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INFORMATION COMMUNICATION TECHNOLOGY AS A CATALYST TO ENTERPRISE COMPETITIVENESS



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**Authored by:
Mike Ducker, Judy Payne**

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Contact Information for the authors are:

Judy Payne: JPayne@usaid.gov

Mike Ducker: mducker@jeaustin.com

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Executive Summary

The expansion of communication networks and the reduction in the costs of computer equipment are giving enterprises in developing countries new tools to leverage information to become more competitive. Enterprises are using Information Communication Technologies (ICT) to become competitive in three ways: 1) To learn about markets and link with them, 2) To upgrade and increase productivity, and 3) To create horizontal and vertical linkages with suppliers and with other enterprises in their sectors. In developing countries the use of technology has become most apparent in industry sectors like agriculture, tourism, and manufacturing; there are very good examples of donor projects that played important roles in creating sustainable impacts in these sectors. For example, in the agricultural sector the Trade and Investment Programme for Competitive Export Economy (TIPCEE) project in Ghana introduced barcode technologies and handheld devices to move pineapple out of the ports more quickly, which limited spoilage and supported GlobalGap Certification. In the area of tourism, web technologies have revolutionized the industry and empowered a small tourism destination like Livingston, Zambia to market and link directly with adventure tourists. In the manufacturing sector, the e-biz project in Macedonia collaborated with an ICT entrepreneur to start up a Computer Aided Design/Computer Aided Manufacture (CAD/CAM) business, which helped save the apparel sector by upgrading enterprises' process so they could compete in the fast-paced fashion market. Although these projects mentioned are considered a success, there are considerable numbers of other projects that were not successful or that have not shown to be sustainable at the time this brief was composed because they did not incorporate some key ingredients.

There seem to be three key ingredients for successful donor projects to utilize ICT to support enterprise competitiveness: 1) The private sector taking a leading role, 2) The donor project acting as a supporter or investor in the process, and 3) Ensuring that the technology being used is not the latest fad but the best tested option for the situation. The biggest lesson for donors on supporting ICT initiatives that promote enterprise competitiveness is that the private sector must lead in order for these projects to be successful and sustainable. This means that the private sector must be vested in the process financially and must help in creating business models and strategies, while innovative entrepreneurs and lead firms are to strategize and implement these business models. The private sector can also be leveraged by working with large technology Original Equipment Manufacturers (OEMs). Firms like Cisco and Intel will often support these projects by offering their technology and technical support to the field to find new applications for their products. In addition, successful projects need to choose the right ICT to incorporate. This does not mean using the latest technologies, but focusing on existing technologies that are accepted by the marketplace. Also for long term sustainability it is important to utilize a local ICT service provider, which can reduce costs on implementation and maintenance over the long term. Whatever technology is chosen it is important to use competitive bidding to select the vendor of these technologies because it will help reduce the costs and encourage innovative ideas. Donor projects can also support enterprise competitiveness by continuing their support of a business environment that supports ICT access and affordability.

The success that donors have had in helping to expand access to the mobile network has been very important for enterprises, but there are more ICT tools (affordable computing technologies and internet access) that enterprises can leverage to become more competitive. If donors can replicate their efforts in the mobile sector by creating a more competitive internet sector and power sector and by ensuring that imports of computer technologies are in line with worldwide norms, then this will allow for lower prices and greater access. Another place for donors to focus

is on helping to support an ICT-savvy workforce. This does not mean creating smart technology engineers and software developers, but having knowledgeable IT enterprise users who typically are able to design an ICT solution to help their enterprise become more competitive. Having affordable and broad ICT access and an ICT-savvy workforce is not just a concern of the ICT sector but one of the entire private sector; donors should therefore help institutions like Chambers of Commerce and Apex Business Associations in their countries to advocate for these concerns.

Lastly, there are a number of on-line resources on these subjects, like globaldevelopmentcommons.net or ict.developmentgateway.org that can provide a cheaper model to deliver technical assistance for donor projects. In conclusion, over the last several years greater access and affordability to ICT products and services is helping enterprises become more competitive. But for donors to support the acceleration of adoption of ICT they must let the private sector lead and then support them, including creating a better business environment for ICT development.

Introduction

This brief continues research summarized in a previous Business Growth Initiative (BGI) brief, *When Should the ICT Sector be a Target for Private Sector Competitiveness Work*,¹ which focused on using Information Communication Technologies (ICTs) to spur economic growth in developing countries. That paper argued that economic growth programs in developing countries too often focus on developing ICT itself as an export sector. These programs are often fueled by the excitement surrounding the stories of successful, young US ICT companies quickly growing to billion dollar businesses or the growth of outsourcing services that employ millions of people in India and the Philippines. The paper instead suggested that the choice to employ ICT as a growth sector should be based upon the same sound economic analysis and on-the-ground confirmation used for other sectors. Moreover, the first brief claimed that ICT is a catalytic sector that supports enterprise competitiveness across all sectors. This brief will point to specific opportunities to use ICT as a catalyst to increase competitiveness in enterprises.

This brief is targeted to those who design and implement donor ICT projects focused on supporting enterprise competitiveness; it should be noted there are numerous examples not covered in this brief of how ICT successfully supports enterprises without donor assistance (many of these lessons can be found in Management Information Systems courses).² The findings in this paper are based on interviews with 17 donor-supported projects and one private sector led project that used ICT to make a specific sector more competitive. Secondary research is used to support and inform the data gathered from the interviews. The interviews and research demonstrate that increased access to mobile phone networks in particular has been critical for experimentation with and innovation in ICT projects in developing countries.

Most enterprises understand that adopting ICT alone (i.e., cell phone applications, Internet-enabled applications, websites, and more) will not lead to productivity gains. A great deal of research on the subject is summarized by the OECD report entitled *The ICT Productivity Paradox*,³ which claims, “[t]urning investment in ICT into higher productivity is not straightforward. It typically requires complementary investments and changes, e.g. in human capital, organizational change and innovation.” However, ICT does indeed offer enterprises opportunities to increase competitiveness. Therefore, enterprises can take advantage of technological advances to create a sustainable advantage through distinct means of competition.⁴ In fact, as advances in ICT continue to offer new applications, cheaper access to telecommunications services, and more versatile devices, firms can use ICT to gain a strategic advantage.

The brief is divided into 4 sections.

- Section 1 suggests a framework for supporting ICT as a tool to improve enterprise competitiveness for donor projects and then gives a brief summary about the framework.
- Section 2 provides much more detail into how the framework operates from the perspective of three industry sectors that donor projects typically work in: agriculture/agribusiness, tourism, and manufacturing.

¹<https://www.businessgrowthinitiative.org/BGIProducts/Documents/When%20to%20Select%20the%20ICT%20Sector%20as%20a%20Target%20for%20Private%20Sector%20Competitiveness%20Work%20with%20Addendum.pdf>.

²<http://ocw.mit.edu/OcwWeb/Sloan-School-of-Management/15-565JIntegrating-eSystems---Global-Information-SystemsSpring2002/CourseHome/>.

³<http://www.oecd.org/dataoecd/15/54/35028181.pdf>.

⁴<http://www.isc.hbs.edu/firm-competitive.htm>.

- Section 3 brings out lessons learned on how donor projects can support ICT projects and initiatives that are more likely to have greater impacts, be sustainable, and be scalable without continuous donor support. It is much easier to write a “success story” about an innovative use of ICT in a donor project before the project ends than to do the hard work that will ensure that it is practically designed, can be maintained, and adds enough value for the enterprises to justify self-financing.
- Section 4 makes recommendations on how donors can create a better business environment to facilitate and encourage the use of ICT to increase the competitiveness of enterprises.

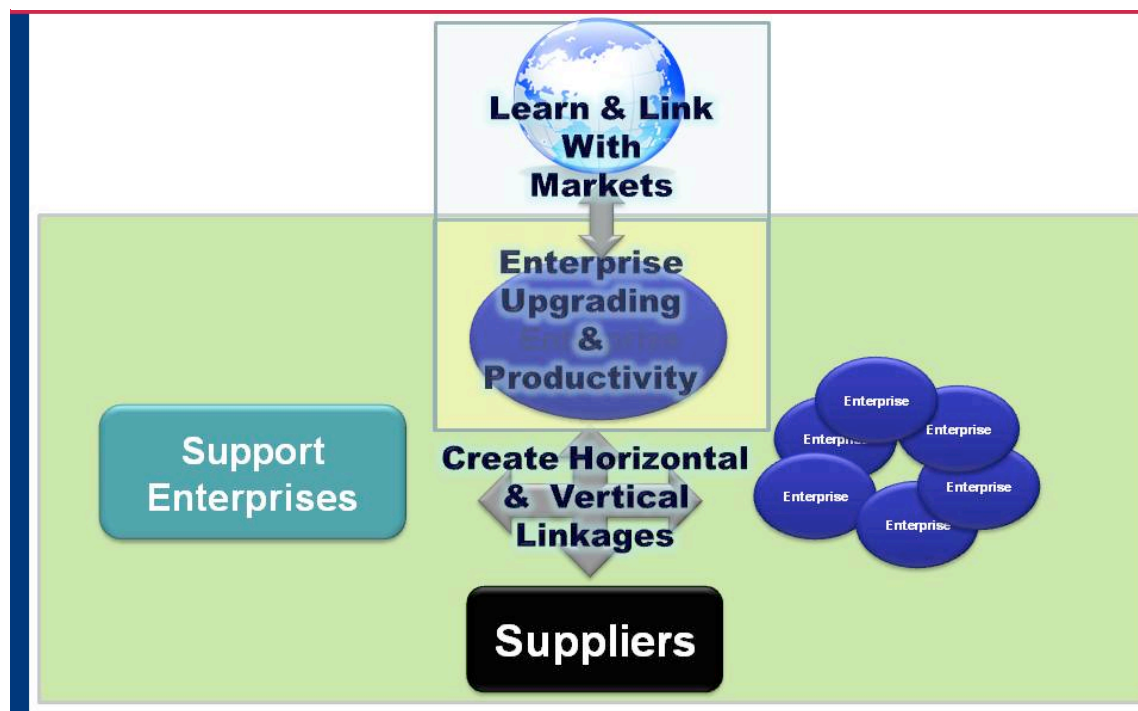
It should be noted that many of the projects detailed in the brief at the time of the interviews were business experiments, not proven business models; some of the projects have already ended, but no follow up assessments have been done to determine if the impacts were sustainable. Therefore, as some of these projects move from an experimental to replicable stage of development, another analysis should be done to verify or edit some of the recommendations from this brief.

Section 1: Framework for Supporting ICT as a Tool to Improve Enterprise Competitiveness

This section of the brief discusses how enterprises in developing countries can use ICT to become more competitive. This section also provides brief descriptions on each part of the framework illustrated in **Figure 1** below. The framework for ICT support of enterprise competitiveness has three parts:

1. Understanding and Creating Market Linkages,
2. Enterprise Upgrading and Increasing Productivity, and
3. Creating Horizontal and Vertical Linkages.

Figure 0: ICT Support for Competitiveness Framework

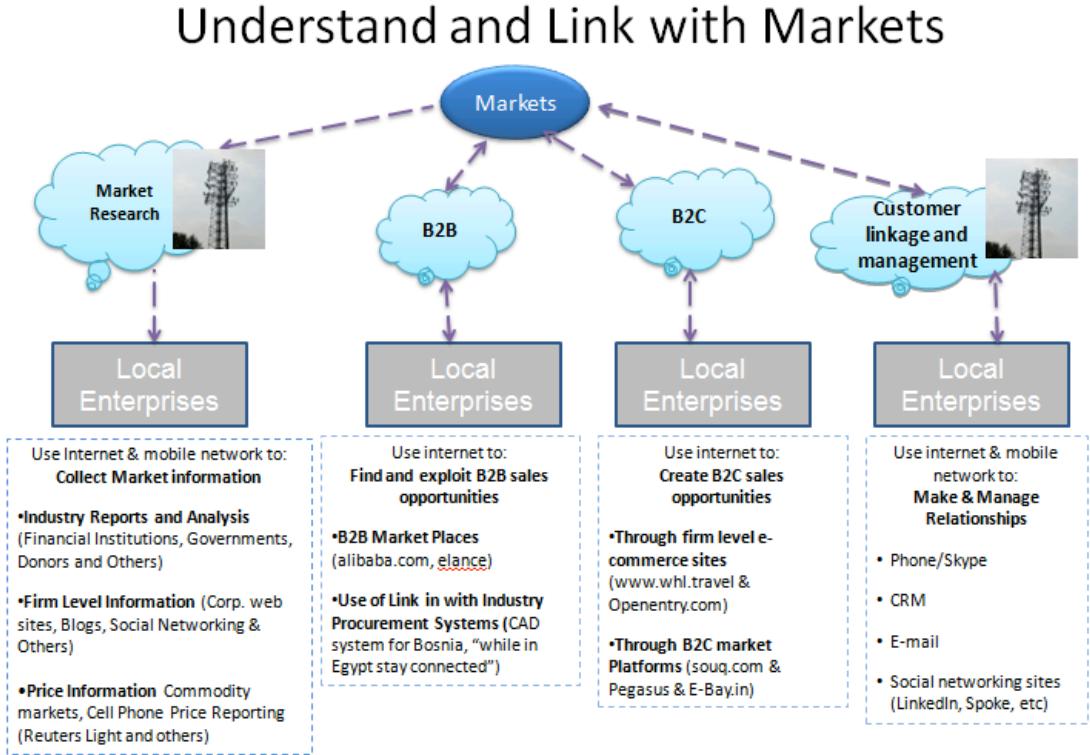


1.1 Understanding and Creating Market Linkages

ICT has revolutionized how enterprises can market and sell their products and conduct market research. These functions are referred to as market linkages. Of the three parts of the framework, this part showed the potential for the greatest impact. This may be because many of the project implementers interviewed felt it was easier to convince enterprises to use revenue-increasing rather than cost-decreasing initiatives. Another reason to focus on these technologies (e.g., web searches, web sites, and email) is that they are relatively affordable. Finally, these technologies do not usually require major changes to enterprises' business processes (i.e., typically no enterprise reengineering is needed).

ICT is one of the most useful tools for enterprises to *learn* about markets and possible customers, (i.e., to conduct market research). Enterprises are also using ICT to *link* with current and new markets in ever more innovative ways. Enterprises can link with both global and local markets as shown in **Figure 2**.

Figure 0: Linking with Global and Local Markets



The Internet has become an incredible tool for market place analysis. Internet users can analyze possible industry segments, customers, key individuals, or technology trends. Enterprises can use the Internet to find this market information from sources such as those included in **Box 1**. Many of these information sources are available at no cost; others are available on a fee basis but may be worth the price given the information provided. Enterprises can collect market information about how their industry works, including competitors, sources of supply, trends, and new technologies. Enterprises can also use the web to research potential customers by studying their websites or by studying independent trade writers and bloggers that cover specific sectors or large firms. Social websites like linked-in.com have created an

opportunity for businesses to learn about key contacts within potential targeted clients.

Besides studying potential customers and clients, enterprises can use the Internet to learn more about the market environment. For example, while commodity pricing data have been available in newspapers for many years, several years ago data became available on websites. This data has always been useful for traders of relevant commodities but not for small and medium enterprises (SMEs). More recently, there have been several attempts to record pricing information from local markets and transfer that information through mobile phones to SMEs selling those goods. The project that has had the greatest success, in terms of raw numbers, is the Reuters Market Light Initiative in India, which is described in more detail in Section 2.

Box 1: Sources of Internet Market Information

- Industry Trade Associations
- Financial Institutions Industry and Business Investment Analysis
- Newspaper / Magazine Websites
- Corporate Websites
- Industry Events and Trade Shows
- Consulting Reports
- Press Releases
- Blogs
- Donor Reports
- Government Reports

Enterprises can use the web to sell products to other enterprises by using B2B (business-to-business) websites such as global websites, like *Alibaba* and *elance*, and also industry-focused websites and procurement systems. These global marketplace sites offer users (primarily SMEs) an opportunity to promote a product, educate consumers, and conduct business with other firms. There are also industry procurement systems that allow enterprises to use one system to actually transact with several different customers in an industry.

A great example of global connectivity is found in the tourism sector. Hotels can link to Global Distribution Systems (GDSs), allowing travel agents around the world to book rooms at these hotels. One USAID project in Egypt called “While in Egypt Stay Connected” helped independent hotels connect with international travel agents and thus the final consumer (more on GDSs can be found in Section 2). There are also several industry procurement sites on the web for specific sectors such as steel, automotive, and aerospace, which are only open to certain pre-qualified suppliers and buyers. Here major players in an industry share a single site for procurement of goods. Although some of these shared procurement portals still exist, many major industry giants now use their own procurement systems to manage proven suppliers, sharing with them production data and using them to manage inventories tightly.

The Internet has also been a great way for enterprises to sell directly to consumers by using business-to-consumer (B2C) sites. Such websites can be focused on national markets or on specific industries. The national B2C sites generally allow enterprises and others to sell a large selection of products over the Internet. Most often these national sites are marketed and operated within national markets because distribution is often cheaper and more organized. Examples of these online marketplaces include Egypt’s souq.com and India’s e-bay.in. Some of the best examples of industry-specific B2C websites are found in the tourism and craft industries. One is the World Hotel Link (WHL) tourism portal targeted for the Do-it-Yourself (DIY) travelers to help book hotels and tour packages in remote and often unwired destinations. WHL taps specific niche market web channels such as the Lonely Planet website to connect with targeted DIY tourists.

Lastly, ICT is a necessary tool for enterprises to contact and manage new customers. The mobile phone is critical to managing customers and e-mail has become one of the most useful

ways to communicate with new and existing clients. The growth of Web 2.0⁵ and social/business networking sites have introduced another way to network globally without leaving the office. As mentioned above, websites such as linked-in.com and Spoke have grown to be useful tools to find contacts and potential clients (although businesses must take care not to dilute their effectiveness by trying to extend their networks beyond contacts that really know them). Web-based (as well as in-house ICT-enabled) systems can be very useful tools for sales contacts and customer relationship management (CRM). Salesforce.com is the premier example of sales force management software and is offered on a web services basis (e.g., enterprises large and small use the application from a third party server via the web). CRM software (again offered via the web or in-house) has become increasingly sophisticated, allowing enterprises to analyze and manage their customers, sales people, and marketing campaigns. By collecting this information a CRM system helps enterprises gain greater insights about its market place.

1.2 ICT can Help Enterprises Upgrade and Increase Productivity

The second part of the framework for increasing enterprise competitiveness is using ICT to help an enterprise upgrade (i.e., increase the value of) its processes, services, or products or increase productivity. The traditional view on how ICT supports enterprise competitiveness primarily focused on productivity gains. Productivity is a measurement of how an enterprise uses its resources (capital, labor, inventory, and others) to produce an output (revenue). In short, a firm is more productive if it can create more value – services or product – at the same cost – in the form of labor or materials. This part of the framework encompasses reducing input costs to increase productivity (the previous part looked at increasing revenue), which includes reducing transaction costs, reducing wastage costs, and helping enterprises upgrade their business process through ICT to gain more value for their products (see **Box 2**). ICT can also enable an enterprise to upgrade in several ways, including allowing enterprises to more easily take on additional processes which could lead to higher revenue or ICT being used to verify that upgrading processes that have been implemented to verify a requirement of international certification.

Box 2: ICT Supports Enterprise Upgrading and Productivity by:

- Reducing transaction costs
- Reducing waste
- Helping firms generate greater value

Reduction of Transaction Costs

One of the ways enterprises can become more productive is using technology to reduce transaction costs through services such as mobile banking (“m-banking” or “m-payments”). Traditional m-banking has been an innovative way for the unbanked to receive banking services,⁶ and oftentimes the unbanked are farmers who sell their products to food processors or exporters. Sometimes these larger enterprises have to pay out hundreds or thousands of small cash transactions. This process can be both expensive and risky when handling cash. ICT can help make these transactions safer and more efficient. One USAID sponsored project in Zambia, the Production, Finance, and Technology (PROFIT) program, helped an entrepreneur start up an m-banking enterprise that allowed unbanked farmers to collect payment from ginnerers for their cotton via m-banking agents like talk time dealers, gas stations, or input suppliers. The large ginnerers appreciate this system because it dramatically reduces the transaction costs and

⁵ More on Web 2.0 can be found at http://en.wikipedia.org/wiki/Web_2.0.

⁶ M-banking refers to using mobile phones to conduct banking and payment transactions. More on m-banking can be found at <http://technology.cgap.org/category/topic/mobile-banking/> and <http://www.egworkshop2007.net/session%20files/Thursday/Power%20Pt/No.%2045%20-%20Mobile%20banking.pdf> and many other websites.

risks of paying cash to thousands of farmers directly. In Zambia's case, m-banking was able to start from a buyer supplier relationship because a large proportion of the local population produced cotton. However, this start up is often not possible, and for these types of electric payments to happen, the system's infrastructure has to be in place. With the rapid growth of m-banking in many emerging markets, this tool will be available for many enterprises to use to increase productivity.

Transaction costs can also be lowered by utilizing e-commerce, which also helps limit the risk of a cash transaction. The Jamaica New Economy Project (NEP) program supported the initiative of an entrepreneur who saw several opportunities to help enterprises reduce transactions. This included starting up a payroll service to help enterprises reduce the transaction costs associated with payment to payroll and creating ICT-enabled services so enterprises could pay utility bills, a B2B transaction, and government pension taxes, a B2G transaction. Typically to pay these monthly bills, enterprise employees would have to stand in line for hours; now the process is completed in minutes. The online bill pay service streamlined the process and reduced the transaction costs for both enterprise and government.⁷

Reduction of Wastage

Enterprises can also utilize ICT to increase productivity through its waste reduction capabilities. For example, the Computer Aided Design / Computer Aided Manufacture (CAD/CAM)⁸ system, which is used by enterprises that want to automate the design and manufacturing processes, can reduce wastage of inventory and labor costs. A CAD system can ensure that many defects are removed from a product design, thereby streamlining the prototyping and manufacturing of products. CAM will ensure that the raw materials and work-in-process will be used more efficiently; this ensures less waste and less wasted labor. One of the most successful examples of this is the USAID e-Biz project in Macedonia, which is highlighted in **Box 3** on the following page. The e-Biz project incorporated many of the approaches for using ICT to increase enterprise competitiveness, including reducing wastage in inventory by allowing textile firms to automate pattern making and the fabric cutting process. Another example of waste reduction is for hotels that incorporate integrated hotel management systems, which integrate the reservation system with the restaurant and inventory systems. This way, hotels can better forecast how much food they need for their restaurants based on incoming reservations.

⁷ More on the B to G transaction system can be found at <http://www.mcsystems.com/default.asp>

⁸ CAD is computer aided design & CAM is Computer Aided Manufacturer, more can be found <http://www.gsd.harvard.edu/inside/cadcam/whatis.htm> .

Box 3: The e-Biz Project in Macedonia

The USAID e-Biz Project provides an innovative model for helping SMEs use ICT to strengthen their businesses. It partnered with Macedonian entrepreneurs to offer “high impact” ICT solutions that quickly and significantly improved SMEs' competitiveness. e-Biz activities included the following:

- Identified the strategic opportunities and problems facing SMEs in sectors and clusters that constitute important segments of Macedonia's economy.
- Identified “high impact” ICT applications that could quickly and significantly help SMEs improve their competitiveness in the near- term and hence employ more Macedonians.
- Partnered/co-invested with Macedonian entrepreneurs to create self-sustaining ICT Business Service Centers (e-Biz Centers) with viable business plans based on high impact ICT applications.
- Used an incentive system that encouraged local SMEs to experience the benefits of the high impact ICT applications.
- Developed the capacity of the e- BIZ Centers and ICT companies to serve SMEs' demand for ICT products and services into the future.

e-Biz worked in 5 industry sectors which include tourism, apparel, footwear, management training, and machine tools, and created e-Biz enterprises for all of them. One of the greatest successes was in the apparel sector. An e-Biz Center was set up to offer CAD/CAM capabilities to smaller apparel manufacturers. These services allowed the apparel companies to respond quickly to the needs of Italian and other EU fashion industry firms and allowed the Macedonian firms to focus on more value-added sewing, beyond simple cut and assembly services. The e-Biz approach cuts across several of this brief's approaches in the following ways.

Understanding and Linking with Markets

In the apparel sector, e-Biz used a CAD/CAM system that allowed them to compete in high value-added “rapid response” niches; link to customers electronically (i.e., receiving patterns in electronic form); and meet quality demands of Italian brand name firms.

Increasing Enterprise Productivity and Upgrading

The e-Biz Center increased productivity by reducing the wastage of materials and shifting labor to higher value-added tasks. The system also allowed a once dying industry unable to compete against lower cost manufacturers in Asia to upgrade and move into the new “fast fashion” market in Italy by adding fast turnaround (because of ICT) to its strength.

Creating Horizontal and Vertical Linkages

The e-Biz Center allowed smaller apparel manufacturers to establish linkages among themselves by adopting this technology via third-party services, while not requiring any of them to make a capital investment into the technology.

Productivity Gains Often Need a Greater Purpose

As stated previously, there is mixed research as to whether ICT really helps enterprises improve productivity. ICT can serve as a means by which to increase productivity, but ICT alone does not necessarily improve productivity. According to the OECD Report “*ICT productivity Paradox*” Enterprises in the US and Australia have had real, impressive productivity gains with the use of

ICT, but developing countries have not seen improvements on the same level.⁹ Most of the studies done regarding the impact of ICT on enterprise productivity have been on labor productivity; since many enterprises in developing countries are unwilling to change their processes or labor structure, the results of the studies are typically negative. Laws and regulations often prevent or make it very difficult to make major changes in labor structures (e.g., laying off workers), or community groups can use political pressure to prevent employment losses. Also in countries where labor is plentiful and cheap, increasing labor productivity may not be the main point. Therefore, the use of technology in ways that may create labor losses will face an uphill battle. As seen in the e-Biz example, using ICT to create productivity gains may be more successful when the focus is on *upgrading* the enterprises by adding new processes or allowing them to enter new markets, rather than on cutting labor waste.

ICT to Help Enterprises Upgrade

ICT is often seen as an enabler that will allow smaller enterprises to upgrade the value of their processes and thus gain higher value for their products and services. The use of ICT can also help enterprises learn about innovative practices in their industry that will allow them to upgrade their business. One good example of using technology to learn best practices is the SAGIC project in Senegal, which has been educating cashew producers through rural radio broadcasts with educational information on harvesting techniques, post harvest handling methods, quality testing, and the drying of raw nuts. Senegalese cashew producers who are listening to the shows and incorporating the trainings and upgrading their processes are earning a higher price for their product.

ICT can also help firms upgrade by serving to streamline or automate processes. For example, a pharmaceutical enterprise can use a CRM system to collect information from doctors and pharmacies regarding the types of medical conditions they are treating, information that will help the pharmaceutical enterprise streamline its product development process. ICT can also be used to automate processes, as demonstrated in the e-Biz example by the use of CAD/CAM systems to upgrade processes and to accelerate response time to the needs of the fast fashion industry. For SMEs to earn higher value from upgrading, their buyers must have a way to confirm the upgrading process used. For example, many certification programs like GlobalGap or shade grown coffee need enterprises to be able to verify the traceability of the source of the product. Tracing by the use of satellite photos can be a way to verify that farmers have followed certain certification criteria for products, and certification in turn earns the farmers' products a higher price. Care must be taken to ensure that the traceability approach is sustainable. In many cases, traceability information can be recorded simply on paper; this satisfies end market demands and avoids a much more costly ICT-enabled system.

1.3 ICT Can Help Create Innovative Vertical and Horizontal Linkages

The third part of our framework focuses on using ICT to create or strengthen vertical or horizontal linkages among enterprises. In today's marketplace a minority of enterprises are vertically or horizontally integrated across a particular industry. For many of these enterprises, ICT can provide a competitive advantage by improving communication and alignment of work processes and systems. Through the growth of broadband and mobile communications, ICT is helping to create or strengthen vertical linkages among enterprises in the same industry and

⁹ A good historical perspective on the productivity paradox can be found Nicholas Crafts paper The Solow Productivity Paradox in Historical Perspective which can be found at http://www.j-bradford-delong.net/articles_of_the_month/pdf/Newsolow.pdf

among firms and support services, such as finance or transportation. Often, technology investments can also be shared across a sector, allowing small firms access to ICT-enabled processes that would otherwise be beyond their financial resources. Alternatively, a larger lead firm, like a processor or exporter, can use ICT to help manage its supply chain, allowing it to work more efficiently and sometimes to pursue new market opportunities.

The use of ICT to support vertical linkages is often employed by larger enterprises to manage its supply chain. These supply chain technologies are typically needed to automate the processes of forecasting needed supplies, making orders, managing processing and shipment, and confirming quality. Usually the technology is first adopted by a larger enterprise, and it has its supply base adopt technologies to integrate with its own systems. These technologies are typically called supply chain technologies or procurement technologies.

A unique example of this type of system is an enterprise that takes satellite photos of its supplier farms to estimate output and thus improve its ability to forecast timing and quantity of farm production. Another good example is the TIPCEE project, which was able to track pineapples as they were transported from collection sites to ships at the port by using bar codes recorded on pallets to make it easier and faster to route the pallets of pineapples through European ports to end customers, hence reducing spoilage (see **Box 4**).

Box 4: Ghana Pineapples – TIPCEE Project

Before the TIPCEE Project, pallets of Ghanaian pineapples were marked with chalk, not bar codes, so they were often the last to move off docks on their way to European supermarkets. Additionally, farmers had a difficult time with traceability paperwork to meet European requirements. The USAID TIPCEE project helped implement bar code technologies as well as ICT-enabled traceability records.

ICT has also been used as an innovative way to encourage enterprises across a sector to work together and help each other become more competitive. ICT-based improvements to horizontal linkages often allow smaller enterprises to utilize technologies without an actual investment into the technologies. An example is found in the tourism sector and the WHL business model, which sets up franchisor models with tour operators in new frontier destinations. These tour operators set up a destination website (using WHL technology) and then link with smaller hotels to that site. The system not only markets the destination and the smaller hotels to specific markets but also has a reservation system to help manage the hotels' room inventory. Horizontal linkages, by contrast, can happen by outsourcing specific operational functions. For example, payroll can be a very tedious process for enterprises especially in countries with a great deal of labor regulation and payroll taxes, so outsourcing payroll technology services to firms is common across the world, including in Jamaica, where the USAID NEP program helped an entrepreneur start up such a service. Another example of this is marketplaceindia.org; seven artisan cooperatives around Mumbai use this B2C website to sell and market their products. The website also manages the suppliers to ensure these independent enterprises manufacture products in time to deliver them to the customer.

Section 2: Examples of How ICT is Supporting Enterprise Development in Specific Industry Sectors

In this section we will highlight some examples of how ICT is helping enterprises in specific industries become more competitive by utilizing the framework explained in Section 1. While not every industry and sub-sector can be addressed separately, the brief will look at how ICT is supporting three major industries in which enterprise development and donor enterprise projects typically operate: Agriculture, Tourism, and Light Manufacturing. This section addresses how

ICT is used to facilitate financial transactions between enterprises but does not specifically review how ICT supports the finance sector. Though the finance industry is a major adopter of new technologies, a great deal of literature has already been compiled on the subject for donors.¹⁰

2.1 Agriculture/Agribusiness and Technology

Introduction

In many emerging economies, agriculture and agribusiness remain sectors that employ a majority of the working population. Previously it was difficult to utilize ICT in agriculture because the population had no access to communication networks, and the cost of the technology was prohibitive.¹¹ However, with increasing competition in telecommunication markets and new technical approaches to providing services, mobile operators are expanding their market reach beyond urban areas. Phone manufacturers also realized that cheaper handsets would allow them to enter into new markets. Because of these changes, mobile phone-based services are now available to enterprises in agriculture and agribusiness sectors.

Currently there is a great deal of experimentation with ICT in agriculture by projects, including SMS-based services and Geographic Information Systems (GIS) that help agribusinesses interact with local service providers within the local value chain, track crop production, manage the supply chain, and connect with re-sellers on the global value chain. Additionally, because farmers and agribusiness professionals have not been heavy users of technology previously, it is necessary for development practitioners to utilize technologies that already exist in the region and do not require significant additional training prior to use. However, older technologies, like radio, are still among the most effective means to disseminate information about the growing season, agricultural best practices, and market information, especially where illiteracy is high and communication needs to be in local languages. Radio can also be combined in innovative ways with access to the Internet; for example World Space Radio¹² users are even able to download video to help with any training. These new experiments with ICT in agriculture and agribusiness will increase enterprise competitiveness and thus enable the private sector to build stronger links with end markets, helping food processors and exporters to become more productive and supporting inter-enterprise cooperation between farmers and support services.

Linking to and Learning about Markets

As mentioned previously, there has been a lot of experimentation with technology in agriculture. One experiment in particular has utilized the web and cell phones to share market information, including sales and pricing information. The success and sustainability of such programs have varied, however. Some of the early experiments focused on utilizing the web to share market prices across a region. Most of these systems are focused on central or regional city markets, and the benefits principally go to traders who have access to and are major users of the system. Producers/farmers who have limited access to the Internet do not accrue benefits. One exception to this has been the e-choupal model which has been highlighted in many reports¹³ and presented in C.K. Prahalad's book *The Fortune at the Bottom of the Pyramid*. The e-

¹⁰ For example, see http://www.microlinks.org/ev_en.php?ID=12669_201&ID2=DO_TOPIC.

¹¹ Note this brief focuses on the uses of ICT to improve agriculture, not the many ways technology in general is used in agriculture to improve agronomic techniques and inputs, e.g., improved tools for plowing, harvest or protection from heavy rains, and improved seeds and fertilizers.

¹² More on world Space Radio can be found at http://www.1worldspace.com/beyond_radio/satellite_services/

¹³ Some of the reports can be found at <http://www.hbs.edu/socialenterprise/pdf/2-Anupindi&Sivakumar.pdf>, and <http://www.bus.umich.edu/FacultyResearch/ResearchCenters/ProgramsPartnerships/IT-Champions/eChoupal.pdf>.

choupal system was largely different because: it brought market information to the rural areas; it had a trained computer user who could distribute the information to the farmers; and it was financed completely by a private firm, ITC. More recent experiments have focused on utilizing mobile networks' SMS technology to receive market information, including price information. So far, the greatest impact that we viewed was the Reuters Market Light (RML) system in India, a private sector-led program already used by 100,000 farmers in 10,000 villages (see **Box 5** for more on RML), but even given these impressive numbers as of the date of this brief the business is not profitable although expected to be.

In Africa, governments have collected information for many years on agriculture crop yields and prices in order to forecast areas of deficits. These systems have also been used to inform farmers of prices for many products in specific markets. OMA, Mali's Market Watch system, is one of the oldest and best known.¹⁴ Many of these government-run or financed systems are now working to manage the move from providing information via print and radio to providing information via mobile phones. At the same time, private (or donor funded) services are emerging that are focused more specifically on providing farmers – sometimes via their associations or cooperatives – with more timely and accurate market price information. Such commercial systems are still working to find sustainable and scalable business models. However, there is still doubt regarding how the government oriented market information systems will work with, replace, or compete with the commercial systems.¹⁵

Box 5: Reuters Market Light System

Reuters Market Light (RML) is a purely private sector project of Thomson Reuters. Compared to similar donor lead projects, this venture has focused a great deal of effort on market research, sales and distribution channels, and product interface. The project felt it was imperative to customize the information to ensure that it was exactly what the farmers needed to grow and sell their crops. RML covers 120-125 crops by employing 270 reporters. The type of information includes:

- Market Prices,
- Weather Forecasting,
- Crop Information, which comes from Universities and R&D centers, and
- Relevant News.

Enterprise Productivity

The use of ICT to help farmers upgrade their processes can earn them a higher profit margin, increase their yields, and reduce traction costs or wastage. Additionally, technology can assist farmers to enter new markets and thus earn more revenue by increasing their yields. An example of this type of ICT implementation is the use of GIS and geo-positioning as mentioned previously.

Use of GIS to Help Increase Farmers' Incomes

For agricultural producers to export to markets like the EU, one requirement is to be able to trace the farmers' sources to get certified (i.e. shade grown coffee and GlobalGap). To be certified with GlobalGap, for example, processors/exporters are typically required to plot the exact location of where the product was produced. Traceability can be done using GPS/GIS geo-locational devices. For example, when individual plots and collection points have been geo-located, processors and exporters are able to trace what product came from what farm, thus helping with the certification process. This program is currently being implemented by the TIPCEE project in Ghana to trace pineapples for GlobalGap, but other fruit exporters are now

¹⁴ There are many references to OMA. See, for example, <http://ictupdate.cta.int/en/Feature-Articles/Mali-s-Agricultural-Market-Watch>.

¹⁵ An example of commercial market information systems (MIS) are Tradenet (now called Esoko) (www.esoko.com)

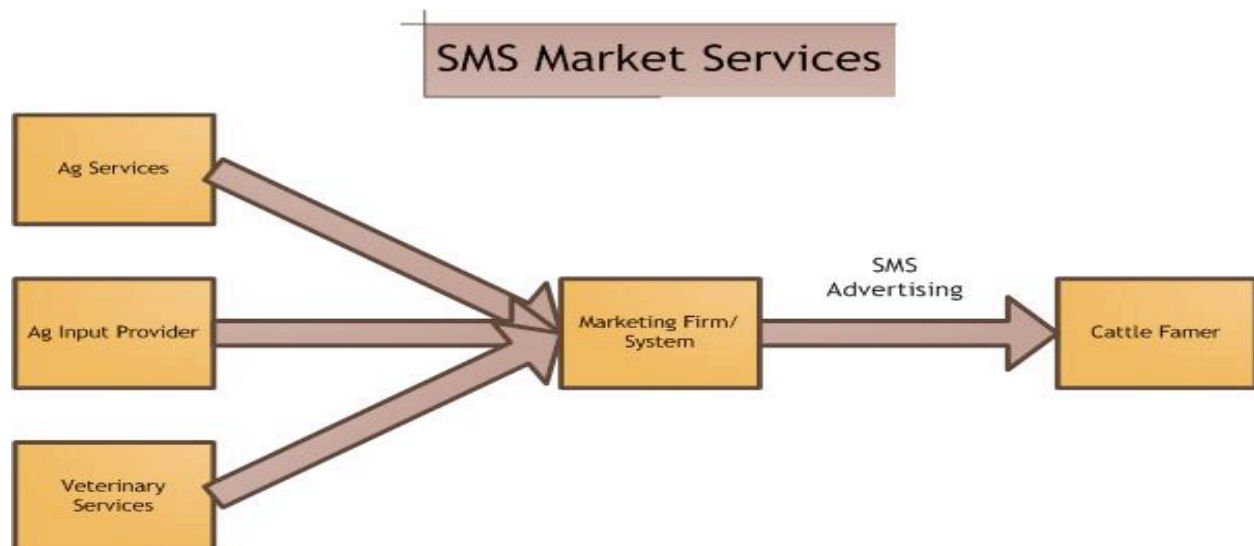
asking for the technology. Satellite photos with geo-positioning can prove specific criteria have been met for certain certifications like rainforest alliance certified criteria. The satellite photo can confirm that tree canopies are present in a coffee farm meeting, an important criteria for this difficult certification. The certification process is not easy and takes time and money. One way to make the implementation of this technology less expensive, however, is to train farmers and extension workers so they can geo-locate farms in their community (and share the devices needed to do so) instead of hiring outside consultants.

GIS technology, similarly, can improve the productivity of farmers and extension workers trying to combat pest infestations. Farmers set up fruit fly traps at pre-determined, geo-referenced locations around their fields and in the surrounding areas. The farmers then check the traps at regular intervals and compare the number of flies caught at the various locations. This information is fed into a system so that farmers and extension workers can track the fruit fly infestation and its movement across huge territories. Targeted responses to infestations ensure that insecticide and resistance chemicals are used more sparingly and more efficiently. Therefore, farmers lose less of their product to waste. However, this technology is fairly new and most projects have been experimental; none of the projects interviewed for this brief have any concrete results to date.

Helping Farmers and Processors, Exporters, and Retailers Cooperate

The use of mobile technologies is beginning to demonstrate real advancement towards the goal of creating greater cooperation between farmers and lead firms, such as food processors and exporters. Also, ICT can help enterprises link horizontally, with input suppliers helping farmers. SMS-based marketing services, which educate farmers about services and could make them more productive, have had some real world application. For example, veterinary services and input providers are able to use SMS marketing to target a very specific audience and ensure that farmers understand how these services will help their productivity. The goal is to educate farmers on agriculture inputs available to them and how they help their production (see **Figure 3** below). The PROFIT project facilitated the creation of such a service. They found that farmers were often unaware of the resources available to them, so an SMS-based marketing system sent advertisements and promotions from input providers and veterinary services directly to cattle farmers.

Figure 0: Impact of SMS Marketing Services



SMS marketing services are a relatively new innovation; traditionally the radio has been used to teach farmers about best practices and information about the weather. The government or NGOs typically create this programming and broadcasted it through rural community radio stations. For instance, the USAID SAGIC program in Senegal has used radio programs to teach cashew farmers good harvesting practices.

Reducing Transaction Costs Using m-Banking

As was noted previously, servicing the unbanked can be very expensive, risky, and complicated; this holds true for paying small farmers, who are among the unbanked. However, the massive growth in m-banking provides an alternative. For example, the USAID-sponsored Microenterprise Access to Banking Services program in the Philippines and the Mobile Operator driven M-PESA project in Kenya have both serviced communities that have no access to banks. The mobile network is being used to transfer money into individuals' mobile phones. They are then able to buy products from certain vendors or even cash out their credits from specific agents. This bank network can also benefit transactions between large enterprises, like processors, and smaller micro-enterprises like farmers. The PROFIT program has designed an SMS-based m-banking platform built specifically for low-cost mobile phone handsets. Farmers receive credit from food processors to their mobiles phones and are then able to spend that virtual money through a network of m-banking enabled vendors.

2.2 Tourism and Technology

Introduction

Tourism is an industry that has been transformed by the use of ICT. The web has become a key resource for tourists to research and book travel to foreign destinations. This oftentimes eliminates the need for foreign outbound tour operators thus creating more value to local in-bound tour operators and their suppliers to create new web-based marketing channels. Technology has also done a great job of helping unique far away tourist destinations reach niche segmented markets. When it comes to tourists, ICT has literally made the world a smaller place. Donor-funded projects have had some success supporting the ICT sector in its role in increasing the tourism sector's competitiveness. These projects have helped tourists to learn and link with foreign destinations, bolstering productivity and creating inter-firm linkages.

Linking to and Learning about Markets

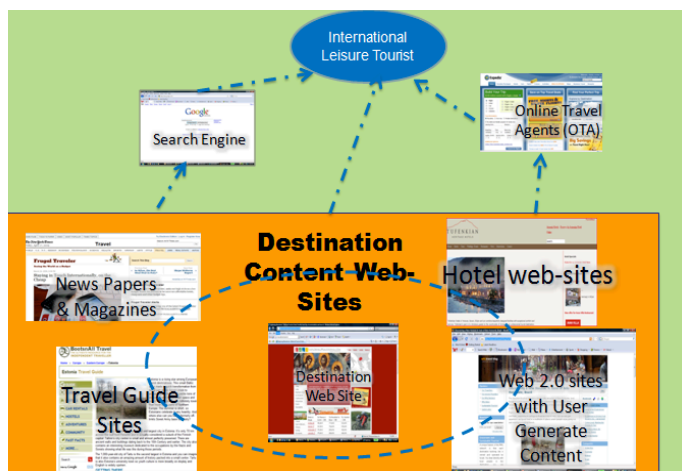
Over 70 percent of tourists use Google as their first point for gathering information about a destination.¹⁶ This has two general implications. First, tourism destinations need information on the web that educates, inspires, and offers details on important information including itineraries, hotels, safety, and how to book travel. The problem with the web is if "you build it (websites and blogs), will people come?" Second, the destination sites' content must reach target markets via search engines. Therefore, destination and other hotel websites must take specific actions to ensure they are linked with their target market utilizing Search Engine Optimization (SEO).¹⁷ For example, destinations targeting eco-tourists should ensure that they place well on eco-tourism keyword searches. Also eco-tourism enterprises should focus their websites with eco-tourism travel websites like National Geographic. On the other hand, mass market beach and sun destinations should be linked with sites with online travel agents (OTAs), like [Expedia.com](http://www.Expedia.com), who target tourists in bulk. One of the biggest trends to take advantage of right now is Web 2.0 technologies, or more specifically, user-generated content sites. These are sites where users

¹⁶ Data is generated by Google inc. http://www.in.gov/tourism/pdfs/Compete-Google_Travel_Economy_Study-Jan_2009.pdf.

¹⁷ More on SEO can be found at http://en.wikipedia.org/wiki/Search_engine_optimization.

upload pictures, videos, and product reviews. These sites have great, interactive content and help tourism websites get better placement in the search engines (see **Figure 4** on how tourism websites connect with their target markets).

Figure 0: Connecting to Target Markets through the Web



The World Hotel Link (see **Box 6**) uses an interesting business model where it will take on last frontier destinations and work with local tour operators to create a brand image and link them with tourist web-sites. WHL's system provides online booking capabilities, which is critical since over half of American and European tourists book travel online. On-line booking capabilities help firms to both open up to a new market place and become more productive.^{18, 19}

Box 6: World Hotel Link

WHL is a private start up with funding from the International Finance Corporation to link off the beaten path locations with tourists using a web marketing channel. WHL sets up franchisors, usually tour operators, in these difficult to get to tourist locations. The franchisor uses WHL's technology and services and is responsible for bringing on additional hotels in which it will manage the booking of hotel rooms and other tourist products. WHL then utilizes SEO and market channel agreements with places like Lonely Planet to highlight these sites.

Tourism Sector Productivity

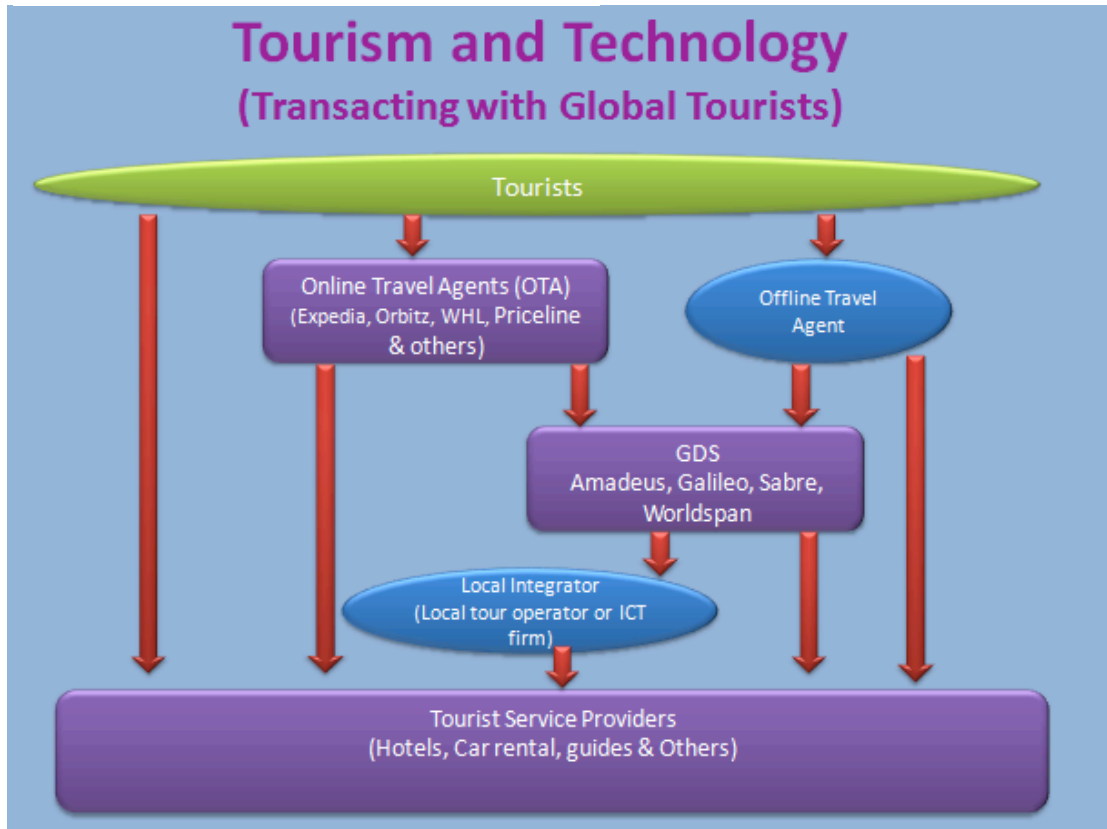
In order for people to use the web to book hotels, guides and to rent cars, these enterprises will need to provide their "inventory" of available rooms or cars to Global Distribution Systems (GDSs) and OTAs. If these hotels are fully integrated with the market, it will increase their productivity; integration with the market place is becoming more important as the market demands it.

Most tourists will book through an online or offline travel agent for tourism products like

hotels, flights, tour packages, and products. Most of these systems are directly connected with a GDS like Amadeus, which allows the tour operators to see tourism product availability. Local hotels utilize a local integrator, which can be a local tour operator or an IT firm, that will link these global distribution systems to hotels' current reservation systems or even manage part of the hotel's reservation system for them, as in the case of WHL. With an online booking system, operators will be able to manage their operations, like labor and supplies, needed more efficiently because they have a more accurate sales forecast, which allows them to plan better for labor and supplies. They will also be able to reduce their transaction costs; technology transactions are generally more efficient because they oftentimes eliminate the need for middle men operators (see **Figure 5**). A good example is the USAID-sponsored project, "While in Egypt Stay Connected," which utilized such web services to eliminate non-value added costs which often charge too high a booking fee, roughly 15%, with little value for the tourist or hotel. There are several more outsourcing models of the booking system where local hotels and tour operators can pay a transaction cost per booking to a third party that manages the booking system.

¹⁸ More on European online bookings can be found at <http://www.crt.dk/uk/staff/chm/trends.htm>.
¹⁹ More on US online bookings can be found at <http://www.itaa.org/upload/isec/docs/e20074-11.pdf>.

Figure 5 Middle Men Operators



Source: WHL

Horizontal and Vertical linkages - Firm Cooperation in the Tourism Sector

Lastly, technology can help tourism firms to cooperate. One possibility is local inbound tour operators working with tourism suppliers like guides. Another is a cluster initiative which brands itself as a tourism destination over the web. A great example of this is WHL. It uses a local tour operator who cooperates with hotels and other tourism suppliers and utilizes its market-based web system to connect with markets and to provide online booking.

2.3 Manufacturing and Technology

Introduction

ICT is becoming ever more critical in the design and manufacture of finished goods. Productivity is at the core of how ICT can improve the manufacturing industry around the world. Everything from t-shirts to jewelry can be digitally designed collaboratively across the globe before being sent to an automated manufacturing system. CAD/CAM is reducing cost and waste and increasing productivity in every industry around the world. Low-cost providers from China and Southeast Asia are utilizing the newest advances in technology to produce complex consumer goods faster and cheaper than ever before. The use of these technologies has led to flexible value chains where standards set up in the design stage allow enterprises to be innovative

suppliers. Today, firms that do not take advantage of advances in computer designs and manufacturing are simply unable to compete on the world market.

Enterprise Productivity and Upgrading

As mentioned before from the e-Biz example, the garment industry in Macedonia, which supported an enormous percentage of the workforce, was on the edge of extinction. Garment producers were simply having a difficult time competing with the low cost alternatives in Asia. There were, however, opportunities for on-demand orders (fast fashion) that were not being met in Asia due to the shipping times. The e-Biz project worked with a local entrepreneur who developed a CAD/CAM service that offered design and automated cutting services on a fee basis to small garment manufacturers in Macedonia. Through the CAD/CAM service, garment producers would be able to solicit designs from local and international clients. Once the designs were received and encoded, the automated cutting system would cut the fabric with greater quality. This allowed the industry to focus on value-added sewing services.

Another donor sponsored e-Biz project in Bosnia was set up to offer CAD/CAM services to leather manufacturers to gain similar productivity increases and linkages with more demanding markets. There are many other examples of how ICT helps manufacturing by utilizing such systems as Enterprise Resource Planning (ERP),²⁰ Manufacturing Resource Planning (MRP)²¹ or procurement management systems,²² but none of these technologies were seen in the brief's interviews with donor projects.

Section 3: Making Projects Sustainable and Scalable for Enterprise Development

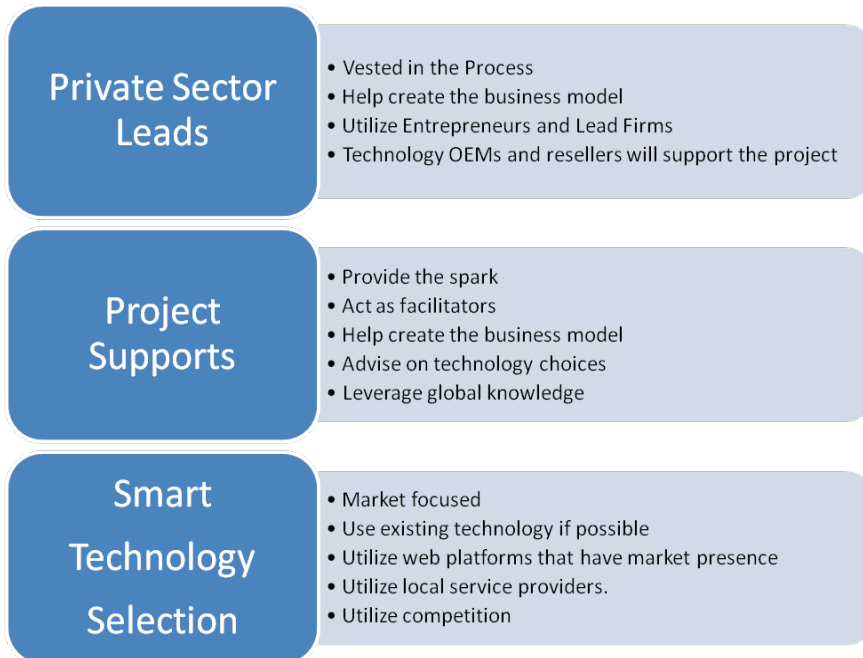
ICT support of enterprise competitiveness has shown real promise in the developing world, but it is time to turn promise into higher impact, sustainable, and scalable results. Projects need to move away from being experiments and towards becoming catalysts in order to get the private sector to scale up proven ICT business models. ICT can be used to address very specific and identifiable inhibitors to competitiveness. However, there are also several dangers within ICT and enterprise development that development practitioners need to avoid. The buzz that surrounds the new and latest technology can distract donor funded enterprise development projects from being effective and objective. All too often, projects bring in "technology experts" who develop technology solutions for enterprises without understanding how the technology will work in the local environment, how it will be maintained, or if the technology can be properly localized for language and cultural concerns. Furthermore, the solution may need to work in an environment that may not be as clean or weather-protected as other locations, or where power is intermittent with regular power surges. The ICT specialists should ask themselves and the project: "Who are the stakeholders?"; "Who will manage and maintain the technology?"; and "What is the business model to ensure the sustainability of the technology and scalability to similar enterprises?" If these questions cannot be answered, then that particular ICT intervention should be rethought. **Figure 6** describes how donor projects can manage some of these risks.

²⁰ More on ERP can be found http://www.cio.com/article/40323/ERP_Definition_and_Solutions

²¹ More on Manufacturing resource planning can be found at <http://www.ijee.dit.ie/articles/Vol14-4/ijee1021.pdf>

²² An example of procurement management systems can be found at <http://dlib.secs.iub.edu.bd/internship/spring2006/0130081.pdf>.

Figure 6: Enterprise Development Projects' Keys in Developing ICT Initiatives



3.1 Ensure the Private Sector can lead the Process

The key ingredient to having sustainable and scalable ICT initiatives in enterprise development projects are a private sector that is vested in the process and is taking the lead (see **Box 7**). Whether the private sector is a high tech firm that will adapt the technology to the local market or a lead firm utilizing technology to help manage the value chain, it is imperative that they are leading the process. Ultimately, they will need to address the issue and then understand how the technology works and how to expand upon it.

Box 7: Private Sector Leads

- Vested in the process
- Help create the business model
- Utilize entrepreneurs and lead firms
- Technology OEM's and resellers will support the project

If the initiative fails, the private sector should share in the pain of the failure; if the initiative succeeds, the private sector should benefit from its success. If this type of business model is in place (if the private sector has “skin in the game”), there is a much greater likelihood that the ICT initiative will be sustainable. Therefore, the business model should involve the private sector in every stage of the process: identifying the business opportunity that ICT will support, selecting the technology solution, building the revenue model that will support the initiative, and fundraising for the initial investment. When firms have their own money on the table, they will make business decisions based on real financial considerations rather than on donor subsidies to ensure their investments get a return.

Because of financial and temporal limitations, any donor project necessarily can only work with a sub-set of enterprises in a sector. Ultimately, the private sector will need to take the lead to create scalable solutions. An example of this is a lead firm that uses a technology solution to

help manage its supply chain and empowers its suppliers to become connected through the same technology. There were several projects that were interviewed in which the technology was being managed by the project as a pilot and there were no incentives for the private sector to jump in and manage these initiatives after donor funding was terminated. Some ICT initiatives support an entrepreneur who wants to start a business around a technology solution that helps other industry sectors be more competitive. These enterprises will find ways to make the business model work and expand because they are driven to grow their investment.

Another successful model for scalability is the replication of other successful business models. Similar to a franchise model, local enterprises (franchisees) will work together utilizing a technology system built and proven on a business model by another enterprise (a franchisor). The two then share the revenue. WHL does just this; the company builds a technology platform around a successful business model that allows local inbound tour operators to utilize the technology and gain global market presence and manage hotel rooms and other tourism services.

Lastly, technology firms will want to leverage any project initiatives to support their own strategies. If the project wants to bring in new technology, it can entice the inventors of the technology or the local IT firms reselling that technology to pilot it with the project. The Dot.org initiative in Panama is one good example of this strategy. The project partnered with Intel, which wanted to field test new WiMAX equipment that allowed eco-lodges in remote Panama to connect to the telecommunication backbone. Intel donated the equipment and the technical expertise, making the integration of technology possible.

3.2 Enterprise Development Projects Should Play a Supporting Role to the ICT Initiatives

Enterprise development projects can work on several areas in order to ensure the implementation of ICT initiatives that have impact, sustainability, and scalability. Enterprise development projects can act as a spark by introducing new global technologies to the country and/or helping enterprises design profitable business models that utilize these technologies. This often entails designing projects that can highlight the business opportunity or new markets that the private sector can take advantage of and helping in acquiring co-investments from private sources for the new business model (see **Box 8**). It should also be noted that more successful projects invest time and resources in understanding the market needs for ICT services. This includes doing market research surveys and facilitating focus groups on prototype technologies. These types of activities will help create a spark in the private sector. A good example of this strategy is the e-Biz project in Macedonia (see Section 2.3), in which the project did the analysis to show market opportunities for CAD/CAM services to enter the fast fashion market in Europe. Then the project helped entrepreneurs work on their business plans and provided some of the start-up funding so they could take advantage of the opportunity.

Box 8: Project Supports

- Provide the Spark
- Act as facilitators
- Help create the business model
- Advise on technology choices
- Leverage global knowledge

Enterprise projects should be neutral, objective, third-party facilitators that bring stakeholders together for mutual benefit. They should not try to favor one technology over another, but should be intimately familiar with all the options so they can recommend different configurations. The project could be a facilitator between the local ICT and non-ICT sectors to help the ICT sector

develop innovative solutions to make the non-ICT sector more competitive. This has been done with tourism in Vietnam, Egypt, and Armenia by utilizing white papers, conferences, and B2B forums (see **Box 9**). The facilitation could also be among firms in the IT industry to help address a critical issue affecting the sector, such as workforce development. Another example of

Box 9: ICT and Tourism Facilitation in Armenia

The USAID sponsored Competitive Armenia Private Sector Project (CAPS) facilitated specific initiatives to bring together ICT and Tourism organizations to help with the competitiveness of the tourism sector. Activities under CAPS include:

- An IT White Paper which spoke of the Armenian Tourism Industries market trends with the use of ICT and where Armenian is placed currently.
- A presentation for the ICT community explaining the critical need for them to developing ICT services for the tourism sector
- A presentation at a tourism conference to explain the why they need to leverage ICT to link with markets
- Facilitating linkages between the two sectors at an ICT B2B event to bring together ICT and tourism firms
 - Worked with local ICT firms on specific presentations on how ICT makes the tourism sector more competitive.

facilitation is the work USAID has done in bringing international technology firms like Microsoft and Cisco to play a larger role in development projects.

Business models and technology choices need to be driven by business opportunities, for which projects oftentimes can provide the key data and analysis. Projects have often helped develop the technology-driven business model so enterprises can take advantage of opportunities and generate enough profit to make a good return on their investment. Often, the biggest risk arises in selecting the technology that will drive the business model. As stated before, there are several dangers in selecting the wrong technology, and this is one of the critical areas where projects can play a role, as presented later in the report. Successful projects will include staff and consultants who are familiar with the technology as well as the local context. When the technology experts are not versed in the local context, it is up to the project to ground the ICT initiatives in local realities. Alternatively, the project should utilize existing research and networks on possible technologies; the PROFIT program, for instance, decided to bypass the typical consultant mobilization process and instead utilized local and international professional networks to aid in the design of the SMS m-banking concept. Project staff members informally used their network of development practitioners to access best practices and lessons learned in an affordable manner while implementing this new technology; they were thus able to avoid the pitfalls encountered by the first implementers.

One of the key roles enterprise projects have played is to facilitate the selection of proven global technologies. Some good practices on selecting the right technologies are in **Box 10**. Many times, markets will dictate the technology that is needed.

Box 10: Selecting the Right Technology

- Integrate with customers' existing technology
- Use technology that has been tested in similar environments, but can be customized
- Utilize web platforms that already have market penetration
- Have local service providers support the technology to save on costs and build capacity
- Have technologies compete; to ensure optimal decisions on selections

Examples include textile/apparel designers who exchange electronic designs in a specific electronic format required by their customers, or hotels that want to connect to global tourism markets and need to incorporate global technology to integrate room inventory with the web.

Picking the latest technology and merely following the buzz can be a risky decision, and many enterprises have been burned by this strategy. A government human resource system will probably not work for SMEs; tax software from the US would not work in other countries. It is often best to pick a technology that has been used and tested in similar environments. There are literally tens of thousands of different software programs available for different industries localized for different countries. There are not many instances where it is necessary to build an entire technology solution from scratch. It is best to pick a technology that meets most of the needs and customize it, which has become an easier task with object oriented programming, web platforms and open source programs.

According to a March 2009 Netcraft Survey²³ there are almost 225 million web sites in the world and this number is growing quickly. As the number of websites grows, it becomes increasingly difficult to get a target market to notice a given enterprise on the web. Projects that want to create a web presence should utilize web platforms that have spent the money on marketing to gain a market presence. For example, for a tourism destination, it is worthwhile to utilize many of the Online Travel Agents (OTA), which generates traffic from the target market.

Although the technology might be from a foreign Original Equipment Manufacturer (OEM), using local technology providers to help design and deploy the solution and train and maintain the technology is often optimal (see **Box 11**). There are several reasons for using local technology providers. First the total cost of the technology will be much more affordable for the stakeholders. Second a local company will know how to set up the technology in the environment, accommodating factors like consistent power outages. Third, technologies that have more affordable local support are more likely to have more sustainability and scalability among other users. Next, using local technology providers in this way increases their knowledge

Box 11: Why use Local ICT Enterprises

1. Affordable design, training, maintenance and administration
2. Ensures technology works in local environment
3. Working with lower cost and localized for the local environment will better ensure sustainability
4. Helps build up the competitiveness of the local ICT industry

and practice, further building up the local industry. Finally, to develop the local ICT industry, local IT firms should be engaged in the process so they can learn a new technology and how it can support enterprise competitiveness.

When choosing a global technology or a local firm, it is best to utilize a competitive bid to make sure you are getting the best solution, price, and support. Several projects that took advantage of competitive bid situations received not only competitive pricing, but also more innovative ICT solutions.

ICT is changing fast and it is difficult to keep up with the progress. Projects must balance using proven, though perhaps old or out-of-date, technology instead of putting firms in emerging markets on the “bleeding edge” of technology by using the latest approaches available. However, new approaches can make software development and operations easier, thus reducing costs. For example, the Grameen Foundation is now funding an AppLab for mobile phone-based applications and has begun partnering with Google and MTN as part of this

²³ http://news.netcraft.com/archives/web_server_survey.html.

initiative.²⁴ Innovations – and mobile phone application platforms – that come out of such initiatives radically reduce the costs of these applications for enterprises.

Section 4: Continued Encouragement of Business Environment Reforms to Support ICT Impact on Enterprises

To date USAID and other donors have had some success in supporting a better business environment for ICT impacts. Projects have often been some of the biggest educators on technology's importance for business. Also, projects have supported telecommunication reforms

Box 12: What Needs to Happen Next

1. Let the private sector promote reforms
2. Support more affordable access to Broadband and IT
3. Develop a savvy ICT workforce
4. Utilize Web 2.0 tools to come up proven solutions.

for mobile phones and ICT workforce development. Donors need to continue their success in supporting the business environment for ICT development. This includes continued reform of telecommunication regulation that has helped spread the use of mobile phones and support reforms of Internet, broadband, and IT products to open up these markets. Also, more support is needed to help the private and education sectors collaborate to make savvy ICT users. More success could be achieved if stakeholders utilized more efficient Web 2.0 tools to

learn about new, proven solutions instead of relying on traditional consulting models. The previous section presented some lessons learned from past donor projects; the following section offers suggestions on what needs to happen next to ensure that projects achieve higher impact.

4.1 Time to Catalyze the ICT Sector to Help Create a Better Business Environment

The Roles the Local ICT Sector Should Play

Donor projects should focus on how to catalyze ICT for a development impact; examples of how to do this are found in **Box 13**. The ICT sector should be promoting the importance of ICT to local private enterprises by focusing on bottom-line impacts. This could mean developing more information on the importance of IT solutions for enterprises, which would include creating tools like case studies and white papers and return on technology investment to show cost of ownership and bottom-line savings. The industry should not just rely on marketing material developed by OEMs and software package firms like Cisco and Microsoft. They should instead produce marketing material that appeals to local businesses. They should distribute this information through several communication channels, like the business and IT media, or help organize an IT-to-Business trade fair in the country. The ICT sector should also work with Chambers of Commerce and Apex Business Associations in the country to address some of their concerns such as

Box 13: How to Catalyze

1. Help the ICT industry to be the promoter of ICT to the private sector.
2. Provide the sparks and the fuel to the private sector (case studies, trends, data, and technical support).

affordable access to technologies, which is a major issue for the entire business community.

²⁴ See <http://www.grameenfoundation.applab.org/section/index> and http://www.grameenfoundation.org/resource_center/newsroom/news_releases/~story=399. The announcement relates to health care-related mobile applications, but the platform and approach may be useful for many other applications for businesses.

Projects Should Encourage the Sector to Cooperate to Create a Better Environment

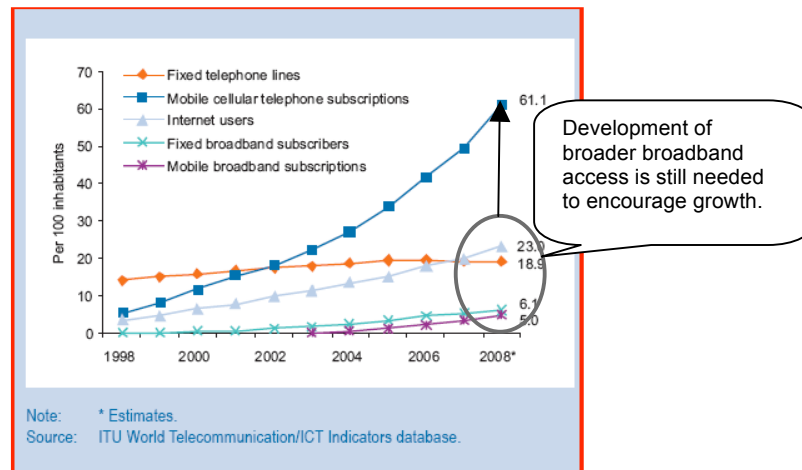
Projects can undertake several initiatives to position the ICT sector as a catalyst with its local private sector and government. Projects can provide the data, case studies, and analysts and help create a roadmap of how the industry can be a catalyst. Projects can also help private sector leaders organize the industry and develop plans for the common good of the ICT industry. Organizing the industry could entail helping it become a cluster or making the ICT Industry Association stronger. Most importantly, the project should not be the interface to implement these activities; the project should be in the background creating the buzz and providing advice to facilitate the process.

Help Increase Access to ICT Products and Services

USAID should take some of the credit for the growth and success of expanding mobile networks. Projects have helped reform some of the telecommunication regulations and this has opened up competition and reduced the cost of mobile calls and SMS. With increased competition and more affordable mobile handsets, a majority of the world's population can now afford mobile phones. Enterprises around the world have benefited from the use of mobile phones, and there are several technologies that have been made to work with these networks and a simple handset. However, there are limits to the applications that can be created for GSM networks and the handsets that operate on them. It is time for donors to utilize more powerful and dynamic technologies, like computers and broadband (see **Figure 7**).

Figure 7: Global ICT Developments 1998-2008

*2006 SASI Group (University of Sheffield) and Mark Newman (University of Michigan)



Power is still an important missing part of ICT

For those who talk about electric-business (e-business) or e-commerce, it is often forgotten how little available “e” electricity there is in many parts of the world. For those who have visited parts of Sub-Saharan Africa or South Asia, it is obvious that electricity is one of the major issues and

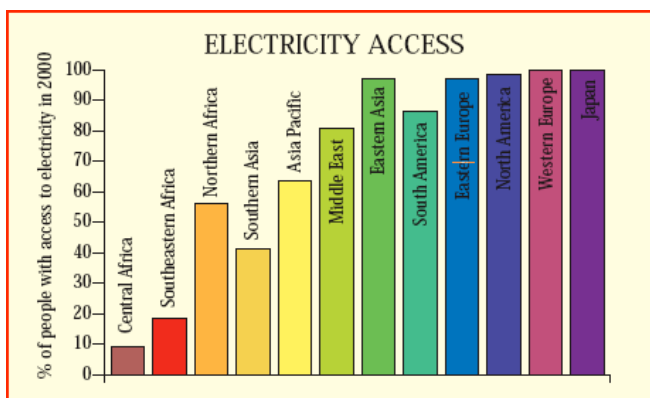
is a major inhibitor for enterprises that want to use ICT (see **Box 14**). According to the International Energy Agency, in 2002 1.6 Billion people had no access to electricity. 99% of those people live in developing

Box 14: e-Enterprises Need More Access to the Following Items

- Electricity
- Affordable IT equipment
- Internet and broadband

countries, and 4 out of 5 of them lived in rural areas. As can be seen from **Figure 8**, most of these people are in Sub-Saharan Africa and South Asia. For developing countries that do have electricity, brown outs are often problematic. According to the World Bank's Doing Business Enterprise Surveys, enterprises in low or lower middle income countries lose 5.2% of their business because of electricity outages; even in high and upper income countries average loss of sales is 2.7%. Electricity access has not been a focus of development professionals recently, and without reliable, affordable electricity there are limits on how much ICT can help enterprises in developing countries.²⁵

Figure 8: Levels of Electricity Access by Region



More affordable computers

The private sector has become the answer for cheaper computer technologies. Professor Negroponte from MIT Labs came up with the innovative idea of \$100 laptops for every child. Although the one-laptop-per-child initiative has not been able to meet its goal, this project has motivated the private sector to pursue this market. Netbooks and smart phones have also started to come into the market with much lower costs of \$100 and up. This cheaper technology will create an opportunity for smaller enterprises around the world to have more computing power. Donor projects can help by ensuring that regulations on imports of computer hardware are not out of line and do not limit the purchase of these products.

The Next Communication Revolution

According to the International Communication Union, 61% of the world's population has a cell phone. Only 23% of the world population has Internet access (55% in developed countries and 13% in developing countries), and broadband connections are even less common; only 6.1% of the world's population has fixed line broadband, and 5% has mobile broadband access. In both cases, most of these networks are in developed countries. Although a lot has been written on the subject and this paper's focus is not telecommunications regulation, it is important to mention a couple key areas on which to focus to create a better environment for Internet and broadband growth (see **Box 15**). First, it is important to open up competition in the Internet and broadband markets. The biggest cost for Internet Service Providers (ISPs) when providing Internet access is charges to the international gateway. Consequently, other organizations beyond the incumbent telecom company (like ISPs) should be able to create additional access points to the international gateway. International Internet traffic is also much more expensive when a country or region does not have an International Exchange Point (IXP). An IXP allows for a local connection to be routed locally instead of traveling internationally, thus reducing the

Box 15: Keys to Internet and Broadband Growth

- Open up competition to the international gateway
- Open up International Exchange Points
- Have multiple broadband technologies compete: DSL, Mobile, WiFi, and others

amount of equipment (servers and routers) it travels across. Again, it is beneficial to have a telecommunication environment that motivates backbone ISPs to invest into IXPs. (More on Internet regulation can be found in the ICT regulation toolkit developed by the

²⁵ Some suggestions of energy initiatives to support economic growth can be found at http://www.usaid.gov/our_work/economic_growth_and_trade/energy/updates/.

International Telecommunication Union and Infodev, a part of the World Bank (<http://www.ictregulationtoolkit.org/en/Section.1646.html>).

The Internet is much more powerful with the use of broadband technologies, and only a small percentage of the world population is utilizing these technologies. Currently the costs of network traffic and equipment like smart phones are also too high for enterprises in the rural areas. The most important challenge to focus on is increasing competition among technologies. This requires a telecommunication environment that will encourage investment in competing technologies like Cable, DSL, and mobile. The technologies that will most likely compete are mobile technologies like 3G and WiMax²⁶. Getting providers to offer WiMax services is showing great promise. There is a great technology model that utilizes WiMax off of microwave towers, which the cell phone providers already have established. This allows for more bandwidth. Additionally, WiMax is becoming much more affordable, at almost \$60 for the hardware.

4.2 Building an ICT Savvy Workforce

Having a savvy ICT workforce is critical for the ICT sector and also the private sector to be able

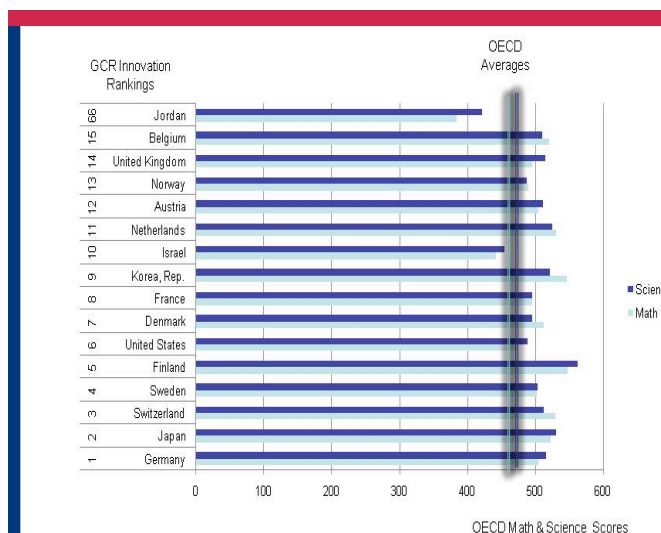
Box 16: Building a Savvy ICT Workforce

- Strong math and science programs in primary and secondary schools.
- Important to focus on the ICT user as much as the engineer.
- Ensure that bridges are created between the ICT sector and education institutions.

to devise how to use ICT to make their business more competitive (see **Box 16**). This is also difficult to do given the fast pace of change in ICT. It is imperative to build bridges between the private sector and education institutions to ensure they are teaching what is needed.

Strong Math and Science Programs

Figure 9: Countries Benchmarked Against OECD Math & Science Scores



Traditional work on ICT workforce has included searching for specific tools that are needed for software developers in the current market or building up the capacity of college graduates to enter the BPO market, often with a mix of technical and soft skills. Knowing the technology tools, however, is only part of the foundation for a competitive workforce; math and science are also important. The majority of countries that rank high as innovators, as listed by the World Economic Forum, have strong math and science skills (as measured by OECD; **Figure 9**). This comes from strong primary and secondary education.

Savvy ICT Users

Another issue in workforce development and IT is that projects typically only focus on creating smart technology engineers and software developers, but having the savvy IT user is just as important. Some of the most innovative technology solutions do not come from the engineers, but rather the

*Adopted from: Capacity for innovation rankings, Global Competitiveness report 2008-2009, WEF and Range of ranks of countries/economies on the mathematics, OECD Program on International Student Assessment (PISA)

²⁶ More on the Wimax standard or IEEE 802.16 can be found at <http://ts.nist.gov/Standards/upload/Process-Promise-Problems-Developing-WiMAX-as-an-International-Standard.pdf>

enterprise users. A 2004 OECD study found that the skills of the enterprise workforce must improve in order for ICT to help increase the productivity of enterprises. Oftentimes the enterprise worker who better understands the uses of technology will help find ways to increase the technology's impact for the firms.

Education and private sector bridges

New technologies come out all of the time, and often the skills needed for enterprises to use the technology change. Academic institutions often have a very difficult time keeping up with the changing technology needs of the IT workforce of enterprises. That is why it is important to develop bridges/linkages between enterprises and education institutions. These could be internship programs, alumni programs, and placement programs, opportunities for instructors and professors to work in the private sector on consulting assignments and sabbaticals, and allowing universities to be part of business associations.

4.3 Utilize Web 2.0 Tools better to Collaborate for More Affordable Access to Technical Assistance and Best Practices

There are opportunities for projects to leverage Web 2.0 tools as a more affordable way to perform technical assistance. From the interviews, a couple of projects were able to leverage personal connections in an informal way to gain expertise virtually (over e-mail and the phone), which allowed them to utilize technical assistance in a more affordable manner. It would be useful and cost affective to have a more formal way of providing technical assistance. This could best be leveraged by

Web 2.0 technologies, especially membership type technologies utilizing technical knowledge. ICT experts are more willing to adapt to and utilize these new tools, so ICT is the natural place to start. Several of these tools are currently available to support the development community,

Box 18: Models for Virtual Technical Assistance

<http://answers.yahoo.com/> provides a technology platform for people to ask questions and then utilize the open model of the web where people give opinionated answers for free. The problem with this model is users sometimes get what they paid for, and even though people can judge the answers that judgment does not always happen.

Another model is the elance <http://www.elance.com/> or rent-a-coder model <http://www.rentacoder.com>. These sites have been successful for enterprises who want quick, small jobs services for cheap. The feedback mechanisms in the site help the more successful providers of service to get more business. This model might be interesting for projects, although there are many issues on procurement and administration that would have to be managed.

Box 17: Partial list of Web 2.0 resources for ICT and Development

- <http://www.globaldevelopmentcommons.net/>
- <http://ict.developmentgateway.org/>
- <http://www.ict4development.org/>
- <http://www.globalknowledge.org/ict4d/>
- <http://www.eldis.org/go/topics/resource-guides/ict-for-development>
- <http://www.i4donline.net/>
- <http://twitter.com/ict4d>
- <http://www.facebook.com/group.php?gid=2553350463>
- http://www.linkedin.com/groups?about=&gid=35887&qoback=%2Egdr_1242058364361_3%2Eanb_35887_*2
- <http://ict4dblog.wordpress.com/>
- <http://www.comminit.com/en/ict4d.html>
- <http://www.idrc.ca/ict4d/>
- <http://ict4d.at>
- http://www.microlinks.org/ev02.php?ID=5538_201&ID2=DO_COMMUNITY

like the Global Development Commons, development gateways, ICT.4.D blogs, or the ICT.4.D group in linked-in. Many of these have good resources and networks (see **Box 17**) to leverage. Many of these do not yet have the ability to connect project issues with expertise, however. Thus, it would

be good for these sites to develop an application yahoo answer or an elance model (see **Box 18**).

Annex I: Interview List

Project Name	Country	Firm	Interviewee	Technology	Dates
Jamaica NEP	Jamaica	Carana	Bob Otto	e-commerce web portals ; e-gov enterprise software ; e-gov customs filing ; e-gov GIS, land database	2000-2004
APEP	Uganda	Chemonics	Clive Drew, COP	GIS	2003-2008
TIPCEE	Ghana	Chemonics	Bill Kedrock	GIS and SMS/GPRS links to exporters	2004-2009
Global Development Commons (GDC)	Global	DAI	Paul Goodman	Social media, networking webportal	Current Live Web-Site
GIS and Global Positioning	Global	DAI	Paul Goodman & Larry Campbell	DAI's in-house R&D of usable and inexpensive GIS alternatives and uses	2006-2008
e-Biz	Macedonia	EDC	Janice Brodman	Manufacturing (textiles, footwear): CAD/CAM Tourism: online aggregator (Expedia, et al) linkages Manufacturing (machine tools): CAD/CAM, 3D rendering	2003-2006
PROFIT	Zambia	EMG	Mike Field	SMS m-banking for credit transfers SMS marketing of service providers for small holders	2005-2010
RADEX	Uganda/Kenya	BE	JP Gauthier	E-gov customs filing and document harmonization	2003-2008
"Tracking Nemo"	Philippines	AED	Mike Tetelman	Smart-phone-based product tracability and certification	2005-2006
While in Egypt, Stay Connected	Egypt	EMG	Nissa Felton	WiMAX in tourist areas so tourists could connect while at sites Linked ICT firms with hotels to get internet available for customers	2006-2007
World Hotel	Global	WHL	Len Corinder	e-booking and web	2002 to

Link				destinations	present ongoing business
Treasury Information Management Systems (TIMS)	Azerbaijan	Carana	Bob Otto	SAP system for budget tracking for MoF and Treasury	2002-2008
Pinoy Farmer	Philippines	Winrock	Gary Garriott	Farmer market prices tracking system (SMS and web)	2000-2003
Panama Indian web linkage	Panama	Winrock	Gary Garriott	Brought solar powered internet connectivity to remote native tribes	2006-2007
Frontline SMS	El Salvador	Winrock	Gary Garriott	SMS marketing and buying of agriculture products	2007-2008
GMED	India	ACDI/VOCA	Don Taylor	Mobile based procurement system with farmers	2001-2008
Reuters Market Light	India	Thomson Reuters	Amit Mehra	Private sector led market information services for farmers	2006-Present ongoing business
Competitive Armenian Private Sector	Armenia	Nathan Inc	Mike Ducker	Helping tourism enterprises to use web-channels to connect with the market	2005-Present

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U.S. Agency for International Development

1300 Pennsylvania Avenue, NW

Washington, DC 20523

Tel: (202) 712-0000

Fax: (202) 216-3524

www.usaid.gov