The Developing World and the Role of Information and Communication Technologies

Media, Education and the Marketplace

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12/14/05

The Developing World and the Role of Information Communication Technologies

There are 4 billion poor people in the world today.[1] This is two thirds of the world's total population. Most of these poor people reside in developing nations where there are limited access to resources. As a result, the developing world today faces challenges in many sectors of the economy. Two key sectors that have been crippled are healthcare and education.

Healthcare is a leading issue in the developing world. Epidemics like AIDS, malaria, and tuberculosis have claimed many lives and continue to do so. Fighting these epidemics requires a lot of resources. In such countries where resources are scarce, healthcare spending takes away lots of spending that could be allocated elsewhere. Malaria is one of the most lethal tropical diseases. It is estimated that African Nations have spent over US $100 billion in the fight against malaria over the last 30 years. Such huge expenditure on health leaves no much room for anything else.

Similarly, Education in developing nations is characterized by poor and limited resources. Lack of funds, lack of qualified teachers and lack of learning materials are only but a few of the challenges. Illiteracy rates are high in these regions, especially among the female population. With education staggering, such nations cannot create the capacity needed to fuel economic growth in a country.

The questions I will address in this paper are:

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[1] C.K. Prahalad and Stuart L. Hart, *The Fortune at the Bottom of the Pyramid*, page 3.

1. How can information and communication technologies (ICT) aid development in Third World countries?

2. What are some of the challenges facing ICT implementation in the developing world?

3. Are there any ICT based cases that have proven successful in enabling development?

4. How can we overcome barriers to eradicating poverty using ICT?

1. Information and communication technologies can be leveraged to enable development

Extensive studies have shown that ICTs are central to any economy today. Information and communication technologies are pushing boundaries in all disciplines. In agriculture, there have been drought-resistant crops developed. In biotechnology, animals have been cloned. Hybrid cars that are environmentally friendly have been produced. These are just a few of the transformations enabled by new technologies. Unfortunately, the developing world has had limited contribution in these new fronts. If we harness these existing technologies we can create ICTs that match local needs and local conditions of developing countries. Here are highlights of a few key areas where ICTs can be used to solve existing problems:

Agricultural Productivity

Most Third World economies have been and still are agricultural based. With fast growing populations, it has been difficult to match production and consumption in these economies. Unpredictable or unfavorable weathers have also led to water scarcity and at times drought. Moreover, urbanization has created labor shortages in rural areas where

agriculture is centered. With growing populations and shrinking labor sources, productivity has suffered.

To address low productivity, governments need to encourage innovations that can spur growth in agricultural output to sustain the needs of the population. Developing nations need to look at alternatives to traditional agricultural practices. Governments need to look at better ways of doing irrigation where rains are scarce. In soil management, nanotechnologies like zeolites can provide better and more efficient fertilizers.[2] As you introduce new and existing technologies, you need to address issues of sustainability. To sustain technologies and new farming methods, you require the expertise. Such expertise can include technicians who can repair broken equipment, scientists who can design new and better pesticides etc. Without such support services, long term desires in increasing productivity will not be achieved. More important, the government needs to increase efficient market access for farmers. This market access will create profit incentives for farmers thus creating capacity to sustain production.

Information Dissemination

Information flow is essential as it creates increased knowledge sharing. Knowledge sharing can enhance development of best practices in many sectors. In education, information dissemination can play significant roles. If well established to meet local needs, ICTs can be used to disseminate educational content across borders and across continents. This sharing may overcome some of the space, time and financial constraints in developing nations. I must make clear though that there is need to adopt innovative

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[2] Calestous Juma and Lee Yee-Cheong, *Task Force on Science, Technology and Innovation, UN Millennium Project, Innovation: Applying Knowledge in Development*, 71

technologies that overcome existing bottlenecks. In developing nations, connectivity and bandwidth become a limitation to sharing knowledge. It is therefore important to identify innovative ways of bypassing these constraints. Once such bottlenecks are conquered, ICTs can deliver educational content that is flexible and responsive to the individual in these nations.

Technology Transfer

Collaboration between the Third World and the developed world can create sustainable technology transfers. Technology transfers can enable cheap ways of producing goods and services in the Third World. Since the purchasing power difference between the developed and developing nations is enormous, products generated in the First World are hardly affordable to those in the Third World. But we can facilitate transfer of technology to the developing nations so as they can use local raw materials and local labor to produce affordable and appropriate goods. In return, the technology owners can charge license fees to those who borrow the technology. Such efforts can create collaboration that fosters economic growth of developing nations while creating returns for the First World.

While ICTs can create the capacity to strengthen economies, there are factors that limit their effective use. These limitations are more prominent in developing nations who have the highest need. As the world becomes global, there will be more reliance on technology to drive transactions and economic relationships. As a result, those without state of the art technology will be left behind. It therefore becomes critical to address these barriers to ICTs urgently before the developed world enters a new era of information technology.

Some challenges in using ICTs

First and foremost, lack of infrastructure is the biggest challenge in employing ICTs to solve development problems. Most developing nations have no adequate infrastructure. There are traditional infrastructures like electricity, water, telephone and roads that are essential for any society. Without such resources, there is no business that can thrive and compete well. In many of the developing nations, there are limited basic infrastructures in the big cities and almost none in remote regions. This isolates the rural areas that are key producers of agricultural goods. Therefore a large part of the country goes unutilized leading to increased poverty. In addition, lack of newer infrastructure has increased the technological gap between the developed and developing world. Lack of fiber optics network has created low bandwidth crisis in Third World countries. Many developing nations rely on limited and expensive satellite communications to connect to the rest of the world. But, most of the technologies today require fast internet connections that satellites cannot provide. Therefore the developing world does not have fundamental infrastructure necessary to further economic growth.

Secondly, governments have been a hurdle for ICT enabled developments. Many of the developing nations' governments do not support programs that integrate technologies in all sectors of the economy. This is because they have no understanding of how integral technology is to economic growth. As such, these governments institute policies that discourage foreign investments. Moreover, governments do not create incentives for innovation and entrepreneurship, two factors that are essential for a sustainable economy. ICTs need to be flexible and reflective of local needs and local environments to be

effective. Through innovation, scientists and entrepreneurs can find incentives to create flexible and appropriate ICTs. If these incentives are not created by the government, then ICTs cannot meet the needs of developing nations.

Science and engineering education are integral to innovation and entrepreneurship. Without considerable investment in science and engineering, the basic skills necessary to sustain ICTs will not exist. In many developing nations, this is the case. Universities lack qualified faculty and the facilities needed to create innovations. Furthermore, developing countries do not have well established patent and intellectual property systems that guarantee the rights of the inventor. This in turn allows others to infringe on scientists' discoveries discouraging them to invent.

Embedded in the above limitations are financial constraints. Limited resources and low productivity have crippled the sustainability of these nations' economies. Further financial constraints have also been experienced due to greater spending on the AIDS epidemics.

To overcome all these challenges requires innovative technologies that are low cost and appropriate to the needs of the locals. Innovative technologies have been used to address some of the needs of these developing nations. I have highlighted two cases that address healthcare and education, two fundamental sectors that are at the core of poverty eradication.

ICT Enabled Developments

1. HealthNet Uganda: The Personal Digital Assistant (PDA) Project

HealthNet Uganda tested the use and usefulness of 40 PDAs by medical practitioners to conduct an epidemiological survey on malaria, and to access and use medical reference tools and texts. Through a partnership with SatelLife, a non-profit organization based in Massachusetts, they used the PDA to collect data and to disseminate information between health professionals. As it turned out, the PDA made data collection and analysis quick, easy and at a fraction of the cost of traditional pen-and-paper survey. The PDA served as a portable patient log book. It enabled doctors to do diagnosis and check side effects of drugs on the spot.

The project was successful for various reasons:

- ✓ **It addressed an existing need**: the lack of information on treatments and disease management hinders effective patient care and prevention. Realizing the need for more information to make better informed medical decisions, HealthNet used the PDA as a tool.

- ✓ **Identified an affordable and appropriate technology**: With the limitations of infrastructure and lack of funds, HealthNet had to identify an appropriate technology. The PDA used the mobile phone networks bypassing the need for the less dense landline network. The PDA is very easy to use and does not require extensive training, making it more appropriate for people with limited computer skills.

- ✓ **Careful selection and adaptation of content**: localizing the health content to the needs and environments of Uganda were requirements for success
- ✓ **Created local ownership**: by collaborating with local schools and hospitals, the project created a sense of ownership for the locals. This in turn created an efficient execution as the locals were interested in seeing the success of the project.

As we have seen in the HealthNet Uganda project, it is essential to address an existing need when implementing ICT initiatives to address health issues. Choosing an appropriate and affordable technology, localizing content and creating local ownership of the project are all key ingredients for success.

2. MIT Africa Internet Technology Initiative

The MIT-Africa Internet Technology Initiative (MIT-AITI) is an innovative program created and managed by MIT students. MIT-AITI integrates computers and internet technology into the education of students in African schools. MIT-AITI achieves this goal by sending MIT undergraduate and graduate students to three African nations for six weeks in order to conduct intensive classroom and laboratory sessions. The MIT-AITI program equips students with programming tools like Java, Linux and PHP. In addition, MIT-AITI runs an entrepreneurship course to encourage students to be innovators. Through this course, students get to develop their business ideas. MIT-AITI holds an entrepreneurship competition at the end of the course and sponsors the winning ideas' initial phase.

MIT-AITI is a great example where technology transfer between developed and developing world can create opportunities for students. Through MIT-AITI, many students develop ownership of their business ideas and try to implement it. It is important to note that MIT-AITI taps into the local minds of the countries they visit and empower these minds to create innovative solutions for their community.

MIT-AITI is similar to HealthNet Uganda since they both address an existing need of the locals. MIT-AITI provides knowledge that students would not otherwise get due to limited resources of their institutions. Moreover, MIT-AITI encourages entrepreneurship and innovation, two things that form the basis for economic empowerment to fight poverty.

Overcoming Bottlenecks in ICTs

As I have shown with MIT-AITI and HealthNet Uganda, successful ICT projects have to have capacity building capabilities. In order to do so, ICT projects have to address existing needs by adopting innovative technologies that are affordable, appropriate and flexible to the needs of the locals. To do this, we need to do the following:

✓ **Educate governments**: governments need to realize the power of ICTs in combating development issues. Governments have to actively promote use of information communication technologies across all sectors of the economy. And more fundamentally, governments have to commit to building infrastructure necessary to carry out ICT projects. Infrastructure is not only physical but also academic. Third World governments have to commit necessary capital to produce

and train scientists, technologists and engineers in order to create a capacity to innovate and invent.

✓ **Promote Innovation**: innovation is at the center of poverty reduction policies. As the United Nations Millennium Report asserts, technological innovation will not only create technological transformations, but its significance will increase over time.[3] ICTs can drive innovation if the local needs are matched with existing technologies. To achieve technological innovation, you have to invest in universities. Universities are centers for innovation and by investing in them, you tap into great sources of ideas that can transform economies. Therefore, there has to be dedicated investment from the government and private sector in university education.

✓ **Create Transferable Technology Platforms**: technology in developing nations can be expensive to access and create. It is therefore important to create platforms that can have far-reaching implications on the economy. ICTs are integral to many sectors of the economy and cut across many fields and should therefore be a focus for developing nations.

✓ **Leverage Existing Technologies**: existing technologies like the mobile phone can be leveraged to solve problems. In the case of HealthNet Uganda, PDA was the right technology to address the information gap, because it made use of the mobile technology that was more widespread than landline. It is therefore

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[3] Calestous Juma and Lee Yee-Cheong, *Task Force on Science, Technology and Innovation, UN Millennium Project, Innovation: Applying Knowledge in Development*, 16

important to consider existing technologies when drafting solutions to development issues.

✓ **Include Developing Nations in ICT Initiatives**: multinational corporations need to consider developing nations when creating new technologies or products. This is because the needs in developing countries are very different often times. More importantly, affordability is a big issue since the purchasing power of developing economies is limited. It is therefore important to think of alternatives for the developing world.

✓ **Promote Collaboration**: collaboration through technology transfers or knowledge sharing can spur huge economic growth in developing countries. The Massachusetts Institute of Technology (MIT) has spearheaded knowledge sharing between academic institutions. MIT, through its OpenCourseWare initiative, has put more than half its subjects' content online. This content can be accessed by anyone for free as long as they have an internet connection. Such initiatives can go a long way in providing opportunities to those who cannot afford it.

Who are the stakeholders

The use of ICT to increase economic growth and empower people in developing regions has to be a global movement. As the world becomes increasingly connected, countries will interact economically and socially even more. Therefore, one country's lack of capacity to play on a global scale will be another country's problem. It is therefore imperative that we elevate the developing countries to a position where they can participate and compete in the world economy as countries converge. And as such, the following entities have to work together to establish ICT in developing countries:

- ✓ United Nations
- ✓ Developed and developing governments
- ✓ Private sector and multinational corporations

Conclusion

Creating opportunities for the poor is the key to eradicating poverty and initiating economic growth in Third World countries. While we are very far from eradicating poverty, ICTs can provide sustainable and scalable solutions that can advance the cause. As ICTs become more important in an ever increasingly global world, it becomes imperative for all stakeholders to address the rising digital divide in the world. It is of utmost urgency that we come up with affordable, appropriate and flexible technologies that can stimulate unprecedented economic growths in Third World countries.