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INFORMATION COMMUNICATION TECHNOLOGY AS A CATALYST TO ENTERPRISE COMPETITIVENESS

RESEARCH REPORT



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

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The authors' views expressed in this publication do not necessarily reflect the views of the United States Agency for International Development or the United States Government.

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Contact information for the authors is as follows:

Judy Payne: JPayne@usaid.gov

Mike Ducker: mducker@jeaustin.com

List of Acronyms

B2B.....	Business-to-Business
B2C.....	Business-to-Consumer
B2G.....	Business-to-Government
BGI.....	Business Growth Initiative
BPO.....	Business Process Outsourcing
CAD/CAM.....	Computer Aided Design/Manufacture
CAPS.....	Competitive Armenia Private Sector Project
CRM.....	Customer Relationship Management
DIY.....	Do-It-Yourself
ERP.....	Enterprise Resource Planning
GDS.....	Global Distribution System
GIS.....	Geographic Information System
GPS.....	Global Positioning System
GSM.....	Global System for Mobile Communication
ICT.....	Information Communication Technologies
ISP.....	Internet Service Providers
IT.....	Information Technology
IXP.....	International Exchange Point
MRP.....	Manufacturing Resource Planning
NEP.....	New Economy Project (Jamaica)
NGO.....	Non-Governmental Organization
OECD.....	Organization for Economic Cooperation and Development
OEM.....	Original Equipment Manufacturer
OTA.....	Online Travel Agent
PROFIT.....	Production, Finance, and Technology (Zambia)
RML.....	Reuters Market Light
SAGIC.....	Support for Accelerated Growth and Increased Competitiveness
SEO.....	Search Engine Optimization
SME.....	Small and Medium Enterprise
SMS.....	Short Message Service
TIPCEE.....	Trade and Investment Program for Competitive Export Economy
USAID.....	United States Agency for International Development
WHL.....	World Hotel Link

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Executive Summary

The expansion of communication networks and reductions in computer equipment costs are giving enterprises in developing countries new tools to leverage information and become more competitive. Enterprises are using Information Communication Technologies (ICT) in three ways to become competitive: 1) learning about and linking with markets; 2) upgrading and increasing productivity; and 3) creating horizontal and vertical linkages with suppliers and other enterprises in their sectors. In developing countries, the use of technology has become most apparent in industry sectors like agriculture, tourism, and manufacturing; within these sectors, there are good examples of donor projects that played important roles in creating sustainable impacts. For example, in the agricultural sector, the USAID-sponsored 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 tourism, web technologies have revolutionized the industry, empowering 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 a Computer Aided Design/Computer Aided Manufacture (CAD/CAM) business, which helped save the apparel sector by upgrading enterprise processes to compete in the fast-paced fashion market. These projects are considered successes.

However, there are a number of other ICT projects that have produced fewer results or have yet to prove their sustainability. In many cases, these efforts failed to incorporate three key ingredients needed for donor projects to successfully use ICT to support enterprise competitiveness: 1) the private sector takes a leading role; 2) the donor project acts as a supporter or investor in the process; and 3) steps are taken to ensure that the technology used is not the latest fad, but rather the best-tested option for the situation.

The biggest lesson for donors on providing support for 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 financially vested in the process and must help create business models, while innovative entrepreneurs and lead firms 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 donor 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 technology to incorporate. This does not mean using the latest technologies, but focusing on existing technologies that are accepted by the marketplace. Also, to ensure long-term sustainability, it is important to use a local ICT service provider, which can reduce costs for implementation and maintenance over the long term. Whatever technology is chosen, it is important to use competitive bidding to select technology vendors because it will help reduce costs and encourage innovation. Donor projects can also support enterprise competitiveness by continuing their support for 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 key for enterprises. At the same time, there are additional ICT tools — affordable computing technologies and Internet access — that enterprises can leverage to become more competitive. If donors can replicate their efforts within the mobile sector by creating more competitive internet and power sectors and by ensuring that imports of computer technologies are in line with worldwide norms, this will help lower prices and expand access. Another area ripe for donor

focus is helping to support an ICT-savvy workforce. This does not mean focusing on the creation of smart technology engineers and software developers, but rather concentrating on developing a base of knowledgeable IT users who can design ICT solutions to help their enterprises become more competitive. Indeed, the need for affordable and broad ICT access and an ICT-savvy workforce is a concern that goes beyond the ICT sector and affects the entire private sector. As a result, donors should reach out to institutions like chambers of commerce and apex business associations in countries to advocate for these concerns.

Lastly, it is important to note that there are a number of online resources on these subjects, like globaldevelopmentcommons.net or ict.developmentgateway.org, that can provide cheaper models for delivering technical assistance to donor projects. In conclusion, over the last several years ICT products and services have made great strides in terms of access and affordability, helping enterprises become more competitive. For donors to support accelerated ICT adoption, they must allow the private sector to take the lead, and then provide support, including in creating an enhanced business environment to facilitate ICT development.

Introduction

This research report continues research summarized in a previous Business Growth Initiative (BGI) technical note, *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. The 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 stories of successful young U.S. ICT companies that quickly grow to billion-dollar businesses or outsourcing services that grow to employ millions of people in India and the Philippines. The first paper suggested that the choice to employ ICT as a growth sector should be based on the same type of sound economic analysis and on-the-ground confirmation used to select other sectors. The paper also discussed the role of ICT as a catalytic sector that supports enterprise competitiveness across all sectors. The current research report points to specific opportunities to use ICT as a catalyst to increase competitiveness in enterprises.

This research report 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 note 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 18 donor-supported projects and 1 private sector-led project that used ICT to make a specific sector more competitive. Secondary research was used to support and inform data gathered from 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 Organization for Economic Cooperation and Development (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 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 research report 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 of the framework.
- Section 2 provides much more detail into how the framework operates from the perspective of three sectors: 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 necessary to do the hard work that will ensure that the initiative 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.

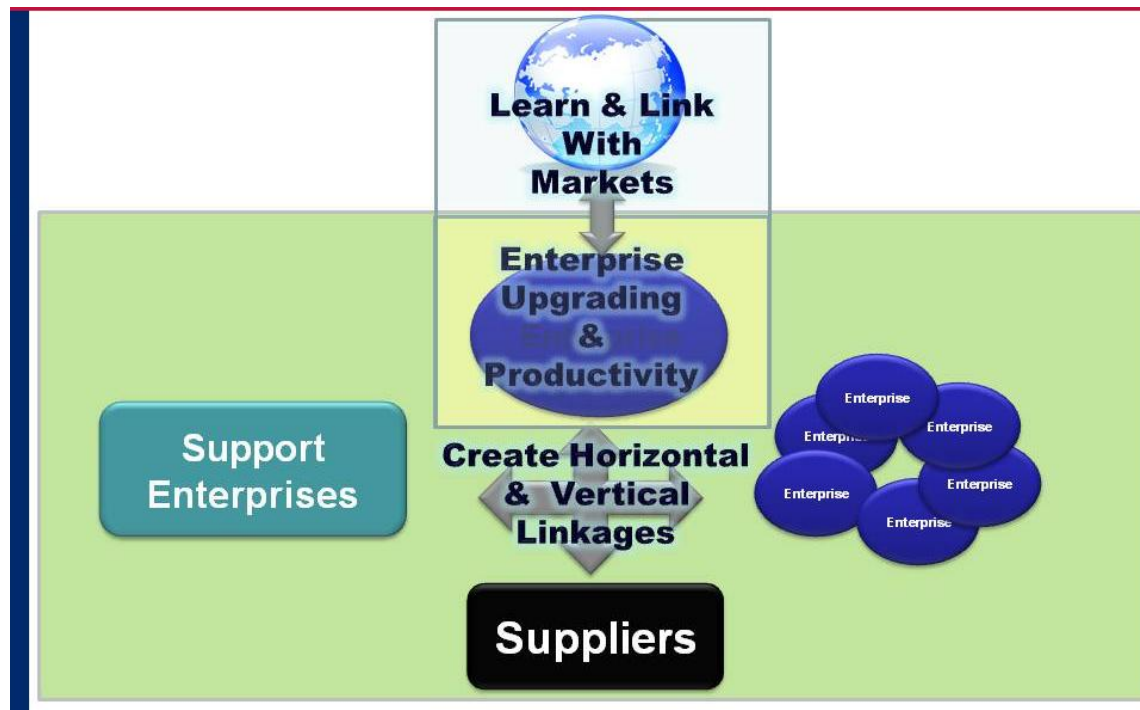
It should be noted that many of the projects detailed in the research report at the time of the interviews were business experiments, not proven business models; some of the projects have already ended, but no follow-up assessments have been conducted to determine if the impacts were sustainable. Therefore,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

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

This section discusses how enterprises in developing countries can use ICT to become more competitive. The 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 1: ICT Support for Competitiveness Framework

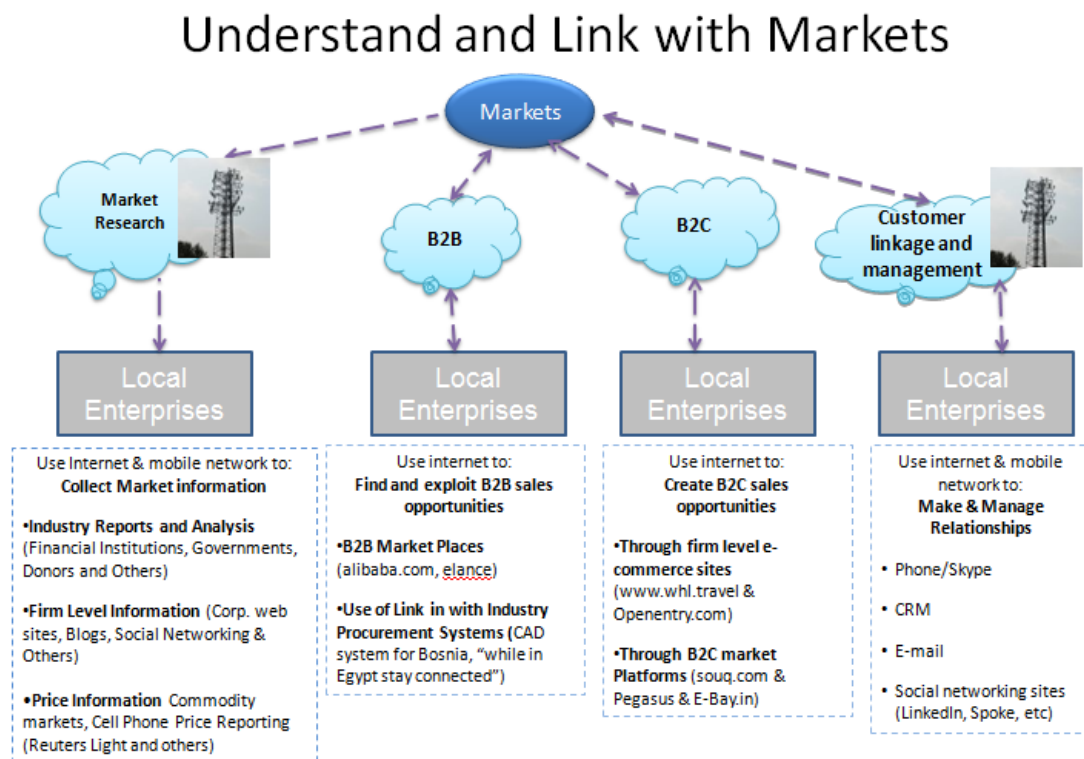


1.1 Understanding and Creating Market Linkages

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, websites, 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 re-engineering 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 2: Linking with Global and Local Markets



The Internet has become a powerful 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, including those noted 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](http://www.linkedin.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, data became available on websites several years ago. This data has always been useful for traders of relevant commodities but less so for small and medium enterprises (SMEs). More recently, there have been several attempts to record pricing information from local markets and transfer the 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, 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, these include 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 a single system to actually transact with different customers within an industry.

An excellent example of global connectivity is 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, While in Egypt Stay Connected, helped independent hotels connect with international travel agents and thus with the final consumer (more discussion on GDSs is found in Section 2). There are also industry procurement sites on the web for specific sectors such as steel, automotive, and aerospace; these sites, which are only open to certain pre-qualified suppliers and buyers, provide major players within an industry with 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 production data with the sites and using them to closely manage inventories.

The Internet has also been a good 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) traveler to help book hotels and tour packages in remote and often unwired destinations. WHL taps specific niche market channels, such as the Lonely Planet website, to connect with targeted DIY tourists.

Lastly, ICT is a necessary tool for enterprises to connect with 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 other ways to network globally without leaving the office. As mentioned above, websites such as [linked-in.com](http://www.linkedin.com) and [Spoke.com](http://www.spoke.com) have grown to be useful tools for finding 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 useful tools for sales contacts and customer relationship management (CRM). [Salesforce.com](http://www.salesforce.com) is the premier example of sales force management software and is offered on a web services basis (i.e., 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 the marketplace.

1.2 Enterprise Upgrading and Increasing 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 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 that could lead to higher revenue or ICT being used to verify that upgrading processes 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 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 electronic 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 (business-to-government) transaction. To pay these monthly bills, enterprise employees would typically have to stand in line for hours; now the process is completed in minutes. The online bill pay service streamlined the process and reduced 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, 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 restaurant based on incoming reservations.

⁷ More on the B2G 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 five industry sectors: 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 paper'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 strengths.

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 *The ICT Productivity Paradox*, enterprises in the U.S. and Australia have had real, impressive productivity gains through 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 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 Support for Accelerated Growth and Increased Competitiveness (SAGIC) project in Senegal, which has been educating cashew producers through rural radio broadcasts with information on harvesting techniques, postharvest 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. 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 to be able to verify the source of the product. Tracing using satellite photos can be a way to verify that farmers have followed certain certification criteria for products, and certification in turn yields a higher price for the product. 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 Creating Horizontal and Vertical 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 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

⁹ A good historical perspective on the productivity paradox can be found in 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

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 on 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 can happen by outsourcing specific operational functions. For example, payroll can be a tedious process for enterprises, especially in countries with complex labor regulations 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 Sectors

This section highlights examples of how ICT is helping enterprises in specific industries become more competitive by utilizing the framework in Section 1. While not every industry and sub-sector can be addressed separately, the paper will look at how ICT is supporting three major industries in which enterprise development and donor enterprise projects typically operate: agriculture/agribusiness, 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 by donor projects with ICT in agriculture, including Short Message Service (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 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 much experimentation with technology in agriculture. One experiment in particular has used the Internet and cell phones to share market information, including sales and pricing information. The success and sustainability of such programs have varied. Some of the early experiments focused on using the Internet 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 with limited access to the Internet do not accrue benefits. One exception to this has been the e-choupal model, highlighted in many reports¹³ and described in C.K. Prahalad's book *The Fortune at the Bottom of the Pyramid*. The e-choupal system was largely different because it brought market information to rural areas; it had a trained computer user who could distribute the information to farmers; and it was financed completely by a private firm, ITC Limited. More recent experiments have focused on utilizing mobile networks' SMS

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

¹¹ This paper focuses on the uses of ICT to improve agriculture, not on 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>

technology to receive market information, including price information. So far, the greatest impact observed 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** on RML). But even given these impressive numbers, as of the time this paper was written, the business has not proved to be profitable, although it is expected to be.

In Africa, governments have collected information for many years on agriculture crop yields and prices to forecast areas of deficits. These systems have also been used to inform farmers of prices for many products in specific markets. Observatoire Du Marche Agricole (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 focus more specifically on providing farmers — sometimes via 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 government-oriented market information systems will work with, replace, or compete with 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-led projects, this venture has focused a great deal of effort on market research, sales and distribution channels, and product interface. Developers of the project thought it was imperative to customize information to ensure 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 from universities and research and development centers
- Relevant news

Enterprise Productivity

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

For agricultural producers to export to markets like the EU, one requirement is to be able to trace the farmers' sources to get certified (e.g., 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 which product came from which farm, thereby supporting the certification process. This program is currently being implemented by the TIPCEE project in Ghana to trace pineapples for GlobalGap; other fruit exporters are now asking for the technology. Satellite photos with geo-positioning can prove that specific criteria have been met to gain a certain certification, such as 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

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).

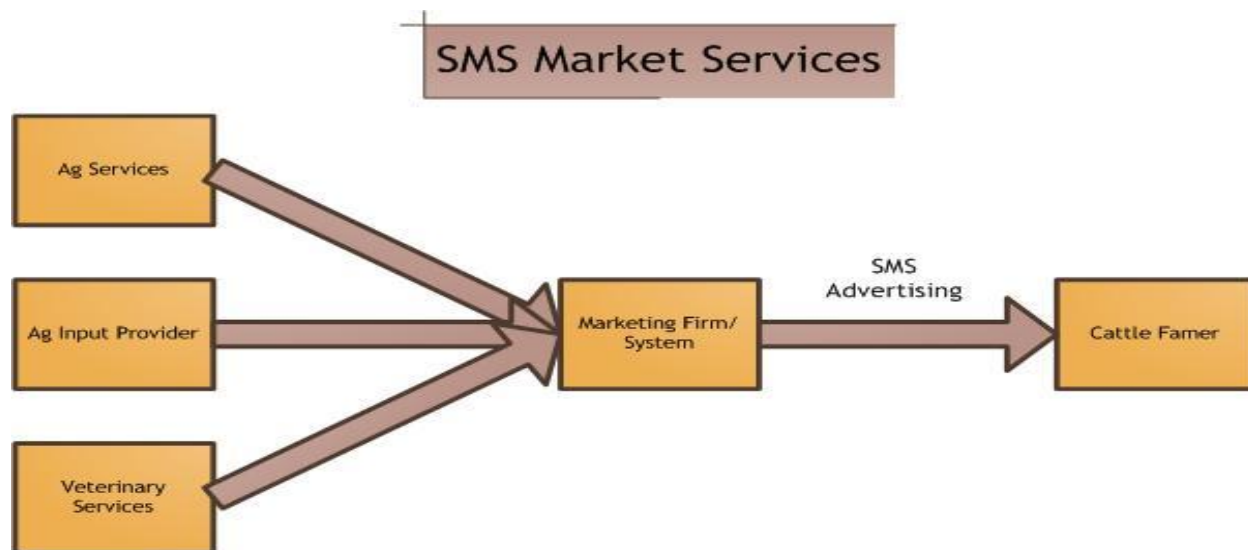
money. One way to make the implementation of this technology less expensive is to train farmers and extension workers so they can geo-locate farms in their community (and share the devices needed to do so) instead of hiring outside consultants.

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 fruit fly infestations and their movements 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 using it have been experimental; none of the projects interviewed for this research report have produced concrete results to date.

Helping Farmers and Processors, Exporters, and Retailers Cooperate

The use of mobile technologies has begun to produce real advances toward the goal of creating greater cooperation between farmers and lead firms, such as food processors and exporters. ICT can also help enterprises link horizontally with input suppliers helping farmers. SMS-based marketing services, which educate farmers about services, have real-world application and have the potential for increasing productivity. For example, veterinary services and input providers can use SMS marketing to target specific audiences and ensure that farmers understand how these services will boost their productivity. As shown in **Figure 3** below, the goal is to educate farmers on available agriculture inputs and their potential impact on productivity. The PROFIT project in Zambia facilitated the creation of such a service: after it was found that farmers were often unaware of available resources, an SMS-based marketing system was developed to send advertisements and promotions from input providers and veterinary services directly to cattle farmers.

Figure 3: Impact of SMS Marketing Services



SMS marketing services are a relatively new innovation. Traditionally radio has been used to teach farmers about best practices and information about the weather. Governments or non-

governmental organizations (NGOs) have typically created this programming and broadcasted it through rural community radio stations.

Reducing Transaction Costs Using m-Banking

As previously noted, servicing the unbanked can be an expensive, risky, and complicated proposition; this holds true for paying small farmers, who are among the unbanked. The recent growth in m-banking services provides a viable 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 serviced communities that lack access to banks. The mobile network is 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. Such a bank network can facilitate transactions between large enterprises, like processors, and smaller microenterprises, 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, thereby creating value for local inbound tour operators and their suppliers to create new web-based marketing channels. Technology has also done an excellent job helping unique and far-off tourist destinations reach niche segmented markets. Donor-funded projects have had some success in helping the ICT sector play its role in increasing tourism sector competitiveness. These projects have helped tourists to learn and link with foreign destinations, bolstering productivity and creating inter-firm linkages. When it comes to tourists, ICT has literally made the world a smaller place.

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 broad implications. First, tourism destinations need information on the web that educates, inspires, and offers key information and supporting details, including itineraries, hotels, safety, and how to book travel. But building websites and other web-based tools is not enough — people must be made aware of these tools and be motivated to use them. Therefore, the second part of the puzzle is to make sure that the destination sites' content reaches target markets via search engines. Destination and other hotel websites must take specific actions to ensure they are linked with their target market using Search Engine Optimization (SEO).¹⁷ For example, destinations targeting eco-tourists need to ensure that they place well on eco-tourism keyword searches; also, eco-tourism enterprises must focus their websites with other 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, which target tourists in bulk. One of the biggest trends now is Web 2.0 technologies, or more specifically, user-generated content sites. These are sites where users upload pictures, videos, and product reviews. These sites, many of which have excellent interactive content, help tourism websites get better placement in search engines (see **Figure 4**

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

Figure 4: Connecting to Target Markets Through the Web



on how tourism websites connect with their target markets).

The WHL (see **Box 6**) uses an interesting business model where it takes on last frontier destinations and works with local tour operators to create a brand image and links them with tourist websites. WHL’s system provides online booking capabilities, which is critical given that over half of American and European tourists book travel online.^{18, 19} Developing online booking capabilities helps firms both to open up new markets and become more productive.

Tourism Sector Productivity

For people to use the web to book hotels and guides and rent cars, these enterprises will need to provide their “inventory” of available rooms or cars to Global Distribution Systems (GDSs) and OTAs. Fully integrating with the market has become increasingly important and allows hotels to increase productivity as well.

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 tour operators to see tourism product availability. Local hotels use a local integrator, which can be a local tour operator or an IT firm, that will link these GDSs to hotels’ current reservation systems or even manage part of a hotel’s reservation system for it, as in the case of WHL. With an online booking system, operators can manage operational needs more efficiently in such areas as labor and supplies, as such systems allow for more accurate sales forecasting and better planning. They can also reduce transaction costs: technology transactions are generally more efficient as they often eliminate the need for middle-men operators (see **Figure 5**). A good example is the USAID-sponsored project While in Egypt Stay Connected, which used such web services to eliminate non-value added costs, which often charge high booking fees — roughly 15 percent — with little value added for tourists or hotels. There are several outsourcing models of the booking system, in which local hotels and tour operators pay a per booking transaction cost to a third party managing the system.

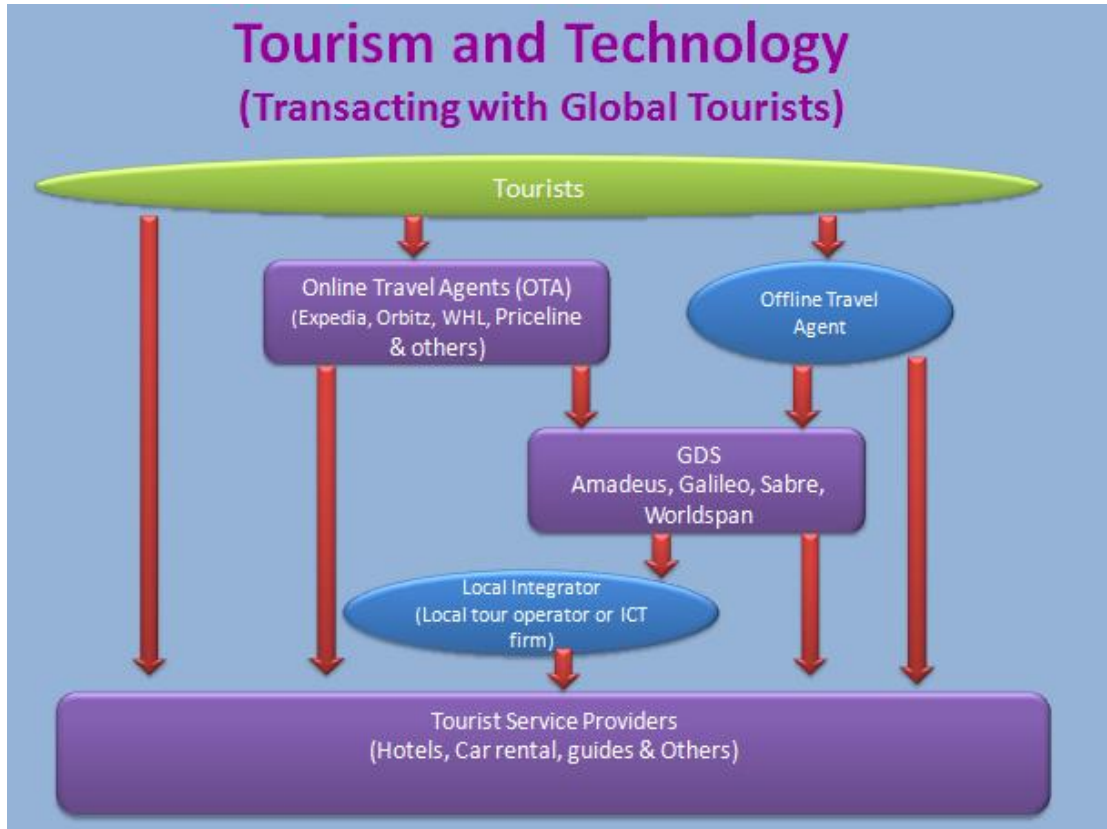
Box 6: World Hotel Link

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.

¹⁸ More on European online bookings can be found at <http://www.crt.dk/uk/staff/chm/trends.htm>

¹⁹ More on U.S. 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

Finally, technology can help tourism firms cooperate. One possibility is local inbound tour operators working with tourism suppliers like guides. Another is a cluster initiative that brands itself as a tourism destination over the web — for example, WHL. It uses a local tour operator that cooperates with hotels and other tourism suppliers and uses its market-based web system to connect with markets and 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 across the globe in a collaborative fashion before being sent to an automated manufacturing system. CAD/CAM is reducing costs and waste and increasing productivity in industries worldwide. Low-cost providers from China and Southeast Asia are using 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 unable to compete on the world market.

Enterprise Productivity and Upgrading

As noted in the e-Biz example, the garment industry in Macedonia — which supported a large percentage of the workforce — was on the edge of extinction. Garment producers were having a difficult time competing with low-cost alternatives in Asia. There were, however, opportunities for on-demand orders (fast fashion) that were not being met in Asia due to 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.

The USAID-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. ICT can also aid the manufacturing sector by tapping such systems as Enterprise Resource Planning (ERP),²⁰ Manufacturing Resource Planning (MRP),²¹ or procurement management systems,²² but these technologies were not seen in the interviews with donor projects conducted for this paper.

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 this promise into higher impact, sustainable, and scalable results. Projects need to move away from the experimental mode to become catalysts for the private sector in scaling up proven ICT business models. ICT can be used to address specific, identifiable inhibitors to competitiveness. At the same time, there are dangers within ICT and enterprise development that development practitioners need to avoid. The buzz surrounding the 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 the following questions:

Who are the stakeholders?

Who will manage and maintain the technology?

What is the business model to ensure the sustainability of the technology and scalability to similar enterprises?

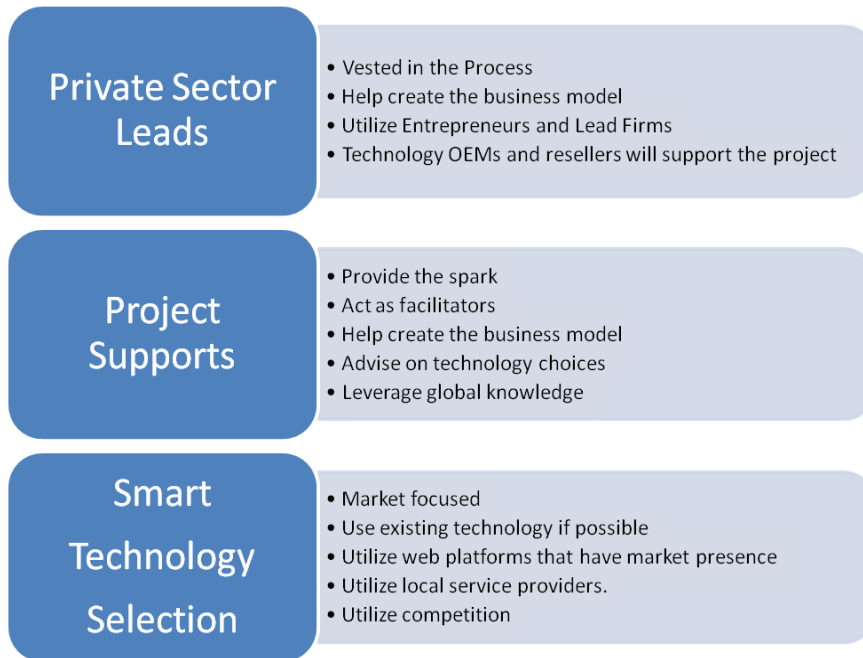
If these questions cannot be answered, the ICT intervention should be rethought. **Figure 6** describes how donor projects can manage some of these risks.

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 Ensuring the Private Sector Can Lead the Process

The key ingredient to having sustainable and scalable ICT initiatives in enterprise development projects is 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 using technology to help manage the value chain, it is imperative that they lead the process. Ultimately, it will be the firms themselves that will need to address the key issues, understand how the technology works, and learn how to expand upon it.

Box 7: Private Sector Leads

- Are vested in the process
- Help create the business model
- Use entrepreneurs and lead firms, with technology OEMs and resellers supporting 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 — in other words, if the private sector has “skin in the game” — there is much greater likelihood that an 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 a revenue model that will support the initiative, and carrying out fundraising for the initial investment. When firms have their own money on the table, they will make business decisions based on real financial considerations, not contingent on donor subsidies.

Due to financial and temporal limitations, a donor project can work with only a subset of the enterprises within any given 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 interviewed for this research report in which the technology was managed by the project as a pilot, with no incentives for the private sector to jump in and manage the initiatives after donor funding was terminated. Some ICT initiatives support an entrepreneur who wants to start a business based on 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 (the “franchisees”) will work together using a technology system built and proven by the business model of another enterprise (the “franchisor”). The enterprises then share the revenue. WHL does just this: The company builds a technology platform based on a successful business model that allows local inbound tour operators to use the technology to manage hotel rooms and other tourism services and gain global market presence.

Lastly, technology firms will want to leverage 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 a good example of such a 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 for ICT Initiatives

Enterprise development projects can work in several areas 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 or helping enterprises design profitable business models that use these technologies. This often entails designing projects that highlight business opportunities or new markets that the private sector can take advantage of, and helping attract co-investments from private sources for the new business model (see **Box 8**). It should also be noted that successful projects invest time and resources in understanding a market’s 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 conducted an analysis, which showed market opportunities for CAD/CAM services to enter the fast fashion market in Europe. The project then 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 favor one technology over another; rather, they should be intimately familiar with all the options so they can recommend different configurations. A project can serve as a facilitator between the local ICT and non-ICT sectors to help the ICT sector develop innovative solutions to make a non-ICT sector more competitive. This has been done with tourism in Vietnam, Egypt, and Armenia by means of white papers, conferences, and B2B forums (see **Box 9**). Facilitation can

also take place among firms in the IT industry to help address a critical issue affecting the sector, such as workforce development. Another example of facilitation is the work USAID has done in bringing international technology firms like Microsoft and Cisco to play a larger role in development projects.

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 make the tourism sector more competitive. Activities under CAPS include:

- An IT white paper on market trends in ICT use within the Armenian tourism industry and where Armenia is currently placed.
- A presentation for the ICT community explaining the critical need to develop ICT services for the tourism sector.
- A presentation at a tourism conference to explain why participants need to leverage ICT to link with markets.
- Facilitation of linkages between the two sectors at an ICT B2B event to bring together ICT and tourism firms.
- Work with local ICT firms on specific presentations on how ICT makes the tourism sector more competitive.

Business models and technology choices need to be driven by business opportunities, for which projects can provide key data and analysis. Projects often help develop a technology-driven business model, allowing enterprises to take advantage of opportunities and generate enough profit to make a good return on investment. In many cases, the biggest risk is selecting the technology to drive the business model. As previously stated, there are dangers in selecting the wrong technology; as discussed later in this report, this is one of the critical areas in which projects can play a role. Successful projects include staff and consultants who are familiar with the technology choices. Projects must also take the local context into consideration. When technology experts are not well-versed in the local context, it is up to the project itself to ground ICT initiatives in local realities. Alternatively, the project can make use of existing research and networks on possible technologies. An example of this is the PROFIT program, which decided to bypass the typical consultant mobilization process and use local and international professional networks to aid in the design of the SMS m-banking concept. Project staff members informally used their networks of development practitioners to access best practices and lessons learned in an affordable manner while implementing this new technology, allowing them to avoid pitfalls encountered by the first implementers.

One of the key roles enterprise projects have played is to facilitate the selection of proven global technologies. **Box 10** highlights good practices in selecting the right technologies. Often markets dictate the technology that is needed. Examples include textile/apparel designers who exchange electronic designs in the specific electronic format required by their customers, or hotels that want to

Box 10: Selecting the Right Technology

- Integrate with customers' existing technology
- Use technology that has been tested in similar environments and can be customized
- Use web platforms with established market penetration
- Ensure local service providers support the technology to save on costs and build capacity
- Ensure technologies compete to optimize selection decisions

connect to tourism markets and need to incorporate global technology to integrate room inventory with the web.

Simply following the buzz and picking the latest technology can be a risky decision. Many enterprises have been burned taking this route: a government human resource system will probably not work well for SMEs, nor will U.S. tax software work in other countries. In most cases, it is wisest to focus on those technologies that have been tested in similar environments. There are literally tens of thousands of different software programs available for different industries and localized for a variety of country settings; it is rarely necessary to build an entire technology solution from scratch. Often the best approach is to pick a technology that meets most of a sector's identified needs, and then customize it, which has become an easier task with object-oriented programming, web platforms, and open source programs.

According to a March 2009 Netcraft Survey,²³ there are currently nearly 225 million websites, a number that is rapidly growing. As the number of websites increases, it has become increasingly difficult for any given enterprise to break through the clutter to gain the attention of its target market. Projects that want to create a web presence should utilize web platforms that have invested in marketing to gain a market presence. For example, for a tourism destination, it is worthwhile to use many of the OTA, which generate traffic from the target market.

Although the technology might be from a foreign 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 stakeholders. Second, a local company will know

Box 11: Why Use Local ICT Enterprises?

1. Local firms allow for affordable design, training, maintenance, and administration.
2. It ensures that technology works within the local environment.
3. It lowers cost and ensures familiarity with the local environment, supporting sustainability.
4. It helps build the competitiveness of the local ICT industry.

how to set up the technology in the local environment, making accommodations for factors like consistent power outages. Third, technologies that have more affordable local support are more likely to result in sustainability and scalability among other users. Fourth, using local technology providers increases their knowledge and practice, further building up the local industry. Developing a local ICT industry requires that local IT firms are engaged in the process so they can learn a new technology and understand how it supports enterprise competitiveness.

When choosing a global technology or a local firm, it is best to use competitive bidding to ensure the best solution, price, and support. Several projects interviewed for this paper found that taking advantage of competitive bid situations not only resulted in more competitive pricing, but also produced more innovative ICT solutions.

ICT is changing fast and it is difficult to keep up with the progress. Projects must balance the pros and cons of using technology that is proven — though perhaps old or out-of-date — and putting firms in emerging markets on the “bleeding edge” by using the latest available technological approaches. Yet 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

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

MTN Group (the large Mobile Network Operator based in South Africa) as part of this 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: Encouraging Business Environment Reforms to Support ICT Impact

Donors have had some success in supporting a better business environment for ICT impact on enterprise competitiveness, as noted in the discussion in the previous section of lessons learned from past projects.. Projects have been some of the biggest educators on technology's

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 ICT-savvy workforce.
4. Utilize Web 2.0 tools for proven solutions.

importance for businesses. Donor-backed efforts have also supported telecommunication reforms for mobile phones and ICT workforce development. Donors need to continue their success in supporting the business environment for ICT development (see **Box 12**). This includes continued support for telecommunication regulation reforms that have helped spread the use of mobile phones and support for reforms in Internet, broadband, and IT products to open up these markets. In addition, more support is needed to facilitate private sector/education sector collaboration in producing savvy ICT users. Greater

success could be achieved if stakeholders used more efficient Web 2.0 tools to learn about new, proven solutions instead of relying on traditional consulting models. The following section offers suggestions on what needs to happen next to ensure that projects achieve higher impact.

4.1 Catalyzing ICT to Help Create a Better Business Environment

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 materials developed by OEMs and software package firms like Cisco and Microsoft. Instead, they should produce their own marketing materials customized to appeal to local businesses. They can distribute this information through such means as communication channels, including business and IT media, or by helping organize an IT-to-business trade fairs in countries. The ICT sector should also work with chambers of commerce and apex business associations in a country to address specific concerns — for example, affordable access to technologies, which is a major issue for the entire business community.

Box 13: How to Catalyze

1. Help the ICT industry assume the role of ICT promoter to the private sector.
2. Provide sparks and fuel to the private sector in the form of case studies, trends, data, and technical support.

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.

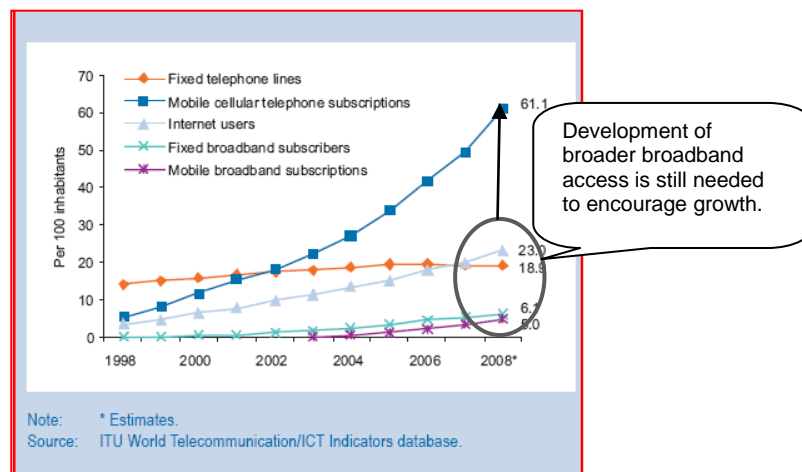
Roles Donors Should Play

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 include helping it become a cluster or making a local ICT industry association stronger. Most important, the project should not serve as the interface for implementing these activities. Rather, it should remain in the background, creating the buzz and providing advice to facilitate the process.

Donors can take some of the credit for the growth and success of expanding mobile networks. Projects have helped reform certain telecommunication regulations, which 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 support a business environment in which enterprises have greater access to powerful, 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 lack of reliable electricity is a major inhibitor for enterprises that want to use ICT (see **Box 14**).

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

- Electricity
- Affordable IT equipment
- Internet and broadband

According to the International Energy Agency, in 2002, 1.6 billion people had no access to electricity; 99 percent of those people live in developing countries, and 4 out of 5 of them live in rural areas. As can be seen in **Figure 8**, most of these people live in sub-Saharan Africa and South Asia. For developing

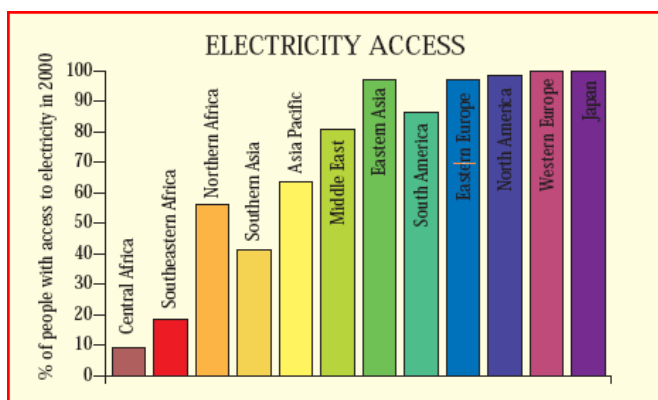
countries that do have electricity, brown outs are often problematic. According to the World

Bank's Doing Business Enterprise Surveys, enterprises in low or lower middle income countries lose 5.2 percent of their business because of electricity outages; even in high and upper income countries, the average loss of sales is 2.7 percent. Electricity access has not been a recent focus of development professionals, but without reliable, affordable electricity there are limits to how much ICT can help enterprises in developing countries.²⁵

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.

Figure 8: Levels of Electricity Access by Region



The Next Communication Revolution

According to the International Communication Union, 61 per cent of the world's population has a cell phone. Only 23 percent of the world population has Internet access (55 percent in developed countries and 13 percent in developing countries), and broadband connections are even less common; only 6.1 percent of the world's population has fixed line broadband, and 5 percent has mobile broadband access. In both cases, most of these networks are in developed countries. Although much has been written on the subject and this paper's focus is not telecommunications regulation, it is important to note several 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 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.²⁶

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.

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/

²⁶ More on Internet regulation can be found in the ICT regulation toolkit developed by the 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, but only a small percentage of the world's population uses these technologies. Currently the costs of network traffic and equipment like smart phones are too high for enterprises in 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 WiMax.²⁷ Getting providers to offer WiMax services is a strategy that shows great promise. There is a technology model that utilizes WiMax on microwave towers, which the cell phone providers already have established, allowing for more bandwidth. Additionally, WiMax is becoming much more affordable, at a little under \$60 for the hardware.

4.2 Building an ICT-Savvy Workforce

Having an ICT-savvy workforce is critical for the ICT sector and the private sector to use ICT to make business more competitive (see **Box 16**). This is difficult to do, given the fast pace of change in ICT. It is imperative to build bridges between the private sector and educational institutions to ensure they are teaching what is needed.

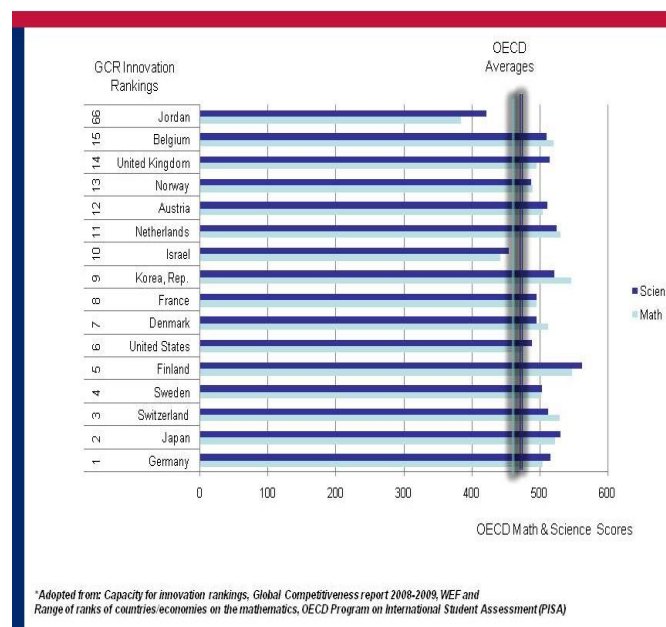
Box 16: Building a ICT-Savvy Workforce

- Ensure strong math and science programs in primary and secondary schools.
- Focus on the ICT user as much as the engineer.
- Ensure that bridges are created between the ICT sector and educational institutions.

Strong Math and Science Programs

Traditional efforts on developing an ICT workforce have included searching for specific tools that are needed for software developers in the current market or building up the capacity of

Figure 9: Countries Benchmarked Against OECD Math and Science Scores



college graduates to enter the Business Process Outsourcing (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 the 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 savvy IT users is just as important. Some of the most innovative technology solutions do not come from the engineers, but rather from users. A 2004 OECD study found that

the skills of the enterprise workforce must improve in order for ICT to help increase the

²⁷ 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>

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 firm.

Education and Private Sector Bridges

New technologies are continuously emerging, and often the skills needed for enterprises to use the technology change. Academic institutions often have a difficult time keeping up with the changing technology needs of the IT enterprise workforce. For this reason, it is important to develop bridges/linkages between enterprises and educational institutions, including 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 Utilizing Web 2.0 Tools

There are opportunities for projects to leverage Web 2.0 tools as a more affordable way to perform technical assistance. Interviews conducted for this paper revealed that several projects were able to leverage personal connections in an informal way to gain expertise virtually (over e-mail and the phone), allowing them to use technical assistance in a more affordable manner. It would be useful and cost effective to have a more formal way of providing technical assistance. This could best be leveraged by Web 2.0 technologies, especially membership-type technologies using technical knowledge. ICT experts are more willing to adapt to and use these new tools, so ICT is the natural place to start. Several of these tools are currently available to support the development community; many have good resources and networks (see **Box 17**) to leverage. In many cases, these tools still lack the ability to connect project issues with expertise. Thus, it would be good for these sites to develop an application for virtual technical assistance (see **Box 18**).

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

Box 18: Models for Virtual Technical Assistance

<http://answers.yahoo.com/> provides a technology platform for people to ask questions and then use the open model of the web where people provide opinion-based answers for free. The problem with this model is users sometimes do not receive adequate, accurate, or complete answers, or may not evaluate or apply answers appropriately.

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 that seek quick, small-job services cheaply. The feedback mechanisms in the sites help the more successful service providers increase business. This model might be interesting for donor projects, although there are many issues related to procurement and administration that would have to be managed.

Summary

ICT continues to be a critical tool for enterprises to be competitive. It can help enterprises connect and learn about markets; it can also help make an enterprise more productive and allow it to upgrade, moving up the value chain. ICT can also help similar enterprises become more competitive or be utilized to integrate enterprises along a value chain. There are several success stories on the use of ICT in industries like agriculture/agribusiness, tourism, and manufacturing. However, those implementing donor-supported enterprise projects need to be careful not to fall for the hype of specific technologies, but instead focus on proven technologies that have produced impacts on enterprise competitiveness in similar environments. ICT initiatives in which the private sector plays the leading role have proven to be most successful.

Donors should support the private sector by providing inputs for ideas and advice on the technology and business model used. They can play an important role in encouraging an enabling environment for ICT development that increases enterprise competitiveness. Donors should focus on duplicating successes by creating greater access to mobile technologies as well as other technologies like broadband and computer technologies. However, for any of these technologies to be effective, the developing world needs more access to a consistent electricity supply. Additionally, support should be given to develop an ICT-savvy workforce that includes not just ICT engineers but also general technology users, who are often able to have a greater impact on enterprise competitiveness. The advent of Web 2.0 tools presents an innovative way for donors and implementers to leverage resources to assist enterprise development. Developing an official method for providing virtual technical assistance on current development-oriented Web 2.0 websites could prove to be a useful new tool for enterprise development experts in catalyzing ICT to create more competitive enterprises in developing countries.

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 traceability 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 ensure Internet availability for customers	2006-2007

Project Name	Country	Firm	Interviewee	Technology	Dates
World Hotel Link	Global	WHL	Len Corinder	e-booking and web destinations	2002 to 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