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Sustaining ICT adoption and use in Micro-enterprises

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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 – 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, comprising of a customizable technology-based assistance infrastructure is utilized for any micro-enterprise willing to adopt Information Communication Technologies (ICT). This 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 have previously adopted ICT during a five-month timespan. This study investigates *how Information Technology adoption and use in microenterprises may be sustained to facilitate their business growth*. The main contribution of this study is 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.

INTRODUCTION

In the United States, there are over 25 million micro-enterprises (MCs), 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 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 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 et al. 2006). This adoption can lead to social, economic, and human development if the ICT is *sustained* (Wolcott et al. 2007). Therefore the research question in this study is, *How can Information Technology adoption and use in micro-enterprises be sustained?*

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 CRM, and other similar technologies (Bharati et al. 2006). In a multi-country level study, Beck et al. (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 et al. 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 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 (IT) 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 and in various use contexts the manner 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 et al. 2004); software development (Chudnovsky et al. 2005); reduction in poverty (Cecchini et al. 2003); better government (Qureshi 1998) and off-shore outsourcing (Preis-Heje et al. 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 (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 the micro-enterprise context it gives entrepreneurs the opportunity to “reduce costs of doing businesses, reduce use of intermediaries, and increase price transparency and negotiation” (Qureshi et al. 2007). We use the Qureshi (2005) model to make sense of the impact of ICTs in micro-enterprises.

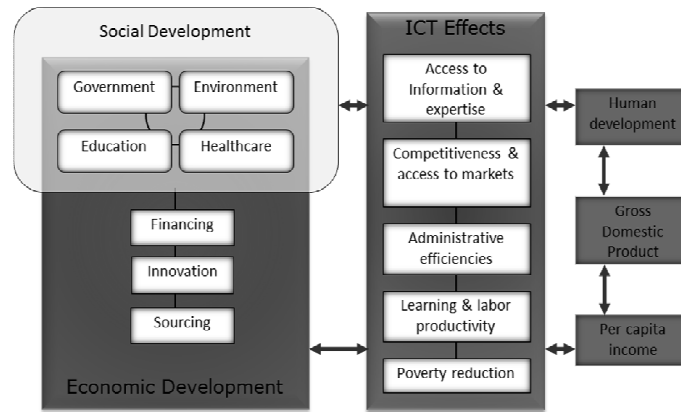


Figure 1. Model of IT for Development (Qureshi 2005)

METHODOLOGY

This study uses an inductive interpretive case study (Walsham 1995) to understand how micro-enterprises may adopt IT. An action research methodology (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 below.

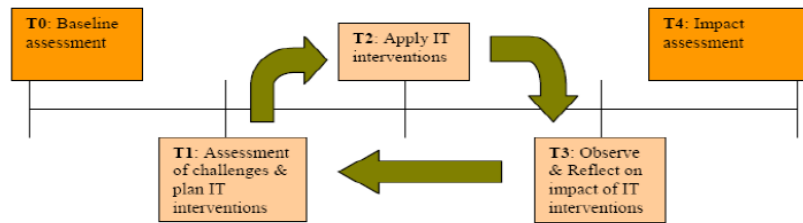


Figure 2. Research Design

As seen in the figure above, there are four distinct stages at which activities will be conducted. At T0, the researcher will interview 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. 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.

CASE STUDIES

Two MCs 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. AC is a small carpet-cleaning business run by a husband and wife. This company has been in operation since 1991. RP is a florist that sells flowers and flower arrangements. This business strives to provide excellent customer service and a premium product. The owner of RP has been in business for 40 years and is very experienced in floral work.

RESULTS FROM THE CASES

T0 – Baseline Assessment

The researchers met with the micro-entrepreneurs and asked questions regarding how they perceived information technology and how they thought their business may benefit from technology. Table 1 gives summaries from both the businesses.

AC	RP
<ul style="list-style-type: none"> Believes that IT can help market her business Technology is both a “curse and blessing” Adopting technology can be fearful and risky Using technology is time consuming 	<ul style="list-style-type: none"> Realizes the importance that technology has on his business Believes that keeping on top of technology is necessary Is willing to learn something new

Table 1. Baseline Assessment

T1 – Assessment of Challenges and Plan IT interventions

The interview responses from the T0 stage provide an initial glimpse as to how the micro-entrepreneurs view technology. Once the initial assessment is completed, the researchers then interviews the micro-entrepreneurs again – with open-ended questions – but this time with the intention to get a better in-depth understanding of the historical and social context of the business (Table 2 below). Doing so will enable the researcher to decide on appropriate IT interventions to apply.

AC	RP
<ul style="list-style-type: none"> Had a website that was created and maintained by an outside source. Can no longer receive help from this outside source Does not have skills to manage website by herself. Customer information and jobs were recorded in hard-copy form on paper 	<ul style="list-style-type: none"> Main computer for RP was quite outdated Applications on the machine were running very slow None of the computers in RP had any form of virus protection “IT center” was sloppy, wires were protruding out everywhere and cords were tangled No backup of customer and other business records

Table 2. Assessment of Challenges

T2 – Apply IT Interventions

Based on responses from the T0 and T1 phases, the following interventions were carried out for each micro-enterprise.

AC	RP
<ul style="list-style-type: none"> Created a website that is easy to update Installed anti-virus scanners Created an electronic database to store customer records with filtering capabilities 	<ul style="list-style-type: none"> Transferred old data to new computer. Cleanup of laptop files and programs carried out. Taught the owner of RP to understand and maintain cookies and browser history. Installed and showed owner how to use backup software to protect data. Taught owner how to maintain a PC in terms of viruses and file cleanup. Made sure that data was kept in more than one location (backup)

Table 3. Interventions applied

T3 – Observation & Reflection

Following are descriptions of the observations made in both micro-enterprises as the interventions were being carried out

AC - Over the course of the ten weeks during which the ICT adoption was being conducted, the owner of AC has shown dramatic improvements. After the first few training sessions, the owner of AC has shown more confidence in her use of technology. From being fearful of technology to being excited, this business owner needed encouragement and access to user-friendly tools to bring out her technical confidence. 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.

RP - 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 was 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. After purchasing the new computer, the owner of RP was trained on how to transfer data from one machine to another.

T4 – Impact Assessment

In this phase, 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). Table 4 below classifies some selected statements made by the owners of AC and RP from the impact assessment interview into the ICT effects categories.

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

Table 4. ICT impact categorizations

HOW CAN ICT ADOPTION BE SUSTAINED?

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 microenterprise 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 & 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 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 & 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”.

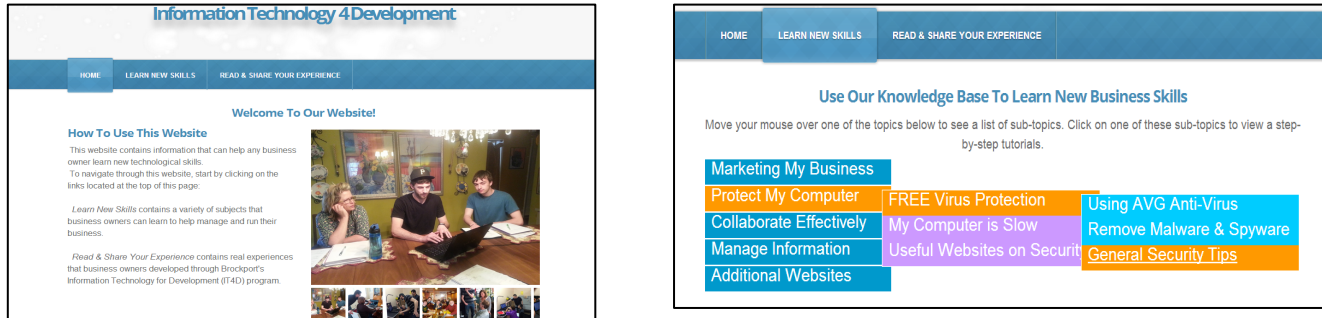


Figure 3. Online Sustainability tool: Homepage (left); “Learn New Skills” webpage (right)

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 & 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 peeked at 21 visits on the same day. These results were recorded three weeks after giving exposure to the tool to the micro-entrepreneurs.

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.

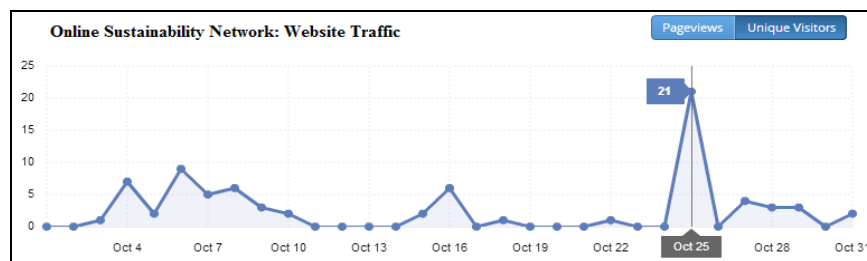


Figure 4. Website traffic

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