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ABSTRACT

Research has shown that when small firms are able to adopt and use Information technology, they can grow faster than firms that don't adopt technology. It has also been stated that microenterprises have the potential to serve as the seedbed for industrialization. But in order to reach their potential, they face a myriad of challenges obstructing their path. A major obstacle to the cause is their inability to utilize technology to its full capability. This paper walks through an innovative approach within two microenterprises to show how cloud-based applications may facilitate IT adoption within these firms. Findings from the case study shed insight for researchers & practitioners involved in using IT to assist microenterprises in underserved regions.

Keywords

Microenterprise, information technology, cloud, adoption, intervention.

INTRODUCTION

Historically, microenterprises (MCs) have been considered the backbone of the U.S economy. This form of business has the characteristic of comprising between 1 – 5 employees. According to the Association for Enterprise Opportunity (AEO), there are over 23 million MCs in the U.S making up 87% of all businesses within the country. MCs are the dominant form of business in both developing as well as in many underserved regions of developed countries. Grosh and Somolekae (1996) have stated that MCs have the potential to serve as the seedbed for economic development. But it is seen that this potential of many MCs are hindered from growing and functioning efficiently by an inability to use information technology effectively (Schreiner and Woller, 2003). Although, it is not the primary engine of growth, the micro enterprise sector is very important for broad-based development, and for basic household economic survival (Leidholm & Mead, 1999). MCs play a very important role in generating jobs, developing business skills, and providing needed goods and services to a community (Duncombe and Heeks, 2002). Barriers to starting these enterprises are generally low, households or individuals may engage in more than one micro enterprise, or may use one to augment or temporarily replace wage salaries. It has been seen that when IT is used within the context of small and medium-sized enterprises (SMEs), significant benefits are achieved. In a report by Qiang *et al.* (2006), it was stated that businesses can grow at a rate of 3.4% faster in terms of sales when email is used for customer communication. In the same fashion, 4% increase in sales as well as 5% increase in export performance was obtained when e-business techniques were adopted by SMEs in the manufacturing sector in Canada (Raymond *et al.,* 2005). It has also been shown that profitability gains can come from cost savings rather than from increase in sales (Southwood, 2004). Although current literature supporting the utilization of technology by SMEs exists, in practice, the scenario is quite different in the case of MCs. Most studies in the field of Information Systems have focused on SMEs. Few studies have focused on issues relating to MC and therefore, are an under-studied topic. Traditional theories of technology adoption and diffusion do not adequately explain the manner in which these types of businesses adopt and utilize technology (Furuholt and Orvik, 2006; Riemenschneider *et al.*, 2003). In a study by Wolcott *et al.* (2007) on a set of MCs in an underserved region in North Omaha, it was seen that although the latest state-of-the-art technology was awarded to these entrepreneurs to assist them with their businesses, most entrepreneurs had not even opened the packaging within which these technologies were contained six months after they had received them! Qiang *et al* (2006) also showed that among micro firms, only 27 percent use e-mail and 22 percent use Web sites to interact with clients and suppliers. The few studies that have shown how small businesses may benefit from adopting IT were very restrictive in the nature of the technologies being used. These past studies utilized applications that were installed on stand-alone PCs. These types of technologies may be feasible for SMEs, however, due to tight resource constraints, MCs are unable to afford such applications and therefore cannot incorporate them for their businesses and lose out of any potential gain from the technologies. A new category of technologies that have recently emerged termed, cloud computing or cloud-based applications/services may serve as a

promising alternative to resource-constrained MCs. Essentially, in a cloud computing architecture, hardware and software services are stored on web servers, the "clouds", rather than spread over single computers. This allows users to access information from anywhere they have internet connectivity. Such architecture has sociological implications by delocalizing hardware and software resources, cloud computing changes the way the user works as he/she has to interact with the "clouds" on-line, instead of in the traditional stand-alone mode (Aymerich et al., 2008). In this study, we investigate this new opportunity offered by the cloud computing architecture within the realm of MCs. Specifically, we address the research question, *Can cloud computing architecture facilitate IT adoption in MCs?* The contribution of this paper is in the findings from carrying out two in-depth case studies that shows how resource-constrained MCs may adopt and use cloud-based applications to gain business efficiencies. Findings from the case studies shed insight to researchers & practitioners involved in using IT to assist MCs in underserved regions.

BACKGROUND

MCs 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). Dandridge (1979) mentions that organizational theories that were developed as a result of studying large organizations, do not explain the true structure and management principles actually encountered in small businesses. Welsh and White (1981) state that "a small business is not a little big business" and show that with respect to financial management practices (cash flow, break-even analysis, return on investment, and debt-equity ratio), the analytical models applicable to large businesses do not apply. Small businesses also face greater risks when investing in technology (Senn et al. 1981). The skills, time, and staff necessary for planning are not major issues in large businesses, yet these same issues represent most of the difficulties in small businesses (Thong 1999). Subsequently, these issues are more prevalent in MCs. A study by Street and Meister (2004) has shown that Information Systems (IS) play a major role in small firms looking to grow. One of the key findings in that study is that in order to support the internal transparency of the firm during its growth phase, there is a need for an appropriate IS to be incorporated at a very early stage – even before many of the other structural or organizational changes are initiated. Small businesses can also harness the power of 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 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. There have also been some studies that have investigated the effects of vendor-approach as opposed to consultant-vendor approach in the implementation of information systems in small businesses and found that small business owners favored the vendor-approach in implementing operational systems such as accounting systems, inventory control, sales order processing, sales analysis, payroll, and purchasing (Thong et al. 1994; Thong et al. 1996). There is an emerging category of technology, termed cloud computing that may have the potential to benefit small and micro enterprises. A cloud computing architecture has hardware and software services stored on web servers, the "clouds", rather than spread over single computers (Aymerich et al., 2008). Cloud-based services can be categorized into three models: (i) Software as a Service (SaaS), (ii) Infrastructure as a Service (IaaS), and (iii) Platform as a Service (PaaS). In a SaaS infrastructure, service providers make available applications for personal and business use such as MS Exchange and Quickbooks. IaaS on the other hand, offers hardware services which may include virtual and physical servers. And lastly, PaaS provides a framework and tools for developers to build their own applications. Online content management systems and website building services are examples of this infrastructure. Cloud computing offers several technical and economic benefits. In terms of technical advantage, it is possible to use the processing power of the cloud to do things that traditional productivity applications cannot do. For instance, users can instantly search over GBs of e-mail online, which is practically impossible to do on a desktop. One of the greatest advantages is that the user is no longer tied to a traditional computer to use an application, or has to buy a version specifically configured for a phone, PDA or other device. Any device that can access the Internet will be able to run a cloud-based application. Regardless of the device being used, there may be fewer maintenance issues. Users will not have to worry about storage capacity, compatibility or other matters. Cloud computing infrastructure allows enterprises to achieve more efficient use of their IT hardware and software investments: it increases profitability by improving resource utilization. Pooling resources into large clouds cuts costs and increases utilization by delivering resources only for as long as those resources are needed. Aymerich et al. (2008) mentions that cloud computing is particularly beneficial for small and medium businesses, where effective and affordable IT tools are critical for helping them become more productive without spending a great deal of money on in-house resources and technical equipment. The following section outlines the research design used to investigate the adoption of cloud-based applications in MCs.

METHODOLOGY

This study uses an inductive interpretive case study (Walsham 1995) to understand how MCs may adopt IT. An action research methodology (Baskerville 1999) is used to apply IT interventions within two MCs in Western New York and the results analyzed. The research design used is shown in figure 1 below.
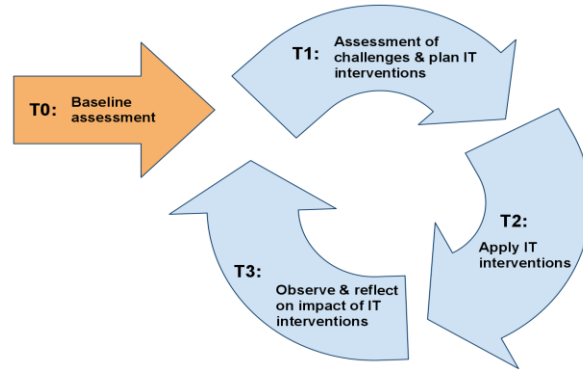
Figure 1. Research design

As seen in the figure above, there are four distinct stages at which activities will be conducted. At T0, the researchers 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 MC. At T2, the actual IT interventions will be applied. At stage T3, the researcher will evaluate whether the IT interventions applied to the MC 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. The researcher will then integrate all the data from the interviews and observations and carry out a case analysis to discover how IT may be adopted by the MCs.

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. GS is a small gift shop located on the main street of a small town. The shop specializes in the sale of collectibles, novelties, souvenirs, and other various gift items. GS has been in business 14 years. The second microenterprise, CF is a pet grooming salon and boutique. CF offers many services such as hair and nail cutting on many different types of pets and also retails a wide range of pet products. CF started the business four and a half years ago as only a pet grooming salon and opened the pet boutique part of her business only a year ago.

RESULTS FROM THE CASES

T0 – Baseline Assessment

The researchers met with the micro-entrepreneurs and asked them 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.

GS	CF
- Has a positive attitude of IT - Is open to adapting technologies - Can adopt new IT with the help of someone teaching him	- Has a positive attitude of IT - Is aware of potential efficiencies IT can bring to the business - Tends not to adopt new technologies when she is informed of them because of the time required to learn the technology

Table 1. Baseline Assessment Summary

T1 – Assessment of Challenges

The interview responses from the T0 stage provide an initial glimpse as to how the micro-entrepreneurs view technology and how IT may potentially help their businesses. Once the initial assessment is completed, the researchers then interviews the micro-entrepreneurs again – also 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 MC (Table 2 below). Doing so will enable the researcher to decide on an appropriate IT interventions to apply in that MC.

GS	CF
- Would like to market his products better - Lacks time due to being sole owner - Lacks IT skills - Objective is to increase sales by retaining customers and establishing new customers. - He has advertised in local papers & on radio - Would like to get a better return on investment with his marketing funds. - Would like to use IT to help market the business	- Relies on family & friends for IT support - Self-taught basic computer skills - Has posted advertisements in local newspapers & attended several expos to market the business - Wishes to branch out into the web domain to attract more customers. - Limited IT skills prevents her from learning new IT skills - Lacks time

Table 2. Assessment of Challenges Summary

It is apparent from the above table, that both the micro-entrepreneurs have similar profiles. Their main objective is to better market their small business and increase sales by reaching out to more customers. They both have limited IT skills and the biggest obstacle is lack of time that they can devote to learning IT on their own. However, both micro-entrepreneurs realize the importance of the Internet in being able to facilitate them in reaching out to more potential customers.

T2 – Apply IT Intervention

The following lists the interventions that were carried out for GS:

1. Social media: Facebook. The owner had never used Facebook before but saw the value in having a business page because of the vast audience Facebook has. GS could notify customers about new sales and also link to and from the newly created website. Facebook is also free and provides a very user friendly experience. Establish online web presence: GS owner wants to create a simple static website promoting his business. This website would mainly serve for informational purposes such as giving potential customers information about his store and products or services he offers. The website will have a links to GS owners other media outlets so everything will be connected.

2. Create a new website: Weebly. The main goal of the website was to provide information to customers about the business such as current sales, product lines, contact information and the location. The first attempt at creating a website was with using Joomla a content management system. The plan was for the researchers to set up the initial site and then the owner could easily update his website without having to code anything, all from within a web browser. The owner did not feel comfortable using the Joomla backend to make updates to the website. He took it upon himself to find an alternative solution. He found Weebly. This is an easy to use, drag and drop webpage creator which is entirely web-based. Weebly has both a free and premium version of its service. The owner was able to form a vast majority of his Weebly based site in only one day.

3. Research a method to manage promotional email to customers: Mail Chimp. GS had purchased a software package with several applications for small businesses. This package was inexpensive and the owner never got the email marketing software to work properly. He had investigated Constant Contact himself but found that it could be very expensive. Mail Chimp was the best solution. Once again, this service is managed entirely from a web-based interface with several options for integration with other email services and applications. The service is free when there is 1000 or less subscribers and less than 6,000 emails are sent a month. After that, plans just start at $15 a month. This is an affordable and scalable way for GS to send and manage his email marketing campaigns.

The following lists the interventions that were carried out for CF:

1. Create a website for the business - Weebly: CF wanted a website for her business more than any other IT solutions suggested by the researchers. Weebly, a web-based website creation tool was proposed for the business to use. Weebly offers both free and premium services so that as CF's website grows, getting a premium service becomes a more suitable option. With no prior webpage development experience, CF would need numerous hands on training sessions. Weebly

is very user friendly in that users can simply drag and drop elements into their webpage and publish the page with the click of a button.

T3 – Observe and Reflect

Following is a description of the observations made in GS as the interventions were being carried out.

GS was very enthusiastic about these interventions at first. The first intervention carried out was having GS set up a Facebook page in which he was able to do on his own. The only minor issue he had was uploading pictures to Facebook. He was able to take pictures of his business on a digital camera and then, with some help, get the pictures and put them on Facebook. Within days, GS uploaded more pictures on his own and became friends with a neighboring business on Facebook. He really liked the ease of use Facebook provides.

A basic website was created with Joomla for GS. When the owner was shown how to update the site from the backend interface, he seemed somewhat lost. Further training on Joomla yielded more resistance. GS wanted a website service that was simpler to use. He felt that he would not be able to use Joomla on his own without any support in the future. He took the imitative and found a tool he feels more comfortable using. GS found Weebly.com which provides a more user friendly interface and simple drag and drop webpage creation. He was able to create a website over the course of one day on his own. GS is very excited with what he was able to do by himself already. He is really seeing the true potential in what he can do with his website and is gaining confidence sustainability.

The owner was shown MailChimp.com for addressing his email marketing campaigns. He seemed somewhat interested but a little hesitant at first. GS was given a walkthrough of an email campaign in mail chimp. He even said "Mail Chimp seems very user friendly." It was not until after the walkthrough that GS performed a mail campaign on his own. This shows that given the proper training, GS was able to apply what he learned.

Following are the researchers' reflections of the impact that the IT interventions created in GS.

Overcame fear of technology: During website intervention, GS demonstrated that he was able to overcome the little fear of technology that he had. He was afraid he would not be able to use Joomla on his own and took it upon himself to find a suitable alternative. When he found what he wanted; Weebly, he was able to quickly adapt it to his business and the fear was gone.
Eagerness to learn: From the first session, GS was always eager to learn. After each successful intervention, the trust and eagerness grew more.
Improved attitude towards IT adoption lead to IT acquisition: After GS was able to create a website on his own with Weebly, he felt like he could be more in control of his website and felt he could be able to update and maintain the website on his own. He is considering purchasing a domain name and possibly upgrading to Weebly's premium service in the future.

Following is a description of the observations made in CF as the interventions were being carried out.

During the first couple of sessions CF seemed somewhat uncomfortable at learning this new technology. She had trouble dragging elements onto the webpage. She would become mildly frustrated at times, but with the support of the researchers, she was able to do what demonstrated to her by the end of each session. On following sessions she would not always remember how to do certain things in Weebly, but after a few attempts she was able to figure it out most of the time. By the end of the series of sessions, CF seemed to be more and more eager to learn and develop her website.

Following are the researchers' reflections of the impact that the IT interventions created in CF.

Process/task improvement: CF was shown how to upload pictures and write captions on her webpage. Towards the end of the series of sessions, she was able to log on to Weebly and make the updates all on her own.
Overcame fear of technology: The owner was able to use Weebly on her own without the help of the researchers.
Eagerness to learn: By the sixth session of the intervention, the researchers entered the shop to find the owner already on her laptop and using the tool that was used in the previous session. This showed the researchers that the owner was ready and eager to learn more.
Increased confidence in technology use: The owner was willing to learn how to use Weebly from the first session; however she seemed to get easily frustrated at times. By the last few sessions of the interventions, the owner became less frustrated and more confident in herself and the technology.

DISCUSSION

From the two cases described in this paper, it is apparent that both the MCs were able to benefit from a systematic learning and adoption of IT. What is interesting is the notion that the nature of the technology solutions were all internet-based or in

other words, cloud-based. The social media and the email marketing interventions that were carried out clearly conform to a SaaS infrastructure allowing businesses to utilize them as marketing services. The website development intervention on the other hand, provided the support for a development framework that aligns with the PaaS infrastructure. Neither of the businesses needed to purchase any form of stand-alone applications in order to meet their business marketing needs. By utilizing applications on the internet platform such as online social networking sites as well as online content management systems, the micro-entrepreneurs that had very limited IT skills and no prior website development skills, were able to set-up and develop customized website for their respective businesses within a very short amount of time. These two case studies show strong preliminary evidence of the benefits of such cloud-based applications to small businesses. With cloud based technologies, system maintenance and reliability issues are in the hands of the service provider which has a technical staff whereas in a standalone PC based environment, the technical issues are in the hands of the business owner. The business owner may not have the technical expertise required nor financial resources to provide their business with the much needed security, reliability, and maintenance support. Cloud services also tend to be very cost effective and offer great scalability. This provides small businesses the ability to grow without the need to worry about hardware and software upgrades. With tiered pricing models that many cloud services provide, barriers to entry are reduced thus giving small businesses quality software and services at an affordable rate. As more and more applications transfer to the cloud, costs related to IT purchase and maintenance will drastically reduce thereby facilitating micro and small businesses to join the bandwagon of their larger counterparts in benefitting from the efficiencies that IT can create making them more competitive in the economy. Taking into consideration the various obstacles that MCs face in adopting technology, cloud-based applications and services serve as a viable option for easy adoption of technology.

CONCLUSION

This paper detailed two case studies of MCs to show how cloud-based applications are amenable for adoption through a very contextualized and systematic approach. This approach entails understanding first how the micro-entrepreneur perceives or views IT and then understanding the business forms the foundation on which appropriate IT interventions need to be designed and applied to create the most impact. For this study, the IT interventions were fully cloud-based and results from the cases reveal that such applications allow MCs to quickly and economically adopt and use IT to bring about efficiencies. With more proliferation of cloud-based applications and services, MCs will have a wider variety of technologies to take advantage of moving them towards industrialization. Future research will investigate different MC to address cloud-based application adoption issues such as; whether the type of industry would have an impact, the type of customer base being served, and various risks associated with cloud-based applications.

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