic needs national poverty line [6], that is a population surviving on less than US$2 per day. A debatable issue arises here:

what really does poverty entail? Poverty is often viewed from income-based perspective as lack of income and measured in terms of income and expenditure. In recent years, however, the concept has been enlarged. Poverty is now seen as a multi-dimensional concept that is the opposite of well being, which includes more than income. Therefore, apart from the inability of poor people to meet basic needs (such as nutrition, clothing and shelter), poverty also refers to disadvantages in access to land, credit and services (e.g. health and education), vulnerability to violence, external economic shocks, natural disasters, powerlessness and social exclusion [7, 8].

Poverty is what a poor person or citizen experiences or feels. It covers all those who can not cope with survival, security, and enabling needs. The poor experience shortfalls in economic welfare; gaps in access to good quality education and health care; deficiencies in the provisions of physical infrastructure; and political barriers that stifle personal initiatives and self-development. They are unable to participate in governance, which is necessary for a healthy democracy and peaceful development. According to the Government Poverty Reduction Strategy Paper (PSRP) [9] and the Poverty Monitoring Master Plan (PMMP) [10], people living in poverty in our society are re-identified to include: illiterate people; unskilled labourers; self-employed micro entrepreneurs; subsistence farmers; women; children; and population living in remote areas (rural). In this group those that are extremely vulnerable include: Children, persons with disabilities, youths, elderly, people living with HIV/AIDS; women, drug addicts and alcoholics.

Poverty, the simplest indicator of alienation [11], causes a citizen to feel devalued, resentful, frustrated and angry. An alienated poor citizen feels isolated, estranged, rejected, left out. It means to feel treated as less than a human being. Poverty is a social evil because it encourages corruption; child abuse (see Fig.3), anti-social activities like drugs smuggling, wars, prostitution, and all sorts of deviant behaviour. Poverty is also often portrayed as an exclusively rural phenomenon. However, vast pockets of poverty and deprivation also exist in urban and semi-urban areas.

H. E. Mr. Nelson Mandela recently challenged the world to make the year 2005 a year of great opportunity to make poverty history [12]. He said, "*like slavery and apartheid, poverty is not natural. It is man-made and it can be overcome and eradicated by the actions of human beings*". This inspiration reminds all of us that poverty is and should always be considered an unacceptable human condition.

Figure 3: Poverty leads to Child labour.

Mr. Mandela went further to qualify his feelings by saying that: "…*poverty is a disorder; …poverty is a prison; …it is a social evil*". These views are unfortunate at times in which the world boasts of breathtaking advances in science, technology, industry and wealth accumulation. That is, despite the vast advances that are being made in the spheres of science and technology, medicine, capital mobility etc., income disparities are ever widening, both within countries and between nations. This imbalance in equity is characteristic of alienation, a nature in each of us human beings. We have alienation between developed and developing nations; alienation between civilizations or cultures; alienations within our nation (regions, districts, etc.) and even alienation within our families. Therefore, overcoming poverty, a consequence of alienation, will require the full participation of every member of our Tanzanian society. We can not afford to see about half of our population (~ 40%) feeling like second class citizens!

With our engineering training, we are challenged to aim at building a healthy Tanzania where each man, woman, and child has the opportunity to reach their full potential. A key part of this

involves creating a Tanzania where poverty is neither acceptable nor necessary. This is in agreement with the proposal in [11] that to reverse the poverty crime we have to resolve the issue of our tolerance of alienation. It is our decision that it is all right for some people to feel alienated and our willingness to tolerate alienation that is fundamental to the continuance of poverty, which includes lack of the capacity to care and to show true compassion (see Fig. 4).

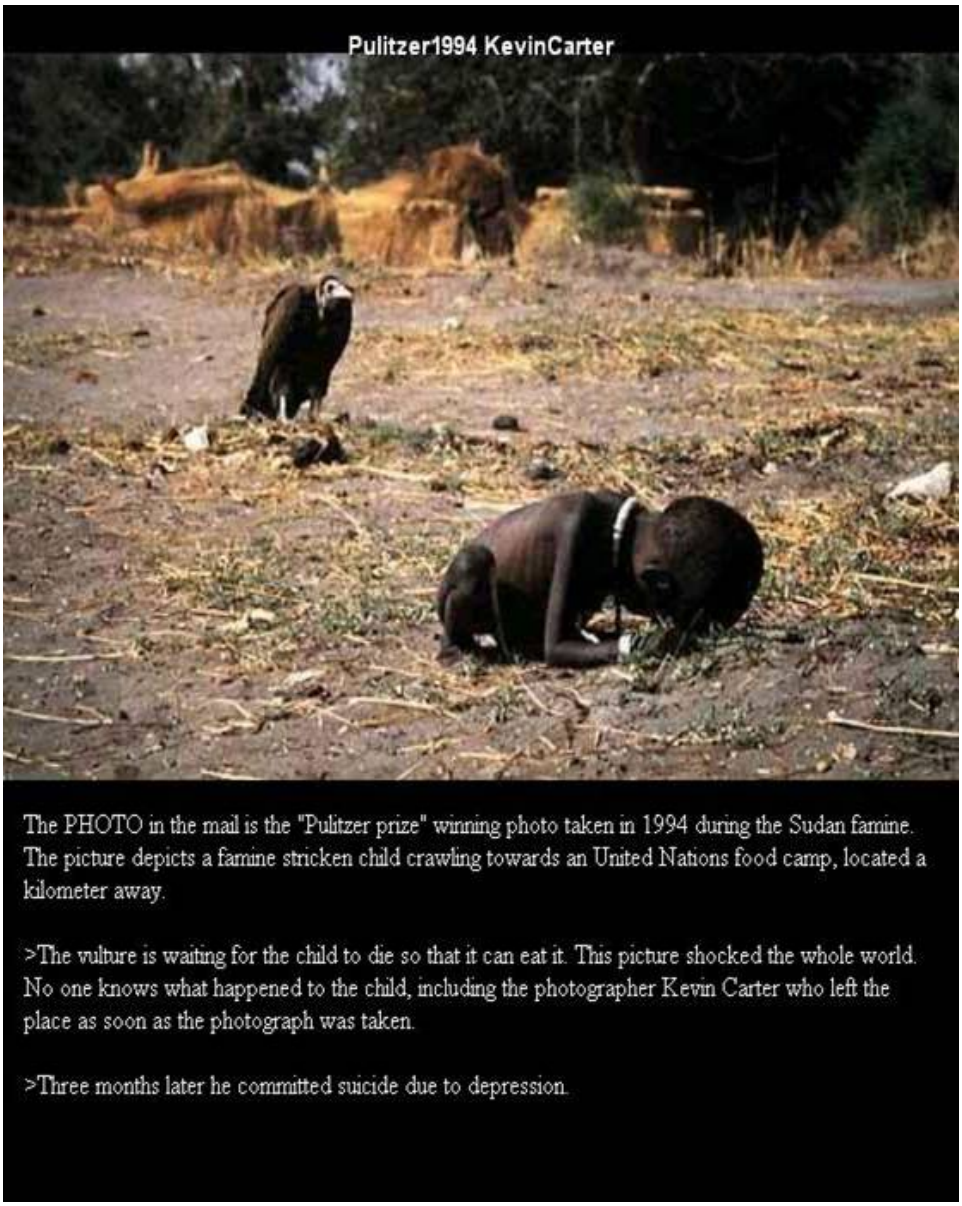


Figure 4: Armed with ICTs – including probably a digital camera, the photographer recorded the event and left the scene. Then compassion reasoning took its toll on him. A real tester of compassion!

One could even propose that the theme: "ICTs as tools for poverty reduction" could be paraphrased to read: "ICTs as tools to help us minimize our tolerance of alienation". Taking this argument further, I wish to note that ICTs are now acknowledged to be a set of powerful tools for building our capacity to care, knowledge management and hence for building the capacity for poverty reduction. In the literature, alienation based on modern ICTs is also popularly known as the ***digital-divide*** [13].

3. Poverty Reduction

Poverty reduction challenge is about how to empower the poor with knowledge and skills thus availing to them new opportunities to improve their livelihood [13]. In terms of income and expenditure this would mean increase in income, and hence capacity to afford food, health services, and other basic needs.

The strategic approach is to use ICTs in a creative manner to level the playing field in economic, social, cultural and political terms by reducing the rapidly growing gap caused by a very asymmetric architecture of opportunities between the rich and the poor. As a matter of emphasis, the role of ICTs in poverty reduction is not limited to reducing income poverty, but also includes non-economic dimensions, in particular, empowerment [14]. This can be accomplished through a variety of strategies ranging from ***the sustainable livelihoods approach*** – by putting people first; ***production-oriented growth strategy*** – which focuses on pro-poor corrective measures; ***a distribution-oriented strategy*** - which emphasises the redistribution of wealth within the nation; and a ***rights and empowerment strategy*** – which promotes knowledge about basic rights and empowerment [13, 14].

Professional groups like the engineering community can play a big role in implementing the strategies. Engineers have knowledge and skills and can create and disseminate new knowledge. That makes us very valuable especially by leading the way of not only developing ICTs but also appropriating (adaptation of) the tools into the Tanzanian society. This is to say that if individuals who are disadvantaged can acquire the kind of knowledge or information that makes them valuable, they certainly will have a significant advantage when it comes to equalising or augmenting their opportunities.

It was stated in the Introduction section that modern ICTs facilitate the creation, storage, management, and dissemination of information by electronic means much more easily, efficiently and conveniently. Some of the desirable characteristics and attributes of these modern CTs useful for poverty reduction include:

(a) **Interactivity:** - ICTs are effective two-way communication technologies, which have drastically changed the way individuals, organisations and enterprises interact. This is made possible by the fact that modern ICTs embody broad communication and processes of economics, social, political activity and organisation, which is capacity to empower citizens. At the same time increasing transparency within and among societies, fostering empowerment and accountability [15,16].

(b) **Permanent Availability:** - The new ICTs are available 24 hours a day, seven days a week. For this reason they can be mainstreamed into our daily activities.

(c) **Global Reach:**- When ICTs are embraced in any socio-economic activity, geographic distances hardly matter anymore. This has changed the shape of the socio-economic activities. One of the impacts is in conditioning and changing the structure of markets hence pushing the world towards globalisation. This is true for the case of the Internet

– which enables individuals in any country to participate in markets or activities beyond the immigration constraints determined by geographic locations [15].

(d) **Reduced per Unit Transaction Costs:**- Relative costs of communication have shrunk to a fraction of previous values and this effect has impacted on the cost of business transactions. Transaction costs have tended to rise with time, distance and correlated variables, especially as the global economy has expanded and become more integrated. With modern ICTs, time and distance essentially don't matter. So the reduction in transaction costs can be larger in absolute and percentage terms than the rising trend. A good example is on long distance or international telephone calls vis voice over IP (VoIP) calls.

(e) **Creates increased Productivity and Wealth or Value:**- ICTs are value adders and amplifiers in products and services. In addition to lowering transaction costs, modern ICTs can be very liberating by enabling wholly new possibilities of creating wealth/value. For example, by making services previously difficulty to trade or non-traded at all to become easily tradeable – within countries and internationally. ICTs also are capable of un-trapping the value of human resources or human capital (e.g. with local skills) by marketing such capital globally than just locally, for example in the case of outsourced jobs and off-shore opportunities [17,18].

(f) **Multiple Sources of Information and Knowledge**:- Modern ICTs embody a lot of knowledge, particularly if such ICTs include electronic networks. These embody and convey knowledge and in this sense provide important intermediate products and services and content in education, human and social capital formation activities. In this context, it is a fact that the creation of knowledge and access to information is the basis of new prosperity. Access by the poor to high tech opportunities empowers them with valuable knowledge and equips them with productivity skills, which is essential in any poverty reduction process. In this respect, poor people do not have simpler set of living needs and aspirations, as may be assumed [19, 20].

Notwithstanding these powerful attributes of ICTs, access to information using ICTs is determined by (a) *connectivity* – are the services available? (b) *affordability* – can the targeted poor users afford the access, and (c) *capability* – do the targeted users have skills required to support and utilise profitably the access? The user's skills relate to technical abilities, language and literacy. Therefore, for ICTs for poverty reduction to succeed, we need to be open-minded and willing to adjust. We should aim at practical and pragmatic solutions to urgent problems. In this respect, ICTs need to be integrated and mainstreamed in the development priorities and projects. This philosophy is well articulated by the following two acknowledged individuals of the last century.

In the early part of the last Century, Mahatma Gandhi proposed a simple test for the effectiveness of any development activity: "*find out how the last man would be affected by it*" [20]. We should adapt this as a test for ICTs for poverty reduction projects. We should ask how is the last man, woman and child reached, touched and transformed by the selected ICTs? This challenge is also neatly summed up by Sir Arthur Clarke, inventor of the communications satellite. In his foreword to one of the UNDPs Regional Human Development Report he said: "*the information age has been driven and dominated by technopreneurs – a small army of 'geeks' who have reshaped our world faster than any political leader has ever done. And that was the easy part. We now have to apply these technologies for savings lives, improving livelihood and lifting millions of people out of squalor, misery and suffering*". It is therefore time to move our professional focus from the geeks to the meek [20].

4. Show Case Experiences

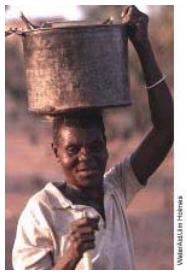
As a reminder: ICTs are impacting on all dimensions of life: education, health, quality of family, culture, leisure and arts, scientific and technological world. The way people do business globally is changing beyond imagination. ICTs are helping economies expand at an unprecedented rate and competitiveness has become the motto of the way. ICTs specifically promise great benefits in the areas of education and information, health,

commerce and electronic money, entertainment and e-governance. However, for ICTs, as tools of empowerment, to contribute to the poverty reduction initiatives, certain conditions have to be met. These relate to ownership, local content, language, culture and appropriate technology enabled by adequate functional basic amenities and connectedness, e.g. roads -, electrical power, telephone, water, etc; (see Fig. 5). Access becomes important only once these conditions have been met. Due to this requirement of connectedness most of the ICTs have an urban bias and discriminate against rural areas.

Since the 1990s, years of economic liberalization in Tanzania, there has been a large wave of investment in ICTs for development and some significant part of this has been aimed at poor people - both in terms of bringing ICT access to poor communities, and in using ICTs in many other ways which support poverty reduction. These investments have produced ***many*** documented successes, lessons learned and experiences. Most of the documented materials on ICT projects are mostly sector and application specific covering multipurpose community access; access technologies amenable to poverty reduction; gender equality; education and human resource development; science, high-tech and ICT-sector growth; business and livelihoods development and support:; public sector, services & poverty management; environmental and natural resource management; and transparency, accountability and empowerment.

(a)

(b)



(c)

(d)

(e)

Figure 5: ICTs for poor people is enabled by basic amenities and connectedness, e.g. (a) & (b) roads; (c) access to clean water, (d) & (e) energy (Biogas and Solar). Lack of the same disables appropriation of ICTs.

Before discussing show case projects, it is good to recap how ICTs can enhance poverty reduction efforts. With appropriate ICTs, it is possible to discern any information, communication or knowledge component of virtually every development challenge. ICTs can help, directly or indirectly, to address many of the dimensions of poverty trap, by making government institutions more efficient and responsive. Increasing the knowledge and skills of the poor, including knowledge about how to manage the livelihood issues like housing, money, water, waste management, Illness, education and security. Also, ICTs are capable of giving a

stronger voice to the poor and their representatives. Overall, ICTs have the potential to reduce poverty by increasing capacities and opportunities, reducing vulnerabilities, enhancing Government capacity, efficiency and accountability. In addition, ICTs can improve participation, empowerment and the strengthening of civil society. These attributes of ICTs are demonstrated in the following cases.

The many experiences that are discussed in the subsequent sections, offer a lot of insight and value, though it is difficult to consistently maintain focus on poverty, and separate poverty reduction from broader economic development insights. Take note that growth and development are necessary but not sufficient for poverty reduction; and also that pro-poor strategies and investments are as important for ICTs and knowledge-economy strategy as for other connected areas of social and economic development. This section uses some of the material from publicly available websites carrying content about Tanzania. Often the best way to convey an experience is just to quote a section from a study or project document. This method is hereby used liberally and also in a selective way.

(a) Projects on Increasing Capacities and Opportunities

One of the many deprivations that compound the misery of the poor and prevent them to rise out of poverty is their lack of access to adequate education, training, skills development, broader information and knowledge resources that could help them improve their lives and livelihoods. One of the show case projects on information sharing is the "*Sharing with Other People Network*", (SWOPNet) managed by the Tanzania Commission for Science and Technology - COSTECH. Its presence is at www.swopnet.or.tz (See Fig. 6). The SWOPNet portal electronically brings together all owners of ICTs projects under one roof. The site is essentially very useful for publishing outputs from different R & D projects in the field of ICTs conducted within Tanzania.

Figure 6: Costech is hosting the Swopnet website, www.swopnet.or.tz, which carries content on National ICT projects for development. It is designed to deepen and nurture ICT culture for information and knowledge sharing.

It has been envisioned that education and knowledge helps the poor to improve their current livelihoods, address impediments and vulnerabilities that prevent them from seeking opportunities to improve their lives, and participate in new sectors of the economy that require advanced skills and therefore offer higher incomes. ICTs can help make educational institutions more efficient and responsive, both by improving communication flows within them and between them and their various constituencies; and by increasing their access to global knowledge and good practice in education. One of the most promising areas where ICT can help improve education quality and outcomes is in teacher training. The Tanzania educational systems is, in general, plagued by inadequate resources for teacher training and curriculum development, which means that, despite the best intentions of teachers, educational quality is often low. Teacher training has long been a priority of the development community, and the newest ICTs are not strictly necessary, nor are they sufficient, to provide quality teacher training. Yet creative combinations of the Internet (for content access and interactivity) and digitally stored training materials (including CD-ROMs) can dramatically increase both the *reach* and the *yield* per unit cost of teacher training efforts (See Fig. 7). There is a show case ICT project owned by the Ministry of Education and Culture (MoE) geared at integrating ICTs in Secondary Education and Teachers Training colleges (TTCs)are the preferred entry points for integrating ICTs into the secondary eduction in Tanzania. In this project, TTCs More details are at www.pambazuka.org/index.php?id=26807.

(a) Class under a tree

(b) Internet enabled class

Figure 7: Internet can enhance education delivery and quality.

(b) Projects on Reducing Vulnerabilities

Poverty and illness go hand in hand and feed upon each other. Poor people are particularly prone to disease and illness for several related reasons. Their living conditions are often unsafe and unsanitary. Their access to safe water and waste disposal facilities is limited. Their diet is poor, low in both calories and nutrients. They are particularly prone to a variety of environmental hazards, such as household smoke from primitive cooking fuels and stoves. Their ability to preserve good health and to treat illness is further compromised by a shortage of medical personnel, medicines and health infrastructure. The medical personnel who do treat the poor are hampered not only by scarce supplies but by scarce information about new threats and new treatments and few opportunities to improve their own skills. These conditions, in turn, keep people trapped in poverty and often return to poverty those who had managed to escape it. The ravages of HIV/AIDS in Tanzania and other developing countries have intensified this vicious circle of disease and poverty, depriving households of their wage-earners, and as a consequence turning countless children into orphans.

There are several ways that ICTs can help to address the health challenges facing developing countries. First, the capacity to monitor, respond to, and thus hopefully control disease outbreaks and address their causes, can be significantly enhanced by improving communication flows and

Figure 8: ICTs are very useful in Monitoring child vaccination programmes and sensitisation on fight against HIV/AIDS.

the information-management capabilities of health care professionals at community, district, regional and national levels (See Fig.8). In many cases, time is of the essence in responding to disease outbreaks, and faster communication and information-gathering can often make a dramatic difference in how well an outbreak is contained. More generally, the ability of health care providers to assemble and share timely information about health trends and needs enables a country's health care system to adapt more quickly and allocate resources more effectively. Several show case projects that show how ICTs are being appropriated to realise health information system, to collect health data at village levels, and on child vaccination programmes are reported within the http://www.swopnet.or.tz/ws_projs.html.

(c) Projects on Enhancing Government Capacity, Efficiency and Accountability

Government officials, and the institutions in which they work, are hampered in many ways by poor information and knowledge flows. They often have weak access to even basic current data about the issues and trends in the country. Information flows poorly within most government departments because of a combination of weak communications infrastructure, hierarchical structures, and rigid bureaucratic cultures.

Figure 9: Tanzania has global presence through several Information gateways.

In addition, government officials have limited information on global good practice, and few opportunities for consultation and collaborative problem-solving with colleagues elsewhere. At the same time, citizens, entrepreneurs and particularly the poor, often have limited information about their rights and the services available to them, about the structure and functioning of government agencies, and about procedures for requesting services. Because they also have limited information about the performance of government in delivering these services, they

have little ability, individually or collectively, to hold government accountable, and few outlets for expressing their concerns.

ICT can help in a variety of ways to address these problems, by helping to reorganize and speed up administrative procedures, increasing the volume and speed of information both within government institutions and between them and the larger society, training government officials in global best practices, and permitting greater collaboration and sharing of experience among government officials both within a country and across borders. The Government of Tanzania is exemplary active in appropriating ICTs to improve its e-readiness and the delivery of public services. The official online gateway of the United Republic of Tanzania is accessible at http://www.tanzania.go.tz (see Fig. 9). Information accessible from this site include fully analysed population census data (See Fig. 10), most of the Government policies and presidential speeches are hosted at this site.

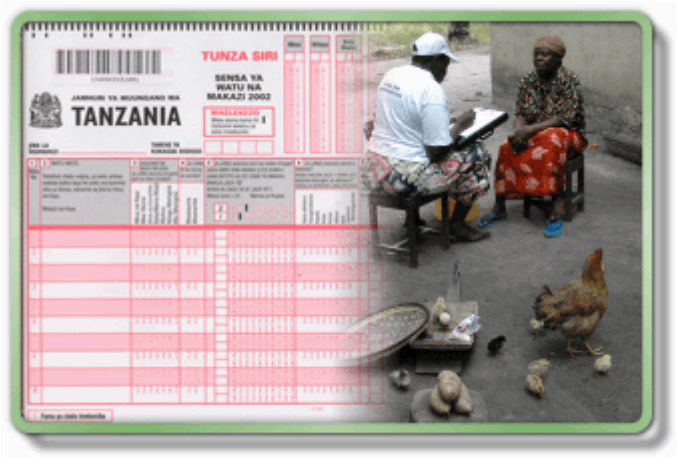


Figure 10: Population census data are available online.

There are several other information gateway projects in the country. For example, the Tanzania Online Information Gateway at www.tzonline.org and the Tanzania Country Gateway project with presence at www.tanzaniagateway.org. Collectively these Internet-based gateways give Tanzania a global presence. The gateways provide links to ideas and good practice, information about development activities and industry trends, funding and commercial opportunities. These portals provide and promote exchange and dissemination of information on development matters.

Another project is the Tanzania National Assembly (Parliament) portal at www.parliament.go.tz. Acts and Bills and useful Bunge documents are readily available from this site through it Parliamentary Online Information System (POLIS) (Fig. 11(a)). This Internet-based global presence clearly demonstrates that The Tanzania Parliament (Bunge) is appropriating modern ICTs to transform the Bunge from an old-fashioned institution to a new, modern paperless electronic parliament. Then we have the Tanzania Investment Centre website at www.tic.co.tz., the official investors guide to Tanzania.

(a) **(b)**

Figure 11: **(a)** Parliamentary Online Information System (POLIS) allows access to many documents produced by the Parliament of the URT. (b) Official portal of the TIC serving as an Investors guide to Tanzania.

ICTs can also play an important role in combating corruption and making government institutions more transparent, by reducing the opportunities and incentives for, and increasing the costs of, corruption. The most obvious role for ICTs is to "disinter-mediate" between the citizen and the services, procedures and documents by automating and making widely accessible, many of the simpler procedures which have traditionally depended on the involvement of a local government officer. If a citizen can directly access a needed form, acquire required documents, permits and certifications, or register a new small business, using automated procedures, the opportunities for corruption are reduced. ICTs can also empower individual citizens and groups to hold government officials publicly accountable. These efforts are evident from the TIC website www.tic.co.tz especially links to the Business Registration and Licensing Agency (BRELA) and the www.necta.go.tz for the National Examination Council of Tanzania (see Fig. 12.), and www.isd.co.tz for the insurance supervisory department.

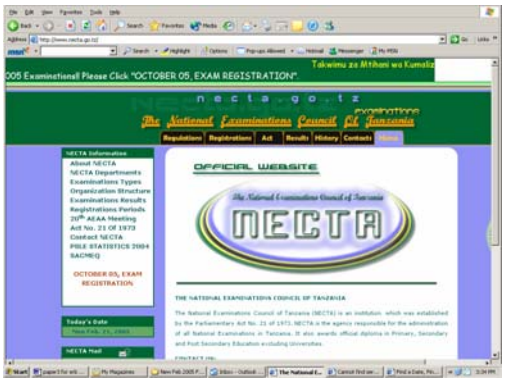


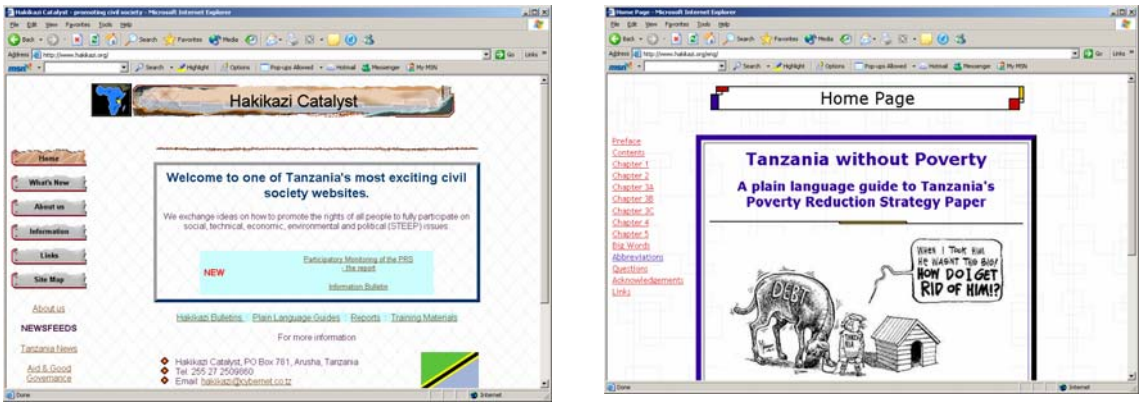
Figure 12: NECTA official website has of recently become very handy in reporting about national examination results for Std VII, Form IV and Form VI and on Technical education.

(d) Projects on Participation, Empowerment and the Strengthening of Civil Society

ICTs can play an important role in informing and empowering citizens and strengthening the capacities of a wide range of civil society organizations and institutions. This is important not only in increasing the demand for good governance and strengthening the voice of citizens in government policy, which is good both for the stability and responsiveness of the political system and for the economy and society as a whole.

By facilitating new forms of many-to-many communication, collaboration, and information-sharing, both within a given country and among groups with similar interests and concerns across borders, ICTs can add to the vibrancy of civil society institutions and networks as a check on government, a source of ideas and innovations, and an outlet for the interests, concerns and desires for solidarity on the part of individuals and groups. This will reduce the alienation of the poor from feeling isolated, powerless and neglected. Figure 13 contrasts between a physical rally meeting to the famous eThinkTank user group at www.eThinkTank.org focussed on issues concerning ICTs. Another portal is at www.hakikazi.org (Fig. 14(a)) a civil society meeting place for sharing ideas promoting the rights of all people to fully participate on social, technical, economic, environmental and political (STEEP) issues. The portal carries a cartoon-based guide to popularise the PRSP [9] (Fig. 14(b)).

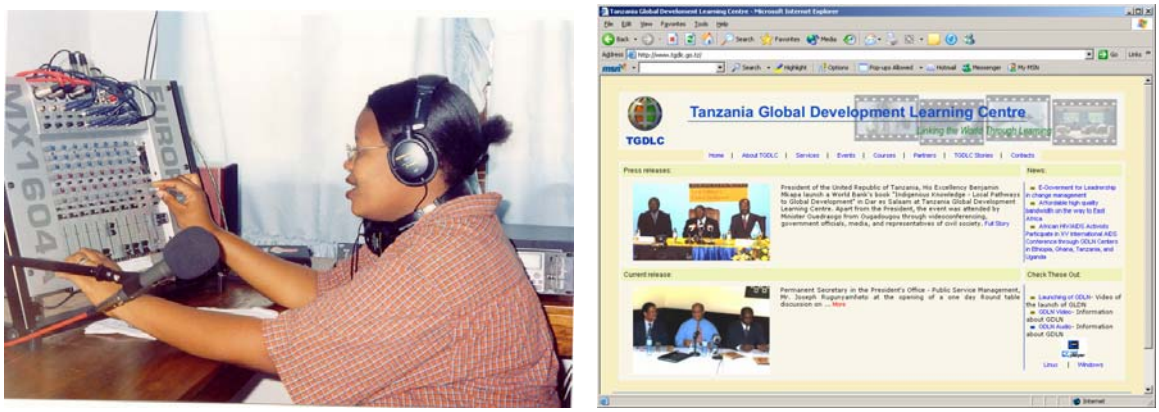
Figure 13: **Rallies are used to disseminate information and allow communities to voice their concerns. ICTs enable e-meetings and e-discussions without need for physical meetings.**



(a) **(b)**

Figure 14: **Hakikazi Catalyst portal for exchanging ideas on how to promote the rights of all people to fully participate on social, technical, economic, environmental and political issues.**

By definition, however, the poor have scarce resources, and the burdens of their daily lives often leave them little discretionary time to engage in activities designed to protect their interests and articulate their needs. Their limited education, and in many cases illiteracy, puts them at a disadvantage when faced with sophisticated ICTs that are not adapted to their most pressing needs, their modes of communication (including a frequent preference for oral communication), their cultural norms, and the social contexts in which they typically interact and pursue joint action. In such cases community radio and video conferencing facilities (like that at the Tanzania Global Development Learning Centre (TGDLC) – www.tgdlc.go.tz) become very appropriate (Fig. 15).



(a) (b)

Figure 15: **(a) Community radios are very effective at empowering communities. (b) The TGDLC is meant to empower citizens by training using modern ICTs including video conferencing facilities.**

(e) Projects/Challenges on Appropriating ICTs for Income Generation

Figure 16: Poverty is measured by lack of income

Economic programmes implemented by the Tanzania Government have been based on the philosophy that Tanzania is committed to a market economy whereby the private sector will take the lead in creating incomes, employment and growth (see Fig. 16). On the other hand, the State will be a producer of public goods, play a regulatory role to level the playing field and create conducive environment for the private sector to take the lead in driving economic growth. The private sector has started playing an ever increasing role in creating incomes and employment. Small and Medium Enterprises (SMEs) account for a large share of the

enterprises active in Tanzania. In fact, SMEs are the emerging private sector and do form the base for private sector-led growth [22 - 24].

According to Peter F. Drucker, a Management Guru, there are eight (8) key areas that constitute any business [25], namely: *marketing*, *innovation*, *human resources*, *financial resources*, *physical resources*, *productivity*, *social responsibility* and *profit requirements*. Let us recall the Gandhi's test for technology appropriateness: to "*find out how the last man would be affected by it*" [20]. I therefore propose we apply Gandhi's test for the effectiveness of ICTs in each selected income generating activity by examining the impact of mainstreaming ICTs into the eight key business areas. In each case, I challenge each one of us to ask how poor people (men, women and children) reached, touched and transformed by the selected ICTs? I have left the cases open for debate and discussion. In our discussions, we should remember that ICTs are embedded in networks and services that affect the local and global accumulation and flows of public and private knowledge. I therefore propose we go beyond our role as civil citizens in Tanzania and consider, more broadly, our role as professional Agents of change who can, think, assess, evaluate, resolve, create, and manage knowledge, through use of ICTs to inspire and support people to reshape our Tanzania towards prosperity.

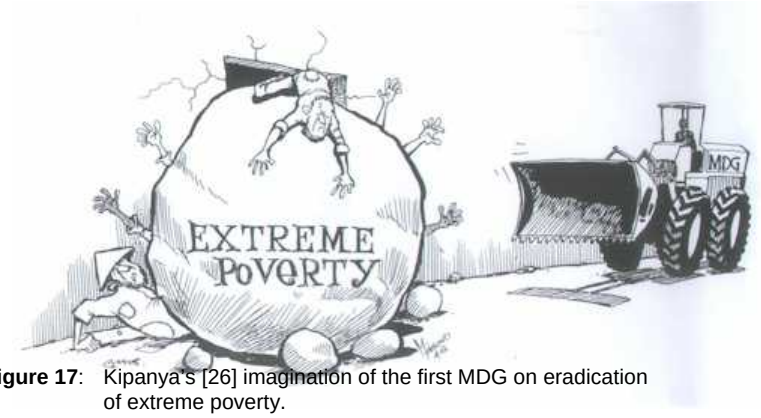


Figure 17: Kipanya's [26] imagination of the first MDG on eradication of extreme poverty.

Case I: Small Traders

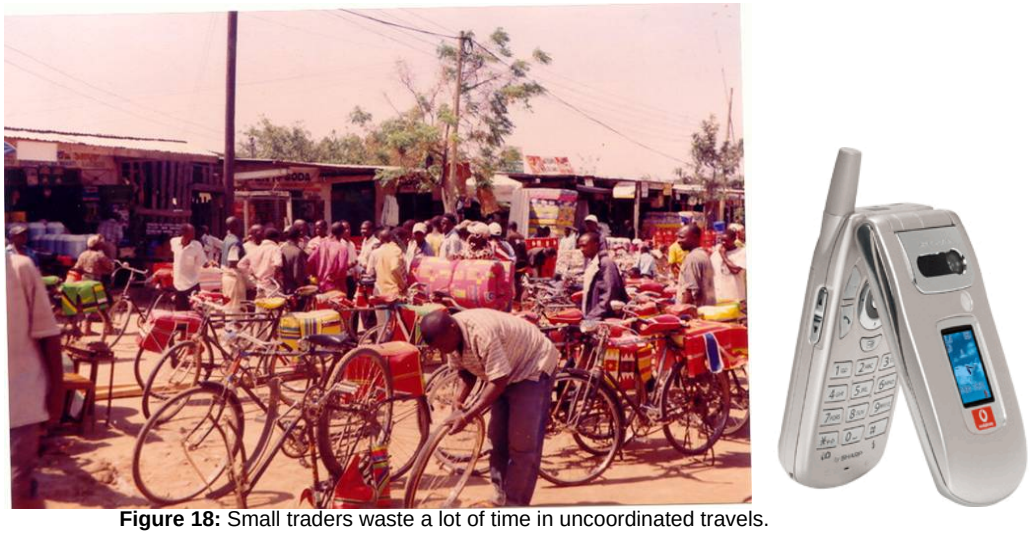


Figure 18: Small traders waste a lot of time in uncoordinated travels.

Case II: Rural Farmers

Figure 19: Small farmers need access to weather, credit and market Information to plan their activities well.

Case III: Small Entrepreneurs

Figure 20: Small entrepreneurs need access to suppliers, credit facilities and to their customers.

Case IV: Internet Cafés

Figure 21: **Internet Cafés in Tanzania have become a popular income**

Case V: Women in Small Business

Figure 22: **Women in business are profitable borrowers from credit facilities and can be greatly enabled by ICTs.**

Case VI: Online Databases for SMEs

Figure 23: Business Information Services (BTL) is another show case project on information sharing targeting rural farmers, traders and SMEs.

5. The Ultimate Challenge: To Focus on Information Literacy and Not only on Computer Literacy?

In Tanzania Vision 2025 [3], we want to see Tanzania to be a well educated and a learning society. What does this mean in relation to ICTs as tools for poverty reduction? It was said earlier that ICTs are embedded in networks and services that affect the local and global accumulation and flows of public and private knowledge. The information society of 2025 will be characterized by a knowledge driven economy, manned by knowledge workers.

Information literacy is the ability to access, evaluate and use information from multiple formats - books, newspapers, videos, CD-ROMs, or the Web. When we discuss information literacy, we are discussing the application of problem-solving skills in real-life situations. Therefore, Information literacy is a set of competencies, skills that will grow with our people as our society evolves towards the awaited knowledge society, even when current computer operating systems, search engines or computing platforms and devices are obsolete.

It is all about being skillful at making informed (information) decisions. For example, traders continuously decide on what product or service to buy and how much to pay for it? How much profit to make and who is the target customer for profitable business? In governance terms, people make decisions on which political candidate will offer acceptable representation and thus vote for? In corporate environment, tough decisions are made on e.g. how to persuade the corporate board to accept a proposal?

To date however, we observe that, in promoting the information society agenda, many of us including our government are still focussed on technology. We are focussed on increasing awareness of the potential applications; on improving the availability of and access to modern digital communications; and on encouraging people and organisations to use technology more efficiently and effectively. We are advocating for policies that encourage and allocate funding towards the development of skills to use technology and improve computer literacy. This focus has been, and is still, invaluable. But if we are to really move into the information age and

benefit from the potential of a knowledge based society, then we need a new focus, that is, on the content that flows through the ICTs, a focus on information and knowledge, and focus on how to create, manage it, and use it. To do this we need a new focus on information literacy. An information literate person is one who [27]:

1. Recognizes the need for information and determines the extent of the information needed;

2. Identifies potential sources of information, accesses the needed information effectively and efficiently from sources of information including computer-based and other technologies;

3. Evaluates information and its sources critically and incorporates selected information into his or her knowledge base and value system;

4. Recognizes that accurate and complete information is the basis for intelligent decision making, develops successful search strategies, then organizes information for practical applications and uses information effectively in critical thinking to accomplish a specific purpose;

5. Identifies potential sources of information and understands the economic, legal, and social issues surrounding the use of information and accesses and uses information ethically and legally.

For sure, information literacy is a challenge for everyone. This need not be underestimated because, in an information society, wealth comes from knowledge. Knowledge is created through accessing, assimilating, sharing and using information. To be really effective at creating that knowledge, people need to be trained in the necessary information skills – they need a higher level of "information literacy" than was necessary in the industrial age. This means that, modern ICTs not only do enable access to vast information resources, they also enable the manipulation, filtering and organisation of relevant information; enable rapid communication and transfer of information; and, if used by an information skilled person, can greatly enhance the learning processes and the creation of knowledge hence creation of wealth.

The show case activities presented in Section 4 clearly shows that, all of us and especially the poor people are all flooded with information options on day to day basis. We are dazzled by a spectrum of communication choices! Unfortunately, to date we are still putting a great investment into technology, thinking it will solve problems. But ICTs on their own has never solved our social-economic problems. It takes access and empowerment to the people to make use of the ICTs and the information delivered by them to solve the problems. We therefore have a challenge: how do we ensure our Tanzania society becomes information-literate? I call this the ultimate challenge to the engineering community in Tanzania!

6. CONCLUSION

Tanzania is one of the 191 United Nations Member states that have pledged to meet the eight (8) UN Millennium Development Goals (MDGs) by 2015. The first goal of these UN-MDGs is on eradication of extreme poverty and hunger. In response to this pledge, Tanzania restated the UN- MDGs and came out with its own nine (9) TZ-MDGs, the first of which is correspondingly on eradication of extreme poverty. Targets for achieving this first TZ-MDG are articulated in the National Poverty Eradication Strategy (NPES). The set timeline for the goal is to halve extreme poverty (measured by income and expenditure) by 2010 and eradicate it by 2025, which corresponds to the articulation of the goals of the National Vision 2025. It is also acknowledged that the new opportunities that Information Communication Technologies (ICT) is opening up can be harnessed to meet the goals of the Vision 2025 as well as the TZ-MDG on poverty reduction. In addition to creation of new opportunities for prosperity, ICTs within networked environment embody enormous knowledge for empowering people and can

massively reduce transaction costs, change the structure of markets and of public services and institutions, integrate global and local markets, un-trap human resources and immediately increase the potential of the human capital. The framework for appropriating ICTs for national development and poverty reduction is articulated in the National ICT Policy.

This paper has attempted to enhance the understanding and knowledge of ICTs in relation to the National ICT Policy and has extensively explored the evolving frontiers of this pervading technology as it impacts on education, commerce, social, cultural and economic life of the poor Tanzanian people. The paper also has presented several show case examples of projects in Tanzania that demonstrate how the Government of Tanzania, entrepreneurs and some of the rural communities are appropriating ICT tools to fit into their needs. Some challenges have been identified and presented with a good of stimulating debate to reflect on perspectives, trends and potential of using ICTs to develop innovative approaches and methods for poverty reduction. It is emphasised that, since these ICTs are not solutions to social problems by themselves, they must be carefully chosen and implemented for each appropriate purpose. Overall, the paper demonstrates that ICTs is a set of tools for knowledge sharing, which is a powerful means for poverty reduction. However, these projects clearly demonstrate just how much can be accomplished through leadership, dedication and determination. Further it is shown that ICTs could only be tools of empowerment for those who have access to them. And that "I" (Information) and the "C" (Communication) are far more important than the various technologies which are just means to an end. Therefore ICTs can not turn bad development into good development; they can make good development better. It all has to do with focussing on information literacy as opposed to just focussing on computer literacy.

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