Science and Technology 2012, 2(5): 142-145
DOI: 10.5923/j.scit.20120205.06

ICT for Sustainable Development

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Abstract The use of ICT to drive sustainable development is a constant debate. Whereas one group staunchly defends employing ICT for guiding and implementing sustainable development, others fight vigorously to highlight its many negatives. One should readily agree that, as with most things in this world, applying ICT to propel any development will have its benefits and pitfalls. Its measurement must therefore be focused on whether the advantages outweigh the disadvantages. I will argue that driving sustainable development through ICT initiatives bring much greater benefits than negative consequence. One is also acknowledging that like all good projects, protocols and methods are important to success. Therefore, when advancing sustainable development with ICT as the driving force, it is essential to have proper planning, analysis, implementation, and monitoring if one anticipates favorable outcomes. I will build upon this argument in more details in the ensuing sections.

Keywords Sustainable Development, Knowledge Transfer, Globalization, Millennium Development Goals, Open Source Software

1. Introduction

Within the framework of the contemporary world, knowledge, like land, labor, or capital, is a primary resource. Knowledge is not only important to advancing the welfare of qualified persons. It is equally important at the grassroots level if countries and industries are to prosper in meaningful ways. Information and communications technology (ICT) has changed the way we act, think, and work drastically. Its deployment has created considerable benefits with new entrants to the market environment and has shown the potential for significant financial viability. To the extent that such initiatives are sustainable is to the degree that they will likely be beneficial without much imbalance to society. Consequently, how both countries and enterprise alike use ICT to derive sustainable development becomes pertinent to modern endeavors and will therefore be the focus of this paper. Given the increasing role of ICT in advancing both voice and data technology within telecommunications and the impact that will accrue from such initiatives toward reducing the digital divide while enhancing the millennium development goals strategies, it would seem foolhardy not to understand the ICT implications in these regard. It is with these sentiments in mind that Gilholly[3] proffered that "for ICT to positively foster development goals, it must be employed where relevant, appropriate, and effective" (p. 181).

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Published online at http://journal.sapub.org/scit

Heeks[4] opined that because of the speed at which digital technologies are changing the modus operandi of developing countries, and equally the rate at which development initiatives using ICT fails, enterprises and government alike should take the extra precaution to recognize that sustainable development is more than a mere transfer of technology from the North to the South. Heeks[4] posited that to the extent that sustainability is possible is to the degree that appropriate alignment between infrastructure and need coalesce. Otherwise, the only benefit will be wasted expenditures.

We have seen dramatic technological advancement in the digital world, especially within the telecommunications sector. New entrants to the Jamaican market dominate the technology environment and are exceptionally profitable. In this new dispensation of globalization, we have seen a wave of enthusiasm and enormous contribution to poverty alleviation in countries such as India and China. Nevertheless, one aught to be careful in how one advance the development of ICT initiatives. Singh[8] opined that:

"ICT provides new opportunities for those who are literate, have a good education and adequate resources. Disadvantaged and marginalized groups have little chance to benefit from tools such as the Internet automatically. This further increase social divides, widens the gap between rich and poor countries, regions, individuals and even between men and women" (p. 2).

The challenge therefore becomes how countries and enterprises engage the use of ICT in strategic ways that advances "economic, social, cultural, and political"[8, p. 2] endeavors for all its stakeholders in advancing sustainable development.

2. ICT Role in Sustainable Development

When one consider sustainable development in any realistic way, the balancing act lies between how individuals need are satisfied and how well one preserve the ecosystem and all natural resources. This is not necessarily an easy equilibrium to achieve. However, without it, sustainability may evade its implementers. We have seen tremendous advances in the role of e-government, for example, and the abilities it gives to citizens to be more productive. This initiative needs to continue by integrating services across departments and ministries. It is not simple to determine and master the complexities surrounding socio-environmental challenges but sustainability is impossible without such comprehension.

Ezz[2] posited that any opportunity to effect sustainable development requires that new and efficient qualitative evaluation schemas coupled with "an integrated assessment of the ecological, social, and economic features and implications of a given project, technology or agro-ecosystem through the use of appropriate indicators" (p. 2) be executed. Sustainable development takes time but its benefits are materially rewarding. Sustainability requires cooperative and collaborative endeavors that advance positive relationships between the various indices. One must therefore, be mindful not to confuse piecemeal approaches, such as sectoral management with sustainable development because although local zones can attempt to manage their own affairs, until there is a common purpose in recognizing a single solution for prevailing problems, the likelihood of problems recurring will hold strong possibilities. Ezz[2] proffered that the following table can guide ones initiative to achieving sustainability.

Table 1. Necessary steps to implement sustainable development using ICT successfully

Budget	Planning	Implementation
Financing	Problem identification and analysis Specification of objectives Delineation of analytic and management boundaries Design of alternative management strategies Research and long-term data collection	Installation of management practices or technologies Operation and maintenance of management strategies Enforcement Monitoring Evaluation

When one carefully examines the relationships between budget, planning, and implementation, the methodological approach beneath each heading in the table should be self-explanatory.

A fundamental concern to ICT supporting sustainable development is the recognition of the existing challenges in ICT itself and how well these demands can be resolved to enhance organizational and spatial integration. Ezz[2] argued that one can glean from globalization initiatives. The author reasoned that certain trends in international business, such as e-commerce, e-business, and e-government all support cross-national collaborative endeavors. Therefore, governments and enterprises alike can glean from such activities and rethink their own administrative praxis. One acknowledges that cultural mores may pose issues but sustainable initiatives need international cooperation, coordination, and standardization. International organizations and multinationals hold many answers in this regard in how to proceed. Another concern in achieving sustainable development through ICT is persons' resistance to change. People usually abhor abandoning familiarity for unknown or different modus operandi.

However, can we think outside the box for a moment? Sustainable development can come from many avenues. For example, the cultural content of Jamaica is extremely rich. How can such content advance Jamaica's development. Jamaica enjoys a sumptuous heritage of artifacts, traditional medicines, music, arts, handcraft, local attire, food, and language, among a plethora of other locally owned, produced, adapted, or published items, ornaments, objects, or things. Through these many opportunities, sustainability can accrue significant gains. Ozioko, Igwesi, and Eke[6] posited that "the overall objective of local content is to promote knowledge creation, preservation, dissemination, and use of locally generated knowledge" (p. 2). Promoting these activities are themselves engendering a broader cultural awareness across national borders because they create a cultural diversity that may not be known prior. Ozioko et al.,[6] noted that "cultural diversity is as essential as biodiversity and is a benefit for present and future generations" (p. 2). ICT allow affordable digitization of such content allowing easy access, sharing, and understanding of local information. Visiting tourists, for example will likely be able to participate more completely in local activities because they already coexist with the culture through technology sharing.

The United Nations millennium development goals (MDG) hope to address the dysfunctional trend in human development within a relatively short period. Although achieving the MDG deadline might be optimistic (2015), its eight objectives are essential to good governance for sustainable development. These goals are (1) eradicating extreme poverty and hunger, (2) achieving universal primary education, (3) promoting gender equality and empowering women, (4) reducing child mortality, (5) improving maternal health, (6) combating HIV/AIDS, malaria and other diseases, (7) ensuring environmental sustainability, and (8) generating a global partnership for development[10]. Although number seven is listed separately, the prevailing contemporary environment dictates that all eight shares a phenomenological umbilical relationship and ICT is fundamental to realizing such noble endeavors. More countries and enterprises are recognizing the importance of ICT to poverty alleviation. A poor

woman farmer in a rural community can use a telephone to enquire about her vegetable prices without the overhead of a bus fare or the physical endurance such journey require. One will agree, however; that such possibilities arise out of the willingness to invest financial resources, ICT infrastructure, and capacity building.

Gilhooly[3] argued that if countries want to tackle the MDG seriously, they must appropriately deploy, integrate, and prioritize ICT. The author noted that ICT is essential both to eradicating poverty and in creating sustainable human development. He conceded, however, that the paradox of "persistent scarcity in a digital era of superabundant capacity – is perhaps the greatest single challenge to the networked economy and society"[3, p. 183]. Gilhooly[3] opined that because of the complex prevailing realities, grasping fulsome clarity is difficult to achieve. Nevertheless, Gilhooly[3] proffered that if ICT is situated appropriately, it can significantly aid the process of the MDG in relatively short periods thereby substantially reducing the gap between the advanced nations and emerging economies.

When one considers some of the broad issues of sustainability, ICT undoubtedly will contribute positively. Examples may include the impact of technology on the lives of the physically disabled, community development, health, social security, education, and grassroots businesses, among the huge list of possibilities. The physically challenged can use technology to work from home through the invention of teleworking for persons with disabilities. Community development activities can be enhanced and supported through ICT, such as the Society for Research and Initiatives for Sustainable Technologies and Institutions initiative in which the purpose is to encourage the use of ICT to advance innovation and eco-friendly solutions to ongoing problems. RajNidhi in Rajasthan, India, use ICT to provide its citizens with information, such as health, family planning, employment, transportation, distance education, agriculture, water, electricity, birth and death registration, and tax rates along with many other services. Health facilities sharing health records can respond timely to individual health concerns and make more accurate decisions about health-related problems. ICT can inform members of a community about their social services available and the benefits to which each individual is entitled. Technology is revolutionizing the way persons learn. World Corps, for example, use ICT to impart technical and business related skill-sets to disadvantaged persons by promoting employment through sustainable and environmentally sound enterprises, such as Internet centers whereas Community Learning Center, also in India, use technology to enhance elementary education and computer literacy among poor children. Grassroots businesses in India are using the Internet to sell their produce through an auction system. They apply the technology in ways that provide information for crop production, cultivation practices, marketing initiatives, processing standards, and pest and disease control. In addition, community based initiatives include engaging the technology to advance and expand micro-financing and micro-enterprise programs[7].

3. Policy Initiatives

Although grasping the phenomenological interrelationships and interconnectedness concept between sustainability and development may be somewhat arduous, such realities cannot be ignored. Contemporary cities, towns, etc. need to share data for effective urban planning. Without such cooperation, the three fundamental characteristics of sustainability: environmental, economic, and societal responsibilities will not materialize. Enterprises and governments alike must therefore enact initiatives that build cities, towns, and other communities that are "economically efficient, socially equitable and ecologically viable"[1]. In the absence of these key factors, sustainability is impossible.

Cities constantly evolve. The digital impact on such dynamism must therefore be factored in terms of its impact on transportation and other urban facilities and how people deploy the technology to stay connected and to make choices. Sustainability must be seen as a strategic endeavor in the face of rapid urbanization across countries and cultures. In this regard, sustainable development must go beyond using cell phones merely to chat. Enriching data services would be a step in the right direction to conduct banking, financing, and other such financially viable services.

Baudouin[1] proffered that with proper sustainability adaptation, homes could transform relationships, for example, the electric company implementing smart meters. Baudouin[1] opined that portable devices can increase worker productivity substantially. He argued that such improvements can occur in public services, tourism, culture, social interactions, community development, and in governance at the local and national levels.

The BEEP methodology (Best eEurope Practices) funded by the European Commission, for example, documents workable solutions across the globe readily available for adaptation. The method gives planners and implementers the ability to adopt good practices, exercise proper evaluation, analysis, and learning, thereby creating an effective knowledge management system for sustainable deployment. The BEEP method is available to the public at http://www.beepknowledgesystem.org and contains roughly 315 practice cases. According to Odamtten and Millard[5], Eastern Europe and the Mediterranean benefitted significantly in using BEEP to transform their economies as a precursor to enter the European Union whereas the Pan-African region is slowly getting on board. Inherent in the BEEP method, is the recognition that there is no absolute solution. Each region and countries differ on many variables, such as culture, governance, economics, and skill-sets.

Initiatives from the above can lead to gender equality

through empowerment, development through capability building, and through alternatives that propel competitiveness. Emerging strategies may include economic growth, sustainable livelihood, and increased freedom for capacity enhancement and expansion.

In addition to the foregoing, free and open source software (FOSS) presents countries with unique opportunities for sustainable development. Papua New Guinea, a country that relies heavily on Australia for just about everything economic, embraced FOSS and used it as a driving force to implement cutting-edge information technology solutions comparable in price to developed states. Papua New Guinea chose FOSS, not because the country could not implement telecommunications technology in the way others have, but because to do so would make the service cost disadvantageous in comparison to advanced economies. FOSS was the clear choice to maintain comparable cost structures.

If one should examine the price of Windows XP as an illustration, acquiring a copy in the United States is likely cheaper than to do so in Jamaica. Proprietary software are priced per market segment and the poorer the segment, the higher the price. FOSS removes such restrictions. Open source software maintains similar price structures irrespective of markets. In addition, such prices tend to be lower than their comparative proprietary choices.

Wheeler, as cited by Reijswoud[9] noted that:

Briefly, free and open source software programs are programs whose licenses give users the freedom to run the program for any purpose, to study and modify the program, and to redistribute copies of either the original or modified program (without having to pay royalties to previous developers) (p. 45).

Although one should indicate that open source software is not always free, FOSS with its bazaar and sturdy development method steeped in sound academic principles, provide considerable advantages. These may include lower total cost of ownership, free base level technical support, fee for service for popular open source software (Red Hat, IBM, Novell, Sun, Oracle,) and shared ideas and knowledge among programmers[9].

4. Conclusions

There are challenges to using ICT as the driving force for sustainable development. However, ICT provide its greatest hope. This paradox, although cannot be ignored must be assessed in the context of modernity and the role that ICT enjoy in the contemporary context. ICT advances "economic, social, cultural, and political"[8, p. 2] initiatives in ways that affect all stakeholders positively when done correctly. ICT situate countries and enterprises to achieve sustainability in efficient ways. ICT furnish the platform to integrate "assessment of the ecological, social, and economic features and implications of a given project, technology or agro-ecosystem through the use of appropriate indicators[2, p. 2]. ICT is therefore, an appropriate tool for advancing sustainable initiatives.

Without ICT, many of the contemporary benefits occurring globally would not have likely materialized. To this extent, emerging economies can use ICT to their advantages. ICT can create cost competitiveness by neutralizing extenuating circumstances. ICT accrue benefits to regions by bringing technology to remote areas where traditional technology would have been too costly. Sustainable development through ICT initiatives is therefore a reality need only to be embraced by those who realistically demand societies that are more equitable.

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