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## Sustainability of Information Technology Therapy on Micro-enterprise Development.

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### Abstract

*The use of information technology in micro-enterprises has been shown to bring about improvements in accessing new markets, in achieving administrative efficiencies, increased productivity and competitiveness. To benefit from IT, micro-enterprises require specialized intervention and support. At the same time these micro-enterprises require skill sets that can translate their unique needs to IT solutions. This paper provides an IT Therapy approach to addressing micro-enterprise needs through IT. Following an action research approach to investigating micro-enterprises, this paper provides insights into how IT can bring about sustained improvements in micro-enterprises. The contribution of this paper is in guidelines of how IT can bring about development in micro-enterprises. This has implications for IT interventions to support micro-enterprises to achieve broader goals of sustainable development.*

### 1. Introduction

There is evidence to suggest that use of IT can play an important role on the growth of small businesses [20], [39], [27], [28]. In this sense, IT can be employed to bring about development if it enables businesses to create new jobs, increase productivity and sales through access to new markets and administrative efficiencies [26], [20]. These development outcomes are not limited to a particular region or country and can be achieved through measurable improvements in the lives of people living with limited resources to sustain themselves. Duncombe and Heeks suggest that there is a role for the ICT intermediary in providing the needed information on markets, customers and suppliers [7]. In their study of 1000 small business enterprises in the United States, Riemenschneider et al [29] found that businesses were prepared to overcome obstacles to IT adoption to achieve web presence. This is because pressures to keep with the competition and promote services to customers are greater than the obstacles to setting up websites. There is a sense that small and

medium enterprises hold the promise of building development incrementally on existing national capabilities, and providing a seedbed for the emergence of dynamic and efficient larger national firms [18], [20], [36].

However, the use of Information and Communications Technology (ICT) by Small and Medium Sized Enterprises (SMEs) is a challenge in both developed as well as developing countries [34], [32], [19], [15], [14]. Small and medium sized businesses are organizations that employ fewer than 500 people and typically have problems adopting IT due to competitive pressures and underestimation of time taken to implement IT [29]. A form of small business, micro-enterprises, are tiny businesses with fewer than 10 employees - often just one. The micro-enterprises investigated in this paper are part of a Micro-enterprise development program. Such programs make loans and or provide classes to people to help them start or strengthen their businesses [34].

A key barrier to micro-enterprise development is also the barrier to the use of ICTs. According to [11] barriers to growth of micro-enterprises are access to capital, educational level of the entrepreneur, legal barriers and start-up financing. In their study of information systems for rural micro-enterprise in Botswana, Duncombe and Heeks suggest that the role of ICT in enabling information and knowledge is important for both social and economic development [7]. They found that micro-enterprise owners relied on localized, informal social networks for their information. Information from these networks was of poor quality and not readily available; it appeared to fail the poorest and most disadvantaged entrepreneurs. In many such cases, ICTs can represent an unaffordable addition to costs and the benefits of using them are not always apparent [7], [20], [38].

The question investigated in this paper is: How can sustained benefits to development be achieved through the use of ICTs in micro-businesses? This paper investigates a set of micro-enterprises in underserved communities of Omaha through a service learning

course on Information Technology for Development. An underserved community is a group of people who have limited access to funds, services and healthcare needed to sustain themselves. For the context of this study, the underserved community that we refer to has a high rate of poverty and has been a neglected portion of the greater metropolitan city of Omaha. The majority of businesses in the area are micro-enterprises.

The micro-enterprises in our study sample had received hardware and software through a grant from the eBay Foundation administered by a micro-enterprise development program called the New Community Development Corporation. Through a series of action research steps carried out by the researchers, the ICT challenges faced by the micro-enterprises were diagnosed through a process of "Information Technology (IT) Therapy" [45]. This process of IT Therapy involved providing individualized IT solutions to pressing problems and opportunities and the development of a longer-term IT project plan, customized for each of the businesses. This paper develops upon the challenges proposed by [44], highlights the IT therapy outcomes per case and provides guidelines through which such efforts can bring about sustainable development.

## 2. Theoretical Background

In order to investigate the achievement of sustained improvements for development in the micro-enterprises, this paper draws upon the field of Information Technology for Development (ITD). The field of Information Technology for Development entails the implementation, use and management of Information Technology infrastructures to stimulate human, social and economic development [26]. IT for Development research is not limited to developing countries and considers communities and regions in which people have limited access to funds, social services and education needed to sustain themselves. Development efforts can be supported by ICTs if employed judiciously and if they address the unequal ways that computers are used [44], [37].

ITD research has made contributions in providing equitable access to information and knowledge in areas such as education and literacy [30], [31], [33]; healthcare [2], [21], [17]; software development [6], [41], [12]; reduction in poverty [3], [16]; better government [41], [43], [25], [23] and off-Shore outsourcing [24], [13]. However there is limited research that considers the effect of IT implementations on micro-businesses and their contributions to development.

Micro-enterprises can contribute to development by first growing into larger enterprises, and second, owners of micro-enterprises could accrue capital to be passed onto the next generation to start bigger businesses [11]. To be effective, micro-enterprise growth needs to be stimulated as part of a larger economic development plan [36]. Such plans need to address the key challenges facing micro-enterprise growth such as lack of savings, lack of education, limitation in target market size and technology support [11], [42], [36]. Levy et al [18] propose that while many problems faced by micro-enterprises are not fundamentally related to technology, selective use of technology can be beneficial to their growth.

ICTs can help businesses gain better access to information and expertise, reach new markets and customers (or more generally, stakeholders), administer the business more efficiently and effectively, and grow in the knowledge and skills needed to run the businesses better [26]. With rapid new and innovative technological advances of today, businesses need to be abreast if not very close behind large organizations in being able to reap the full benefits that new emerging technologies have to offer. But traditional methods of IT adoption in big organizations fail to apply in the context of micro-enterprises due to inherent characteristics of such small businesses [18]. Micro-enterprises that exploit simple systems such as word processing and trivial accounting processes can be seen as being successful in adopting IT [22].

While micro-enterprises face a number of challenges relating to the financing, access and adoption of ICTs [9], [18], [37], [44], [11], this research focuses on the immediate benefits obtained by the micro-entrepreneurs in adopting the technologies. Wolcott et al. [45] addresses the issue of incorporating technology into the business operations of micro-enterprises through a process of IT therapy. In this paper we extend the Wolcott et al. [45] study by focusing on the specific phases of the IT therapy process of ICT adoption of micro-enterprises and investigate whether the adoption of ICT brings about outcomes related to either social or economic development or to both. The contribution of this paper lies in the in-depth analysis of each of the steps in the IT therapy process for the eight micro-enterprises comprising our case studies.

## 3. Methodology

The research methodology followed for this study is that of Action Research. Action research involves the application of tools and methods from the social and behavioral sciences to practical problems with the

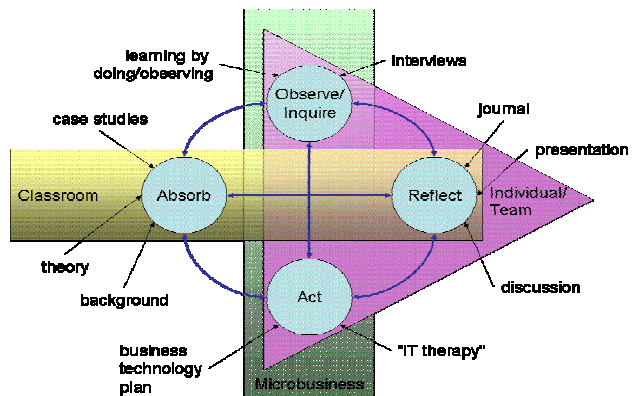
intention both of improving the practice and of contributing to theory and knowledge in the area studied. Action researchers participate directly or intervene in a situation or phenomenon in order to apply a theory and evaluate the value and usefulness of that theory [4], [5], [10]. The action researchers in this study were local university students of an IT for Development (IT4D) course who partnered with Techquity Grant recipients to facilitate the application of the technology acquired with the grants to the development of these enterprises. The Techquity Grant Program offers small grants, typically around \$2000, to be used for purchasing hardware, software, and training that would promote the development of micro-enterprises.

The anticipated benefit to the micro-enterprises would be more effective utilization of technology, improved thinking about technology and the role of information, and, in general, economic and human development. In return, students would gain valuable insight into the challenges and realities facing micro-enterprises. Action research is a change oriented research methodology that seeks to introduce changes with positive social values, the key focus being on a problem and its solution [8]. Action research is typically carried out as part of an attempt to solve problems by allowing the researcher to become a participant in the action, the process of change itself becoming the subject of research [4].

In action research, the researcher has a remit for action [4]. This means that the organization in which he or she is doing research has given him/her the go ahead to solve their particular problem or help manage change processes. Action research is best seen as an iterative cycle in which the researcher begins with a plan of how to carry out the activity, then act to intervene to solve the immediate problem, observe the results of the intervention and reflect on the impact and next steps [46], [1]. Carried out as part of an academic service-learning course, the action research was supplemented by the absorbing of knowledge through classroom lectures and discussion. In this study, the plan was to assist the micro-enterprises through partnership with New Community Development Corporation (NCDC). The cycle continued to action or intervention, to solve the problem or manage the change process; this is where the researcher collects data. On location at the micro-businesses, students worked with business owners to understand the business and existing technology, implement technology-based projects, and train business owners as appropriate. This process was referred to as "IT therapy" in which assistance was given to the micro-business owner to solve their immediate IT needs. Additional data on the situation or phenomenon being

studied were gathered through observation while implementing the IT therapy.

The following reflection entailed interpretation of the data, and consequences of action that then fed into the planning stage to modify the methodology or model that then determine what action would be taken in the next cycle. On their own time, students maintained a reflective journal, worked on assigned class exercises and readings, and prepared a technology plan for the micro-businesses. The class served as a sounding board for issues and proposed solutions, offered advice or relevant information, and offered constructive criticism of proposed courses of action to address any IS/ICT adoption/implementation issues specific to any of the micro-businesses. Further cycles of activities continued until a desired end-state is achieved [46], [1]. Figure 1 shows the action research approach followed in this study.



**Figure 1: Applying the Action Research Methodology**

This study investigated eight micro-enterprises using the IT therapy interventions described. Each business has been given an arbitrary name for the purpose of this study to maintain confidentiality. All of the businesses are located in Omaha, Nebraska. The following sections illustrate the results of the action research process through which IT was adopted in the micro-enterprises.

#### 4. Results of the IT therapy per case

As part of the action research processes, the students entered into a partnership with the micro-enterprises. They began the *Absorb* phase in class when past case studies, theories and models were discussed, and foundations laid for the relationship with the micro-enterprises. In this phase, the students were assigned to businesses and briefed on the key challenges faced by the micro-business owners. After the absorb phase, each group entered into a more specific action research cycle of their own which

involved distinct IT therapy interventions carried out in the *Act* phase of the action research process. The specific phases of action research within these micro-businesses are described in the following sections.

**Case 1: HH** - HH offers a structured residence with treatment and support services to individuals who are transitioning from a treatment program back to society.

*Observe/Inquire:* The owner of HH has been in substance abuse counseling for 8-9 years. He encountered the “revolving-door problem”, where individuals would go into treatment, then get back on the streets, abuse substances again, and go back into treatment. The HH is an effort to solve this problem by giving people a bridge from the treatment setting. It started in 2003. Currently, there are four houses, two for men and two for women, and they are expanding much more quickly than they had indicated in their business plan. Business has been by a lot of trial and error. Their main issues relate to being able to access more funding and services, finding out with whom they can network (in a human sense). For the Techquity grant, HH received a laptop (and probably other equipment). The owner’s pressing need is to figure out how to use the technology effectively. Right now, when he sits down to use it; he always spends most of his time hunting through manuals. Quicken, the personal finances software, “is like reading Japanese.” Some of the technology issues are:

- Developing effective Powerpoint presentations that can better enable HH to make pitches to potential funding agencies. This need includes some basics, like learning how to hook a laptop up to a projector, and create handouts for the attendees. In the past the management has relied on personnel at the presentation site to help with technical problems, but this has not been very effective because of the varying degree of technical knowledge at the sites.
- Figuring out how to consolidate the data on individuals associated with the HH, and easily accessed the information (cross-referencing). Development of an information system of recording statistics of the guests including referral sources and type of drug addiction has been started and is mainly spreadsheets. Some of the information needs to be validated and the method for presenting the information needs to be addressed.
- Improvement of record-keeping. Potential donors always want to see the data that shows you’ve been effective. The owner of the HH would like to be able to generate this data and present it. A cost benefit analysis for potential donors has not been attempted so far; however the data to perform such an analysis is available.
- The owner teaches a course in criminal education (which does not involve teaching people to be

criminals) and getting his lesson plans & lectures on the computer would be helpful. Future course of action will be to automate the classes and present them in the computer lab.

*Reflect:* The owners of HH have very good intentions for their business and just want to be able to help people. They rely on many different contacts for their IT assistance. For example a friend is developing their Powerpoint slides for them. However, unless they develop their own skills, they will always rely on this person even if they just need minor changes. Managing data will be more difficult in the future as more and more clients come to HH for treatment. A system needs to be established to maintain historical data on their clients that can be used for measuring outcomes (progress). They have data flowing in from multiple sources because their clients are coming from various programs such as incarceration, drug court or other rehabilitation programs. A single system with a daily backup process would enable them to manage this data more effectively.

*Act:* The following IT therapy interventions were carried out: Streamlined business practices including system maintenance and backup standard procedures; financial data updated and used for making proposals to prospective lenders; business input, output and outcome data updated for display to potential donors and stake holders as well as referral services; data prepared for a database on resident statistics.

**Case 2: HE** - HE offers massage therapy services. The owner is seeking to diversify into the retail sale of a variety of natural health products.

*Observe/Inquire:* The HE business is a massage therapy business, which the owner conducts out of her home. The owner has technology already available to her, but needs help utilizing it. She had an unopened PDA, a laptop, and a desktop. She would like to get things organized between the two computers and her PDA. She also wants help learning QuickBooks and possibly setting up a company website. She needs security on her laptop and Microsoft Office 2003 installed on both computers.

*Reflect:* The owner knows that technology will help her business. Everything she knows, she has taught herself. On meeting with the owner, it was evident that she wants to change, but is a little hesitant to change the regular ‘routine’.

*Act:* The students provided the following IT therapy deliverables: installing Microsoft Office 2003; setting up security on her laptop computer; connecting her PDA to her laptop and desktop; installing a CD-backup system; helping her learn how to organize her contact information in Microsoft Outlook.

**Case 3: HC** -

*Observe/Inquire:* HC is primarily an Internet business that sells wedding-cake toppers representing different ethnic backgrounds. The owner of HC uses a number of vendors from all over the United States to obtain the cake toppers. The sales she has made have come from the website. Once a customer places an order for a cake topper, HC receives the order form by mail and packages the cake topper figurine and ships it out to the customer. Payments for the cake topper are handled through the Paypal. A major problem the business owner faced was the lack of skills or formal technical training that would enable her to make changes to the business website when modifications were necessary.

*Reflect:* The owner is open and eager to embrace new technology. Her initiation of her business through a website is evidence of that fact. She wanted to start selling her cake toppers through the Internet even though she did not possess enough know-how about the technology. She did however have an understanding that technology would play a big part in her business and would help her to expand in the future.

*Act:* The following IT therapy interventions were carried out: New website: One of the major outcomes was the development of the new website. The new website has a more organized and efficient layout comparable to other leading online competitors of similar products. Content is laid out in a more manageable and attractive manner for visitors to easily surf the website. Colors chosen for the new site are of a much softer color in line with other online sellers.

*Training:* Training for the owner has come in form of providing her with a manual to help add/delete products on her website so that customers will always have the new and updated product list. And most importantly, the owner will not have to depend on someone else to change the products for her – she will be able to perform the changes herself by following the steps outlined in the manual. The manual gives screenshots as well as descriptive information as to the process to follow. A couple of hands-on sessions were done with the student so that any confusion could be cleared.

Perceptions and attitude changes: One of the owner's needs is to have her website look more "crisp" and professional. On doing some preliminary research as to the look and feel of other comparable businesses, we had to suggest to the owner to change the colors and layout of her current site to help attract more customers. We had to persuade the owner to shift away from her inefficient current layout and existing bold colors (red and black) to a more "crisper" organized layout and softer colors to help attract more customers.

**Case 4: LD** - LD specializes in high quality soups and sandwiches. During the period of this study LD moved its deli from its original location to a better one that could serve local businesses and students.

*Observe/Inquire:* LD is a local sandwich shop established in 2003. The owner would like to provide a comfortable New York style deli, with the convenience of Wi-Fi (Wireless Communications) for anyone wanting to grab a bite to eat and catch up on news, e-mail, or work.

*Reflect:* In the past technology has been seen as a secondary need. The owner believes that technology is tool for success. She sees the benefits of technology through the use of the Internet, laptop, and cell phone. All three of those technologies have provided an extensive and continuing convenience and have given her the ability to successfully multitask several activities. Past technologies have not provided her the competitive edge or a business advantage (other than the cell phone). Her old register system is merely a calculator. It does not provide any data to her on trends, sandwich purchases, inventory usage, or payroll.

*Act:* The students of the IT4D class helped the owner select a register system. The new register system will create an ideal usage. Ideal usage is the total amount of use of a particular item that is an ingredient for various menu items. The register system will also maintain payroll information. Between the back-office software and the register, the data will be secure and accurately reported. This will ease the problems of calculating payroll at the end of the period. The Internet café implementation is a work in progress. A wireless communication network through a local Internet Service provider was set up. For a small fee per month, LD will have enough bandwidth to operate 20-25 computers on the same network.

**Case 5: FD** - FD specializes in the design of elegant, conservative women's clothing. The owner has aspirations of being a player in the global fashion market.

*Observe/Inquire:* The owner wanted a website that will enable her to market herself and advertise all her product lines. She also needed technical support on how to use, maintain, and modify the website. She also needed to have a cash register installed. The owner wants to see her business grow and shift from small business to big business as a fashion designer within the next five years. Additionally, she would like to train people so that they can assist her in creating her products as it is difficult to get all the orders completed on time with just the owner being the sole employee in the business.

*Reflect:* The students in the IT4D class assisted the owner with creating a Powerpoint presentation to show

at an upcoming client meeting. The students not only wanted to create this Powerpoint for her but at the same time teach her how to create it so that next time she would be able to do it herself whenever she had a business meeting. The students ended up taking photos of all her product lines and creating the Powerpoint presentation for her without being able to explain to her how to do it because she was very busy talking to her clients on the phone. We felt that she just needed someone to come and create the Powerpoint presentation for her.

*Act:* On meeting with the owner of FD and analyzing the technology needs of the business, The IT4D students came up with the following list of items that need to be carried out in the future to assist in the growth of the business: FD's website will consist of four WebPages. It will need a developer to update and to do maintenance. In addition, it will need training and technical support for FD's staff to be able to update the website regularly; FD's personnel's training is an important factor in the operation of technology systems. FD needs to look for the best training programs at low cost; FD's website and any other technology implementation will require a professional to provide service, technical support, and maintenance. FD may benefit from online free technical assistance programs.

**Case 6: CZ** - CZ is a franchise that pairs individuals of all ages who need tutoring in any subject with tutors who can provide the service.

*Observe/Inquire:* CZ is a franchise that pairs individuals of all ages who need tutoring in any subject with tutors who can provide the service. As of now, the owners spend a lot of time meeting students, going over their backgrounds, and trying to find a suitable tutor for each student. Considerable time is also spent in developing schedules between tutors and students. Ideally, the owners of CZ would like to have this process automated and form an online community whereby, tutors can be matched with students and also take care of scheduling issues.

*Reflect:* On working with the owners of CZ, it became apparent to the IT4D students that there was a need for changes in perceptions and attitudes on the part of the CZ's owners. There needed to be more involvement from the owners. More disclosure of their secure information such as relationship between stakeholders, customer database, and other secure information was needed. Building trust between the owners and the IT4D students was necessary. The students found it very difficult to find packaged software that best fits this business

*Act:* The following IT therapy interventions were carried out: creation of a decision-making framework to resolve the buy-vs-build question; free trial of

"When to work" software from whentowork.com. Whentowork.com is an online application that the owner suggested to the IT4D students. But it does not provide the customization option for their customers. According to the owner of CZ, the software on this website cannot be downloaded and customized. After the IT4D students spoke with the technical staff of whentowork.com, those assumptions were eliminated.

**Case 7: EP** - EP is a modeling agency that provides models who reflect the diversity of "normal" (non-glamorous) Americans.

*Observe/Inquire:* EP is a modeling agency that provides models who reflect the diversity of "normal" (non-glamorous) Americans. The owner would like to learn to use remote desktop software to allow her to access her desktop from remote business location or at her home. Additionally, she would also like to customize appropriate software applications to better meet the business needs, where possible.

*Reflect:* The owner has little extra time to spend on technology and is therefore very reluctant to embrace new technology for fear that it will cost her valuable time.

*Act:* The IT4D students trained the business owners to help her understand the strategic importance of technology in her business. Remote desktop was installed and demonstrated to show how greater mobility and convenience could be achieved through technology. Basic workstation maintenance such as ensuring critical patches and updates were current. The differences between critical and non-critical updates were explained. Desktop security and wireless security were explained to the users. Using QuickBooks to cut down on time spent on non-value added services was explained. Website ranking and place was also explained with possible solutions. An important role of the students was increasing the EP's owner comfort level with the technology.

**Case 8: CC** - CC provides pet grooming services to customers with specific requirements for their pets..

*Observe/Inquire:* CC is a pet grooming salon established in April, 2006. CC maintains the overall pet grooming needs of pets, which include bathing, clipping, and nail trimming. The owner possesses the necessary hardware and software but does not have the IT skills and knowledge needed to integrate the various software packages to work seamlessly to make her daily business activities more efficient.

*Reflect:* The owner is not at all afraid of implementing and testing new technologies. This made it easy for the IT4D students to implement the technology without any problem. After a first meeting, the students discussed the importance of technology and the impact of technology in the small business.



*Act:* The IT4D students fixed the Internet connection and configured an Outlook express account for the owner. The new email account now matches her business domain. The heart of the CC business depends on an application called Kennel Connection, which keeps track of all the business activities from clients' databases to appointments. The owner had been using the demo version so students upgraded it to the full functionality version. QuickBooks is accounting software that works well with the Kennel Connection. Linking them together made an excellent combination for CC.

The owner makes frequent businesses trips but she does not have the ability to check or make an appointment unless she physically walks into her office building. The IT4D students installed VNC software that is available free with GPL. VNC stands for Virtual Network Computing. It is remote access software which allows one to view and interact with one computer (the "server") using a simple program (the "viewer") on another computer anywhere on the Internet. VNC was installed on both the computers (office PC and laptop). The office PC always stays in wait for call mode and her laptop will work as a client. She can dial into her office PC without any problem. She can check or book an appointment while she is at home or on business trips. She can now better utilize her time to focus on her clients.

These software systems work well as long as the computer is maintained and free of viruses and hacker-intrusion. Her brand new PC came with the factory installed unwanted programs. We identified the unwanted programs and removed them permanently. We are able to free some space in the hard drive as well. We scanned for virus and spyware. We discussed the importance of scanning and removing virus and spyware from the system. Finally, we prepared a trouble shooting guide for future reference. This guide includes the basic troubleshoot of email, VNC, and PC.

The IT Therapy component of the work was focused on the entrepreneurs' strongly perceived issues and problems: LD's Internet connection was very unreliable; HH needed to provide better statistics to stakeholders; FD wanted to be able to show potential customers a Powerpoint show of her fashions; HE had customer information scattered in many different places; EP was frustrated by having to maintain duplicate accounting systems at work and at home; HC had ideas for enhancing her web site; CZ needed a more effective means of tracking tutors; CC needed Internet connectivity. In addition, students applied their IS education and background to identify solutions to problems the entrepreneurs may not have been aware of. CC had junk software removed from the desktop; the visibility of EP's web site was poor in the major

search engines; HE needed to upgrade software and install virus protection; HH needed to make backups of data.

The second major task for students was to think systematically about how information could benefit the micro-enterprise and identify ways in which technology could bring about this benefit. This analysis led to the formation of a technology plan for the micro-enterprise that would identify a sequence of projects that might be undertaken, a prioritization and timeline, and an analysis of the resources and skills that might be necessary to carry out the projects. In developing the technology plans, students were able to identify some of the critical issues that existed within each business in being able to adopt and implement proposed ICT technologies. The following section analyses these cases in terms of how sustained benefits to development can be achieved through the use of ICTs in micro-businesses.

### 5. Analysis

The above cases illustrate very specific interventions customized to the needs of the micro-businesses. Through the IT Therapy, an assessment of the needs was translated into interventions that enabled the micro-business to achieve measurable improvements in their operations. How these improvements in micro-businesses translate to economic development can be measured in terms of job creation, increase in sales and productivity [40]. There is empirical evidence to suggest that the adoption of IT in SMEs increases their profitability and outreach [20] as measured by increased sales [27], [28] and cost savings [38]. These outcomes to economic development that are often easiest to quantify and are illustrated by case in Table 1 per case.

The ITD outcomes were classified using Qureshi's [26] model of IT for Development. Overwhelmingly, the immediate needs were in the areas of administrative efficiencies and, to a lesser extent, access to markets.

**Table 1. Outcomes per Case**

Case	Intervention	ITD Outcome	Development Outcome
HH	Training, hardware, Internet connection	Competitiveness, Administrative Efficiency, Information Access	Job creation, Income generation
HE	Installation of hardware and software	Administrative Efficiency	Productivity improvement
HC	Website development and training on website maintenance	Access to new markets, Administrative Efficiencies	Increase in sales



LD	Internet connectivity, point of sale system installation and Internet café	Administrative Efficiencies, Access to new markets and competitiveness	Job creation, Increase in sales
FD	Powerpoint presentation	Competitiveness	Increase in sales
CZ	Options for software acquisition	Administrative Efficiencies,	Cost reduction
EP	Software updates, installation of terminal services and improvement of search engine	Administrative Efficiencies, Access to new markets	Cost reduction
CC	Software configuration, Internet connectivity	Administrative Efficiencies, Access to new markets	Cost reduction

Access to information, knowledge, and expertise was a less pressing concern; the entrepreneurs understood their businesses quite well and in most cases had sufficient information and expertise to run them. Using technology to connect with, for example, other entrepreneurs or business development resources certainly offers great potential, but likely future benefit. Learning and increased labor productivity was achieved through the use of technology to provide training and education. While the students provided on-going training and instruction in how to use the technologies or benefit from the solutions, this instruction was provided in a face-to-face context rather than using ICT to provide the training itself. The example of job creation observed during the semester was a HH guest finding a job by using the new Internet connection to post his resume on the web. In short, the IT therapy tasks tended to reflect the hierarchy of needs perceived by the entrepreneurs.

## 6. Sustainability of IT Therapy on Micro-Enterprise Development

When the ITD course ended, the students who provided the technical and business assistance moved on and were no longer available for the entrepreneurs. However, as with any organization, the micro-enterprises' need for technology support did not cease. New technology needs and opportunities emerged, and sometimes maintenance or repair of past solutions was required. By itself, a service learning course does not provide sustainable IT support. In order to sustain improvements in the growth of micro-enterprises, organizational and technical infrastructures are needed to provide technical and business assistance within the community in which the entrepreneurs reside. Most of the efforts in micro-enterprise development have

focused on economic development while ignoring the social networks that sustain these entrepreneurs [42], [35]. To ensure sustainable development, one must consider the growth of micro-enterprises within the context of a larger development strategy that takes into account the social capital needed to sustain them [36], [35], [42], [32], [37].

According to the World Bank, sustainable development entails the simultaneous achievement of economic (growth, equity and efficiency), social (empowerment, participation, social mobility, social cohesion, cultural identity and institutional development) and ecological objectives (ecosystem integrity, carrying capacity, biodiversity and protection of global commons) [42]. Community development efforts to support micro-enterprise growth can enable sustained improvements to be achieved [42], [36], [37], [44]. A sustainable development strategy will have to support the community in which the micro-enterprises operate. In remaining with the World Bank's definition of sustainable development, we offer the following framework for achieving sustainability of IT therapy efforts on micro-enterprise growth:

**Economic Objectives:** Improvements in micro-enterprises can be achieved by growth stimulation, equitable distribution of resources, and increasing the efficiency of factors of production through the IT therapy training and technology interventions. To sustain these improvements, the following need to be in place for the micro-enterprises:

- Micro-loans or financing that can be easily paid back.
- Partnerships with IT company foundations such as eBay and Microsoft to ensure targeted technology support.
- A partnership that includes educational, non-profit, and for-profit institutions that can provide the expertise and resources to provide on-going technical consultation, training, and support for micro-enterprises who cannot afford to pay market rates for such assistance.

**Social Objectives:** Sustained improvements in micro-enterprises can be achieved by empowering owners through participation in social and cultural activities that reinforce their identity. Institutional development for supporting micro-enterprise owners need to include the following:

- Provide training on IT applications and business plan development. In our cases, NCDC provides such services.
- Extending partnership with NCDC to include a cybercafé with facilities for business development and technical assistance. This serves as a social space in which micro-enterprise owners can connect with each other.

- Connect the cybercafé to the University infrastructure for remote technical assistance and maintenance.
- Develop IT therapy skills sets for graduates going into the workforce to enable them to stimulate growth in micro-enterprises.

The above objectives can be used as part of a socio-economic development strategy to provide possible courses of action for sustainable micro-enterprise development.

## 7. Summary, Conclusions & Future Directions

This paper has investigated the use of IT by micro-businesses to bring about sustainable improvements. A key factor affecting the successful adoption of IT by micro-businesses was the IT therapy interventions. These took place as part of an action research cycle involving students from an IT for Development course which partnered with the micro-businesses. The IT therapy interventions involved provided individualized IT solutions to pressing problems and opportunities and the development of an IT project plan. Following an analyses of how the action research cycle enables the IT therapy to be successful, this paper concludes with implications of IT therapy on sustainable development.

Future research needs to consider a larger sample of small and micro-business enterprises and categorize these according to industry or business type. Such research needs to develop upon the IT therapy process analyzed here by assessing the sustainability of these interventions.

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