

Creative Destruction in Information Technology Adoption by Microenterprises: Three Cases in Global Development

Research-In-Progress

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ABSTRACT

Participation in the global economy by people in underserved communities appears to be a barrier to those without access to or the ability to use Information and Communication Technologies. It appears that an understanding of processes of creative destruction can explain how technologies may be adopted by people in underserved communities to enable them to participate more fully in the opportunities offered by globalization. This paper investigates the process of creative destruction in microenterprises as they are the basic unit through which people with limited resources adopt technology to achieve better livelihoods. Following an analysis of IT adoption in three microenterprises, this paper concludes that IT interventions in microenterprises do improve their ability to move to, survive, and thrive in the current technological paradigm. This research also finds that technology is a series of innovations which when adopted through appropriate technology interventions, can enable microenterprises to contribute to global development.

INTRODUCTION

A number of theories have been developed on the nature and impact of the process of globalization (Castells 1996, Held et al 1999, Hirst and Thompson 1996, Robertson 1992, Scholte 2000, Wallerstein 1974, Giddens 2000). Castells 1996 is notable in his description of

globalization to be fueled by information technology in what characterizes this current technological revolution is not the centrality of knowledge and information but the application of this knowledge and information to knowledge generating and information processing devices. Amartya Sen (2002) argues that the economic predicament of the poor across the world cannot be reversed by withholding from them the great advantages of contemporary technology, the well-established efficiency of international trade and exchange, and the social as well as economic merits of living in open rather than closed societies. Ajayi (2003) adds to this argument by stating that globalization offers new opportunities, including expanded markets and the acquisition of new technologies and ideas. The use of IT can enable development to take place through access to new markets, increased competitiveness, and access to knowledge and skill (Qureshi, 2005).

More recent studies by Qureshi et al (2009), Kamal et al (2009), (2010), have illustrated how the most underserved populations have been able to take advantage of Information and Communication Technologies (ICTs) to access new markets, increase their competitiveness, and through administrative efficiencies achieve lower costs and higher returns. The basic unit of how person using technology can take up new opportunities to achieve better livelihoods is done using microenterprises (Qureshi et al 2009). Microenterprises are tiny organizations for one to five employees. This small size forces microenterprise owners and staff to assume multiple and diverse duties and responsibilities. They are often faced with numerous challenges because of lack of time, skills or resources. Many microenterprises employ outdated tools, methods and skills that were valid before technological innovations changed the business and social environment. This makes it even more difficult for them to participate in the global economy such as taking opportunities to expand their markets, to acquire current technologies and learn of new ideas.

It appears that viewing microenterprises through Schumpeter's framework of creative destruction offers a way of understanding how microenterprises may continue to support global development. Schumpeter (1942) argues that Capitalism is an "evolutionary process" that "is by nature a form or method of economic change and not only never is but never can be stationary (p. 82). This evolutionary change is not caused by changes in economic life, the social environment, or population changes. While these are important, the "fundamental impulse that sets and keeps the capitalist engine in motion" comes from new goods, new services, new

methods of production, new markets and new forms of industrial organization. This internal process “revolutionizes the economic structure *from within* (italics Schumpeter), incessantly destroying the old one, incessantly creating a new one” (p. 83).

This ongoing process of *Creative Destruction* is “what capitalism consists in and *what every capitalist concern has got to live in*”. (Schumpeter, 1942, pg. 83.) Microenterprises are not excluded from this process. Viewed through the framework of creative destruction these microenterprises may reside in the older, and now obsolete, technology paradigm. According to Schumpeter, they risk perishing if they do not adopt current technology and move into the current technology paradigm. Investigating how microenterprises can migrate to the current technology paradigm and thus avoid creative destruction is the focus of this paper and is the literature gap it seeks to fill. Specifically, what must the microenterprise do to survive, thrive, and grow in the global economy?

Researchers and scholars have focused on how medium to large business both drive and avoid creative destruction. A few examples illustrate this point. Tripsas (1997) details in depth the typesetting industry and its confrontation with three cycles of creative destruction. Spencer and Kirchoff (2005) investigated the role of new technology firms in the process of bringing about creative destruction determining that new technology invent and market new products that disrupt the current market equilibrium. Examples of creative destruction in action abound. Spencer and Kirchoff (2005) hold that the most famous is the advent of the personal computer which dramatically changed the computer industry. Leading computing firms disappeared including Control Data Inc., UNIVAC’s computer manufacturing division, Digital Equipment Corp., Data General and Prime Computer. Apple Computer, Dell Computer, Gateway Computer, and HP-Compaq computer, among others, replaced them. IBM, while it remained in the personal computer market for a time, sold its personal computer business to the Chinese company, Lenovo, and has restructured much of its business. Christensen argues that creative destruction reoccurred often in the hard disc industry (C. M. Christensen, 1993) and with such dynamics that the industry leader changed with the major technological innovation.

However, little has been written on what microenterprises must do to avoid this creative destruction. This research investigates the question: How do microenterprises survive and thrive using technology? The Action Research method was employed to investigate the technology adoption process of three microenterprise case studies. This paper is structured as follows. First

the theoretical framework of creative destruction is discussed and then related to the microenterprise. Second, the research methods are discussed including Action Research and the specific microenterprise cases. Third, the preliminary results are detailed. Fourth, the findings are analyzed. Last, tentative conclusions are drawn and avenues of future research explored.

THEORETICAL FRAMWORK

Creative Destruction

Schumpeter (1942) argues that Capitalism is the process of *creative destruction* where innovative entrepreneurs constantly change the marketplace with the introduction of new products, processes, and markets. The concept is circular because the very innovations that change or destroy the status quo become the new status quo, which new entrepreneurs then target with new innovations. Under this theory, the entrepreneur is the change agent; the catalyst of the new order because only the entrepreneur has the energy, will power, and mindset to overcome and persevere over the obstacles in the way of bringing his innovation to the marketplace.

Schumpeter believed that this process is internal to capitalism:

The opening up of new markets, foreign or domestic, and the organizational development from the craft shop and factory to such concerns as U. S. Steel illustrate the same process of industrial mutation--if I may use that biological term--that incessantly revolutionizes the economic structure *from within* (italics the author's), incessantly destroying the old one, incessantly creating a new one. This process of Creative Destruction is the essential fact about capitalism. It is what capitalism consists in and what every capitalist concern has got to live in." (Schumpeter, 1942, p. 83)

It is during the transition from this disequilibrium to the new equilibrium or status quo that competitors of the innovation must decide to adopt the innovation or adapt to the new environment. Schumpeter believed that failure of a business or enterprise to adopt or adapt to the new dominant innovation resulted in the organization perishing from the marketplace.

This has special relevance to the microenterprise because they are, by Schumpeter's definition, both too small to compete against these forces and too small to implement their own innovations on a grand scale. Therefore, following Schumpeter's logic, microenterprises must adapt to the new status quo to survive. However, Schumpeter defined the term 'entrepreneur'

differently than this common understanding. He was a champion of the entrepreneur believing that innovation came from this energetic type whose chief property is “getting the job done“ (Schumpeter, 1942, p.132). For Schumpeter innovation encompasses the creation of “new combinations”. These combinations do not have to be inventions, the common interpretation of innovation, but rather include the introduction of a new product, a new way of manufacturing or marketing a product, the opening of a new market, or the creation of a new or better process. The object is change. These innovations fuel economic change and create disequilibrium which, once accepted and incorporated lead, the economy back to equilibrium. Then the process starts over again.

While Schumpeter champions the entrepreneur and innovation, he also champions the large and often monopolistic corporation arguing that some innovation and implementation are too expensive for the small organization and requires the resources of a large organization. Thus goes the hypothesis that larger firms are more innovative than smaller firms and innovations tend to be more frequent in monopolistic industries than in competitive ones (Bauer, 1997, p. 560). Bauer counters with research that argues that loose oligopoly is most conducive to innovation activity and that moderate to large firms possess the strongest ability and the most advantages to innovate (1997, p. 560).

Under Schumpeter’s definitions of innovation, entrepreneur, and organization size; the microenterprise owner does not qualify as an entrepreneur or an innovator. He does qualify as a small, very small, business owner. While it is true that many innovations came out of creative persons working in their garages (Apple is one example while Hewlett-Packard is another) these entrepreneurs did not stay small but rather move their innovations into marketplace and change the marketplace. A microenterprise owner may be an entrepreneur with an innovation, but once he implements his innovation, his organization will grow and cease being a microenterprise.

What Are Microenterprises and Why Are They Important

The definition of a microenterprise varies from country to country, depending on each country’s standard of living. For example, Duncombe and Heeks (2002) define the “micro- and small enterprise” as 10 employees or less. In the United States a microenterprise is defined as a small business of 5 or fewer employees and a loan of \$35,000 or less. This targets a market that includes low and moderate-income people who have difficulty accessing traditional lines of

credit, finance, and training and who are not being served by the marketplace. Traditionally, these groups have been labeled as disadvantaged and include women, minorities, displaced workers, and public assistance recipients (Servon, 2006, pp. 352-353). Microenterprises are often sole proprietorships with the owner being the main employee. Their use of technology has been investigated as a means of promoting development in underserved areas by Qureshi et al (2009), and Duncombe and Heeks (2003).

Microenterprises comprise about 93% of businesses around the world and around 87% of businesses in the USA according to the Economist and the Association of Enterprise Opportunity. The idea of alleviating poverty for the very poor by providing non-collateralized loans to microenterprises originated in the 1970s with Dr. Muhammad Yunus when he made small loans to impoverished Bangladesh basket weavers. In 1983, he founded the Grameen Bank, which provides small loans to persons wishing to work their way out of poverty by operating a microenterprise. From these beginnings, the Grameen Bank has been replicated in over 100 countries (“Muhammad Yunus - Biography,” n.d.) In 2006, both Dr. Yunus and the Grameen bank won the Nobel Peace Prize for this work. Yunus’ goal was to address to needs of the desperately poor and to combat poverty in Bangladesh by providing no-collateral loans to the very poor to enable them to start and run their own businesses. This goal remains the primary focus and purpose of the microenterprise movement throughout the world including the United States.

Applying the Process of Creative Destruction to Technology and Microenterprises

Under Schumpeter’s model, new innovations, including technical innovations, arise that challenge the current equilibrium and if the innovation succeeds then it replaces the previous one and a new equilibrium is established. These equilibriums, or *techno-status quos*, are points in time when the technology dominates the market and is not under serious challenge from newer innovative technologies. Modern society is filled with examples of how new inventions and new technologies have changed the way we work, relax, shop, and socialize. The cell phone is but one example.

The development of the cell phone makes communication vastly more mobile and immediate. Cell phones are carried everywhere and used in ways not imagined at their creation from keeping tabs on children (who carry their own cell phones) to instant response. Analyzing

cell phones in the context of the process of creative destruction model shows how these units have replaced pay phones and are supplanting traditional landline phones (Long, 2010). The impact can be subtle or dramatic. For example, landline telephone surveys used to be quite reliable as a measure of population opinion but such surveys are now biased to the older generations because up to 25 percent of cell phone users, mostly young people, do not have landlines (“Cell phones and election polls: An update,” 2010). Other technologies - email, the Internet, social networking, word-processing, and spreadsheets - have revolutionized industries and fields.

The implementation of new technologies society-wide creates “situations of disequilibrium” that result in a new techno-status quo. Therefore, the existing microenterprise that fails to implement modern technology solutions remains in the previous status quo. At best, this places the microenterprise at a distinct economic and competitive disadvantage and at worse puts it in the position to be a victim of the new techno-status quo. Microenterprises, by their nature, are tiny organizations with limited resources. The owners may be resistant to change, may not have time to implement change, or may not have the resources to implement the changes.

How Do Microenterprises Survive and Thrive?

Under the assumption that the process of creative destruction will lead to the eventual demise of microenterprises that do not adapt to the new techno-status quo, what can be done to move the existing microenterprise into the current techno-status quo? The microenterprises of developing countries offer insights in how the microenterprise can both survive and thrive. Kaplinsky (2011) argues that consumers in developing countries want technology with basic features at low prices. Again, the use of the cell phone is instructive. In developed countries, cell phones are sold with many features. In Africa, the basic cell phone is the norm with texting and phone capabilities. However, with this basic technology, innovations are taking place. For example, cell phones are used for money transfers where traditional banks are not available or where their fees and costs act as barriers to the poor. For example, in *The Power of Mobile Money* (“The power of mobile money,” 2009) cell phone add on applications and processes enable poor people to pay bills and receive money by their cell phones bypassing banking fees.

Kaplinsky calls this “appropriate technology” and cites Schumacher as the creator of this concept, where the technology employed is appropriate for the culture and economic status of the users (2011, p. 5). Cell phone use is also instructive to explain this concept. In developing countries, more persons have access to cell phones than to computers (“Not Just Talk,” 2011). Many services and applications have been developed to take advantage of this technology. Examples include Farmer’s Friend in Uganda and Dialog Tradenet in Sir Lanka that send out text messages on agricultural prices, Mobile Trading designed and operated in India that sends out low-skilled job offers, and KeynaBUZZ which allows for the purchase of concerts and sporting events.

The important lesson from these examples is that it does not take expensive products with extra features to meet a technology need, but rather the appropriate technology products that fit the need.

Instruments and Concepts

Below is a chart of the specific concepts employed in this analysis.

Concept Chart

Concept	Reference	Definition	Question
Creative Destruction	Tripsas (1997), Schumpeter (1942)	The idea that entrepreneurs drive capitalism with innovation. These innovations, when implemented challenge the status quo and upset the equilibrium. As the innovation is accepted, competitors either adapt or perish. Once the innovation is the standard, the current status quo is open to an innovation challenge.	How do microenterprises survive creative destruction? What characteristics must the microenterprise owner possess to survive? Is the microenterprise capable of moving from the traditional, and now obsolete, equilibrium to the new technological paradigm?.
Innovation	Schumpeter (1942)	Innovation is the implementation of a new change that affects and alters a market. Innovations are not just inventions, but can be new processes or new markets.	The current technologies in use are the result of innovations. How do microenterprises decide which technological

Concept	Reference	Definition	Question
			innovations to adopt and which to avoid or pass on?
Entrepreneur (Schumpeter) vs common usage of the term	Schumpeter (1942)	This is the change agent with the energy and will power to implement his product or process.	Are microenterprise owners 'entrepreneurs' in the Schumpeter use of the term? Or are they tiny small businesses, defined in the traditional use of the term?
Appropriate Technology	Schumacher, E. F. (1973)	The acquisition of technology appropriate for the microenterprise's economic environment. Generally, this means a lower level of technology than being marketed. The idea originated with E. F. Schumacher, in <i>Small is Beautiful</i> , 1973. The core idea is that more labour intensive technology and later intermediate technology could better serve the needs of rural persons and developing countries rather than the capital intensive products of the manufacturers and developers of the Northern hemisphere.	How does the microenterprise select 'appropriate technology'? Is the technology for the microenterprise different from for other businesses? What is lacking or different in the selection of technology?

As argued by Schumpeter, the capitalism does not remain in equilibrium and is not stable, but is under constant change by the process of creative destruction. This process involves innovations, which enter the marketplace and challenge the status quo. The superior innovations eventually replace the older and less efficient processes or products establishing a new equilibrium (Schumpeter, 1942).

Two of Schumpeter's concepts deserve further discussion. The first is the definition and role of the entrepreneur as an "agent of change." For Schumpeter, the entrepreneur is the champion of innovation with the energy and will to ensure the innovation reaches and changes the marketplace. The Schumpeter entrepreneur may or may not be a business owner or an

investor. However, he is the agent of change. As noted earlier in this paper, this is different than the more traditional view of an entrepreneur as a person who starts and runs his own business.

For Schumpeter innovation encompasses the creation of “new combinations” that are more effective and efficient than the current methods or products, and thus challenge the status quo. These combinations include inventions, a new product, a new way of manufacturing or marketing a product, the opening of a new market, or the creation of a new or better process. The result of innovation is change. Innovations fuel economic change and create “situations of disequilibrium” which, once accepted and incorporated lead the economy back to equilibrium. Then the process starts over again.

Innovations in technology have been numerous and are continuous. Technological innovations disrupt the marketplace equilibrium. A technological market equilibrium, or *techno-status quo*, is defined by this author as a stable point in the marketplace not under challenge by new technologies. A techno-status quo may be disrupted by the introduction of a technological innovation.

First proposed by Schumacher in *Small Is Beautiful* (1973) the *appropriate technology* concept argues that the extreme poor in developing countries have different technology needs and requirements than those in developed countries. The core idea is that more labour intensive technology and later intermediate technology could better serve the needs of rural persons and developing countries rather than the capital-intensive products of the manufacturers and developers of the Northern Hemisphere. For the microenterprise, this concept means selecting the technology for the business. Kaplinsky (2011) argues that the view of the extreme poor consumer toward the purchase of products is different than the view of most Northern Hemisphere consumers. More affluent consumers, like those in Europe and North America, seek additional functionality and features in their products. However, consumers in developing economies seek basic functionality and forgo additional features for lower price. In this respect, microenterprises in the United States may have similarities to microenterprises in developing countries in seeking to purchase technology based on basic functionality and price as well as forgoing features that do not directly contribute to the enterprise.

METHODS

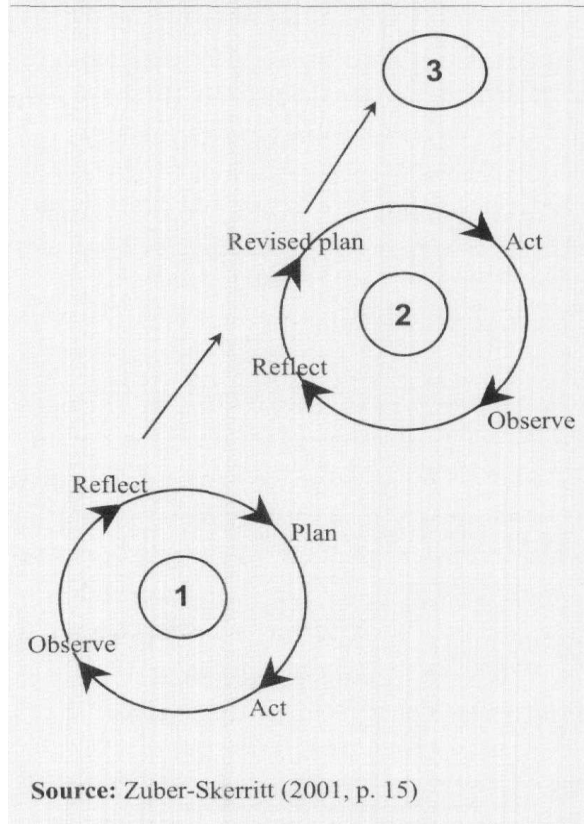
This paper applies the theoretical lens of Schumpeter's *creative destruction* model to the technology adoption process of microenterprises. The cases are analyzed and conclusions are arrived at by applying Schumpeter's concepts and model of creative destruction. The study uses the Action Research method to examine the impact of introducing current technology to the microenterprise.

Action Research

The Action Research method is employed in this study. Action Research applies methods and processes from the social sciences to practical issues and problems with the dual goals of resolving the problem and adding to the theory and knowledge of the area under study. Unlike most other research methods, researchers actively participate in the process and the resolutions. This enables the researcher to apply theory and to evaluate the accuracy and value of the theory. Action research uses a four-stage process: plan, act, observe, and reflect (Altrichter, Kemmis, McTaggart, & Zuber-Skerritt, 2002, p. 130). Specifically, action research is an interactive cycle in which the researcher begins with a plan of how to carry out the activity and then acts to intervene to solve the immediate problem. Next, the researcher observes the results of the intervention and finally he reflects on the impact of the intervention and determines the next steps. At this point, the process repeats itself until the logical conclusion of the project.

For each microenterprise, these four steps were followed. For the **plan** step, each microenterprise was interviewed, a diagnosis of the needs determined, and an implementation plan designed. It should be noted that the implementation plan is a cooperative effort by both the researcher and the microenterprise owner.

Figure 1 The spiral of action research cycle



Next for the **act** step, the implementation plan was carried out by the researcher together with the microenterprise owner. This stage ends with implementation of the interventions that attempt to resolve the identified problem. These intervention therapy tasks were classified according to the major categories of IT effects on development as detailed in Qureshi et al (2009). The act steps included both the implementation of technology as well as the training of the microenterprise staff in the use of the technology.

After completion of the intervention, the **observe** stage involves assessing the outcomes. The **reflect** stage involved an analysis of the answers to the questions and this analysis will determine how to proceed further as well as the level of success (or level of failure) of the interventions to move the microenterprise into the current technology paradigm.

Selection of Case Study Participants

The criteria for selection of microenterprises are: 1) They are the beginning stages of their IT adoption, very little or no experience with IT adoption, 2) They are willing and motivated to use IT to grow their business, 3) They operate with very limited resources, which include time,

money and skills, 4) They operate as of a community in which resources, information and skills are exchanged, and 5) They have a fear of technology and a resistance to its implementation.

This criterion is applied to three microenterprises. Each enterprise has been given a code for the purposes of this study as well as to maintain the organization's confidentiality. All businesses are owned and operated by the microenterprise owner who is the sole employee. All are located in Omaha, Nebraska.

Data Collection Strategy

The initial data collection was accomplished by interviews of open-ended questions designed to determine the nature of the microenterprise, the specific technology desired by the owner, and the owner's disposition and attitude toward both technology and working with the IT therapy organization.

During the action research process observations were made and follow-up interviews were conducted. The activities, contents and analysis of these observations and interviews were captured in a running journal at all stages of the process. Because of the nature of the process, only the first interview with the survey questionnaire was recorded. All other interviews were captured by note taking both during and shortly after the interaction or interview. These observations were transcribed to the running journal.

Analysis Mode

Determining if implementing technology, by itself, enables a microenterprise to survive and thrive is a difficult task. Many other factors and barriers can influence microenterprises. A preliminary analysis of the success or failure of the technology implementation can be gauged by interviewing the microenterprise owner after the implementation. This post-implementation interview can serve as a measure of how the technology is received by the owner and how it is impacting the business. This will be the method employed in this paper. Long-term analysis and follow-up interviews would better determine the success or failure of the IT intervention strategy.

Interviews and observations were used to collect data for this research. The questions for these were developed through the concepts described in the theoretical background.

In addition to the use of the concepts described in the Theoretical Framework section, several questionnaires were used. The initial interview was conducted using a questionnaire designed to determine the client's technology needs, their attitude toward technology, their attitude toward the intervention program, and the current technology knowledge skills and abilities.

Once the project began both observation and follow-up interviews were employed to track the clients' reaction, acceptance (or rejection) of technology, and their progress. It should be noted that as the researcher interacted with the clients, their willingness to discuss issues and objectives, as well as their general openness, improved. Discussions often moved from formal questions, to open-ended questions, to general give and take discussions.

Participants

Based on the above selection criteria, three micro-enterprises were chosen for this study. WR operates an Environmentally Friendly Lighting Provider whose objective is to reach international markets more effectively through a multi-lingual website, improve online customer experience and expand sales volume. DK runs a space planning and design company whose objective is to grow its customer base by establishing a distinct online presence. DL operates an environmental analysis business and wants a website to be able to attract more customers. The following sections illustrate the IT interventions conducted for each of the businesses:

RESULTS

WR: Environmentally Friendly Lighting Provider

WR specializes in providing energy efficient lighting to clients globally. The role is primarily as a middle-man between his Asian suppliers and clients. WR wishes to market his business globally. WR perceives his greatest technology needs to be acquiring the ability to modify his website himself and implement web functions including a light converter calculator and multi-language website translation capability.

IT Interventions

The light wattage to LED light wattage converter is a marketing tool for his enterprise. Such a converter, placed on the website will allow potential customers to determine their savings instantly, and without WR's intervention of time. As such this is also a customer service tool.

The translation capability will broaden WR's exposure to potential non-English speaking/reading clients. Because WR is marketing literally worldwide, this is an important tool for his enterprise, and will raise the level of his website.

WR's requests are to be able to edit and maintain his website, deploy language converters to his website, and implement a lighting watts to LED converter to his website. Having investigated the options, the researcher found the language converter is not expensive, but getting all the languages he wants may be difficult. Also, it is possible that his web provider has this capability and that may be a better alternative. The light convertor was more problematic as the type he desires does not appear to exist.

Training him to modify and customize his website was difficult as he did not have access to it directly and this must be provided by his Internet provider.

Outcomes of Interventions

WR has a working knowledge of some current technology including laptops and cell phones. Further, he has a working website and is only seeking training. Unlike the other two, he resides more in the current technology paradigm. He is seeking enhancements that will help his business. It is possible that these enhancements (website translation, light converter) are critical to his microenterprise survival in this paradigm; however it seems that other factors may be playing a larger role. For example, he has a large investment (relative to the other two) and requires a fairly large return per contract. This adds pressure and risk to the enterprise. If his venture fails, it may be due to more traditional business issues like under capitalization, lack of sales, or poor planning.

DK: Space Planning and Design Business

DK specializes in interior design with an emphasis on color coordination. DK markets in her host metropolitan area. She has been running her business for several years and has several other jobs and business ventures. Her clients are mostly individuals and small businesses. She

perceives her greatest technology needs as establishing a web presence and learning graphic image software.

IT Interventions

Training on Photoshop was performed by a researcher who is certified in the software package. The training was one-on-one, with one researcher performing the training and the other observing, but offering no comments. A basic training process was followed of explaining a process, showing the process, and then having her perform the process. Then the next process was taught which built on the previous one. Often the trainer would have her repeat a previous step or procedure, assumedly to reinforce that specific aspect of the training. At the end DK expressed great satisfaction with the training stating she had learned and absorbed more in that one session than in her previous class.

The purchase of Photoshop training book was recommended as Photoshop is necessary for her business because it will enable her to generate design layouts and examples to clients as well as display art for the gallery of her second website. Becoming competent in this software is a critical need, according to DK.

In order to begin working on this website, the DNS settings had to be modified to point to the Internet provider hosting her website in order to deploy the website development software. The following interventions have been completed: a) DK has activated her two websites, b) The website has been redirected to the site hosting the web development software. c) DK has provided materials for the design of the website - photos, samples, content, and d) Photoshop training has taken place and support materials purchased.

Outcomes of Interventions

DK was grateful and appreciative of the Photoshop training: “I have learned more in the first session than I did in the entire class I took.” Her confidence level appears to have increased with the product. DK uses a cell phone and carries a large laptop with a screen suitable for displaying her work. She has purchased the large screen intentionally to meet one of her perceived business needs - displaying product to clients. The issue then seems to be breaking the technology needs into specific needs, and having the client select the appropriate technology. Technology is not a

single term, but represents a multitude of products and functions. In this case appropriate technology translates, at this time, to:

- a) Cell phone of communication with clients and vendors
- b) Laptop with both Email, word-processing, Internet access, and Photoshop.

(Accounting software or Excel may be next, she has expressed interest in both.)

- c) Internet Access - both to communicate with clients and to perform research.
- d) A Web Presence - Website will enable marketing, and communication with clients.

DK uses the cell phone and laptop enough to meet her immediate needs. The mastering of Photoshop then the deployment of the websites and the ability to maintain them are the next critical needs. She had deployed the necessary and appropriate technology to meet her needs at the current time.

Viewing this through the lens of creative destruction, it appears that DK had moved from the old technology paradigm to the new paradigm in two ways. First, she had purchased and mastered enough features of a cell phone to meet her needs. This allows her to keep in more immediate contact with vendors and clients. Thus she has moved from the landline technology to the mobile cell phone technology. Second, she has mastered the use of a laptop including accessing the Internet and using wireless. This moves her from the old paradigm of researching by paper media to use of the Internet. Further, the use of word-processing, for example, allows her to develop flyers, write letters, and reports. Third, she uses email to communicate, a very common method to keep in touch with clients, vendors and others.

With the development of a Web presence and with the mastering of Photoshop, DK is moving from the old paradigm to the new one. In the case of the Web presence, a website is often seen as a sign of credibility. It is also a marketing tool which often replaces, or at least viewed as more productive, previous media including Yellow Pages, print media, flyers, and business cards. Deployment of a website allows her to both expose her business to more clients and compete with others operating over the Internet. The mastering of Photoshop also moves DK from an older paradigm of paper boards and hand created art to the modern paradigm of digital design creation. There are future technology moves DK is considering. One is the purchase of accounting software. Another is the mastery of spreadsheets for creating estimates and quotes. Both, if implemented, will replace current old paradigm paper methods.

DL: Sub-Contracting Environmental Analysis Business

DL specializes in environmental analysis for both businesses and government. DL started the business in January 2011. He is experienced in this field intending to offer his services to businesses and as a consultant to other firms on a subcontract basis. He markets nationwide, but believes this is limited by lack of an Internet presence. DL perceives his greatest technology need to be the development and deployment of a website including the training to maintain the site.

IT Interventions

The website was demonstrated to him. It was found to be rough, but it had all the information needed in it - location, contact, description. Things to add including his resume, picture of him, examples of work, testimonials, and customer incentives were discussed. Information he provided was added and a site was created. This includes the creation of a temporary logo, information on the business.

DL has already adopted some of the newer technologies. He is a heavy cell phone user as well as a heavy laptop user. When asked about these technologies, he said that he did not go for the newer items and technologies, but stayed with the more tested and established ones.

Outcomes of Interventions

The adoption of appropriate technology is necessary, in his eyes, for his ability to function. DL views the establishment of his company's presence on the Internet in much the same way as the use of the cell phone. It is necessary for the survival and growth of his enterprise. He sees a web presence not as just a method to advertise and promote his business, but also as a symbol of "credibility" because in his mind, to be a credible business you must have a web presence. Therefore, in his view, a website is an appropriate technology.

Another sign of "credibility" for him is the need for a company logo. This came up several times in the training sessions. Logos, in DL's mind, are something that a credible business has. DL has begun using certain technologies. He is familiar with MS-Word, Excel and PowerPoint -- "enough to get around". However, he would like to get better at them. He also uses a digital camera in his environmental survey work, but is not familiar with photo-software.

He expressed a desire to acquire and learn QuickBooks in an effort to automate his accounting and billing processes.

He is also interested in improving his marketing materials (brochures, stationary, and letterhead). To him this also is something that credible businesses have. The researcher mentioned MS-Publisher and its templates for newsletters, brochures, and business cards. He was unaware of the product, but then found that he has it on his laptop. He has no interest in moving his business into the social networking environment - Facebook, Twitter, etc. He argued that these take time that he cannot spare. The mobility of the web, and the mobility of the Internet, is also something he may attempt to take advantage of, mentioning that with a laptop he can work from anywhere and anytime, including maintaining his website.

ANALYSIS

It appears from the results thus far that, microenterprises that reside in the old techno-status quo may be at a distinct disadvantage and may risk their economic sustainability unless they move into the current techno-status quo. It appears that they go through a process that may involve 1) Assessing current technology of the microenterprise, 2) Assessing and prioritizing the “appropriate” technology needs in the current techno-status quo that affect the microenterprise, 3) Assessing the capability and wiliness of microenterprise to learn and adopt new technology, 4) Prioritizing the implementation process, and 5) Implementing the new technology and required training and support.

Desire for Global to a Local Web Presence

The advent of the global communication and the Internet can be understood in Schumpeter's model as new innovations that have dramatically reshaped the marketplace enabling microenterprises to participate from a local to a global level. The responses of the three microenterprise owners reflect this new market reality. All see the need for a web presence to increase the visibility and market their products. However, the scope of this presence varies from a global presence down to a local presence.

WR is the most global in his outreach and scope. His website focuses on a truly international market with products from China and customer contacts ranging from the Middle

East, to the US, to South America and to Europe. Converting his website to multiple languages is a reflection of this global reach.

DL has chosen to focus on a more national market and, while not adverse to international business, views his clientele as US-based. However, while the market is US-based, the web presence is viewed as critical to the success of his enterprise.

DK's chosen market is local to Nebraska and specifically Omaha, but she too sees the potential of national clients reached through a web presence.

Existing Technology

At the time of the study, all three microenterprise owners used some form of technology. All had cell phones that they carried with them and used frequently for both personal and professional calls. All three owned and used laptop computers from which they performed various functions including accessing the Internet, checking email, and performing basic word-processing.

Table A lists the technology of the microenterprise at the time of the project.

Table A - Existing Technology and Desired Technology

Technology	Status
Cell Phone	DK - used for communication DL - used for communication WR - used for communication
Laptop	DK - used for email, Internet access, word-processing DL - used for email, Internet access, word-processing WR - used for email, Internet access, word-processing
Business Website and Web Presence	DK - Recognized need for marketing and advertising DL - Recognized need for marketing and credibility as a viable business WR - Working website, developed by third party
Specialized Software	DK - Owned Photoshop, recognized the need for training to take full advantage for her business. DL - Saw no need for specialized software at this time. WR - Saw no need for specialized software at this time.

All three microenterprise owners perceived the need for their own Internet presence in the form of a website. For example, DL determined and was most interested in establishing a marketing presence by implementing a website. DK was also interested in a website for marketing purposes, but also software training. WR's focus was on being able to maintain and

change the organization's website, apply multiple languages to it, and add a standard light wattage to LED wattage conversion calculator.

All three subjects agreed that having an Internet presence is necessary and vital to the survival of a business in today's economic environment.

WR is especially interested and concerned with using his website as marketing tool. For example, he wants to place a light wattage to LED light wattage converter on his site. Such a converter, prominently position on the website will allow potential customers to determine their savings instantly, and without WR's intervention of time. This is both a marketing tool and a customer service tool. A website translation capability will broaden WR's exposure to potential non-English speaking/reading clients. Because WR is marketing literally worldwide, this is an important tool for his enterprise, and will raise the level of his website.

DL went on to say, "Without a website you are not a credible business." To DL a website was more than just a tool for marketing and communication; it was also a sign that the business was valid, viable, and credible. Thus, an Internet presence not only brings tangible results, but also intangible results as well.

Training

Training is a recurring theme with the microenterprise organizations. WR is looking to be able to change his website, as are DL and DK. All want that control, ability to customize, and venter independence. However, all three stated that they need training and none feels confident enough to attempt to teach themselves how to modify their sites. This may be out of fear, or a lack of time, or from bad previous experiences.

DK was especially grateful for the one-on-one Photoshop training. She reported that she had taken a class in it before but that the instructor did not teach at a level she understood. She said, "I have learned more in the first session than I did in the entire class I took." She expressed more confidence in her abilities.

Appropriate Technology

One of the aspects of appropriate technology is that of costs. As noted, in developing countries, inexpensive cell phones are purchased over the more expensive ones with extra features. The opposite occurs in Western developed countries. However, for the microenterprise, this is an

important distinction. Both DL and DK have attempted to develop their websites as cheaply as possible, incurring as little expense as possible. They are using inexpensive hosting sites. This is not the case with WR, who has purchased from a provider that built his website and provides additional marketing services. He admits to a substantial investment incurring a heavy debt for a startup enterprise. However, his site has features not present with the others, including a list of each organization that views the site. WR admits he did little research before purchasing from his current Internet service provider.

Assessing the current technologies (or lack of technology) is the first step in determining both the needs of the microenterprise as well as where they reside in the previous techno-status quo. Second is identifying the technologies needed to move to the current techno-status quo. For example, to reach customers is a website needed? To communicate better with clients and customers is email notification to the cell phone a good solution? This assessment will include the costs involved in time, training, and money.

In working with the three microenterprises, the importance of the concept of *appropriate technology* is highlighted (See Kaplinsky, 2011). All three microenterprise owners want to improve their Internet presence. All recognize this as a critical issue. And all want to have control over the content, as well as the knowledge to exercise that control. Their website is becoming the “front door” to their business. Further, the web has few boundaries, so this becomes a tool to expand their market. The secondary needs are different for each microenterprise. DL is focused solely on improved Internet presence and exposure as his appropriate technology. WR has secondary issues - multiple language translators and a light convertor. But, these are web enhancements, so he too has primary focus on the web. However, he also wants software to prototyping and presenting light display and savings. DK has a secondary web/Internet focus in deploying a second website. Photoshop training is also critical.

The mind-set and willingness of the microenterprise owners and staff should be considered. Two theories that will assist in this analysis are the Theory of Planned Behavior (TPB) and the Technology Acceptance Model (TAM). The Theory of Planned Behavior argues that human behavior is guided by three kinds of considerations: beliefs about the likely outcomes of the behavior and the evaluations of these outcomes (behavioral beliefs), beliefs about the normative expectations of others and motivations to comply with these expectations (normative beliefs) and beliefs about the presence of factors that may facilitate or impede performance of the

behavior and the perceived power of these factors (control beliefs) (Ajzen, n.d., p. 1). Behavioral beliefs produce an attitude toward the behavior; normative beliefs lead to perceived social pressure, and control beliefs lead to ideas of behavioral control. These will combine and influence the intention of the individual to change (or not change) their behavior. Finally, given sufficient control, the individual is expected to change their behavior.

The Technology Acceptance Model (TAM) (Davis 1989, Venkatesh 2000, Venkatesh and Davis 2000) argues that the perceived usefulness and the perceived ease of use of technology will impact the users attitude toward using the technology, the intent of the person to use the technology and then the actual use of the technology. When prioritizing the intervention process, there may very well be technologies too expensive to implement or ones that require too much time and training. It may be necessary to start with simple and inexpensive implementations to demonstrate the effectiveness and need to migrate to the microenterprise owner and staff. Once the new technology has been implemented, it is important to track the effectiveness of the new technology.

Creative Destruction in Technology Implementations

Viewing the technology implementations through the lens of creative destruction helps explain the situation microenterprises find themselves. Schumpeter (1942) argued that through the ongoing process of creative destruction innovators are constantly impacting and changing the marketplace by implementing new innovations that result in the demise of old products and process to be replaced by new more effective, efficient, and desirable processes and products. Enterprises that do not adapt to and adopt the new innovations risk perishing. In all three cases, the microenterprise owners viewed themselves at a disadvantage by not possessing an Internet presence. Applying the creative destruction model, that lack of an Internet presence places them in the pre-Internet paradigm from which they need to move to the current Internet-paradigm. DK's need for Photoshop expertise is another example of a microenterprise needing to move from an outdated "paper layout method" to a digital graphics method.

It appears that IT interventions do improve the ability of microenterprises move to, survive, and thrive in the current technological paradigm. All three case studies participants indicated that creating or enhancing their current an Internet presence would improve their marketability as well as customer service. DL also expressed the idea that an Internet presence

adds credibility to the business within the business community. DK recognized the value of the Photoshop training to improving her business. However, a note of caution, technology expertise and usage are just single elements of a microenterprise's survival. Other factors play a role as well. For example, WR's financial situation may end up influencing his ability to survive more than the technology factor.

Technology is not a monolithic entity, but a series of innovations. This point means that there may be streams of technology innovations moving through the marketplace both over time and at different rates. This places an importance on selecting and rejecting the correct technology. For example, while all three had adopted cell phone use and laptop computers and all three wanted an enhanced an Internet presence, only DK expressed an interest in social networking. Technology is composed of multiple innovations taking place at the same time. Therefore the issue is not just moving from the old paradigm to the new paradigm, but deciding which innovations to adopt and which to bypass.

Related to the multiple flow and types of technologies in the marketplace is the issue of why specific technologies are adopted without the need for intervention while others seem to require an intervention process. Each microenterprise owner had moved in some way to a current technology paradigm. For example, all three used cell phones and email as their primary means of communication. In addition, all three owned laptop computers and were familiar with accessing the Internet. However, two of the three had no website and no Internet presence, and felt the need for support in creating this presence. All felt the need for one-on-one training on maintaining the sites.

The Technology Acceptance Model (TAM) may also help explain this. TAM (Davis 1989, Venkatesh 2000, Venkatesh and Davis 2000) argues that perceived use of the technology and the perceived ease of use influences the user's attitude toward technology. Cell phones are relatively easy to use and laptops have become established over time and their core products (email, Internet access, word-processing, and presentation software) are also both accepted and relatively easy to use plus the microenterprise owners have learned over time how to use them, at least for their needs. However, the products that these three wish to use are products they are not familiar with and that they appear to be intimidated by. While the first requirement of TAM, that the software is of perceived use, is met, the second aspect, ease of use, is not. None of the three appears to believe that setting up their website is something they can do on their own. Further,

DK appeared intimidated by Photoshop until she received the one-on-one training. TAM supports the concept that training overcomes this type of fear.

These cases appear to show that appropriate technology implementations are important. Cell phones, laptops, and email are viewed as appropriate technology in these cases. Internet presence is also viewed as appropriate. However, social networking is rejected by two of the three owners at this time. DK views Photoshop as appropriate, while DL is focused strictly on an Internet presence. The website acquisition process of the three cases may be instructive here. DK and DL acquired their domains and services much more cheaply than WR. This placed a much less financial burden on them, than on WR. It may be that WR's purchase is "appropriate" for his business, but it appears to violate the concept of appropriate technology.

Conclusions and Future Research

By assessing the effects of appropriate technology interventions in three micro-enterprises, this research has investigated how microenterprises can adopt technology to move to a new technological paradigm, survive and thrive. This research has shown that the use of technology by microenterprises helps move these businesses into the current technology paradigm and enables them to better compete, prosper and survive. This appears to be the case whether it is the adoption of Photoshop by a US microenterprise owner or cellphones by subsistence farmers in Africa.

Follow-up observations, additional interviewing, and analysis are necessary to determine if the technology interventions indeed have the impact of enhancing the survival and growth of the microenterprises. More studies are needed focusing on the impact of technology on the microenterprises. Additional enterprises should be studied in different locations and assessments made over a longer period of time to see if they are able to weather the process of creative destruction. In addition, an analysis of past studies would enable the results of this research to be triangulated.

A limitation of this investigative study is the lack more cases. Additional cases would benefit this area of study. Such additional research may open avenues for quantitative study of this subject. Another avenue of future research is the investigation of what technologies microenterprise owners adopt without the need of intervention compared to the technologies they perceive require technical support and intervention. This research indicates that not all

technologies are feared and rejected by microenterprise owners. Independent adoption may be include the actual or perceived ease of use of the technology, the dominance of the technology in the market place or in the overall society, its cultural acceptance, or the need of the microenterprise owner to use the technology, to name a few.

REFERENCES

- Ajayi, S. I. (2003). Globalisation and Africa. *Journal of African Economies*, 12(1), 120-150.
- Ajzen, I. (n.d.). Behavioral interventions based on the Theory of Planned Behavior. *Icek Ajzen:Homepage*. Retrieved January 24, 2011, from <http://www.people.umass.edu/aizen/tpb.diag.html>.
- Altrichter, H., Kemmis, S., McTaggart, R., & Zuber-Skerritt, O. (2002). The concept of action research. *The Learning Organization*, 9(3/4), 125-131.
- Bauer, J. M. (1997). Market power, innovation, and efficiency in telecommunications: Schumpeter reconsidered. *Journal of Economic Issues*, 31(2), 557-565.
- Castells M. (2000). *The information age economy, society and culture. Volume 1: The rise of the network society*. Oxford: Blackwell.
- Cell phones and election polls: An update. (2010, October 13). *Pew Research Center Publications*. Retrieved February 13, 2011 from <http://pewresearch.org/pubs/1761/cell-phones-and-election-polls-2010-midterm-elections>.
- Christensen, C. M. (1993). The rigid disk drive industry; A history of commercial and technological turbulence. *Business History Review*, 67, 531-588.
- Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly*, 13(3), 319-340.
- Duncombe, R. & R. Heeks, (2002). Enterprise across the digital divide: Information systems and rural microenterprise in Botswana. *Journal of International Development*, 14, 61-74.
- Duncombe, R. & R. Heeks, (2003). An information systems perspective on ethical trade and self-regulation. *Information Technology for Development*, 10(2), 123-139.
- Giddens, A. (2003). *Runaway world: How globalization is reshaping our lives*. New York: Routledge.
- Held, D., McGrew, A., Goldblatt, D., and Perraton, J. (1999). *Global transformations: Politics, economics, and culture*. Stanford: Stanford University Press.

- Hirst, P. and Thompson, G. (1996). *Globalization in question: The international economy and possibilities of governance*. Cambridge: Polity Press.
- Kamal, M., Good, T.G., & Qureshi, S. (2009, January 5-8). Development outcomes from IT adoption in micro-enterprises. Proceedings of the 42nd Annual Hawaii International Conference on System Sciences (HICSS-42), Waikoloa, Hawaii.
- Kamal, M., Qureshi, S., and P. Wolcott. (2010). How can Information Technology be adopted by Micro-enterprises? Guidelines for sustainable development. In Frank Teuteberg and Jorge Marx Gomez (Eds), *Corporate Environmental Management Information Systems: Advancements and Trends*. IGI Global 2010. DOI: 10.4018/978-1-61520-981-1.
- Kaplinsky, R. (2011). Schumacher meets Schumpeter: Appropriate technology below the radar. *Research Policy*, 40(2), 193-203.
- Long, C. (2010, May 3). The end of the pay phone: One time public mainstay easing into obscurity. *LJWorld.com*. Retrieved from <http://www2.ljworld.com/news/2010/may/03/end-pay-phone-onetime-public-mainstay-easing-obscu/>.
- Not Just Talk. (2011, January 27). *The Economist*. Retrieved February 3, 2011, from <http://www.economist.com/node/18008202>.
- 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* (pp. 500-509). Presented at the Americas Conference on Information Systems, Omaha, NE.
- Qureshi, S., Kamal, M., and P. Wolcott. (January 2009). Information technology therapy for competitiveness in micro-enterprises. *International Journal of E-Business Research*, 5(1), 117-140.
- Robertson, R. (1992). *Globalization: Social theory and global culture*. London: Sage.
- Scholte, J.A. (2000). *Globalization: A critical introduction*. New York: St. Martins Press.
- Schumacher, E. F. (1973). *Small is beautiful: Economics as if people mattered*. New York, NY: Harper Perennial.

- Schumpeter, J. A. (1942). *Capitalism, socialism, and democracy*. New York, NY: Harper & Brothers.
- Servon, L. (2006). Microenterprise development in the United States: Current challenges and new directions. *Economic Development Quarterly*, 20, 351-367.
- Sen, A (2002). Globalization, inequality and global protest. *Development*, 45(2), 11-16.
- Spencer, A. S., & Kirchhoff, B. A. (2005). Schumpeter and new technology based firms: Toward as framework for how NTBFs cause creative destruction. *International entrepreneurship and management journal*, 2(2), 145.
- The power of mobile money. (2009, September 24). *The Economist*. Retrieved February 3, 2011, from <http://www.economist.com/node/14505519>.
- Tripsas, M. (1997). Unraveling the process of creative destruction: Complementary assets and incumbent survival in the typesetter industry. *Strategic Management Journal*, 18, 119-142.
- Venkatesh, V. (2000). Determinants of perceived ease of use: Integrating control, intrinsic motivation, and emotion into the technology acceptance model. *Information Systems Research*, 1, 342-365.
- Ventatesh, V. & Davis, F. D. (2000). A theoretical extension of the technology acceptance model: Four longitudinal field studies. *Management Science*, 46(2). 186-204.
- Wallerstein, I. (1974). *The Modern world system*. New York: Academic Press.
- Yunus, M. - Biography. (n.d.). *NobelPrize.org*. Retrieved February 12, 2011, from http://www.nobelprize.org/nobel_prizes/peace/laureates/2006/yunus-bio.html .