The Role of ICT among Small Scale Farmers and Small and Medium Enterprises in Developing Countries

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Kevin McBriarty
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INTRODUCTION

For over a decade Information Communications Technology (ICT) has come to dominate daily life around the globe. Whether it is for financial information, markets, news, general knowledge or simply entertainment, the ease and speed of communication has grown phenomenally.

The most obvious manifestation of ICT is with PC’s and the internet, but ICT is also much more than this. Communication is at the heart of ICT and no other device in history has enabled more effective communication to so many people than the mobile phone.

Possession of a mobile phone used to be viewed partly as a status symbol, a sign of affluence, but, far from being for the wealthier in society, mobile phone technology is a revolutionary development that allows affordable connectivity throughout the world. Although this technology is new, the developing world has not been slow to take advantage and Africa, for example, has some of the highest subscriber growth figures (Warden & N’getich, 2007). There is a danger, however, that much of this growth is taking place in the urban centres and that the rural populations may get left behind to suffer information-poverty.

Applying technology to the lives and work of small scale farmers in developing countries is not new, and has been an area of focus for many years with improvements in farming implements, irrigation methods and techniques. Applying ICT, and in particular mobile phone technology, is rarely seen on the agenda of development programmes however. Information and Communications Technology (ICT) can bring unprecedented potential to deliver information, provide links to markets and much more (Mukhebi, 2007).

METHODOLOGY

Through a desk review of published literature and case studies, this paper will present an overview of the main issues, benefits and concerns in developing ICT technologies for use by small and medium scale enterprises in developing countries.

DISCUSSION

Rural Life
Some 75% of developing countries’ population live in rural areas, and of these the vast majority are small-scale farmers, who contribute significantly to the economy yet remain as the poorest (Melchioly & Sæbø, 2010). If this is to improve then knowledge and information are critical, according to Muriithi et al. (2009), and should be included in any poverty alleviation programme. Penetration of mobile networks into these rural areas is of concern. As the urban centres approach saturation it is the rural areas that could provide substantial opportunity for growth and hence profits.
Farmers Requirements
Small and medium size enterprises (SME’s) are major sources of productivity and contribute a significant percentage of employment in developing countries (Melchioly & Sæbø, 2010). Fixed line or mobile phones allow SME’s to communicate without the necessity of going in person, thus enabling much greater efficiency.

For farmers, access to information is vital, for without sufficient information a person is unable to make an informed choice and is open to exploitation. Typically, farmers will need information on seed and fertilizer availability, followed by climate data so that planting or preparation can be carried out in a timely fashion. Rural market prices can vary, so in order to get the best deals up-to-date information is necessary.

Remoteness of farms makes the laying of fixed lines impractical and expensive. It is therefore word of mouth and face to face contact that is the means of communicating, such as through extension services or farmer institutes which play a vital role in rural life.

From the author’s own research in Ethiopia, these institutes can often be male dominated and discriminatory and do not reach all farmers equally. For married women, for example, it is usually the husband who attends meetings and training, and often that knowledge is not passed on to the family. Those that are stigmatised in the community may be omitted entirely and can only get information through neighbours (McBriarty, 2011).

Similarly, market information is through local contacts, such as market nodes or just associates. The farmer may need to involve several intermediaries leading to less profit and greater uncertainty. Again, women are frequently sidelined in such matters.

Growth
While fixed line subscribers have risen steadily but modestly, mobile phone subscribers have gone from being equal in 2002 to twice as many by 2006 (Bhavnani et al., 2008), and since 2008 have doubled again to the present where over 5 billion people own a mobile phone (Bhavnani et al., 2008, GSM World, 2011).

Bhavnani et al. (2008) state that this phenomenal growth has been driven mainly by private sector investment, assisted by favourable enabling conditions and regulatory environments. The mobile phone industry, therefore, is able to be fast moving and responsive to technological advancements.

What Direct Benefits Can Mobile Phone Technology Bring?
For the rural SME where transport infrastructure is weak, so also will access to information be weak. Thus, mobile phones can serve as a substitute for transport, allowing farmers to access vital information in a timely and cost effective manner (Bhavnani et al., 2008). Mobile phone services offer great flexibility, with SMS and voice, allowing two way communications which TV and radio for example cannot do.

ICT can greatly enhance Farmers Information Services (FIS), by providing timely information on land preparation, planting, weeding, irrigation, harvesting, storage and marketing, which are of prime concern to farmers. Furthermore, ICT can liberate women who are often omitted from discussions. Information is power, and ICT allows far greater access cutting through gender and status (Duncombe, 2007).
The direct benefits for the farmer or other SME is in increasing productivity. More research and case studies are needed, but the purpose is to open access to information on climate, seed and fertilizer availability and advice on planting times. Following harvests, mobile phones can, through various services, provide farmers with accurate and up-to-date market information.

“Gone are the days when I would aggrieve if cauliflowers and onions would fetch the right price that reflected my hard work, time and cost invested, from plantation to harvesting.”

“We were always constantly manipulated by the wholesalers who possessed both information and purchasing power and we had to rely on the fake information about the prices of our vegetables.”

The Kathmandu Post (Bhandari, 2011)

“….Mobile telecommunication contributes to equity by enabling the disadvantaged, including the poor, isolated rural people, and the disabled, to obtain information that would otherwise be very difficult or impossible to access if it were to rely on the fixed-line phones that in most areas are not expected to be in place soon…….”(Employee, M, personal communication, 19th December 2008).

Melchioly & Sæbø (2010)

One method of evaluating the effectiveness of ICT is by considering recent case studies. (Muriithi et al., 2009) have looked at the frequency of hits on the Interactive Voice Response (IVR) and Short Message Services (SMS) employed in Kenya. They present evidence for increasing numbers of farmers opting to use these services from 2006 to 2008.

Also in Kenya is the Kenya Agricultural Commodity Exchange (KACE), which began in 1997. With the aim of making agricultural markets work better, KACE utilises various mobile phone services along with radio to provide low-cost market information (Mukhebi, 2007). Monthly usage for KACE rose from 1273 in 2006 to 24716 by 2008 (Muriithi et al., 2009). According to KACE, the results are promising; in one district farmers who used the services were able to receive 22% higher maize prices at harvest time than those who used middlemen.

Another lesson is that farmers are demanding and willing to pay for further services such as storage, transportation or credit (Mukhebi, 2007).

Further Benefits
Other stakeholders besides the SME’s can gain directly from ICT. According to Vodafone, in a typical developing country, an increase of 10 mobile phones per 100 people boosts GDP growth by 6% (Bhavnani et al., 2008). Other direct benefits are job creation, and a source of tax revenue (Bhavnani et al., 2008).

Indirect Benefits
Mobile phones can aid entrepreneurship; running costs can be reduced and business opportunities made easier to find. As a transport substitute it can benefit both the business and that of its customers by eliminating time-consuming journeys for direct contact. The ease of comparing markets will also lead to a smoothing of market inefficiencies. In addition, with SMEs using ICT for market services, governments
have a means of collecting feedback and data to influence future policy (Gakuru & Stepman, 2009).

**Intangible Benefits**

One of the main intangible benefits to derive from ICT is that of increased social cohesion, allowing social networks to vastly increase. ICT and mobile phones can additionally play an important role in disaster risk reduction and emergency situations, while also being an efficient means of providing health information and education. The wide ranging applications, touching on many aspects of life, can therefore act as catalysts for further change and development (ITU, 2011).

Duncombe (2007) classifies the roles and benefits that ICT can bring into four categories:

![Figure 1. Typology of Information Roles Livelihood Strategies Source: Duncombe (2007)](image)

Type A is short-term that serves the immediate day-to-day needs, such as remittances from relatives, and enables participation in social networks.

Type B is also short-term but more formally structured, such as government services or markets.

Type C is long-term but informal, which can strengthen social capital. Examples are nonmarket-based institutions that favour the poor, and e-trading platforms that support fair trade.

Type D is again long-term and formally controlled by organisations that seek to strengthen the other assets (human, financial, physical and natural) of the poor. For example this could include health, micro-finance or training services.

**Roles of ICT**

Specific to farmers, ICT can provide two basic services: market information and agricultural information (Gakuru & Stepman, 2009).

Iraba et al. (Iraba et al., 2010) ask: how can inexpensive mobile technologies be harnessed to provide market related information to rural farmers?

In answer to this, they argue that a system that uses Unstructured Supplementary Service Data (USSD) and Short Message Service (SMS) can reduce user costs to acquire information. Cheaper than voice calls, these services are also available on lower priced handsets, and that USSD menus are often subsidized by the provider which allows it be a free to use service (see figure 2) (Iraba et al., 2010).

![Figure 2. Scematic of a proposed system Source: Iraba et al. (2010)](image)
KACE provides a further example; its Market Information and Linkage System (MILS) has five distinct components (Mukhebi, 2007):

- Rural based Market Information Points (MIPs) – located in rural markets which serve as the sources of reliable information.
- District-level Market Information Centres (MICs) which have internet connectivity and link MIPs to KACE.
- Mobile phone SMS to deliver information to farmers.
- Interactive Voice Response (IVR) which uses a simple menu to deliver information via voice mail.
- Internet based database system and website.

Survivalist v Entrepreneurial
For developing countries, there are two distinct forms of microenterprises, those that are survivalist and those that are entrepreneurial (Duncombe, 2007). The survivalists are pushed into enterprises for lack of alternative forms of income generating activities. These make up the majority of SMEs and are generally termed the informal sector (Duncombe, 2007).

Entrepreneurs, on the other hand, are pulled into enterprise by the opportunity for increased profits and growth. These Duncombe (2007) argues, tend to cover a more diverse range of options, including manufacturing, and may become part of the formal sector. MSEs that are entrepreneurial, though fewer in number, can play a greater role in reducing poverty. They may employ more labour and their owners have more skill and confidence than the survivalist SMEs and are thus better placed to exploit market opportunities.

Issues/barriers
Often ICT is presented as a win-win potential, however (ITU, 2011) offers a cautionary note on adoption of ICT in developing countries. What may appear to be a beneficial development programme may open routes for exploitation by developed countries. Although ICT can raise the statuses of SMEs, the relative advantage between developed and developing countries may in fact worsen (ITU, 2011).

Constraints
Most developing countries continue to face considerable technological challenges and constraints. Lack of infrastructure and physical resources hinder existing networks and thus information flow. The focus should move beyond just the technology, but also the information handling and communication.

Institutional Constraints
Perhaps one of the greatest constraints is that of the enabling policy and regulatory environment within a particular country, and whether is conducive to stimulating competition. The number of providers also plays a pivotal role in driving competition and expansion, and in this the private sector plays a key part (Bhavnani et al., 2008).

Figure 3 shows the extent of the current underdevelopment of ICT infrastructure, but conversely the potential that is yet to be exploited. There is concern that some countries may be left behind and suffer from information poverty.
Although the current lack of infrastructure in developing countries is undoubtedly a major constraint, it is precisely because of this that mobile phone technology is so appealing. Fixed line systems in countries were many of the population live in dispersed rural areas would require laying cable to every household. Besides the huge cost, and copper cable is a lucrative commodity on the illegal market which would further lead to unreliability and breakdowns (Warden & N'getich, 2007).

Erecting mobile phone masts is therefore an efficient, flexible and relatively inexpensive means of providing connectivity in such environments (Bhavnani et al., 2008).

**Trust**

One concern, highlighted in the South African study by (Warden & N'getich, 2007), is that a level of mistrust existed, particular between developed and developing worlds. Trust is an important requisite of any service, and it is vital that customers are able to trust the information they receive.

**Perception of youth**

Another concern in the same study is that there is a perception that new technology is mainly for the younger people. For this reason adoption of new technology is left to the youths but often they will subsequently leave the household for life elsewhere (Warden & N'getich, 2007).

**Electricity**

It may be argued that the natural barriers in developing countries, such as lack of electricity, will act as constraints to ICT development. However, such barriers can be the stimuli for ingenious solutions and new income generating opportunities. In Tanzania, for example, communities collect together mobile phones to take to a neighbouring village to charge. Elsewhere, services to charge mobiles using car batteries have been created (Bhavnani et al., 2008).

**Cost**

It also may be considered that the cost of a handset and subscription to services will prohibit the poorest in society from utilising ICT technology. However, handsets continue to lower in price and with the possibility of sharing devices, there is no
reason why even those on the lowest incomes cannot gain from the benefits. Mobile phones allow an easy and cost-effective entry, without the need for large up-front payments or contracts (Bhavnani et al., 2008).

The fact that in developing countries mobile phones are commonly shared is a cautionary note on interpreting statistical data on subscriber numbers (Scott et al., 2004).

Language/literacy
As with any form of communication, language is critical. Expansion of ICT has the danger of marginalising those that lack the necessary skills. Developing countries have high levels of illiteracy, in which women and girls predominate, and combined with possible fear of new technology may leave some disadvantaged. Without the fundamentals of literacy education, ICT cannot provide empowerment, and therefore improved literacy for rural women with increased relevant content must form an integral part of development for ICT to become as asset in rural women’s lives (ITU, 2011).

The decision to use voice or text based services could include or exclude certain members of the population. If voice based, then the spoken language to use could be problematic – developing countries often have a high diversity of ethnic groups and local languages (Bhavnani et al., 2008). The case study of Gakuru and Stepman (2009) details how in Kenya a speech database had to be built up containing 60 000 words.

Literacy not only excludes people from taking full advantage of text based services, but will generally affect business skills also. Any programme to develop ICT for SMEs must ensure that literacy and education are not neglected (Duncombe, 2007).

Integration
Finally, to date, ICT rarely features prominently on the agendas of development agencies where the focus remains on agriculture and livelihoods (Bhavnani et al., 2008). It is largely these institutions of change that will determine to what degree ICT is incorporated into daily rural life.

CONCLUSION

The key benefits of mobile phone technology are:

- Mobile phone networks are cheap, reliable and easier to set up than fixed line
- Handsets are affordable and convenient
- The technology offers flexibility in services provided
- Mobile phones allow disintermediation (i.e. no middlemen)
- Cross-cutting and empowering for women, disabled and others (but literacy and education must also be included)
- Mobile phones can bring many more benefits and act as a catalyst for change

If implemented correctly, ICT and mobile phone innovations could transform the SMEs in developing countries. In all case studies and pilot studies mobile phones were perceived as beneficial, allowing farmers and traders to take greater control over negotiations and decisions.
REFERENCES


