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Mehruz Kamal

The College at Brockport, mkamal@brockport.edu

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FACILITATING SOCIOECONOMIC DEVELOPMENT THROUGH CLOUD-BASED SERVICES IN MICRO-ENTERPRISES

Mehruz Kamal

The College at Brockport, State University of New York

mkamal@brockport.edu

ABSTRACT

Cloud based services offer an opportunity to support the growth and development of micro-enterprises by enabling low cost Information and Communications Technology solutions delivered over the Internet, to be made available to them so that they may adopt with little effort or skill. Since the ability of micro-enterprises to adopt technology depends upon the unique conditions in which they find themselves, the goal of this research is to investigate the ways in which Cloud based services may support the growth of micro-enterprises to facilitate socioeconomic development. In this study, we do this through an in-depth analysis of two case studies of micro-enterprises in the Western New York region.

Keywords

Cloud computing, micro-enterprises, socioeconomic development, information technology

INTRODUCTION

In the United States, there are over 25 million micro-enterprises, which encompasses 88% of all businesses. In New York State alone, 90% of all businesses are micro-enterprises. Micro-enterprises have the potential to serve as the seedbed for economic development (Grosh et al. 1996). Yet many micro-enterprises are hindered from growing and functioning efficiently by an inability to use information and communication technology (ICT) effectively (Honig 1998; Hyman et al. 1998). There is some research that suggest the benefits of ICT use within small businesses. Businesses can grow at a rate of 3.4% faster in terms of sales when email is used for customer communication (Qiang et al. 2006). Although current literature supporting utilization of technology by small businesses exists, in practice, this is not the scenario in the case of 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. 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 ICTs. The challenge for global development lies in enabling these micro-enterprises to adopt the appropriate ICT solution that fits their needs. Often the tools available to them are either too expensive or require more resources than they have available. Cloud computing offers an opportunity to support the growth and development of micro-enterprises by enabling low cost ICT solutions delivered over the Internet to be made available to them so that they may adopt with little effort or skill. Since the ability of micro-enterprises to adopt technology depends upon the unique conditions in which they find themselves, the goal is to facilitate this by investigating and assessing the ways in which Cloud computing functionality and processes may support the growth of micro-enterprises. Subsequently the research question being addressed in this study is, *what is the impact of adopting cloud based services in micro-enterprises on socio-economic development?* In addressing this question, an action research methodology was used to investigate two micro-enterprises in Western New York during a five-month timespan. The contribution of this study is in understanding the nature of any impact that may come about in resource-constrained micro-enterprises as a result of ICTs.

BACKGROUND

Micro-enterprises

Many ICT adoption challenges stem from the very nature of micro-enterprises. A company of one to five employees, one run by a proprietor of limited means, may want for the depth and breadth of skills necessary to gather business intelligence, solve problems, (Qureshi et al. 2009), and the ability to access to networks of capital and professional services (Grosh et al. 1996). Lack of information, against the backdrop of an enterprise's constantly being on the verge of failure, can foster risk averse and/or fearful behaviors. In two related studies by Wolcott et al. (2007) and Qureshi et al. (2008), it was seen that a group of micro-enterprises were awarded certain technologies through a technology grant program but even after six months, the boxes containing the new ICT devices were unopened. The researchers in those studies discovered that although almost all the micro-entrepreneurs realized that technology can help their business in some way, this realization was not sufficient to drive them or motivate them to incorporate and use the new ICT. One of the greatest potential benefits of technology usage by micro-enterprises is access to new markets, made possible due an increase in internet usage and e-commerce worldwide (Qureshi et al. 2007). Training and use of good software further promote growth (Harrison et al. 1997). From a macroeconomic perspective, ICT innovations have the potential to enhance economic growth via self-reinforcing cycles of disruptive change (Prendergast

2006), in which ICT adoption decisions serve as the basis for new business opportunities. In this vein, this research will draw upon the field of Information Technology for Development (ITD) to understand and assess the impact of ICTs in micro-enterprises. The field of ITD is built on this notion and entails the implementation, use and management of Information Technology infrastructures to stimulate human, social and economic development (Qureshi 2005). 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. 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.

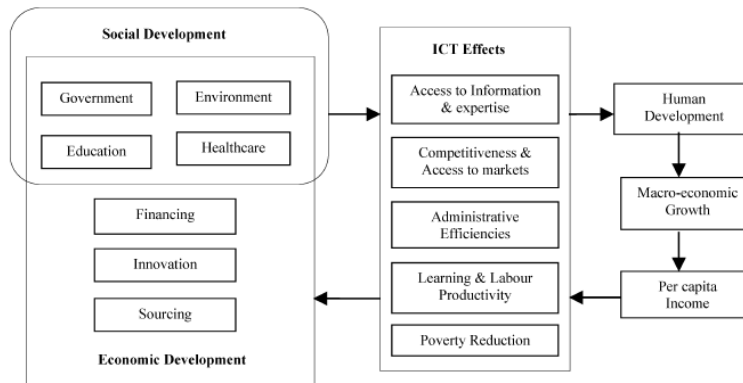


Figure 1. Model of Information Technology for Development (Source: Qureshi, 2005)

Cloud Computing

Cloud Computing can be defined as a style of computing where massively scalable ICT-enabled capabilities are delivered ‘as a service’ to external customers using Internet technologies (Plummer et al., 2008). Leavitt (2009) gives an explanation of the basics, with three main types of “services” being provided to cloud users: Infrastructure, Platform, and Software, all “as a service” (IaaS, PaaS, and SaaS, respectively). IaaS refers to tangible physical devices in a remote location that can be accessed from a terminal location or device. PaaS refers to software development kits (SDKs) and other tools that are hosted by a provider and are run from over an Internet connection. SaaS consists of an application or software that is hosted by a vendor, and the use of that software is licensed to a user. Carr (2005) states that Cloud computing will be the next step towards the utilization of the Information Technology (IT) industry, where most, if not all services will be outsourced to other firms so that the focus for companies can be on their business rather than worrying about IT infrastructure. This is especially true for small and micro-enterprises, where a lack of employees, resources, and time can push IT integration such as Cloud Computing to the side (Cragg & King, 1993). There has been recent research into the effects that Cloud Computing has on different business types and sizes. Small firms have been found to be some of the most impulsive businesses willing to adopt cloud computing services because they typically have less-complex IT needs; despite this, small and micro-enterprises are still slower than larger firms to adopt these newer technologies (Christauskas & Musevucue 2012). Christauskas and Musevucue state that this may be a result of the lack of information about the benefits of the Cloud Computing technologies available and the security presented in the cloud for small firms, while Cragg & King state that small and micro entrepreneurs are afraid that their implemented IT would ruin their business or go under or unused. This lack of knowledge and confidence can be a big negative for small firm Cloud integration, as Kamal et al. and Cragg and King found in their research that a small business owner’s enthusiasm was the main key in implementing IT and Cloud systems. Scott (2010) found that encouraging factors for owners to implement Cloud Computing were vendor terms, no contracts, and pay-as-you-go infrastructure that is supported by cloud computing. Cloud computing may be able to help small and micro-enterprises lower their financial hurdles. For small businesses, liquidity is a prime objective (Welsh & White, 1981). In this sense, Cloud Computing creates a much more liquid business, in that, companies do not have to invest as much money into equipment and hardware, and removes the potential risk of having low liquid items such as servers and old computers in a company’s accounting, as these items depreciate quickly and are not easy to resell. It then appears that the benefits of supporting software and technologies can have a quicker impact on the small and micro-enterprise business model.

METHODOLOGY

This study uses an inductive interpretive case study (Walsham 1995) to understand how micro-enterprises may adopt ICT to grow their business and facilitate development. An action research methodology (Baskerville, 1999) is used to apply ICT

interventions within two micro-enterprises in Western New York, a region known for its high poverty levels and lack of resources, and the results analyzed. The research design used is shown in Figure 2 below. As seen in the Figure 2, there are four distinct stages at which activities will be conducted.

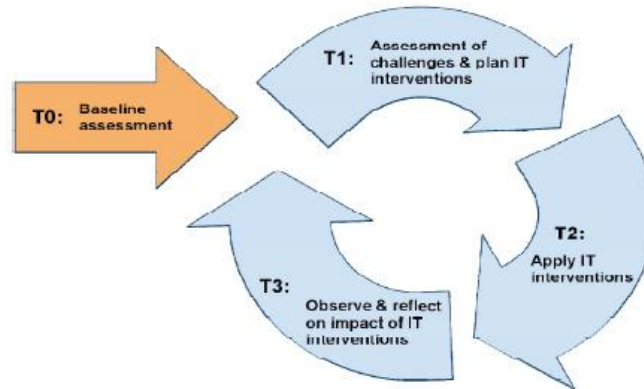


Figure 2. Research Design

At T0, the researcher will interview the micro-entrepreneur to understand their past, present, and future use of technology and how the owner thinks ICT 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 ICT 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 ICT intervention would be appropriate to apply to the micro-enterprise. At T2, the actual ICT interventions will be applied. At stage T3, the researcher will evaluate whether the ICT 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 ICT 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 ICT may be adopted by the micro-enterprises and may impact socioeconomic development.

CASE STUDIES

Two micro-enterprises 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. The first case is AR, which is a wellness spa targeted to women which opened in 2016. The owner produces her own skin care products which are also sold at the spa. The owner of AR is the sole employee of the business. The second case is DW, which is a dog wash that provides various dog grooming needs. The business provides both self-service provisions as well as professional grooming services. It has been in business since 2007 and besides the owner, who works full time, has two additional part-time employees.

RESULTS FROM THE CASES

T0 – Baseline Assessment

The researcher 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.

AR	DW
<ul style="list-style-type: none"> • Eager to adopt new technologies • Adapting to new technologies will benefit her business • Plays around with the technology through trial and error until she understands how to use it. 	<ul style="list-style-type: none"> • Hesitant to adopting new technology • Insecurity of not knowing how to use a newer technology

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 interviewed 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 enabled the researcher to decide on appropriate ICT interventions to apply.

AR	DW
<ul style="list-style-type: none"> Limited time to find right technology Unsure of what IT is needed in business Needed to promote new business online through via a business website and social media Limited technical skills in developing website and integrating social media Time consuming manual recording of customer appointments on paper. 	<ul style="list-style-type: none"> Was paying money to a 3rd party vendor to manage the business’s social media accounts with very little to no return on investment. Wanted a more cost-effective social media presence Limited technical skills in managing social media accounts

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.

AR	DW
<ul style="list-style-type: none"> Created a website to promote business that is easy to update using a content management system - Wix. Integrated online appointment scheduling through website Integrated online store for customers to place orders and accept payment for skin care products through website Created and integrated social media accounts on Twitter and Instagram Taught owner how to maintain website and social media accounts 	<ul style="list-style-type: none"> Created business social media accounts on Facebook, Instagram, & Twitter. Implemented a centralized application, Hootsuite to integrate the individual social media accounts. Trained owner on how to use the individual social media accounts as well as the Hootsuite application

Table 3. IT Interventions

T3 – Observation & Reflection

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

AR - Over the course of the ten weeks during which the ICT adoption was being conducted, the owner of AC has shown dramatic improvements. Being the owner and sole employee of this new business, although she had an overall positive attitude towards technology, she did not have much time to devote to technology related issues. Initially, the micro-entrepreneur took a hands-off approach and simply wanted to have the technology implementations done by the researcher. However, once she understood that it was important for her to know how to sustain these ICT implementations for the continued success of her business, she became much more involved and engaged in learning the new technologies. The micro-entrepreneur was given training and video tutorials on maintaining the new website and social media accounts.

DW – Although the owner of DW realized the importance of utilizing social media to promote her business, she was however quite hesitant in having to manage it all on her own. She did not have much technical skills and was of the opinion that any kind of technology would be too overwhelming for her to deal with. However, over the course of ten weeks, the micro-entrepreneur was taught on how to work with the different social media accounts. What made it most appealing and easy for the business owner was the Hootsuite application. This application integrated all the individual social media accounts so that she only needed to update the Hootsuite account and all the other connected social media accounts would be automatically updated with the new content. Due to her limited technical skills, prior to these interventions, she was paying a 3rd party to manage her social media presence. This cost the business \$79 per month. As a result of these technology and training interventions, she was able to bring that cost down to \$0.

IMPACT ON SOCIO-ECONOMIC DEVELOPMENT

Our analysis of the observations in the two cases is summarized in table 4 below. The interventions carried out, and outcomes obtained from each of the two cases is correlated to the ICT effects from the Qureshi (2005) model of Information Technology for Development (figure 1).

Intervention	Outcome	IT4D Effect from Qureshi (2005) Model	Potential Development outcome
AR			
Creating Wix website	The owner now has a customizable website to stay connected with	Administrative Efficiencies Competitiveness	Human Development

	customers, and market their products and services.	Access to Markets	Economic Development
Setting up online store through website	Customers are now able to purchase products and “Guest Passes” from anywhere in the US and/or Canada.	Competitiveness Access to Markets	Economic Development
Setting up appointment scheduler through website	Customers are now able to book a spa service appointment online by themselves. The owner is now able to manage all appointments within the site.	Administrative Efficiencies	Economic Development Human Development
Training on how to maintain website, online store, & appointment scheduler	The owner is now able to efficiently use the Wix Editor to make changes/updates to the website in addition to being able to manage product pages associated with the online store as well as the customer appointment schedules and bookings.	Access to Information & Expertise Administrative Efficiencies Learning & Labor Productivity	Human Development
Created and trained user on Instagram & Twitter	The owner is now able to use these social media accounts to promote the business	Competitiveness Access to Markets Learning & Labor Productivity	Human Development
DW			
Setting up Hootsuite account	The owner can now manage various social media accounts more efficiently	Administrative Efficiencies	Human development
Training on how to use Hootsuite	The owner can now post to various social media accounts simultaneously	Competitiveness Access to markets Learning & Labor Productivity	Human Development Economic Development
Training on how to use Facebook, Instagram, & Twitter	The owner is now able to use the individual social media accounts to reach a broader audience	Access to markets Learning & Labor Productivity	Human Development Economic Development

Table 4. Impact on socio-economic development

From the two cases described in this paper, it is apparent that both micro-enterprises had very similar needs with regards to reaching out to new markets and customers. Another common element in both micro-enterprises was the fact that the micro-entrepreneurs possessed very little technology skills and needed a cost effective solution to help address their needs. What is interesting, is the notion that the nature of the technology solutions that were applied were all Internet-based or in other words, cloud based. The website development intervention provided the support for a development framework that aligns with the PaaS service model. On the other hand, being able to make posts on social media sites aligns with the SaaS service model allowing businesses to utilize these sites for marketing purposes. 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 cloud computing applications for resource constrained 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. The greatest benefits offered by cloud computing to micro-enterprises come in the form of cost effectiveness, scalability and flexibility. For example, if the resources required by the micro-enterprise/user are large then the size of the corresponding request to the cloud computing network will be larger so as to request that many resources from the cloud. Furthermore, the size of the network request can change dynamically to accommodate the changing needs of the user. To save on costs, users do not use more resources unless they actually need those resources, and since these resources are allocated on-the-fly there is no upfront cost or resource wastage. Thus the cloud computing network infrastructure provides micro-enterprises 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 micro-enterprises 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 micro-enterprises face in adopting technology, cloud-based applications and services serve as a viable option for easy and cost effective adoption of technology. In both the cases described in this study, it was observed that the micro-entrepreneurs were able to learn new technology skills in a very short amount of time. The systematic approach that was

used in applying the technology interventions coupled with the nature of the technology implementations, i.e. cloud based, facilitated improved learning of new skills. Through their newly learned skills, the micro-entrepreneurs are now in more control of their business through the use of technology. In terms of socio-economic development, this outcome aligns with the learning and labor productivity effect in the model of Information technology for development (Qureshi 2005) shown in figure 1. Improved learning also has implications for human development through empowerment. In addition, both micro-enterprises were able to get access to new markets through their newly developed websites as well as social media sites. This ability has the potential of exposing the business to customers beyond their local geographic regions and generating revenue resulting in economic development. Subsequently, results from these two case studies provide evidence of how a very context sensitive approach used to enable ICT adoption using cloud based services, are a viable solution to assisting resource constrained micro-enterprises in facilitating socio-economic development.

CONCLUSION

While the majority of businesses around the world are small and micro-enterprises, they are the most vulnerable and are often run by people with limited resources, and skills to be able to avail the benefits of ICTs. When they do adopt Information Technology, their potential to survive and grow increases as they are then able to participate in the global economy. The challenge for global development lies in enabling these small and micro-enterprises to adopt the appropriate technology solution that fits their needs. As evidenced in the case studies described in this paper, cloud based services offer an opportunity to support the growth and development of small and micro-enterprises by enabling low cost ICT solutions delivered over the Internet to be made available to them so that they may adopt with little effort or skill. Future research will investigate the long term effects of the cloud based services on the continued growth of the micro-enterprises.

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