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ICTs, Capabilities, And Socio-Economic Development - Results And Implications

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ABSTRACT

The ability of micro-enterprises to adopt technology depends upon the unique conditions in which they find themselves. The goal of this study was to investigate and assess such adoption through a very systematic and contextualized approach. 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 applying a modified adaptation of the capabilities framework to understand the nature of the grass-root level impact within the micro-enterprises from the technology adoption and use.

Keywords

ICT, Capabilities, Socio-Economic, Development, 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 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. Since the ability of micro-enterprises to adopt technology depends upon the unique conditions in which they find themselves, the goal of this study is to investigate and assess such adoption through a very systematic and contextualized approach. 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 applying a modified adaptation of the capabilities framework to understanding the nature of the grass-root level impact within the micro-enterprises from the ICT adoption and use.

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 aversive 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.

ICTs, Capabilities, and Development

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 entails the implementation, use and management of Information Technology infrastructures to stimulate human, social and economic development (Qureshi, 2005). However, it is first important to have an understanding of what is meant by development. In order to do this, we draw on Sen's view of development – which essentially considers development to mean an increase in freedom, both the freedoms of what one can do in theory, and the freedoms of what one can actually do in practice. Freedoms are understood as two related things – capabilities and functionings. In simple terms, "a functioning is an achievement, whereas a capability is the ability to achieve" (Sen, 1987). From their set of capabilities, a person has a choice about what they seek to realize as functionings; with realized functionings being "what a person is actually able to do" (Sen, 1987). According to Sen's capabilities approach, development can therefore be understood as combining three things. On a broad scale, expansion of the contextual capabilities that provide a context of opportunities. And at a narrower scale, expansion of the specific capabilities an individual can select from, and expansion of the realized functionings they are able to do or be in practice. These differences create the basis to understand the pattern of incremental development.

For this study, we use Sen's capability framework as a foundational lens to assess the impact of ICTs. Heeks (2018) built on work done by Zheng and Walsham (2008) to link ICTs directly to Sen's ideas. The conceptual model is shown in Figure 1 below.
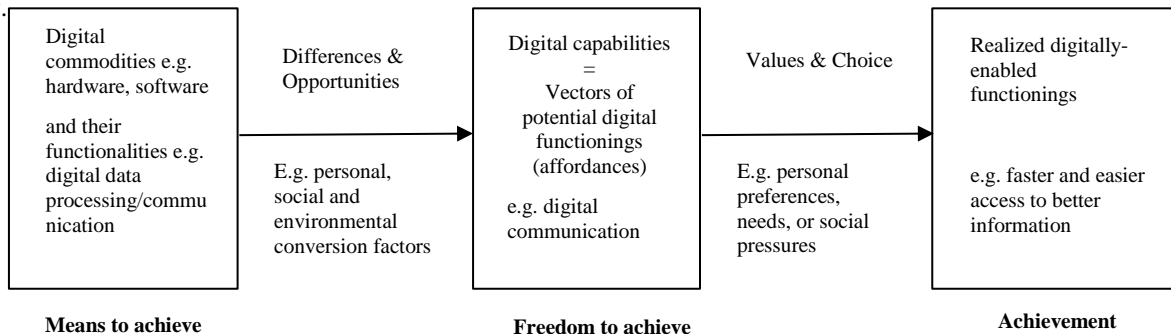
Figure 1. ICTs and the Capabilities framework (Heeks, 2018)

In this model, ICTs are considered to be commodities (Zheng and Walsham, 2008; Heeks, 2018). ICT commodities are a means to achieve functionings such as information, communication, computation, transaction, coordination, etc. Which of these baseline functionalities of ICTs actually becomes a capability in any given context depends on a set of conversion factors. Heeks (2018) outlines the following conversion factors: (i) Personal – an individual's resource endowment, (ii) Social – the institutional and other structural conditions in a particular context, and (iii) Environmental – including geography, human/technological infrastructure, and other public goods and resources. Then, from among the digital capabilities – what an individual is able to achieve with ICTs – they will choose the particular digital functionings to achieve such as better communication, increased knowledge, etc. Choice is determined by a combination primarily of personal and social/institutional factors, though wider environmental elements may play a role. We use the Heeks (2018) model to make sense of the impact of ICTs in micro-enterprises.

METHODOLOGY

This study uses an inductive interpretive case study (Walsham, 1995) to understand ICT adoption and use in micro-enterprises 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.

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.
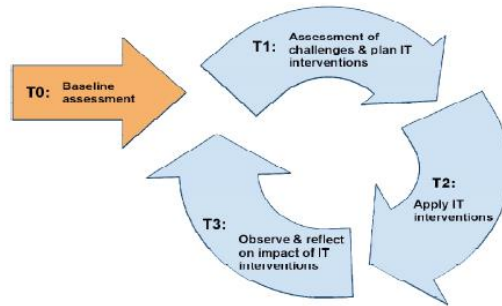
Figure 2. Research Design

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 understand the nature of the impact in the micro-enterprises from the ICT adoption and use within the context of 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 WY, which is a yoga studio that opened in 2017. The owner has been teaching fitness and wellness classes for seventeen years but only recently started her own business. The owner of WY is the sole employee of the business. The second case is LP, which is a consulting firm that provides services for the cultural heritage field, specializing in preservation environments. As a part of their services, the business provides custom workshops and presentations on a variety of topics related to collections preservation, building and mechanical system operation, and sustainability. This business began in 2017 and besides the owner, has one additional part-time employee, the owner's wife that assists with the financials.

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.

WY	LP
• Eager to adopt new technologies • Adapting to new technologies will benefit her business	• Positive attitude of technology • Overwhelmed with rapid change in technologies • Insecurity of not knowing which IT to adopt and learn how to use.

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.

WY	LP
• Needed to promote new business online via a business website and social media • Limited technical skills in developing website and integrating social media • Old website was outdated and non-functional • Needed online appointment scheduling. • Outdated hardware	• Limited time to devote to keeping up with technology • Limited IT skills • Needed to redesign website to be more professional • Need to create & integrate social media presence to showcase projects & travels to client sites • Needed a digital program to create charts for presentation to clients.

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.

WY	LP
• Created a professional website to promote business that is easy to update using a content management system - Wix. • Integrated online appointment scheduling & payment through website • Created and integrated social media accounts on Facebook and Instagram with new website • Taught owner how to maintain website & social media accounts	• Created a professional website to promote business that has better information organization & easy to update. • Created & integrated business social media account on Instagram with website. • Trained owner on incorporating social media live feeds to website • Trained owner on using a digital chart creation application to make presentations to clients more professional.

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.

WY - Over the course of five months during which the ICT adoption was being conducted, the owner of WY showed 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 was confused on how to edit some of the content on her website, and she could not get the calendar feature that she was paying extra for, to work. The micro-entrepreneur did not have much experience with ICT and in the past, would get confused when trying to edit the old website. She was not resistant to adopting new technology but she was unknowing of the correct steps to take which had become her technological barrier. However, after creating the new website and walking her through how to edit it, she was ecstatic and seemed to be more confident and motivated to edit her website and keep it current. The micro-entrepreneur was given training and video tutorials on maintaining the new website and social media accounts.

LP – The owner of LP was skeptical about incorporating social media into the business, mainly due to lack of time and knowledge of social media use. However, the researcher showed him a way that would automatically update the website as he posted to the social media platform. The micro-entrepreneur's attitude about social media is that he is now very excited and ready to start posting pictures of his travels and work. The owner mentioned that in the past, clients that he has worked for have tried to tag him (and his company) in social media posts but have not been able to due to lack of presence. Now they will be able to. Using social media and having it integrated into his website can help him expand and access possibly new clients.

UNDERSTANDING SOCIO-ECONOMIC IMPACT THROUGH THE CAPABILITIES FRAMEWORK

Our analysis of 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 Heek's (2018) adapted capabilities conceptual model (figure 1).

Means to achieve **Digital commodities**	*Freedom to achieve* **Digital capabilities**	*Achievement* **Realized digitally-enabled functionings**
WY		
Online Content Management System (Wix)	Customizable website	Stay connected with existing customers Reaching out to new customers Marketing their yoga services.
Online social media	Online marketing Engaging customers online	The owner is able to use social media to promote the business Can interact with customers through online posts
Online appointment scheduling application	Customizable schedule & booking	Easily & quickly informing customers of upcoming yoga classes Quick scheduling of customers for yoga classes online Easily manage all appointments within the site.
LP		
Online Content Management System	Customizable website	Reaching out to new customers Marketing their consulting services
Online social media	Online marketing Engaging customers online	Showcase business-related travels/project sites Can connect with clients online by being tagged in posts
Diagram software	Digital diagrams/charts	Can efficiently create diagrams digitally Save time by reusing digital diagrams previously created Easily incorporate into professional presentations to clients.

Table 4. Impact on socio-economic development

Humans are diverse and have different opportunities to benefit from interventions. This is essential in our analysis of ITD interventions. "We are deeply diverse in our internal characteristics (such as age, gender, general abilities, particular talents, proneness to illness, and so on) as well as in external circumstances (such as ownership of assets, social backgrounds, environmental predicaments, and so on)" (Sen, 1992). In our analysis, we have to take this into consideration and look at what conversion factors (personal, social and environmental) prevent individuals from expanding their capabilities. In ITD projects we can either, design the intervention to fit within the context or design interventions that change the context (i.e. the intervention can remedy problematic conversion factors) (Hatakka and De, 2011).

In then appears that the phases we carried out and described in the methodology section above i.e. T0 – T3 serve as an integrated conversion factor. These phases together provided the requisite information as to the challenges faced within each micro-enterprise context. The challenges identified, lead systematically to applying the right intervention to ameliorate the situation. For example, in both cases, a common digital commodity was an online content management system. Phase, T1 revealed the reasons behind the need for the digital commodity. Phase T2 enabled the digital commodity to transform into a digital capability through the outcome of a new redesigned customized website for each micro-enterprise. Conversion factors will influence both the enablement of potential functioning and the ability of people to utilize the potential functioning i.e. their ability to make choices. What functionings the intervention enables must be evaluated within the context where it is deployed (Hatakka and De, 2011). Accordingly, in order to achieve greater realization of the digital functionings, our methodology of cycling through T1 – T3 (figure 2) and context-based technology training as outlined in table 3 helped to build personal confidence in each of the micro-entrepreneurs' technology skills. Subsequently, this allowed them to choose the digital capabilities that will provide the greatest value for their business as outlined in the last column in table 4.

Our analysis can then help us outline a number of implications that can shed light on using the capabilities framework as a lens to understanding technology adoption and use for socio-economic development at the grass-root level.

1. The capabilities framework moves us beyond just focusing on rolling out ICT infrastructure – which is just a means to achieve – and beyond just the ability to access and use ICTs – which is a freedom to achieve – to think what is actually achieved by using ICTs i.e. the decisions and actions and results of those actions.
2. The framework also recognizes the enablers and barriers – skills and money; cultural norms and one's position in society; extent of infrastructure – that intervene between the technology and its effective use; and also the personal choices people make about how to use ICTs thus linking in to ideas about motivation.
3. The capabilities perspective demands a particular approach to ITD design. Socio-economic development is no longer generic but should be brought down to the level of the individual. Discovering this requires a "radically participatory, bottom-up approach" to ITD design and implementation (Klein et al., 2012). One that involves all beneficiaries; one that starts by discussing goals and values rather than jumping to focus on the technology; and one that retains involvement of beneficiaries throughout. This idea was operationalized in our study through the steps, T0 – T3 (figure 2).
4. A capabilities perspective on ICT also gives a rather different view of impact and evaluation. Instead of asking "What is the impact of ICTs?" in some general sense, a capabilities-oriented evaluation would ask, "To what extent do ICTs help people achieve the things they value doing or being?" "ICT usage patterns represent the choices people make about what is important to them and how they use technology to meet those needs" (Rangaswamy and Cutrell 2012). From a Senian viewpoint, then, these are developmental; they represent ICTs increasing freedoms: both substantive freedoms as ends in themselves, and also, instrumental freedoms in helping develop competencies which are means applicable to other developmental uses.

CONCLUSION

The ability of micro-enterprises to adopt technology depends upon the unique conditions in which they find themselves. In this study, we investigated and assessed such adoption through a very systematic and contextualized approach. 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 was in applying a modified adaptation of the capabilities framework to understanding the nature of the grass-root level impact within the micro-enterprises from the ICT adoption and use. Using the action research methodology coupled with the capabilities perspective enabled us to take a bottom-up approach. Which capabilities may be enabled to enrich people's lives have to come from the users themselves. This means that the analysis has to be individualistic as there will be variations within otherwise heterogeneous groups (both in terms of which capabilities they value and what factors that hinders their choices). In our study, this appropriates to the level of the micro-entrepreneur. The achieved functionings were based on their context, their choice, and their ability to use the technology applications, as they deemed appropriate. Using a bottom-up contextualized approach, we captured the functionings that the technology interventions actually enabled, and not just how the outcome maps against the implemented intervention.

This study provides insights for both academia and practice. For academia, the integration of the action research steps outlined along with the capabilities framework perspective presents a better lens for socio-economic development analysis at the individual level. It is better in the sense that the focus is on ends and not means, the case studies are viewed within the context where they are deployed and we gain a better understanding of why and how socio-economic development come about. For the practitioner community, insights from this study can be used when planning and initiating ITD projects. The action research-capabilities perspective will focus practitioners' attention to all aspects of the intervention, including the context (conversion factors) and the notion of choice.

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