

2015

Developing a Sustainability Network for Information Technology Adoption and Use in Micro-Enterprises

Mehruz Kamal
The College at Brockport, mkamal@brockport.edu

Follow this and additional works at: <http://aisel.aisnet.org/jmwais>

Recommended Citation

Kamal, Mehruz (2015) "Developing a Sustainability Network for Information Technology Adoption and Use in Micro-Enterprises," *Journal of the Midwest Association for Information Systems (JMWAIS)*: Vol. 1 : Iss. 1 , Article 3.
Available at: <http://aisel.aisnet.org/jmwais/vol1/iss1/3>

This material is brought to you by the Journals at AIS Electronic Library (AISeL). It has been accepted for inclusion in Journal of the Midwest Association for Information Systems (JMWAIS) by an authorized administrator of AIS Electronic Library (AISeL). For more information, please contact elibrary@aisnet.org.

Date: 11-14-2014

Developing a Sustainability Network for Information Technology Adoption and Use in Micro-enterprises

Mehruz Kamal

State University of New York at Brockport, mkamal@brockport.edu

Abstract

In the United States, there are over 25 million micro-enterprises, comprising 88% of all businesses. These businesses with five or fewer employees are resource-constrained – one of the many constraints is the lack of technical skills. An inability to acquire and use these skills creates a disadvantage relative to larger corporations. An innovative approach was explored that involved deploying a customizable technology-based assistance infrastructure for micro-enterprises. Information and Communication Technologies (ICT) adoption can lead to social, economic, and human development if the ICT is sustained. An action research methodology was used to apply the innovative technology adoption approach to investigate a set of micro-enterprises in Western New York that had previously adopted ICT during a five-month timespan. This study investigates how Information Technology adoption and use in micro-enterprises may be sustained to facilitate their business growth. The main contribution of this study is development of an online tool to facilitate micro-enterprises' sustainability of ICT adoption and use.

Keywords: Micro-enterprise, Information and Communication Technology, Sustainability, Technology adoption, Action research.

Copyright © 2015 by Mehruz Kamal

1. Introduction

In the United States, there are over 25 million micro-enterprises (MEs), which encompass 88% of all businesses. In New York State alone, 90% of all businesses are micro-enterprises. Micro-enterprises, which are businesses with five or fewer employees, are resource-constrained – with one of the many areas being the lack of technical skills (Honig, 1998; Hyman and Dearden, 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 efficiently run Information Communication Technologies (ICTs). Research has shown that if micro-enterprises 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, Clarke, and Halewood, 2006). This adoption can lead to social, economic, and human development if the ICT is *sustained* (Wolcott, Qureshi, and Kamal, 2007). Therefore the research question in this study is, *How can Information Technology adoption and use in micro-enterprises be sustained?*

2. Background

Micro-enterprises are a form of small business. Small firms differ from large firms in various ways. In terms of technology, micro firms tended to primarily use technologies such as email, web and simple accounting packages as opposed to medium and larger sized firms that used more complex applications such as Customer Relationship Management systems, and other similar technologies (Bharati and Chaudhury, 2006). In a multi-country level study, Beck, Demirgu, Kunt, Laeven, and Levine (2005) showed that small and medium-sized firms faced greater financial, legal, and corruption obstacles compared to large firms, and that the constraining impact of obstacles on firm growth was inversely related to firm size. Subsequently, these issues are more prevalent in micro-enterprises. Small businesses can also harness the power of Information Technology (IT) as a source of strategic advantage to help them become competitive and obtain a favorable position in their sector of activity (Bergeron and Raymond, 1992). In a study by Matthews (2007), it was shown that ICTs play an important role in the expansion of Small and Medium-sized Enterprises (SMEs). The results showed that there is an increasing awareness and desirability of small firms looking to grow to use the potential of the Internet communications to reach a larger market for their products and services. Matthews (2007) also discovered that lack of confidence in technology was a major inhibiting factor for SMEs looking to grow and suggests that training along with making small business owners aware of product and solution knowledge will improve their confidence in the use of ICTs to help support their business. It has been acknowledged by researchers and development agencies around the world of the increasingly important role that Information Technology can play in facilitating development. Steinberg (2003) suggests that the high versatility of ICTs have the potential to address a country's development strategies - provided an enabling environment exists.

Researchers in the field of IT for Development (ITD) have investigated various ways in which IT may help to bring about development. One such context is within the sphere of small businesses to help them achieve not only operational efficiency but at a broader level help bring about economic and social wellbeing. ITD research has made contributions in providing equitable access to information and knowledge in areas such as education and literacy (Rodrigo, 2003); healthcare (Braa, Monteiro, and Sahay, 2004); software development (Chudnovsky and Lopez 2005); reduction in poverty (Cecchini and Scott, 2003); better government (Qureshi, 1998) and off-shore outsourcing. (Preis-Heje, Baskerville, and Galina, 2005). However, there is limited research that considers the effect of IT implementations on micro-enterprises and their contributions to development. The above suggests that little research has been done in micro-enterprises. It then appears that there is a need to discover ways in which IT may be used by micro-enterprises to help them streamline their business activities and compete with larger firms and potentially impact development. Qureshi (2005) developed a model of Information Technology for Development (Figure 1) that identifies interactions that take place among social and economic development, ICT effects, human development, Gross Domestic Product and Per capita income; this model shows how e-commerce can be used to reduce the digital divide. In more general terms, the Information Technology for Development model explains the effects seen when ICTs are injected into the socio-economic sphere of society. Specifically, the effects seen are (i) access to information and expertise, (ii) competitiveness and access to markets, (iii) administrative efficiencies, (iv) learning and labor productivity, and (v) poverty reduction. These effects in turn facilitates greater human development enabling individuals to develop improved skills and self-empowerment. Subsequently, improved skills can facilitate an individual to seek out better jobs and earn more revenue contributing to the gross domestic product of the community and thereby enabling investments in improving the various sectors such as education, healthcare, government, etc. This cyclical nature of the model can also help explain negative cycles of development which might occur when IT

implementations are not suited to the local needs thus causing bottlenecks and preventing any progress to be made. In the micro-enterprise context, the model gives entrepreneurs the opportunity to “reduce costs of doing businesses, reduce use of intermediaries, and increase price transparency and negotiation” (Qureshi and Davis, 2007). We use the Qureshi (2005) model to make sense of the impact of ICTs in micro-enterprises.

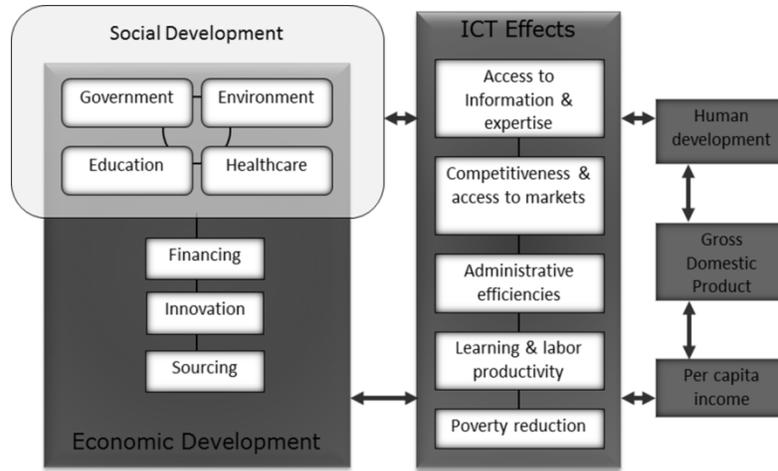


Figure 1. Model of IT for Development (Qureshi, 2005)

3. Methodology

This study uses an inductive interpretive case study (Walsham, 1995) to understand how micro-enterprises may adopt IT. An action research methodology (Chiasson, Germonprez, and Mathiasen, 2009; Baskerville, 1999; Zuber-Skerrit, 1991) is used to apply IT interventions within two micro-enterprises in Western New York and the results analyzed. The research design used is shown in Figure 2. As seen in the figure 2, there are four distinct stages at which activities will be conducted. At stage T0, the researcher interviews the micro-entrepreneur to understand their past, present, and future use of technology and how the owner thinks IT could benefit the business. Stages T1 through T3 comprise the action research cycle that will be conducted. At T1, the researcher will once again meet with the micro-entrepreneur to inquire about any of the immediate IT needs and also get an in-depth understanding of the business. Equipped with that information along with the information obtained from the interviews at the T0 stage, the researcher will then plan what type of IT intervention would be appropriate to apply to the micro-enterprise. At T2, the actual IT interventions will be applied. At stage T3, the researcher will evaluate whether the IT interventions applied to the micro-enterprise actually meets and/or solves the needs expressed by the micro-entrepreneur. If not, then modifications are made and additional IT interventions are applied.

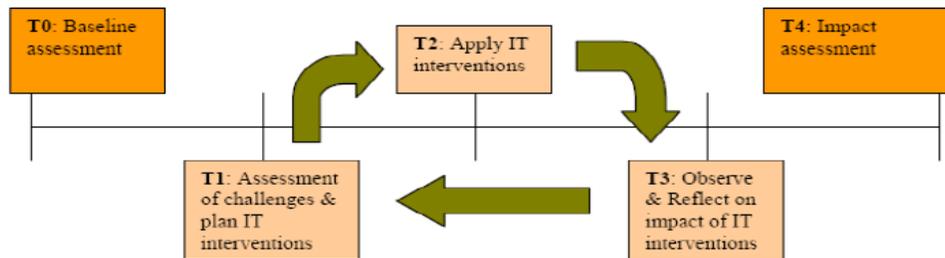


Figure 2. Research Design

Iteration between stages T1 through T3 represents the cyclical nature of the action research approach. At T4 after the action research cycle is over, the researcher sits down with the micro-entrepreneur and interviews them again to inquire in what ways the IT interventions impacted their businesses.

3.1 Case Studies

Two micro-enterprises (MEs) were selected for this study. These businesses were selected based on number of employees being between one and five and having annual revenues of less than \$25,000. A key selection criterion was the willingness to grow their businesses with technology.

3.1.1 Case 1: AC (Carpet Cleaning Business)

T0: Baseline assessment

ICT Perceptions: The responses from executing the baseline assessment of AC revealed that the owner believe that ICT 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 to the owner of AC. The capabilities that technology can do in terms of attracting customers and marketing a small business are 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 be, 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 ICT 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 time consuming as they thought.

Plan ICT 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 ICT 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 in Table 1.

Intervention	Initial Impact
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 Search Engine Optimization and has a mobile-friendly website.
Install anti-virus scanners	The computer is much more protected from malware, spyware, Trojans, and other viruses.
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.

Table 1. Interventions in AC

T3: Observation and Reflection

Over the course of the ten weeks during which the ICT adoption were being conducted, 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 confidence 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 about 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 to 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 ICT-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 ICT 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 software protected both her business as well as personal data. The lack of any anti-virus program prior to carrying out the interventions 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 as an "IT Center." There were separate folders dedicated to the business, and several sub-folders pertaining to specific information, such as "commercial customers before and after pictures."

3.1.2 Case 2: 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

ICT 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 ICT 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 ICT 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 Search Engine Optimization (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 ICT 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 slowly. 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 ICT Interventions

RP experienced several hardware and software upgrades throughout the course of the ICT assistance program. Mainly, the slow computer at RP was replaced with a new one. All of the data from the slow computer were 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 ICT interventions that were carried out for RP can be viewed on Table 2.

<u>Intervention</u>	<u>Impact</u>
Transfer old data to new computer.	RP has a faster computer with the same data on it.
Cleanup laptop files and programs.	RP’s laptop runs much more efficiently and has organized folders.
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.
Installed and showed owner how to use backup software to protect data.	Files that are used daily had a backup location.
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.
Make sure that data was kept in more than one location (backup)	External hard drive holds a backup of crucial data.

Table 2. Interventions in RP

T3: Observation and 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 micro-enterprise owner was familiar with technology.

3.2 Case Analysis

In the T4 phase of our research design (Figure 2), the researchers carried out an impact assessment by going back to the two micro-enterprises 5 months after their initial ICT adoptions had been carried out. Our analysis of the observations is correlated to the ICT effects from the Qureshi (2005) model of IT for Development (Figure 1). Specifically, the ICT effects are: Administrative efficiency, learning and labor productivity, poverty reduction, competitiveness and access to new markets, and access to knowledge and expertise. Table 3 below classifies some selected statements made by the owners of AC and RP from the impact assessment interviews into the ICT effects categories. Following Table 3, is a detailed analysis of the impact in each of the micro-enterprises as a result of the ICT adoption.

Case 1: AC	Case 2: RP
Administrative Efficiency	
<p><i>“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.”</i></p>	<p><i>“I do a lot ordering now by email and it saves me time when I can access my email more quickly.”</i></p> <p><i>“We are always using it [the computer] and it has been running great with everything.”</i></p> <p><i>“We now can have multiple tabs open at the same time.”</i></p>
Learning and Labor Productivity	
<p><i>“I even began teaching my husband.”</i></p> <p><i>“I learned how much easier website creation has become.”</i></p> <p><i>“This [the new website] is less time-consuming to make updates than the last website tool we had.”</i></p> <p><i>“I can login and create new pages on my website.”</i></p>	<p><i>“It is about five minutes faster on boot-up; it is way faster than our previous machine.”</i></p>
Competitiveness and Access to New Markets / Poverty Reduction	
<p><i>“The website showed us that people are looking at it and calling us about our services.”</i></p> <p><i>“This [the website tool] is so much more economical to maintain a website.”</i></p>	

Table 3. ICT Impact Categorizations

3.2.1. Case 1: AC (Carpet Cleaning Business)

With regards to **Administrative Efficiency**, 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. In terms of **Learning and Labor Productivity**, 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 ICT 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.

Regarding, **Competitiveness and Access to New Markets / Poverty Reduction**, 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. In terms of **Access to Information 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).

3.2.2 Case 2: RP (Florist)

With regards to **Administrative Efficiency**, 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.

In terms of **Learning and Labor Productivity**, 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. Regarding **Competiveness 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 protecting 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.

4. Discussion

From the analysis of both micro-enterprise cases so far, it is apparent that through very simple yet contextualized ICT implementations, significant outcomes were achieved. In addition to the stated outcomes in Table 3, another very important observation is with regards to the micro-entrepreneur's attitude towards technology. The owner of AC stated,

*"I even plan on making a whole new website for another service that our business provides."
"I'm more willing to try new technology, it is less intimidating."*

It then appears from the above statements that the owner of AC has shown dramatic changes in terms of being in control of her technology. During AC's 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. 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 ICT 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.

Similarly, the following statements were made by the owner of RP:

*"I have pretty good working knowledge with technology, but this program [ICT 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 before and after the ICT 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 ICT 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. 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. The owner of RP stated that the importance of ICT 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.

5. Sustainability Network for Micro-enterprises

Based on the discussion so far, it is clear that both micro-enterprises were able to adopt new technologies and technical skills. However, a key issue is what can be done to sustain and build upon such initiatives to facilitate continued benefits to micro-enterprises from ICT adoption. This study provides an *Online Sustainability Network* website (figure 3) 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 a questionnaire that micro-enterprise owners participated in, 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 in 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 micro-enterprises' 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 them, 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 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 audience of users to read and 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 and Share Your Experience.” The “Learn New Skills” page is dedicated for users to learn new technological skills. This page presents five skill-building areas that a user can select from (Marketing My Business, Protect My Computer, Collaborate Effectively, Manage Information, and Additional Websites). 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.”

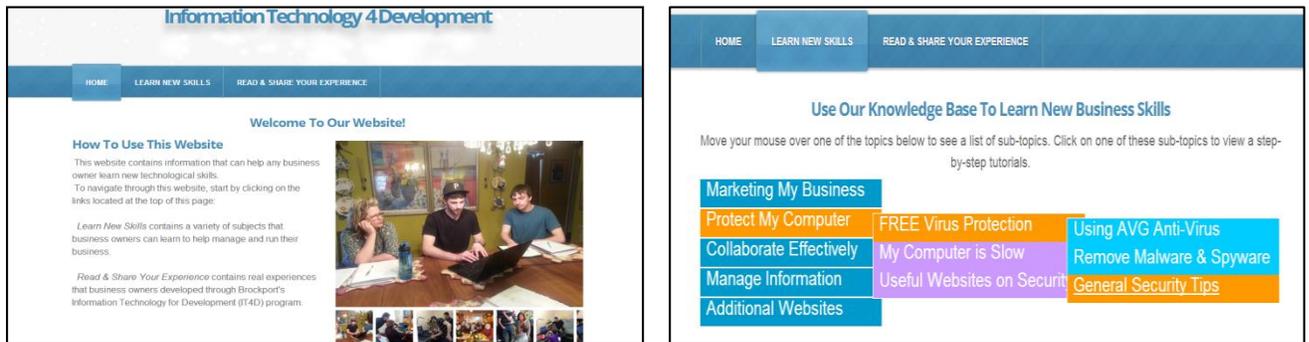


Figure 3. Online Sustainability Tool: Homepage (left); “Learn New Skills” Webpage (right)

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 ICT effect of 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-enterprise. Being able to carry out this process and retain technological skills is a form of sustainability. Even if an owner forgets a skill on how to use a certain system, they can reference and print out copies of a tutorial that is posted 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 and 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. 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 community members to have the ability to post on this tool can create a self-sustaining environment. Users can make comments on stories and interact with other local business owners. This furthermore addresses how businesses can sustain their technology after undergoing the IT adoption phases outlined in this study. 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 micro-entrepreneurs, the feedback from the owners was all positive. The micro-entrepreneurs wrote about their IT adoption experience on the tool. This is a sign that users are visiting and navigating the tool.

“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 Figure 4, the tool peaked at 21 visits on the same day. We do not know what was specific about October 25th when the peak occurred. These results were recorded three weeks after giving exposure to the tool to the micro-entrepreneurs.

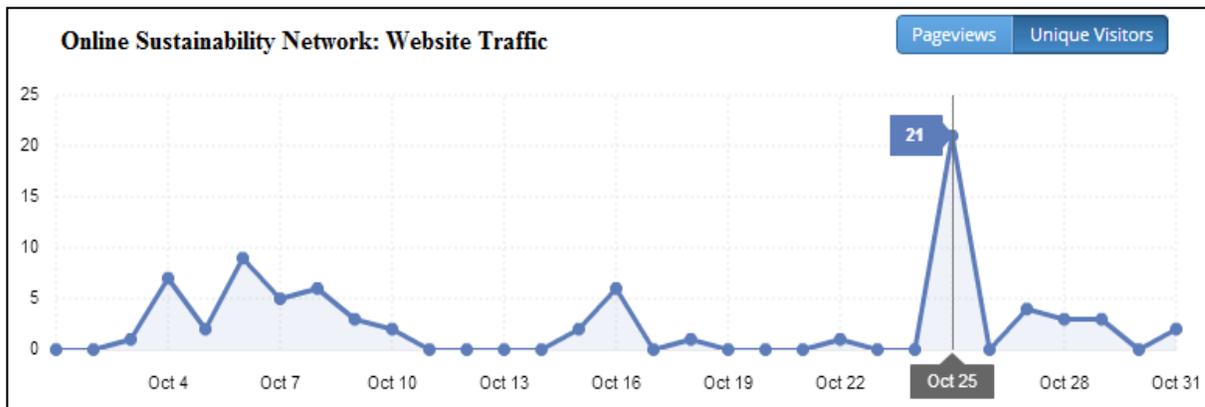


Figure 4. Website Traffic

6. Conclusion

In this study, we investigated IT adoption in two micro-enterprises 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 micro-enterprises, this study contributed an *Online Sustainability Network* website. Future studies of this research may involve investigating a larger number of micro-enterprises from different sectors over a longer period of time to obtain quantitative data to help support the initial qualitative findings reported in this study.

REFERENCES

- Baskerville, R.L. (1999). Investigating information systems with action research. *Communications of the Association for Information Systems*, 2.
- Beck T., Demirgu C., Kunt A., Laeven L., & Levine R. (2005). Finance, firm size and growth. *World Bank Policy Research Working Paper*, No. 3485.
- Bergeron, F., & Raymond, L. (1992). Planning of information systems to gain a competitive edge," *Journal of Small Business Management*, 30(1), 21-26.
- Bharati, P., & Chaudhury, A. (2006). Current Status of Technology Adoption: Micro, Small and Medium Manufacturing Firms in Boston. *Communications of the ACM*, 49(10), 88-93.
- Braa, J., Monteiro, E., & Sahay, S. (2004). Networks of Action: Sustainable Health Information Systems across Developing Countries. *MIS Quarterly*, 28(3), 337-363.
- Cecchini, S., and Scott, C. (2003). Can information and communications technology applications contribute to poverty reduction? Lessons from rural India. *Information Technology for Development*, 10(2), 73-85.
- Chiasson, M., Germonprez, M., & Mathiassen, L. (2009). Pluralist action research: a review of the information systems literature. *Information Systems Journal*, 19(1), 31 – 54.

- Chudnovsky, D., & Lopez, A. (2005). The Software and Services Sector in Argentina: the pros and cons of an inward-oriented development strategy. *Information Technology for Development*, 11(1), 59-75.
- Honig, B. (1998). What determines success? Examining the human, financial, and social capital of Jamaican microentrepreneurs. *Journal of Business Venturing*, 13(5), 371-394.
- Hyman, E.L., & Dearden, K. (1998). Comprehensive impact assessment systems for NGO microenterprise development programs. *World Development* 26(2), 261-276.
- Matthews, P. (2007). ICT Assimilation and SME Expansion. *Journal of International Development*, 19(1), 817 – 827.
- Pries-Heje, J., Baskerville, R. & Galina, I. H. (2005). Strategy Models for Enabling Offshore Outsourcing: Russian Short-Cycle-Time Software Development. *Information Technology for Development*, 11(1), 1-26.
- Qiang, C.Z., Clarke, G.R., & Halewood, N. (2006). The Role of ICT. In *Doing Business Information and Communications for Development—Global Trends and Policies*. World Bank, Washington DC.
- Qureshi, S., & Davis, A. (2007). Overcoming the Digital Divide through Electronic Commerce: Harnessing opportunities in IT for Development. Hawaii International Conference on System Sciences, Hawaii.
- Qureshi, S. (2005). How does Information technology effect Development? Integrating Theory and Practice into a Process Model. *Proceedings of the eleventh Americas Conference on Information Systems*. Omaha, NE.
- Qureshi, S. (1998). Fostering Associations in Africa through Networking. *Information Infrastructure and Policy*, 1-13.
- Rodrigo, M.M.T. (2003). Tradition or transformation? An evaluation of ICTs in Metro Manila schools. *Information Technology for Development*, 10(2), 95-123.
- Steinberg, J. (2003). INFORMATION Technology & Development BEYOND 'EITHER/OR'. *Brookings Review*, 21(2), 45-48.
- Walsham, G. (1995). Interpretive case studies in IS research: Nature and method. *European Journal of Information Systems* (4:2), pp. 64–81.
- Wolcott, P., Qureshi, S., & Kamal, M. (2007). An Information Technology Therapy Approach to Micro-enterprise Adoption of ICTs. *Proceedings of the Americas Conference on Information Systems (AMCIS)*. Keystone, Colorado, USA,
- Zuber-Skerrit, O. (1991). *Action Research for Change and Development*. Aldershot: Gower Publishing.