

Microenterprise Sustainability: The After-Effect of ICT Adoption and Use

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ABSTRACT

In the United States, there are over 25 million microenterprises, which encompasses 88% of all businesses. These small businesses have five or fewer employees and are resource-constrained – with one of the many areas being the lack of technical skills. Their inability to acquire and use these skills causes them to be at a disadvantage to larger corporations. An innovative approach, called “IT Therapy”, is a customizable technology-based assistance infrastructure for any microenterprise willing to adopt Information and Communication Technology (ICT). This adoption can lead to social, economic, and human development if the ICT is *sustained*. Therefore the research question in this study is, *how can Information Technology adoption and use in microenterprises be sustained to facilitate their business growth?* The main contribution of this study is an *Online Sustainability Network* to facilitate sustainability of microenterprises’ ICT adoption and use. This tool serves as a repository for micro-entrepreneurs to learn, interact and share technological experiences with one another.

INTRODUCTION

Information Technology (IT) integration within businesses has been a recent phenomenon for increasing business productivity. IT is the use of technology to support or solve a problem by retrieving, storing, and processing information. This may involve information systems (IS), which are systems that maintain a part of an organization, such as an electronic inventory system or a website that sells products online. Large organizations have the money and technical staff to incorporate these systems, which allows them to be competitive. However, microenterprises, which can be defined as a business with five or fewer employees, are typically resource constrained and unable to adopt technology for various reasons. In the United States, there are over 25 million microenterprises, which encompasses 88% of all businesses ("Number of microbusinesses," 2011). In New York State alone, 90% of all businesses are microenterprises ("Number of microbusinesses," 2011). Microenterprises typically lack technical skills (Honig 1998; Hyman et al. 1998). Their inability to acquire and use these skills causes them to be at a disadvantage to larger corporations that possess the finances and technical acumen to effectively run Information and Communication Technologies (ICTs). Research has shown that if microenterprises become exposed to technical skills and ICTs, they can grow 3.4% faster, thereby, positioning themselves to become a significant driving force for the country's local economy (Qiang et al. 2006). If the adoption and usage of ICTs are *sustained*, it can lead to social, economic, and human development. (Wolcott el al. 2007). Therefore the research question in this study is, *How can Information Technology adoption and use in microenterprises be sustained to facilitate their business growth?* In addressing this question, an action research methodology was used to apply the IT Therapy process to investigate a set of microenterprises in Western New York that have previously adopted ICT over a five-month timespan. The goal of the overall research is to keep these microenterprises afloat with their technical knowledge in order to safeguard their business future. The next section outlines a background on Information Technology for Development.

BACKGROUND

Microenterprises typically have one to five employees and lack technical skills. Lacking this technical skill is something that these businesses are aware of and have desire in obtaining (Wolcott et al. 2008). However, every microenterprise is unique and a straightforward path to

obtain these skills and adopt ICTs is not always available immediately and or feasible. In a study by Matthews (2007), it was found that the lack of confidence in technology by the micro-entrepreneurs was a major factor for small to medium enterprises looking to grow. Although confidence is lacking, several micro-entrepreneurs have expressed that they once planned for or in the process of focusing on IT or IS adoption (Levy et al 2002). The idea that technology can help small businesses and owners that lack technical skills are willing to try to adopt ICTs has been focused upon by many researchers on a global scale (Steinberg 2003; Qureshi 2005; Qureshi & York 2008; Heeks 2008; Guo & Jin 2009). This field of research is called Information Technology for Development (ITD). Prior ITD research has contributed in providing access to information and knowledge in areas such as education and literacy (Rodrigo 2003); healthcare (Braa et al. 2004); and reduction in poverty (Cecchini & Scott 2003). Within the field of ITD, a concept of “IT Therapy” has been introduced, specifically for microenterprises. “IT Therapy” is an innovative approach for a customizable technology-based assistance infrastructure for any microenterprise willing to adopt ICTs. The “IT Therapy” process has been researched in various studies (Wolcott, Qureshi, & Kamal 2007; Qureshi, Kamal, & Wolcott 2008; Kamal & Qureshi 2009) which shows social, human, and development outcomes occurring in businesses. A model of the effects of IT interventions has been developed and served as a base for recent ITD studies (Qureshi 2005). This cyclical model is a combination of two types of development, social and economic. Social development activities are designed to raise the standard of living and give the public information regarding the government, environment, education, and healthcare (Qureshi 2005). Economic Development is the investigation of inflows and outflows of funds for financing, innovation, and sourcing. The model outlines ITD effects on a societal level. We use the Qureshi (2005) model to make sense of the impact of ICTs in terms of microenterprises and how it can relate to sustainability. In the context of this study, socio-economic development within a business can result in a variety of effects when technology is implemented. Access to information and expertise is an effect that describes how a business can access accurate and high quality information regarding a specific topic. Another effect, competitiveness and access to markets, describes how a business can expand its customer reach through the use of technology. For example, by adopting a website, customers can buy products from around the world, as opposed to just the area in which the business operates in. Administrative efficiencies is another effect that demonstrates improvements in

daily business operations, such as saving time by recording customers electronically as opposed to recording customers by using a paper file. Furthermore, another ICT effect is learning and labor productivity. This involves the learning process and ability to learn a system so that it can be passed onto the next generation of a business. Another effect is poverty reduction; this effect shows that ICTs can save a business money. These ICT effects can also lead to further development, such as human development and macro-economic growth. The effects all link back to socio-economic factors, stating that this model acts as a cycle; however it may not always show positive outcomes. A bottleneck may occur within a business if the technology that is being implemented is not tailored to a business's needs. Qureshi's model (2005) can be viewed in figure 1 below.

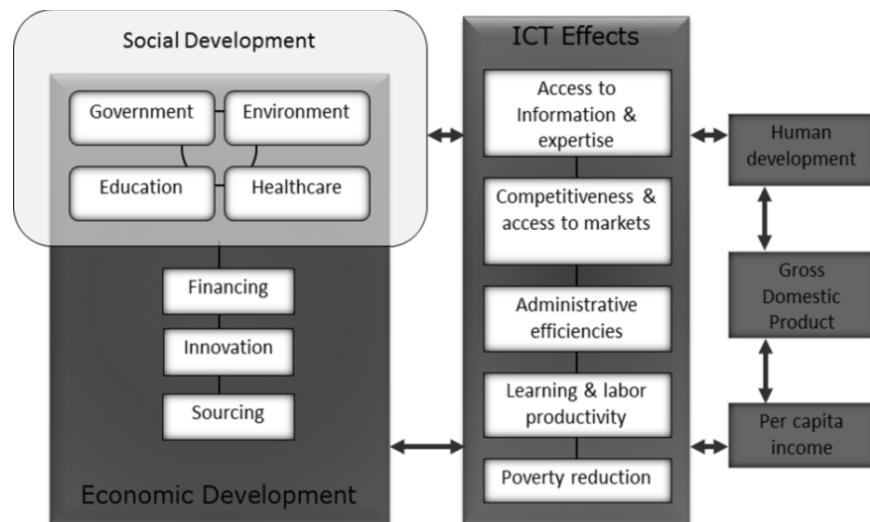


Figure 1. Model of IT for Development (Qureshi 2005)

A lot of existing and current research focuses on ICT adoption issues in large organizations (Sieber and Valor, 2008; Swanson and Ramiller, 2004). There are very few studies focusing on ICT adoption in micro-enterprises. And those that have did not investigate how the technology adoption may be sustained (Grindle and Hilderbrand, 1995; Matthews, 2007; Vargas, 2000; Warschauer, 2003; Southwood, 2004). This study addresses this gap by making the connections between ICT adoptions and moving toward sustainability. The next section outlines to methodology that was used in this study.

METHODOLOGY

This study uses an inductive interpretive case study (Walsham, 1995) to understand how micro-enterprises may adopt IT. Although adopting IT within a microenterprise is not a straightforward path, there are essential stages that microenterprises must undergo. These stages are shown in the research design as seen below in figure 2.

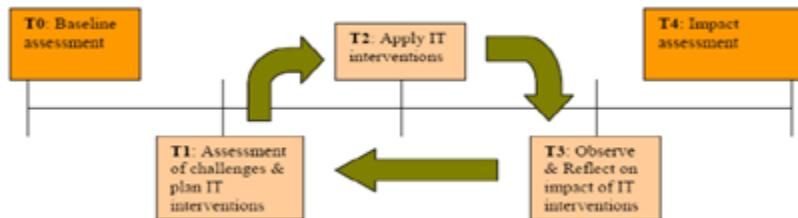


Figure 2. Research Design

An action research methodology (Baskerville 1999; Zuber-Skerrit 1991) was used to apply IT interventions in this study that addresses the research design. A group of students taking a service leaning course at a local university carried out the roles of researchers as they were provided a microenterprise to work with. Students carried out the stages T0-T3 in the research design and met with the micro-entrepreneur between one to two times each week until all interventions were applied successfully. This study uses five micro-enterprises from different sectors, as seen in figure 3 below. To protect the name of these microenterprises, a two-letter identification scheme has been used to represent each business in this study. These businesses were chosen because they all possessed similar characteristics, such as the size of the business, lack of IT knowledge, and expressed that technology can play a large role in their business. The action research methodology has also been used in studies by Wolcott et al (2007) and Qureshi et al. (2008).

Case Study	Type of Business
AC	Carpet Cleaning
RP	Florist
SF	Handcraft Jewelry
WH	Historical Society
DG	Dog Wash

Figure 3. The Five Case Studies and Business Type

At each of the distinct stages of the research design, specific activities within the microenterprise are carried out. Starting at T0, the researcher will interview the micro-entrepreneur to understand their past, present, and future technological standpoint. At this stage, the researcher can grasp an idea on how familiar the micro-entrepreneur is with general technologies. Additionally, questions are asked to see how the owner believes that the incorporation of technology can show benefits within the business. In a study of eleven microenterprises, Wolcott et al. (2008) found that *all* owners had a common feeling that adopting technology can in some way help their business. After this baseline assessment is complete, T1 through T3 are executed. These stages represent a cyclic nature of action research. At T1, the researcher revisits the micro-entrepreneur at the business location and gathers an in-depth understanding of the business. This may entail observing day-to-day activities that are carried out within the business. At this stage, the researcher also questions the owner if there are any immediate IT needs. Once the observations and an assessment of the challenges being faced by the microenterprise are complete, the researcher then creates an IT intervention plan. This plan lays out possible IT solutions that the business owner can adopt to mitigate the challenges identified earlier. This is created based off the interviews at T0 and the observation of challenges seen during T1. The next stage, T2, is the actual IT intervention. Once this is done, at T3, the researcher evaluates whether or not the applied technologies meets the need of the micro-entrepreneur. This reflection is done with the owner to see whether the IT intervention resolved the problem or not. Once the IT meets the needs of the owner, stages T1 through T3 are carried out again, addressing another challenge that the microenterprise faces. After all IT interventions are carried out and reflected upon, stage T4 begins. At T4 the researcher interview the micro-entrepreneur again, similar to stage T0. However, at this stage the interview revolves around the ways that the IT interventions impacted their businesses - whether it is positive, negative, or mixed impacts. This interview is carried out 5 months after the interventions were applied. The purpose of the time gap is to help assess whether the ICT interventions had any prolonged adoption and usage effects. To make sense of this data, a qualitative approach using case study analysis was carried out, based on the interviews at T0, T1, and T4. The next section outlines each case study in detail.

CASE STUDIES

An action research methodology was used to apply the IT Therapy process to investigate five microenterprises in Western New York. At the time of this study, these microenterprises have previously adopted ICTs over a five-month timespan and followed the action research approach by student researchers. Types of ICT interventions involved the creation and maintenance of websites, databases, and social media accounts. In addition, face-to-face IT skill training sessions were also a core component of the IT Therapy carried out with the microenterprises. Short-term growth has been evident in areas identified from theoretical models, such as administrative efficiencies, learning and labor productivity, access to information and new markets, as well as competitiveness. Yet, it is the *sustainability* of these initiatives that will either cause the business to grow or revert to traditional methods.

Case 1: AC (Carpet-Cleaning Business)

AC is a small carpet-cleaning business run by a husband and wife. This company has been in operation since 1991. The business's main goal is to "do good work, make sure the customers are happy and to grow as a business, but not too large". The owner's husband used to work for a carpet cleaning business and when that company went out of business, they sold him the client list and the equipment that he needed to continue this service to customers. The owner of AC knows that technology can help businesses, but she is afraid to adopt new technologies because she feels that if she is not in control of it, that it can ruin her family business.

T0: Baseline Assessment

IT Perceptions: The responses from executing the baseline assessment of AC revealed that the owner believe that IT can help market her business, but only if it is manageable for her and her husband to use. Technology is both a "curse and blessing" according the owner of AC. The capabilities that technology can do in terms of attracting customers and marketing a small business are so vast. However, the owner of AC realized that with such a vast opportunity comes a time commitment. The owner of AC knows how time consuming a website and a Facebook page can take, but she knows it will be worth it in the end if she pays attention to it. If an error occurs or competitors try to see who AC's customers are, that is when technology becomes a curse. Overall, the owner of AC believes technology can be positively used to promote business growth, but adopting it can be fearful and risky.

T1: Assessment of Challenges and Plan IT Intervention

Historical and Social Context: The owner and her husband had been operating primarily without direct interaction with technology regarding their business. The owner has been using basic technological skills, like surfing the web and using email. However, modern business technologies such as social media and a business website have become overwhelming and frightening. For example, the owner of AC fears that competitors will look on her social media pages and steal her customers online. The owner of AC realizes that many businesses are using social media, so she decided to make an account for her business a year ago. Another reason why the business has not adopted ICT is due to time. They originally felt that maintaining a website and having a social media page would consume hours a day to maintain – however they later realized that for the scope of their business, ICT will not be as consuming as they thought.

Plan IT Interventions: AC had a website built for them a few years ago. Although this website was functional, no maintenance has been performed by either owner for months. The website was created and maintained by an outside source. Due to other obligations, AC could no longer receive help from this outside source and AC was left with the website code to be maintained by themselves. This caused the owner to become overwhelmed with technology, she did not know how to code and the product she was using was too complicated for a person with “average” computer skills. Additionally, AC has a Facebook account for the business. The page contains sections on “about us”, “description of services”, “contact information”, and “pictures” (from jobs performed). Since the company began, all customer information and jobs were recorded in hard-copy form on paper.

Based on this assessment, AC needed a way to create and edit their website. This solution must be user-friendly program since the owner does not possess any coding background. The website will function as the main electronic source of AC’s services and information. With a more visible and current website, AC can access a wider customer base.

Furthermore, AC needs a way to record customer information electronically. The owner of AC needed some form of email list for their customers. Another technological point was that AC used one desktop computer for holding pictures of the work they do. This computer is also used for personal use. Upon investigation, the computer had a number of viruses on it, causing pop-

ups to occur and slowing down the computer. To efficiently maintain her website and business, AC needed virus protection software.

T2: Apply IT interventions

The owner of AC has been provided with many new software upgrades for her business. First off, the owner was provided a new website building tool, Weebly, a user-friendly website provider with a drag-and-drop setup. This online tool allows users with little to no training in web development to maintain their own website. Additionally, two anti-virus/anti-spyware programs were provided that removed a number of viruses on AC's computer. The final intervention was a simple database with filtering capabilities. This would drive the business's paper model of tracking customers to an electronic one. No additional *hardware* was needed for any of these upgrades provided.

The following interventions that were carried out for AC and can be viewed on table 1.

Table 1: AC – Carpet Cleaning Business

AC		
<u>Intervention</u>	<u>Initial Impact</u>	<u>IT4D Effect (Qureshi, 2005)</u>
Create a website that is easy to update	The business owner now uses a new tool to develop new websites, webpages, and content on those pages. She has improved SEO and has a mobile-friendly website.	-Administrative Efficiency -Competitiveness -Learning & Labor Productivity -Access to New Markets
Install anti-virus scanners	The computer is much more protected from malware, spyware, Trojans, and other viruses.	-Administrative Efficiency
Create an electronic database with filtering capabilities	The owner has less paper files, a more efficient member storage system, and an easier way to create a customer email list.	- Administrative Efficiency - Competitiveness

T3: Observation & Reflection

Over the course of the ten weeks, the owner of AC has shown dramatic improvements with operating Weebly to make changes to the business. The owner of AC has received hours of visual training and one-on-one demonstrations from a group of college IT students. These training sessions included many different tutorials on how to operate all the software and web tools given to help solve their problems. The majority of the time was spent on Weebly, going over many functions and designing the layout. After the first few training sessions, the owner of AC has shown more confident in her use of technology. From fearful of technology to excited, this business owner needed encouragement and access to user-friendly tools to bring out her technical confidence.

Further training was provided on how to use anti-virus programs. The importance of having anti-virus programs was emphasized to the owner of AC. The process of how to download and scan AC's computer was demonstrated by the group of college students. The owner began to realize the threats of "hidden viruses". Her computer did not show signs of viruses (i.e. being slow), but after performing scans, she realized that viruses could still exist. During further training sessions, the owner spoke how she was performing virus scans weekly on her machine.

Finally, the owner has been trained on how to use *Microsoft Excel Starter* to maintain an electronic customer records file. The owner of AC was shown how filter records in a spreadsheet. After the list was filtered, she expressed how she always wanted to send mass emails to target customers. The owner learned by herself (through browsing the Internet), how to filter out records by the date they last received a carpet cleaning. From this list, she easily highlighted the email column on her spreadsheet and pasted them into an email client.

The owner of AC was not overly "tech savvy" going into this intervention. She knew that technology really did set businesses apart in her market but she did not really know what to do. After weekly meetings, some helpful solutions and training, the owner has really hit the ground running. One huge factor that contributed to all of AC's success was the owner's *enthusiasm* and *determination*. There was never a time where it seemed that the owner of AC was underprepared or lacking motivation. The amount that she has learned will hopefully reflect all the hard work she has put into adopting ICT solutions.

It was obvious from the first day of the IT-intervention that AC saw the value in using ICT. The owner explained that the business was not bringing customers in via the Internet, which was a big concern. AC is doing well as a business, but they see how making a few IT improvements could really push their business to the next level. The computer AC is using to maintain the website is also the owner's personal computer, so the anti-virus also affected outside the business work. The lack of any anti-virus program showed a lack of infrastructure in the "IT Center" at AC. Additionally, now that AC is recording customer appointments on an electronic spreadsheet, AC has a much more accurate and efficient way to maintain customer records. The files on the computer were organized in terms as an "IT Center". There were separate folders dedicated to the business, and several sub-folders pertaining to specific information, such as "commercial customers b and a [before and after] pictures".

T4: Impact Assessment

AC has been left alone for 5 months after their initial ICT adoptions. An impact assessment was then conducted to observe if the company has sustained any of their ICT knowledge and systems. The assessment categorizes observations and the following categories: Administrative efficiency, learning and labor productivity, poverty reduction, competitiveness and access to new markets, access to knowledge and expertise, PDC – self efficacy, and attitude towards ICT.

Administrative Efficiency:

"We are still in the process of updating our spreadsheet system of customer records, mainly to hold customer emails so I can mass email them special offers."

AC has begun an electronic-based customer record system using *Microsoft Excel*. AC has made substantial progress on this system; however records are still being written down on physical paper, if her husband gets a call from a customer. If she answers a call, she will write it down on paper for her husband, and also input the records in the electronic system. Although redundant, the owner of AC still wants to maintain an up to date email list as she tries to remind her husband to transfer over paper records to electronic records.

Learning and Labor Productivity:

*"I even began teaching my husband."
"I learned how much easier website creation has become".*

“This [the new website] is less-time consuming to make updates than the last website tool we had”.

AC is still using their new website and has been updating it periodically. In fact, the owner is setting up a new website by herself for a new service that her company will be providing – air duct cleaning. The owner is also spreading her IT knowledge to her husband, the other employee at AC. AC has also experienced time-saving in terms of updating their new website. Prior to the new website tool, the owner would spend hours trying to figure out the code on how updating the homepage. Now, within minutes, the owner can update images and text on any webpage. With the user-friendly website builder, AC saves time and the headache of making text edits and creating new pages on their new website.

Competitiveness and Access to New Markets / Poverty Reduction:

“The website showed us that people are looking at it and calling us about our services.”

“This [the website tool] is so much more economical to maintain a website”.

Since the new website launch, AC has seen an increase in customers. AC knew they were brought in from the website because customers would directly say something like, “from your website, I saw” The owner of AC was overjoyed that her website was being used by real customers. AC also discussed how this new website building tool saved them money. On a monthly basis, AC was saving about \$20 on web hosting costs. This saving is a form of poverty reduction for the business. Due to the sudden burst of customers, AC was also able to update their cleaning equipment with the profits they gained. They hope to hire an additional employee due to the present workload. AC appears to be growing as a business and continuing to use their ICT.

Access to Knowledge and Expertise:

The owner of AC discussed how search engines and social media are much more useful for her now. On social media, the owner can view what other competitors’ prices are and how they are marketing to customers. This gives AC a much better way to benchmark. The owner of AC also stated how she is using her smartphone more often to browse the web, rather than just checking emails. She is using this to look up costs of new equipment and learning how to add a payroll system into her business (since she is planning to hire a new employee soon).

PBC – Self Efficacy:

“I can login and create new pages on my website”.

“I even plan on making a whole new website for another service that our business provides.”

The owner of AC has shown dramatic changes in terms of being in control of her technology. During AC’s T0 baseline assessment, the owner feared that technology could ruin her business and that it was complicated to her, but now she is embracing ICTs and her comfort to work with technology. Her ability to work with technology, after guidance, can show that with familiarity and access to the right tools, business owners without technical knowledge can still stay afloat with their technical competitors.

Attitude towards IT:

“I’m more willing to try new technology, it is less intimidating.”

Overall, the owner of AC found that technology, as powerful as it is, can cause positive effects on a business. After gaining access to user-friendly tools, the owner realized that technology is now being built for non-tech savvy users. The owner of AC went from fearing IT to embracing it within a few months. Making a “complicated” process, such as building a website, can now be done through easy to use website builder tools.

Case 2: WH (Non-Profit Historical Society)

WH is a non-profit historical society in Western New York. In 1964, the home of a well-known and privileged family went up in flames for an unknown reason. The damaged house was later restored by the community in efforts to show remembrance to the family that did not survive. WH then began in 1965 to preserve the history of the tragic event. Today, over 20 officers for this organization hold fundraiser events and tours to keep their organization running.

Non-profit organizations are similar to microenterprises – both being resource constrained and lacking in the area of technical skill. WH offers a unique view on how the IT Therapy methodology applies to an organization that is similar to a microenterprise. Throughout the course of the IT Therapy process for WH, a trustee of the organization served as the “business owner”.

T0: Baseline Assessment

IT Perceptions: After executing a baseline assessment, it was revealed that WH comprises of a diverse group of members. The typical age of a WH officer is over 40 years old and these officers hold little knowledge of ICT. The trustee of WH was one of the most tech-savvy members on the board of representative and he knew the importance of technology within an organization. He realized that if WH did not adopt and upgrade technology, the organization would put itself in a poor stance for the years to come. The trustee also explained that change within this particular organization takes time and convincing. In hopes to keep administrative efficiencies and marketing to a younger generation of members possible, the organization knew technology needed to play a major role.

T1: Assessment of Challenges and Plan IT Intervention

Historical and Social Context: The trustee of WH explained how the organization has two functional printers, two PCs, wireless internet connection, a projector, a Facebook page, and a GMAIL account. Additionally, WH has a website that was run by a member of WH. This website was built over ten years ago and the design of the website has not changed since it was adopted. This member is also the only one with access to edit webpages on the site. The organization also used multiple paper calendars to organize events and members knew about these events by word of mouth and monthly newsletters. The trustee of WH realizes that other

historical societies are gaining more of an online presence and he feels WH needs to keep up with technology. The trustee fears that without a change in IT, the organization may find itself having a difficult time recruiting new members and preserving the history that the organization.

Plan IT Interventions: The first need of the WH is an updated website that can be easily passed down to future members. The ease of passing down the technology is critical because if one member holds onto it and only has access, future generation leaders of the society may be harmed. This website needs improved search engine optimization (SEO) and a way for multiple officers to edit webpages if necessary. Another need is to have an updated (electronic) way of handling events. With that stated, training of existing technology is also needed. The society has a Google Gmail account, but does not use it to their fullest potential. They could use this account for calendar purposes. The current members of the society are older in age, so the simpler the technology the better.

This organization really needed to invest into updated technology. The information they receive will affect member communication and administrative efficiencies. Since the society has many events during the year, the way this is communicated to all the members is vital. In addition, time saving will occur with methods that are more efficient. This brings less stress to officers when having to deal with events.

T2: Apply IT Intervention

WH experienced in-depth training of existing tools they had as well as a new online tool to create an entirely new website. The website tool, Weebly, was an easy solution for an older generation of users to construct and maintain webpages. Multiple people could be given permissions to edit pages. With this new website, WH purchased a '.org' name instead of using a free domain that Weebly provided (www.websitename.weebly.com). Furthermore, WH was trained in a new electronic calendar system that was linked with their existing GMAIL account. Smaller IT interventions that were resolved included the deleting of all non-official Facebook pages and training on email sending and embedding images within an email. All of the IT interventions can be viewed on table 2.

Table 2: WH – Non-profit Historical Society

WH		
<u>Intervention</u>	<u>Initial Impact</u>	<u>IT4D Effect (Qureshi, 2005)</u>
Update website into new modern look	The society has a new website that can be easily passed down from generation of officers. Has a professional look and is compatible to mobile phones and multiple web browsers.	Administrative Efficiency, Competitiveness
Get more web recognition through a new domain name	The new (.org) domain name is easy to remember and will a higher ranking on search engine.	Competitiveness
Provide technical training on web site maintenance	The society's business manager can edit and modify webpages.	Administrative Efficiency, Learning and Labor Productivity
Create a new electronic calendar system	Google Calendar allows real-time updates on the society's events. All members know where to find the most recent event information. Paper calendars have been removed from the cluttered desk of the business manager.	Administrative Efficiency
Delete all non-official Facebook pages	Only one official Facebook page is present online. Members are no longer confused on which one to join.	Administrative Efficiency, Access to Markets
Link website and Facebook page	The new website has social media icons for visitors to click and follow the society on Facebook. The Facebook page has the new URL on the information page.	Administrative Efficiency, Competitiveness
Embed images/files through emails	The business manager can now embed images and files through email instead of sending attachments. Some members forget to view and download attachments.	Administrative Efficiency

T3: Observation & Reflection

Throughout the IT Therapy process, WH has shown dramatic change in their web presence and use of existing tools. Several officers of WH received specialized training on how to update web pages, how to add new calendar events, and how to update their Facebook page. Initially at the WH, it appeared that a web presence was not a high priority for the board members. They were aware of having a website (the old website), but they did not think that this need to be focused on or updated. Several of the board members (including the representative trustee) did not even know that the society had a Facebook page. This showed that the board had a lack of IT involvement or engagement.

Since the historical society is a non-profit organization, board members felt they do not have competition. Their sole purpose is to retain the history behind the organization and educate others. The trustee of the society did recognize that other historical societies have websites for their organization. Therefore, the pressure of having an updated website was surely visible in this situation.

Training on tools to the officers took a majority of the time throughout the IT adoption process. The trustee of WH grasped the online website creation tool quite easily. However, once the IT adoption was complete, he was not the main “webmaster” for the site; this was the responsibility of WH’s business manager. The business manager needed more time than the trustee needed to understand the tool and the features that it offered. After realizing the lack of general ICT knowledge from this officer, more time reiterating the features of this tool was necessary. After repeated training lesson at the beginning of each weekly session, the business manager was not only able to use the new tool, but she was also able to teach this tool to existing officers.

Training session on the electronic calendar system was much less complex than the website creation tool. Officers had general knowledge of a GMAIL account and the different features it had to offer. The calendar system on GMAIL allowed for easy event creation for WH. This calendar was something that multiple officers can view at once, opposed to the paper copies they held. Exposing the officers to this feature allowed them to efficiently use their existing technology. No officer had major troubles or concerns when working with this new system.

Finally, the observation was made that the IT infrastructure of WH lacked organization. This arose when several officers did not know who was running the society's Facebook page. In fact, some officers did not know the society used Facebook. When showing them Facebook and their Facebook page, several "unofficial" pages were found. It appeared that several officers and members made a page for the society. To resolve this, the business manager was able to disable all the pages (with some guidance) besides one; this was deemed the official Facebook page for WH.

T4: Impact Assessment

After 5 months of maintaining their technological needs, WH carried out an impact assessment. This assessment demonstrated the actions that the board officers of WH voted on in terms of IT maintenance and technological outlook.

Administrative Efficiency:

"We now have communication technology improvement."

"More members do notice the updated calendar and said that they now know where to go to get event information."

WH has continued to maintain their new website, mainly being updated by the business manager. Currently, the old website for WH is still up and running, but the board members voted that in May 2014, the old one would officially be taken down. They voted on this so there was not a huge surprise to officers and members when they began to refer to the new website. In addition, flyers and handouts needed to be modify to display the new domain name to the site – this took several weeks to accomplish. Since there is a voting process that WH undergoes for any IT changes, the adoption process took a few months to finalize after the IT assistance.

The quickest change that the officers of WH experienced was the fact that more members knew about upcoming events in the society. The new electronic calendar is constantly being updated and officers have the ability to save these dates directly to their own GMAIL accounts and smartphones. WH hopes that this new calendar system draws in more members to events; however, no data can confirm this yet.

Learning and Labor Productivity:

Within 5 months after the IT assistance, the business manager of WH taught a newly elected officer how to make web updates, input calendar events, and make new web pages. This shows that WH is spreading their existing knowledge and can maintain their website all on their own. The web updates became more of a “generalized” job that several officers can perform.

Furthermore, the adoption of the new website cuts the time it took to make a web change. Before the IT assistance, the business manager had to email a member on changes to make and then that member had to confirm these changes. At times, it could be weeks before this member actually updated the website. Now when the business manager needs an update, she can go directly on the website and make changes within minutes.

Competitiveness and Access to New Markets:

“Other historical societies have a website.”

“The new website name [URL] is easier for everyone to remember.”

The adoption of the new website and website creation tool made WH more competitive to other local historical societies. Their new website is more modern and follows web design techniques that look appealing. Additionally, their website is mobile friendly – something many businesses and organizations lack. Although WH is not competing to make customers, opposed to microenterprises, they still compete to attract new members.

Furthermore, the new domain name was something the officers really enjoyed and glad they changed. The old website was an extension of a free domain name that a member with a hosting account acquired. Since this website domain name was long and not easy to remember, officers “bookmarked” the site so they knew how to go back to it. Now instead of having the old website’s URL in their “bookmarks” page on their browsers, they can easily just type the new site’s URL directly in the browser search bar.

Access to Knowledge & Expertise:

“I know where to go get help. We have the tutorials, which I believe can teach anybody.”

WH has expressed that the paper-based tutorials that the IT assistance team provided throughout the “IT Therapy” process is used heavily. These tutorials are referenced frequently and were used when the business manager trained the newly elected officer. If something was not

mentioned in the tutorials, officers of WH said that they would use the FAQ page on the website creation tool's help page.

PBC – Self-efficacy:

The trustee of WH expressed that more officers could carry out web updates and create calendar events on their own time. They had several questions when they first started out, but now hardly any officer needs assistance. Officers are now feeling more in control of their technology they use and are much more knowledgeable than before the IT assistance.

Attitude towards IT:

“I have become more aware on what is out there and how easy it is to access technology.”

“From a technology standpoint, understanding the technology and what impacts what is important to know”.

“All organizations need to look ahead and change in terms of technology. And those that I observed, in general, that don’t change, usually die.”

The trustee of WH, as well as other officers, found that keeping on top of their technology is important. Initially, not all officers were convinced that having a new website would help the society; however, they later realized that the outdated website made the impression that the society was shutdown. New members or prospecting members may be turned away due to the outdated design and feel of the old website. After realizing this point, the adoption of a new website appeared almost necessary. The trustee of WH then realized how easy it is to access technology. Website creation tools were not available when the first website was constructed and he was surprised that *free* website creation tools existed. From this, he realized that these tools are out there to *help* people. It is not a scam to take a person’s money. Finally, the trustee of WH explained how the board members were in the process of making a rule on updating their website design every couple of years. This shows that WH is becoming more concerned with their technology and technology changes in the future.

Case 3: SF (Handcraft Jewelry Business)

SF is a one-person microenterprise whose goal is to create and sell handcrafted jewelry. The owner of SF applies crafting techniques from her past training and heritage to make jewelry themed to her native country. Her product line includes rings, earrings, necklaces, pendants, and bracelets. The owner enjoys making jewelry in her free time and selling them pays for the materials to continue. The owner runs her business out of her home and has been in operation for over ten years.

T0: Baseline Assessment

IT Perceptions: The owner of SF revealed that the Internet is heavily used in her business. She relies on it to order the supplies for her jewelry. She understands that technology is helpful in her market, but being able to maintain it is an issue. The owner of SF has outsourced IT projects, such as her website, in the past and her experiences are unfortunate. Her source has failed to keep up with the maintenance of the IT projects that the owner of SF paid for and one day this source unexpectedly left. The owner began to lose trust in outsourcing projects and understands that learning new technology is time-consuming, but almost necessary to keep her business operational. Currently, SF has multiple computers, an iPad, a smart phone, digital camera, and digital video recorder that is used for her business – the owner has average technological knowledge. However, the owner is still hesitant of adopting new ICT systems for SF due to her experiences.

T1: Assessment of Challenges and Plan IT Intervention

Historical and Social Context: Although SF has been in business for over a decade, the owner has never faced any legal issues or barriers. In the handcraft industry, copyrights are a major concern among artists. For an artist to be successful, it is important to produce unique art, after all, this art becomes their identity. Although the owner has been able to successfully design and construct unique jewelry, she has encountered a lot of amateur artist who have copied her art in the past – nothing however, that would be a major concern to hire a lawyer over.

As far as her future aspirations for her business, the owner is not willing to expand drastically; she does not want to hire any employees. According to the owner, being a “one-person” business is manageable and the time and resources it would take to purchase a physical storefront and hire

employees would not be worth it. SF is a business that was created out of a hobby and the owner does not want to learn many technical skills, even though she realizes the importance of it.

Plan IT Interventions: SF had a website outsourced for them for several years, however one day this source vanished. SF was left alone with an abandoned website that was slowly becoming obsolete and not updated at all. A website is crucial for her business to obtain, since this will likely drive the most customers to view and consider buying her products. Therefore, a way to either update the existing website or creating an entirely new web presence would be necessary for SF to adopt. The owner also expressed that her website did not have a way for customers to purchase her jewelry online. Customers would have to come to her home, view the jewelry in person, and then consider purchasing it. Taking into consideration that the owner does not want to learn many new technical skills, a user-friendly approach is most desired. The owner wanted a tool that can suffice all the web-features as well as being able to manage it herself.

SF also has a Facebook account, however this is a *personal* account that the owner uses and sporadically markets her business on it. Separation of Facebook accounts, one being for private use and one for business would be ideal in SF's situation. Customers would respect a business page much more than a personal account trying to sell jewelry.

T2: Apply IT Interventions

After taking all of SF's business expectations into consideration, a group of college students with an IT assistance background was able to carry out the "IT-Therapy" process. The owner was trained with a website creation tool called *Webs*. This tool had various features and tutorials that made it possible for the owner of SF to understand. Features used in this tool were an electronic calendar system and an *Etsy* storefront. *Etsy* is a website that allows users to sell handmade goods online. Furthermore, a Facebook business page was made for the owner and focusing on the difference between a personal account and a business page was heavily addressed. SF did not experience any additional hardware upgrades, the focus was on strengthening SF's web presence.

The following interventions that were carried out for SF can be viewed on table 3 on the next page.

Table 3: SF – Handcraft Jewelry

SF		
<u>Intervention</u>	<u>Initial Impact</u>	<u>IT4D Effects (Qureshi, 2005)</u>
Created new website	The owner now will have editing permissions and will no longer have to rely on others to update information. The new website's hosting service is also cheaper.	Administrative Efficiency, Competitiveness, Poverty Reduction
Link website to Facebook	The new website has a link to SF's business Facebook page.	Administrative Efficiency, Competitiveness
Provide training on website maintenance	SF no longer has to rely on others to update the business website.	Administrative Efficiency
Create a new electronic calendar system	Built-in calendar feature makes notification of upcoming events easier for followers.	Administrative Efficiency
Make <i>Etsy</i> store and link to website	Create a store on <i>Etsy.com</i> that the owner could use to sell her jewelry from online and also link it to her website so those who browsed could buy them as well.	Competitiveness, Administrative Efficiency

T3: Observation & Reflection

The owner of SF was motivated throughout the entire duration of the IT assistance program. She had looked up tutorials on her own, tried doing things herself, and was willing to spend time on accomplishing her tasks. The owner had some trouble at first with learning the website building tools, which is why she looked up the tutorials herself but eventually caught on to how they worked. After the process of viewing two free website creation tools online, she picked the one that suited her unique features, such as the ability to have an *Etsy* storefront.

The value of getting SF's name out to more people is a universal concept that the owner understood. The more attention she could get for her business, the more traffic she will most

likely have and the more options there will be available to her. The new website also provides a central location that could plan and notify her followers of art shows she will be attending.

Throughout the IT adoption process, time has been a large area of concern for the owner. She was willing to learn new tools; however, she felt that since her business was not her fulltime commitment spending many hours a day on her hobby might take the fun out of creating jewelry. The owner of SF also spends a lot of time in her community and participates in several community-run organizations. Adopting the technology *fully* and being on top of it was a concern for the owner.

T4: Impact Assessment

SF has been left alone for five months and then re-examined to see if the new IT that was adopted is still being maintained. Overall, the owner expressed benefits in the areas of: administrative efficiency, learning and labor productivity, competitiveness and access to new markets, poverty reduction, PBC self-efficacy, and a new attitude towards IT. The owner stated that she did face challenges in adopting IT after to assistance program. She has not yet had the time to publish her new website to be “live”. Some of the technologies, such as her *Etsy* storefront, were also something she did not update, due to time-constraints and her recent travels. Non-technical reasons, such as time and other obligations were issues that caused this microenterprise to not fully adopt the technology as planned after a five-month period.

Administrative Efficiency:

“I’ll be now able to keep a website up to date”

Although SF’s website is not “live”, the owner believes that the new tool she uses will be beneficial. She still has the knowledge in making web updates as well as making new pages on her website. Furthermore, the owner has managed to keep her electronic calendar updated. This calendar can be accessed through her phone and the website, once it is live. The calendar is something the owner still maintains and is a reminder to herself on which days she will be going to art fairs to display her jewelry.

The separate Facebook accounts are something that the owner of SF is currently maintaining. She is now only advertising on her business page, opposed to her personal account. She feels that this could attract new customers, but at this time, she has not noticed any change in customer

traffic. Separation of these accounts was an internal “organization cleanup”, according to the owner.

Learning and Labor Productivity:

“Not one person can show you everything with technology; but there is a lot out there where people can go read.”

SF has been provided a handful of paper-based tutorials to reference once the IT assistance team left. The owner said that she still keeps them in her home office and references them when using her Facebook. She began to explore other ways to market on Facebook, such as through Facebook advertisements. She plans to purchase Facebook credits to advertise her business once she creates more jewelry and releases the new website.

Competitiveness and Access to New Markets:

“Being able to sell online will be big once I fully implement it on the new website”

The owner of SF stated that she has temporarily abandoned her *Etsy* storefront feature for her new website. However, once the website is live and running, she plans on starting her *Etsy* account again and enabling this feature to the website. If the owner adopts this technology in the future, her business would be much more competitive. Anyone around the world could purchase SF’s jewelry and have it shipped to their homes. As of now, customers can view products online and then they must visit the owner’s home to make an actual purchase.

Poverty Reduction:

“The new way [the new website tool] is cheaper than what it was.”

Although SF’s website is not yet published, the owner is experiencing cost reduction in business operations. Her old website hosting service, which was abandoned, was costing SF around \$108 annually. The new website creation tool offers paid hosting services, which is something SF opted-in to purchase. This hosting is \$3.75 per month, \$45 annually. This means that SF could use the “extra” \$63 per year on some other business operation, such as more supplies to create jewelry.

PBC – Self Efficacy:

“It [the website] is something that I can edit it myself, which was my focal point.”

The owner of SF has shown more confidence in adopting technology for her business. Her main issue prior to the IT assistance was that she did not have a way to update her website. Now that she has a new tool and resources to reference, the owner feels more in control of her technology for SF. She does not have to rely on others (outsourcing) to run her IT systems for her business.

Attitude towards IT:

"I always have been interested in technology. This program [“IT Therapy” process] showed me how easy technology can be."

It appears that the owner of SF found that technology is easier to deal with than in previous years. The owner felt that modern technologies, like building a website, always needed to have a specialist coder. However, the owner discovered that anyone could create and run a website without having the ability to code. The owner has taken away valuable IT knowledge that can be implemented when she has the time.

Case 4: RP (Florist)

RP is a florist that sells flowers and flower arrangements. This business strives to provide excellent customer service and a premium product. RP currently has five full-time employees and one part-time employee. The owner of RP has been in business for 40 years and is very experienced in floral work and common technology practices. The owner of RP benefits from belonging to a group of florists that share warehouses around the Western New York area. This allows customers to make distance purchases from RP, just in case they want a product delivered to a different town.

T0: Baseline Assessment

IT Perceptions: The owner of RP revealed that he is knowledgeable in modern technologies and is always willing to learn something new. He realized the importance technology has on his business when he discovered that other florist have been adopting ICTs. He personally knows other local florists that have hardly any IT and he expressed how those businesses are not doing as well as his own. The owner believes that keeping on top of technology is necessary for any type and size of business. According to the owner, if a business in today's era does not have *any* ICTs, they are very likely to fail.

T1: Assessment of Challenges and Plan IT Intervention

Historical and Social Context: In the past, the owner of RP has purchased used-computers from a local computer store near his business. He also utilizes a commercial company to run and maintain his POS (point of sales) system. RP's website is hosted and run by an outside company and the owner is very happy with their performance. RP's web presence however needs more SEO work done. The owner stated that if he had someone to show him or a push in the right direction of technological choices and skills, he would be open for anything. The owner feels his business is currently doing well in its market reach and administrative efficiencies. This allowed him to proceed with competing against other florist.

Plan IT Interventions: After reviewing the business needs of RP, it was quickly addressed that the main computer for RP was quite outdated. It was bought over a decade ago and all applications on the machine were running quite slow. Being able to speed up the computer or consider purchasing a new machine was almost necessary. Employees complain about the speed

of the computer and always wished it were faster. None of the computers in RP had any form of virus protection, so a solution to this was to find a free antivirus that could be installed on multiple computers. As far as organization, the business's "IT center" was sloppy, wires were sticking out everywhere and cords were tangled.

Furthermore, RP lacked in data protection. The computers in RP hold important customer and business information and no backup of these records were ever carried out. If a computer were to crash or break, crucial information might be lost with it. Being able to securely backup data is something that will keep RP more organized and protected.

T2: Apply IT Interventions

RP experienced several hardware and software upgrades throughout the course of the IT assistance program. Mainly, the slow computer at RP was replaced with a new one. All of the data from the slow computer however was transferred over successfully. The computers at RP had antivirus programs installed onto them and the owner learned a few tools that could speed up RP's computers. These tools addressed internet history, cookies, and disk fragmentation.

The following IT interventions that were carried out for RP can be viewed on table 4.

Table 4: Florist

RP		
<u>Intervention</u>	<u>Impact</u>	<u>IT4D Effect (Qureshi, 2005)</u>
Transfer old data to new computer.	RP has a faster computer with the same data on it.	Administrative Efficiency
Cleanup laptop files and programs.	RP's laptop runs much more efficient and has organized folders.	Administrative Efficiency, Labor Productivity
Teach the owner of RP to understand and maintain cookies and browser history.	The owner knows how to clear history and cookies on his computer and smartphone.	Administrative Efficiency Learning & Labor Productivity
Installed and showed owner how to use backup software to protect data.	Files that are used daily had a backup location.	Administrative Efficiency Learning & Labor Productivity

Teach owner how to maintain a PC in terms of viruses and file cleanup.	The owner knows how to use CCleaner, Malwarebytes, AVG Anti-virus software.	Learning & Labor Productivity
Make sure that data was kept in more than one location (backup)	External hard drive holds a backup of crucial data.	Administrative Efficiency

T3: Observation & Reflection

The owner of RP appeared to be confident with the technological decision throughout the entire IT assistance program. He is in charge of all technology that is purchased and he trains his employees if they need to use a particular technology on a daily basis. The owner was able to learn various antivirus programs quite easily; he was unaware of how many “undetected” viruses his machine had. He plans to run the virus scanners at least once a month. He also setup an automatic scan feature so his machine scans when it is turned on, however this feature is only set on his laptop.

When it came to the decision to speed up his main store’s computer, the owner thought a good option was to buy new accessories and attach it to the existing computer. However, after calculating the costs, it was cheaper to buy a new computer than all of the “speed up” accessories. After purchasing the new computer, the owner of RP was trained on how to transfer data from one machine to another. He also grasped this technique quite quickly; this microenterprise owner was familiar with technology.

T4: Impact Assessment

RP has expressed several benefits in the area of administrative efficiency and learning and labor productivity. After five months of maintaining their IT center, the owner of RP remains impressed on how smoothly everything is running.

Administrative Efficiency:

“I do a lot ordering now by email and it saves me time when I can access my email more quickly.”

“We are always using it [the computer] and it has been running great with everything.”

“We now can have multiple tabs open at the same time.”

The main area of impact for RP was in administrative efficiency. The new computer is being used on a daily basis and the owner always checks the business email on it. He has noticed how much more timely it was to boot up the computer, go to the Internet, and then access his email. This computer is used by several employees throughout the day, and they are more satisfied with this machine than the previous one. This new machine allowed users to open up multiple browsers and multiple tabs without freezing up. Employees also enjoy the fact that they can listen to music, check income emails, and carry out several business tasks without having to close out of each program before opening a new one. The owner of RP overall explained how this computer is making everything so much more efficient within his business.

Learning and Labor Productivity:

“It is about five minutes faster on boot-up; it is way faster than our previous machine.”

With the new computer, RP has been more productive in their tasks. The computer does not cause any headache among the staff and every task that was computerized can now be done more quickly. This involves using the Internet, RP’s custom POS system, booting up the computer and running any other software, such as word and spreadsheet processors. In all, this saves time for carrying out business tasks and keeps the employees and owner satisfied.

The owner of RP also began some research in antivirus programs. He is satisfied with his free programs from the IT assistance team, but he is now learning more about viruses and the affects they can have on a computer and laptop. He has taught all his employees how to run the virus scanner, just in case he was not around to do it. The owner said the staff is very confident in using the scanning software and know when to run it.

Competitiveness and Access to New Markets:

RP is now considered more competitive than other local florists. They have an updated computer and a system to backup customer and business information. According to the owner, being able to backup data onto an external hard drive will not only allow storing more data, but also protect vital data pertaining to the business, such as revenue histories and contact information for vendors. Having an organized and dedicated space for this information allows RP to operate without the headache of wondering what would happen if they lost electronic business files.

PBC – Self Efficacy / Access to Knowledge and Expertise:

The owner of RP before and after the IT assistance feels in control of the technology at RP. He believes that he knows where to find help in case no one else is around - he is tech savvy enough to properly search online. After the IT assistance, the owner has gained more knowledge in virus scanning software and he has continued into researching the topic further in his own time. He has found several websites as resources for this topic and he believes he may try to use new software in the future to protect and scan his data. The owner of RP feels he can successfully run the technology within his business.

Attitude towards IT:

“I have pretty good working knowledge with technology, but this program [IT assistance] solidified my understanding.”

“It’s a lot easier to promote a small business for a lot less money by doing it online”

The owner of RP remains to have a positive outlook towards technology. He is aware of the benefits it could bring to a business and understands how it should be continuously maintained. Relating IT to business was something that this microenterprise owner excels doing. He knew that businesses could save money by marketing themselves online than instead of printing flyers and subscribing to the yellow pages. The owner of RP stated that the importance of IT is an ongoing job that business owners need to be aware of and not neglect. If they refuse to accept and change technology, their business will likely suffer.

Case 5: DG (Dog Wash Business)

DG is a microenterprise that provides a “do-it-yourself” dog wash service. This business has been in operation for seven years and has five employees. Besides the owner, all employee work part-time. All employees at DG are certified dog groomers and are there to help customers groom their dogs. Besides the two “do-it-yourself” dog wash stations, customers also have the option to let employees groom their pet in one of the three “professional” grooming rooms. Pet accessories, shampoos, and toys are also available for customers to purchase.

T0: Baseline Assessment

IT Perceptions: The owner of DG understands the power that technology has in the business world. Being an engineer in the past, the owner is familiar with using simple IT systems on a daily basis. However, at the rate in which technology is growing, the owner sometimes feels scared. The owner is scared mainly when she does not know how to use a certain piece of technology or when errors on her computer pop up. Yet, the owner has had a pleasant experience with technology overall, she mainly fears technological errors.

T1: Assessment of Challenges and Plan IT Intervention

Historical and Social Context: Six years ago, the old owner of DG made a new career path decision and was selling DG. The business had little IT systems in it at this point. However, after the current owner purchased the business, DG adopted several IT systems, such as an all-in-one printer, a business laptop with Microsoft Office, a website, social media accounts, and constant access to the Internet. DG has recently noticed an increase in customers returning to the store, mainly because it is the only store in the area that provides a “do-it-yourself” service. The owner of DG is proud to say that this idea is what separates her organization from all other dog grooming businesses. DG has been expanding and the owner expressed how current systems need to be adjusted. Ever since the business started, employees filled out customer information and appointments by hand, using a paper-based system.

Plan IT Interventions: After assessing the technological needs of DG, the main area of focus was to suggest a new method of maintaining customer information. Paper cards were used since the business started and these cards were stored in several boxes in DG. There is now no more room to add additional boxes; they are all full of customer cards and are unorganized. Therefore,

a need for an electronic system is needed for administrative purposes and to clear up physical workspace. The owner expressed that she is comfortable with all other aspects of her business besides the paper-based card system.

T2: Apply IT Interventions

To change the current paper-based system, several database packages were researched and reviewed. Finally, one package was found that addressed all the needs of DG. This software is called *Oasis* and it is a database system that cost \$119. *Oasis* required no prior experience with database; everything can be created by using a “drag and drop” technique. After purchasing and demoing this product, weeks of training on this system took place. Overall, DG adopted one new piece of software (the database system). Additionally, DG purchased a 32GB thumb drive to backup customer records.

The IT interventions that were carried out for DG can be viewed on table 5.

Table 5: Dog Wash Business

DG		
<u>Intervention</u>	<u>Impact</u>	<u>IT4D Effect (Qureshi, 2005)</u>
Find and purchase an electronic system to maintain customer information	DG can create and find customer records much more timely.	Administrative Efficiency, Labor Productivity
Backup electronic records by using a thumb drive	Customer data is backed up and can be accessed in case of emergency	Administrative Efficiency
Train the owner on how to use the new database system.	The owner is in control of her new IT system and can maintain it herself.	Learning & Labor Productivity
Teach the owner how to use search engines more efficiently.	The owner can search and find more information on search engines.	Learning & Labor Productivity

T3: Observation & Reflection

After the first few meeting with the owner of DG, it was clear to the IT assistance team that the main area of focus was conversion of the paper-based customer information system to an electronic one. The owner felt in control and confident in other IT areas of her business, such as the website and social media accounts. Therefore, the first few weeks of the IT assistance focused solely on the different database packages DG could purchase. Several demos of each solution were presented to the owner and the owner had time to test out each demo version in her spare time. She appeared to be most pleased with *Oasis* – the system that was adopted. After the system was purchased, the owner and IT assistance team setup the database tables and forms that were needed. The owner quickly grasped how the system functioned. After the training solutions and tutorials on how to convert her paper customer card to an electronic record, the owner was very well off on using the system.

T4: Impact Assessment

The impact assessment of DG was carried out five months after the IT assistance team left. Overall, the owner experienced benefits in the areas of administrative efficiencies and learning and labor productivity. There was however, a trouble in fully adopting the new database system on a daily basis. The owner explained how she trained a part-time worker in data entry for the system and that not all of the paper cards were transferred to the new system. According to the owner, the process of converting all of the records will take a lot of time. The owner also explained how she is still recording *new* customers on the paper-based system. She feels that on some days it is just more convenient to write everything down quickly and have the other employee transfer that record later when she gets to it. This appears to be a repetitive process that DG is carrying out. The owner realizes this but explained how time was such an issue and she could not spare the time to have more than one employee enter data into the system. The owner stated, “One day I hope to see all the paper records transferred over.” A more specific time frame was not given.

Administrative Efficiency:

“The system (database system) is more accurate, I don’t lose the cards, which was a problem in the past.”

“Oasis saves me time, if a physical card is lost I have to fill out a new one and ask the customer for his or her information again.”

While still in the process of converting all paper cards to the electronic system, the owner of DG expressed how internal organization has approved. Customers that are inputted onto the new system can easily have their information accessed opposed to looking into boxes of paper cards. The owner said updating an electronic record could be done much more quickly than editing a paper card. For example, if a customer changed his or her email address, the owner would need to write out a new paper card, because everything on the cards is written in ink and crossing out values looked too sloppy to the owner. Additionally, these electronic records are less likely to be “lost”. The owner’s largest concern before the IT assistance was losing customer cards. The new systems allow all customer records to be in one file.

Learning and Labor Productivity:

“I tried to find a solution myself online, but I couldn’t and it was very aggravating, so it was nice for them [the students] to come in. They actually came up with several different solutions and together we picked the best one.”

“I taught the girl who came in during the summer how to perform data entry of physical cards to electronic cards.”

Before the IT assistance, the owner would sometimes have difficulty searching for optimal IT systems online. For example, she always wanted to have a customer management system, but did not know where to start. The students helped the owner learn how to properly search for systems online using search engines. The owner stated that she always uses to be very specific on search engines – so specific that hardly any results were found. She now knows that being broader with her searches can give her more results to research. The owner of DG expressed how she has been using this technique more regularly both relating to her business and personal use.

The owner of DG continued to keep working with *Oasis* and has the knowledge of teaching others. DG hired a part-time worker to work with the new database system. The owner taught how to input records. However, this worker was only available to work for a few weeks, since

this worker was a college student and had to return to school. Being able to teach another person the IT system was a sure sign that the owner was in control of DG's systems.

PBC – Self-Efficacy:

DG has remained on top of other IT systems and the owner feels that she can effectively run all of these systems on her own. She understands how to use them fully and can teach any worker how to use a system. The owner remains to have a positive outlook for DG and its future when it comes down to technology. She expressed that she can also create new forms within the database system if she ever needed to. In the future, she said that she might create a feedback form for her customers to rate their experience.

Attitude towards IT:

“We (IT assistance team and owner) picked the perfect system. I did not know databases became easier to build and use”

The owner realized that newer technologies have been made to be more user-friendly. The database system that was adopted by DG uses a “drag and drop” interface, which allows the creation of tables and forms to be done more quickly. This all could be done without having background knowledge in coding and designing databases. Overall, the owner expressed more appreciation with products that are out on the market.

ANALYSIS

After analyzing the five case studies and their impact assessments, the top relevant ICT effects from Qureshi (2005) model can be viewed in table 6 below. Based on the researcher's observations and qualitative analysis of the interviews carried out, it was apparent that a majority of microenterprises achieved greater outcomes in Learning and Labor Productivity – mainly focusing in the *Learning* aspect. Every microenterprise in this study has Learning and Labor Productivity in either the most relevant or the second most relevant ICT effect. The second most seen effect was administrative efficiency; this was found in three of the five case studies.

Table 6: Top Relevant ICT Effects

Case Study	Most Relevant ICT Effect	Second Most Relevant ICT Effect
AC (Carpet Cleaning)	Learning & Labor Productivity	Competitiveness & Access to New Markets
WH (Historical Society)	Learning & Labor Productivity	Administrative Efficiency
SF (Handcraft Jewelry)	Learning & Labor Productivity	Poverty Reduction
RP (Florist)	Administrative Efficiency	Learning & Labor Productivity
DG (Dog Wash)	Learning & Labor Productivity	Administrative Efficiency

These two effects demonstrate that the *owner* of the business is taking control of the technology and is able to maintain it. Learning and Labor Productivity demonstrates that the owner has understood the adopted ICT and has the ability to train others and pass down their technological knowledge. Administrative efficiencies demonstrate that the adoption of IT has shown a positive impact in terms of the operation of day-to-day business processes. This effect shows that IT within a business is important for daily operations and the need to maintain it in the future is necessary.

Two cases in the study, SF and DG, have not shown *complete* adoption of ICTs within their business. This suggests that ICT interventions in themselves do not enable sustainability. A study by Kamal and Qureshi (2009) suggests that it is the learning processes that allow technological interventions to achieve business growth. For example, the cases SF and DG may not have fully understood the technology that they adopted, causing them to not engage in further use of it. Based on a qualitative interview in the impact assessment with these micro-entrepreneurs, both owners claimed they did not have the *time* to completely adopt the ICT. This may suggest that

the learning process was not as strong as in the other cases, or that the business owner truly did not see this challenge within their business as a core aspect that needed to be addressed.

For the cases that did adopt the ICTs and have proved continued use of them (AC, WH, and RP), the question of “how did they sustain?” may arise. A study by Matthews (2007) demonstrates how adopting and assimilating ICT within small businesses have constraining factors attached to them. This mainly involves money, skilled staff, and willingness to learn. This is relevant because if successful adoption is obtained by microenterprises, they must learn how to properly use those adoptions and overcome the factors that may inhibit them. If a business adopts an expensive technology, they may not have the funds to sustain that for future years. Furthermore, if owners are unwilling to learn, this could hinder the reality of using the adopted ICT for daily business operations. Business owners should gain awareness of the factors Matthews (2007) mentions so they can prioritize business goals.

It appears that it is the micro-entrepreneurs’ responsibility and involvement for whether or not sustainability occurs. Therefore, willingness to learn and use technology is a large factor in sustainability. Grindle and Hilderbrand (1995) suggest that constructing sustainable capacity involves the improvements in individual performance through training and technology transfer activities that improve skill levels. Using this study as a base, Matthews (2007) further discusses the idea of confidence and training loops. This cyclic process originates at ICT adopters having knowledge of their products. The owners are finding new technologies, training with that tool, which then gives them more knowledge. This then turns into confidence, which leads to a successful business model and then growth. If owners continue to follow this cycle, the existing ICT they have can be retained and passed onto future generations of the business. The constant motion of training and confidence gaining is a key contributor to successful ICT sustainability. Cases AC, WH, and RP all exhibited great willingness to learn, according the researcher’s observations. During the IT interventions, these owners constantly asked questions when reviewing the technology they wanted to adopt. AC and WH have both began teaching other employees the skills they learned through the IT intervention program. The impact assessment showed that the micro-entrepreneurs both knew the technology well enough through the weekly training sessions that student researchers helped carry out.

Another area of research, community development, also shows that microenterprise growth can enable sustained improvements. Various studies (Vargas, 2000; Warschauer, 2003; Southwood, 2004) have shown that a sustainable development strategy can support the community in which microenterprises operate. A community of micro-entrepreneurs could have the potential to assist each other in basic ICT interventions and discuss issues that they may have encountered. By looking at the cases in this study, student researchers helped the micro-entrepreneurs and eventually left after the interventions and training was complete. After the researchers left, it was up to the owner to sustain and retain the information that was learned. However, if the local microenterprises were able to interact with each other, they may be able to support one another and share relevant experiences. This could further enhance sustainability of technology within the microenterprises.

ONLINE SUSTAINABILITY TOOL

This study provides a free *Online Sustainability Network* website for micro-entrepreneurs to reference. The goal of this tool is to not only reinforce and retain micro-entrepreneurs' current skills, but also to build new technological knowledge. This tool would provide users access to step-by-step tutorials for a specific IT area (website building, security, social media, etc.) and the ability to post their IT adoption experiences. Based on responses during the impact assessment, there was an interest if such a tool were to exist.

"I am curious on what tools other people are using."

"I would want to learn more about the businesses around the local area and see how they are doing certain business activities"

"I want to see what could benefit me that other businesses are doing"

"Personally, I'm always curious what people are doing for their small business."

"I like seeing what other people are doing and see if it applies here and benchmark."

The importance of this tool is to sustain microenterprises' technological efforts. The community of owners that use this tool can create a *self-sustaining* business. The adopted technologies for any of these businesses will eventually become outdated in a few years; that is why it is crucial for the micro-entrepreneurs to realize the importance of learning their systems and being able to identify new opportunities. If owners can recognize new IT opportunities from this tool and learn how to address these vulnerabilities, their business can maintain their technology in the future.

The *Online Sustainability Network* website was created for non-technical visitors to use. In other words, users who do not use the Internet often or browse websites should not have difficulty navigating this tool. This tool is a simple website that has three pages to visit. First, the homepage, as seen

The screenshot shows the homepage of the Information Technology 4 Development (IT4D) website. The header features the text "Information Technology 4 Development". Below the header is a navigation bar with three tabs: "HOME", "LEARN NEW SKILLS", and "READ & SHARE YOUR EXPERIENCE". The "HOME" tab is currently selected. The main content area contains a "Welcome To Our Website!" message and two sections: "How To Use This Website" and "Learn New Skills". The "How To Use This Website" section explains the purpose of the website and how to navigate it. The "Learn New Skills" section describes the variety of subjects available for business owners. To the right of the text, there is a large photograph of three people sitting around a table, looking at a laptop together. Below the main image is a row of smaller thumbnail images showing various scenes related to the website's purpose.

Figure 4. The Online Sustainability Tool's Homepage

in Figure 4, introduces the tool with a slideshow of pictures and a brief description of the site. The text on the page is large enough for an older aged audience of users to read; the website uses a minimalist design. The links at the top of the page state clearly the differences between pages. The links are “Home”, “Learn New Skills”, and “Read & Share Your Experience”.

The “Learn New Skills” page is dedicated for users to learn a new technological skills. This page presents five skill-building areas that a user can



Figure 5. The Learn New Skills Page

select from (Marketing My Business, Protect My Computer, Collaborate Effectively, Manage Information, and Additional Websites). As seen in figure 5 below, while hovering over a skill-building area, an additional sub-topic list appears for a user to specifically choose a topic. For example, if a user hovers over “Protect My Computer”, an expanded list appears, branching out from the “Protect My Computer” option – “FREE virus protection”, “My Computer is Slow”, and “Useful Websites on Security”. When a user clicks on the farthest “branch” of these options, a new page appears – a step-by-step tutorial with screenshots on the chosen topic. These tutorials are viewable online and can be downloaded directly onto the users computer.

The reason this page was created was to address the most relevant ICT effect from the five cases in this study – Learning and Labor Productivity. Micro-entrepreneurs can retain the skills they currently have and learn a new skill. These new skills can then be taught to employees or be passed down to the next generation of business owners. New skills that are learned will further enhance the use and importance of technology within the micro-entrepreneur’s business. Being able to carry out this process and retain technological skills is a form of sustainability. Even if a owner forgets a skill on how to use a certain system, they can reference and print out copies of a tutorial on the tool. Learning about new technologies can enhance the overall IT infrastructure for a business and can help improve other areas within their business – such as administrative efficiencies, poverty reduction, and competitiveness and access to new markets. The third page of

this tool is “Read & Share Your Experience”. As the title suggests, this page allows micro-entrepreneurs to write about their IT adoption experiences and read about other owner’s experiences. Being able to read about other experiences can motivate a business owner in trying new technologies. The motivation and “real-life” scenarios can therefore create confidence in the owner to adopt a new technology. This can relate back to the “Learn New Skills” page. For example, if an owner reads about how another business installed a virus scanner on their PC successfully, they may be more inclined to do so for their computer. Allowing members to have the ability to post on this tool can facilitate a community of microenterprises. Micro-entrepreneurs can make comments on stories and interact with other local business owners. These microenterprises are all exposed to similar weaknesses (such as being resource constrained) and have similar needs. Therefore, they are all facing similar problems – one being adopting IT. This furthermore addresses how microenterprises can self-sustain their technology without other institutional support. Owners can discuss among one another on what technologies worked in their small business and any hardships they faced.

After exposing the *Online Sustainability Network* website to the five cases in this study, the feedback from the micro-entrepreneurs were all positive. Four of the five microenterprises from this study posted their IT adoption experience on the tool. This is a sign that users are visiting and navigating the tool. Based on an open-ended qualitative inquiry, the following responses were given:

“It was easy to view and find what I was looking for.”

“Everything seemed simple enough to follow and I think anybody should have the knowledge to use it.”

“I did not have any problems using the website.”

To validate that this tool is being used, a website analytic program was used to record traffic. As seen in the figure 6 on the next page, the tool peeked at 21 visits on the same day. These results were recorded three weeks after giving exposure to the tool to the micro-entrepreneurs.

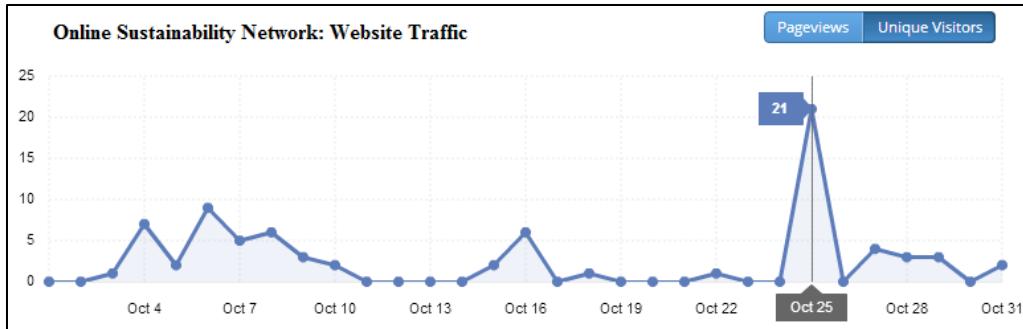


Figure 6. Website Traffic for the Online Sustainability Tool

The exposure that micro-entrepreneurs have with this tool can assist there future business operations. They now have a base to help them create a sustainable “IT center” to pass down to the next generation of their business. Additionally, if micro-entrepreneurs continue to use this tool and collaborate with one another business growth is a likely outcome.

CONCLUSION

In this study, we investigated IT adoption in five microenterprises in Western New York during a five-month timespan. Short-term growth resulting from the technology adoption has been evident in areas identified from theoretical models, such as administrative efficiencies, learning and labor productivity, access to information and new markets, as well as competitiveness. Yet, it is the *sustainability* of these initiatives that will either cause the business to grow or revert to traditional methods. Qualitative assessment carried out in the study showed evidence of on-going sustainability, such as micro-entrepreneur’s retained ICT knowledge and continued belief that technology plays a vital role in their business. To further support these resource-constrained microenterprises, this study contributed a free *Online Sustainability Network* website. The goal was to not only reinforce and retain micro-entrepreneurs’ current skills, but also to build new technological knowledge. This was achieved by providing step-by-step tutorials on common business technology needs and the ability to share their ICT adoption experiences with other local businesses. In terms of sustainability, these outcomes need to be pro-longed for long-term effects. The five-month timespan may have shown immediate outcomes for the microenterprises, however a longer duration may further show evidence that sustainability of ICTs enhance business growth even further.

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APPENDIX A: Impact Assessment Questionnaire

This questionnaire was used for stage T4 (Impact Assessment) during the research design.

1. What IT assistance did you receive? Can you tell me about the technology solution that was carried out?
2. Now that you have received IT assistance/technology solution, can you tell me your experience as you worked to incorporate this new technology/skill?
3. How has the technology solution that you received changed the way you do business? Can you give me an example from your business activity that has changed as a result?
4. To what extent were the outcomes that you just mentioned, what you expected it to be?
5. How were they different from what you expected?
6. Did these outcomes *help* your business in any manner? If so, in what ways?
7. To what extent did the issues you were concerned about before the IT assistance come true? Which things came true? Which didn't come true?
8. Would you be able to teach the skills that you learned to the next generation of your business? If so, why? If not, why not?
9. How did the IT assistance/technology solution affect you personally? E.g. your attitude towards IT, awareness of its benefits, confidence, control, etc.
10. To what extent has the technology impacted your business performance? E.g. time savings, increased revenue, increase in number of customers, etc.
11. Can you give me an example of how you do things now after your experience after receiving the IT assistance? (Computer self-efficacy)

12. After having interacted and experienced the new technology set-up or having applied your new learned IT skills, do you believe you would be able to complete a business task using IT if there was no one around to tell you what to do as you go?
13. If there was an online tool that you can use to read about other micro-entrepreneurs using their technologies, would you use it? Why or why not?
14. Would you be willing to use such a tool to learn something new from neighboring businesses? If so, why?
15. How do you think the ways you are doing business now by incorporating IT, will have an impact on your business in the future?
16. Can you tell me any other effects, which we have not talked about so far, that you now see in your business as opposed to before receiving the IT assistance?

APPENDIX B: Online Sustainability Network – Follow-Up Questions

These follow-up questions were used three weeks following stage T4 (Impact Assessment) to evaluate the Online Sustainability Network, as mentioned in Appendix A.

1.) When you visited the online network by yourself, what were your first impressions?

(Was it easy to use? Did you feel lost?)

2.) Have you read about any new skills or other business posts that you could apply to your business, if so what were they?

3.) Would you consider coming back to this online network, after viewing the current information it has? Why or Why Not?