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Analysing ICT Applications for Poverty Reduction via Micro-enterprise Using the Livelihoods Framework

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Table of Contents

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Abstract

This paper seeks to provide a contribution to theorising ICT and development by applying a 'livelihoods approach' as a suitable framework of analysis, taking rural micro-enterprise as an important potential area of ICT application in a developing country context. The livelihoods framework has been chosen because it employs, at its centre, a broad and systematic analysis of poverty. Rural micro-enterprise has been selected as a topic for analysis because it represents a viable route out of poverty by providing increased and more diversified income streams for poor households. The paper highlights how information systems concepts can be integrated into the livelihoods framework in order to aid analysis. A country case study is presented to demonstrate how the framework can be applied, and some key questions are raised concerning the application of the framework as research tool.

A. Introduction

A number of researchers have sought to apply the livelihoods framework to assess information and communication technology (ICT) and poverty reduction and a number of frameworks have been developed for that purpose (Albu & Scott, 2001; Chapman, Slaymaker & Young, 2001). However, there is little conceptual understanding of how the livelihoods framework can be adapted to cater for this type of analysis. The livelihoods framework was initially developed as a means to understand the reasons for poverty through detailed analysis of social relations in a specific poverty context, and to provide a means to empirically investigate the conditions of the poor (Carney, 1999; Chambers & Conway, 1992). The livelihoods framework does, however, represent a flexible and evolving framework, and it is informed by a number of key concepts and ideas that are applicable to a broad range of poverty-related issues. One such issue concerns the potential poverty-reducing role of ICT.

The paper seeks to provide a contribution to theorising ICT and development by applying a 'livelihoods approach' as a suitable framework of analysis, taking a case study of rural micro-enterprise as an important potential area of ICT application in a developing country context. Rural micro-enterprise has been selected as a topic for analysis because it represents a viable route out of poverty by providing increased and more diversified income streams for poor households. Rural micro-enterprise activity is also observed to enhance rural livelihoods by reducing risk and vulnerability, by strengthening non-financial assets and by promoting social and economic empowerment (Davis, 2003; Ellis, 2000).

The topicality of this issue is reflected in data supplied by OECD (2003) that highlights the increasing recognition of ICT as an enabling tool within Poverty Reduction Strategy Papers (PRSPs). By late 2003, 12 (out of 29) countries that had adopted PRSPs defined or positioned ICT as a strategic component for poverty reduction and/or discussed it as an independent item. For the remaining 17 countries, rural telecommunications were highlighted as an important component of infrastructure development. There is less explanation, however, of the precise mechanisms by which ICT can contribute to poverty reduction. There is, therefore, both conceptually and practically, a rationale for this paper.

The paper is structured as follows: the following section (Section B) presents a brief literature review concerning ICT and rural micro-enterprise in developing countries from which some key research issues and questions are drawn. Section C outlines the livelihoods framework for analysis and highlights two key modifications to the theory. Section D further expands on the livelihoods framework by extending and adapting its main components to explain in more detail the role of information and communication in livelihoods analysis and action. A number of key ideas from information systems are incorporated into the livelihoods framework thus employing a socio-technical 'information first' approach (Heeks, 1999). In Section E the livelihoods framework is applied to analysing ICT applications for poverty reduction using a case study example of rural micro-enterprise in Botswana. The data for the analysis is drawn from a number of studies conducted in Botswana, including a detailed study conducted by the author (Duncombe & Heeks, 2002). Finally, Section F presents a review of the theory and highlights some key questions for researchers in the area.

B. ICT and Rural Micro-enterprise in Developing Countries

A distinction is drawn in the literature between those rural micro-enterprise occupations that are survivalist and those that are entrepreneurial (Shaw, 2004; Duncombe & Heeks, 2002). Survivalists form the majority of rural micro-enterprise and are commonly founded upon the direct sale, trading or processing of natural resource (primarily agricultural) inputs, as well as lower skilled occupations such as fishing, household cultivation, simple brick making, rock breaking, etc (Liedholm & Mead, 2002). Entrepreneurial enterprises encompass more diversified activities including small-scale manufacturing and the provision of rural services and trade (Shepherd, 1998). Typical entrepreneurial occupations are based around agricultural production (e.g., poultry rearing, processing and packaging of food stuffs); personal services (e.g., hairdressing, food preparation, retailing); and skilled trades (e.g., textiles; carpentry, metalwork, motor mechanics).

Entrepreneurial enterprises are likely to have experienced some growth; they may employ some labour; and will use more sophisticated technologies. They will interact more effectively with established local (and possibly distant) markets and their owners are more likely to possess business and technical skills, as well as the personal attributes (e.g., self confidence and motivation) necessary to identify and exploit market opportunities (Shaw, 2004). Micro-enterprises that are entrepreneurial have greater poverty reducing potential. However, all income-generating activity will exist on a continuum. Some are more entrepreneurial and less survivalist, but most are less entrepreneurial and more survivalist. As previously outlined, within this broad spectrum, there will be wide range of occupations.

Poor households will likely step in and out of micro-enterprise activity depending upon the nature of the activity, seasonal demand, the availability of resources or other personal and social factors (Ellis, 2000; Shepherd, 1998). Studies from Malawi (Orr & Mwale, 2001), Sri-Lanka (Shaw, 2004) and Uganda (Ellis & Bahiigwa, 2003) confirm that the proportion of earnings from rural micro-enterprise are non-existent or very low for those in extreme poverty, but tend to increase in a fairly uniform manner for those who are less poor or non-poor. For most rural households micro-enterprise is a supplementary activity, with the largest proportion of household income still gained from a wider portfolio of traditional sources – primarily wage labour, crop sales, livestock sales, transfers via social programmes or remittances from relatives residing in urban areas.

With the context of rural micro-enterprise, we define ICT as an electronic means of capturing, processing, storing, and communicating information (Duncombe & Heeks, 2002; Heeks, 1999). ICT is based on digital information such as contained in computer software and transmitted over communication networks such as the Internet. However, in the rural areas of developing countries other pre-existing 'non-digital' media are far more widespread (Kenny, 2002). These include information held as electro-magnetic waves such as used in radio, television and pre-digital (analogue) telecommunication networks. They also include paper-based technologies based on information held as the written word such as used in books, manuals and newspapers; as well as information that is transmitted via oral means –

and held in the human mind – what might be described as indigenous knowledge (Davenport & Prusak, 1998).

ICT applications based on digital technologies face considerable constraints in the rural areas of developing countries. Moyi (2003) points toward lack of access to physical resources and infrastructure and stresses the importance of prioritising information flows via pre-existing networks of communication. Other studies also take a cautious approach to ICT, but detect a greater role for new technologies that are able to supplement existing systems by improving communications – between buyers and sellers, for example (Pigato, 2001; Duncombe, 1999). Further studies have focused on changing conceptions of agricultural extension, placing small-scale farmers at the centre of the analysis (Roling, 1995). Historically, agricultural extension services have represented the primary means whereby information concerning rural technologies and methods has been transmitted to the rural poor. Such services have been criticised for employing a 'top-down' approach based on a 'one-way flow' of information from agricultural research centres to farmers as 'users' of those services. Alternative conceptions envisage a more 'enterprising' role for farmers as active problem-solving individuals who are able to innovate and seek out information independently (Chapman, Slaymaker & Young, 2002; Berdegue & Escobar, 2001; Chapman & Slaymaker, 2001).

From the literature surveyed we can summarise three underlying factors as being important for our analysis of ICT applications for rural micro-enterprise.

a) *Differing portfolios:* rural entrepreneurs participate in a range of income generating activities. The ICT requirements of the rural poor are likely to cut across those activities and it may be difficult to separate one from the other.
b) *Differing vulnerabilities:* the level and complexity of poverty experienced by rural entrepreneurs will differ significantly. Vulnerability is defined according to how external factors impact upon the poor (Hulme and Shepherd, 2003). Differing vulnerabilities (e.g., due to poor health, geographical isolation, economic exclusion, etc) will also impact upon how ICT can be accessed and used by the rural poor.
c) *Differing capabilities:* the assets possessed by rural entrepreneurs will also vary. Potential for ICT applications will be dependent, not only on availability of financial assets and income, but also on a wide range of other capabilities associated with level of education, extent of social resources, advantages conferred through gender or ethnicity, access to infrastructure and availability of natural resources (Davis, 2003).

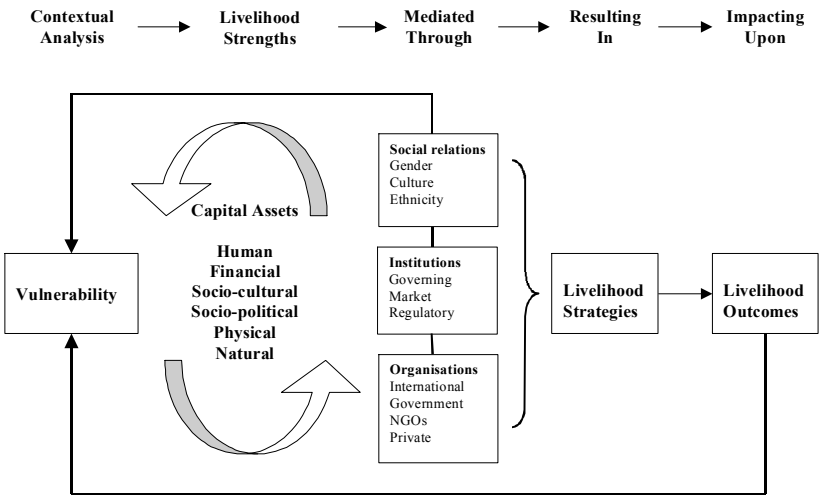
Thus, existing research points toward an approach to analysis that centres on the condition of the poor themselves. McNamara (2003) concurs, and suggests we should begin the analysis 'not with the presence or absence of ICT, but with the specific, inter-dependent causes (both local and global) and the components of persistent poverty in a given country, the most effective measures for addressing those causes, and then, and only then, the tools (not just ICTs, but other resources, policies, partnerships, etc) necessary to proceed' (ibid: 5).

Thus, this study poses a key practical research question: what role can ICT play in supporting rural micro-enterprise in developing countries? According to the views of McNamara and others the analysis of this question should be firmly grounded within a contextual understanding that places the requirements for poverty reduction at its centre. The livelihoods framework can provide such an approach.

C. The Livelihoods Framework of Analysis

The livelihoods framework for analysis provides a way of thinking that views the rural poor as operating in a context of vulnerability (Fig.1). Within this context, the poor have access to certain assets or poverty reducing factors. These gain meaning and value through the structures and processes of the prevailing *institutional, organisational* and *social* environment. This environment also influences livelihood strategies – ways of combining and using assets – that are open to people in pursuit of beneficial livelihood outcomes that meet their own livelihood objectives (Bebbington, 1999; Carney, 1999; Chambers & Conway, 1992). Thus 'a livelihood comprises the capabilities, assets (including both material and social resources) and activities required for a means of living. A livelihood is sustainable when it can cope with and recover from stresses and shocks and maintain or enhance its capabilities and assets both now and in the future, while not undermining the natural resource base' (Chambers & Conway, 1992: 6).

Fig 1. The Livelihoods Framework of Analysis



Adapted from: Carney (1999).

The livelihoods approach has evolved principally as an analytical tool that seeks to provide a logically consistent means for thinking through the complex issues and actors that influence the lives of the poor (DFID, 1999). The livelihoods approach has a number of key features and is underpinned by a set of principles that guide its application. It starts with an analysis of poor peoples' lives that is fully involving and participatory. It recognises multiple causes, multiple influences and multiple strategies for the reduction of poverty, and seeks to provide a model of change that can positively impact on the lives of the poor, that is resilient to external shocks, and not over-dependent on external intervention. Thus, it recognises that the poor have their own assets and strategies to cope with vulnerability, whilst also acknowledging the importance of the external structures and processes that can transform the lives of the poor.

The livelihoods approach has undergone revision and modification and in many senses represents a flexible and evolving framework. The most significant omission from early conceptions of livelihoods related to how the framework dealt with power, powerlessness and unequal social relations (Moser and Norton, 2001; Moore et.al, 2001). Within the assets pentagon there was no overt reference to political capital. Powerlessness is felt most strongly by the extreme poor, those who are most often excluded from rural micro-enterprise activity, and not able to take advantage of opportunities provided through market mechanisms (Chronic Poverty Report, 2004).

There is a second important aspect of the livelihoods approach that has become more influential as the framework has been applied. This concerns the importance of creating effective macro-micro links that can lead to the transformation of structures and processes that directly impact upon the lives of the poor (Schulpen and Gibbon, 2002). Thus, the livelihoods approach makes connections between levels of analysis. For example, at the macro level, national or international governing institutions can enact policy to create trade, regulatory or market mechanisms that have the potential to favour or disfavour the rural poor; they can choose to provide the type of infrastructure and services that may assist or sideline the rural poor; or they can put in place forms of governance that may encourage or discourage political participation by groups that represent the rural poor. Similarly, at the meso-level, mediating organisations (extension services, NGOs, health and education systems, etc) have the ability to design strategies and programmes that can either be responsive or non-responsive to the needs of the rural poor.

D. The Livelihoods Framework, Information and ICTs

The livelihoods framework advocates a people-centred approach that is 'bottom-up' rather than 'top-down'. Thus by implication, the approach also suggests that the methodologies associated with extracting data and assembling and communicating information should also embody those principles. Thus, the livelihoods approach advocates participatory methods for data collection and analysis that fully involve the poor. The livelihoods approach is also centrally concerned with linking a conceptual understanding of the conditions of the poor with the practice of planning and managing livelihoods strategies. Therein lies a tension between employing the livelihoods approach as an analytical framework and as a developmental objective. This suggests a dual role for information within the framework: a) an *analytical* role which focuses on how data is accessed, assessed and applied to 'understand' livelihoods (a retrospective approach) and used to 'plan' livelihoods strategies (a prospective approach) by researchers, project/programme planners, policy makers and the rural poor themselves; b) a *functional* role which focuses on action – the manner in which information is used within livelihood strategies to create favourable livelihood outcomes.

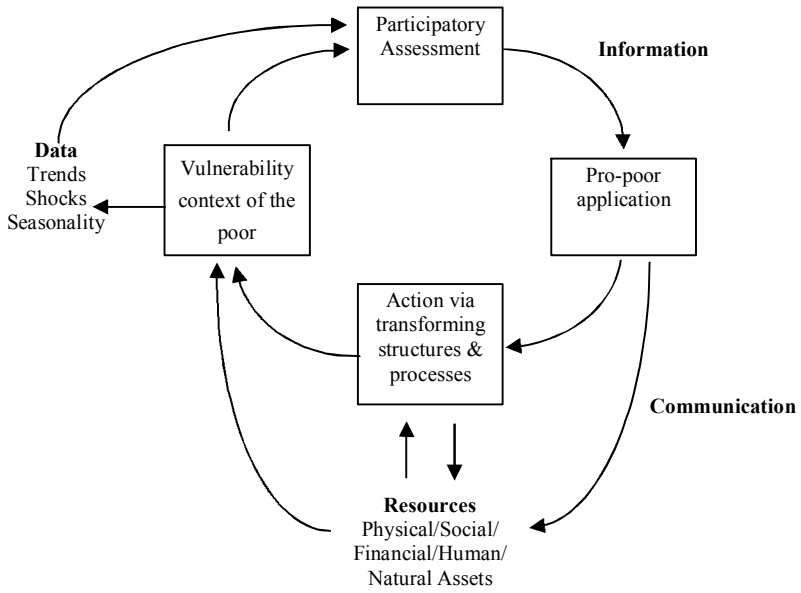
Analytical and functional roles can be considered by breaking down the livelihoods framework into three constituent parts: a) contextual analysis of vulnerability; b) livelihood strengths or assets; c) the structures and processes through which livelihood strategies are mediated.

D1. The Context of Vulnerability

The starting point for the development of a livelihood analysis is firmly rooted at the micro-level, where individuals, families, households and groups create their own coping strategies within a context of vulnerability. The extent of vulnerability of the rural poor is determined by multiple influences related to trends, shocks and seasonality concerning economic, social, political, geographical and natural resource factors (DFID, 1999). The vulnerability of the rural poor can increase due to lack of access to resources, weak economic integration and climatic problems, factors that are often exacerbated by ineffective governance, lack of economic opportunities, social exclusion, conflict, discrimination and lack of voice for the poor (Hulme and Shepherd, 2003). Vulnerability can also decrease when trends move in directions that are favourable to the poor.

In itself, information and ICT can do little to assist the poor in reducing their vulnerability. However, there are two key enabling applications: a) an analytical role for information in assessing the vulnerability context; b) a need to communicate that information to those who can act upon it. Figure 2 proposes a model of the main information and communication processes within the livelihoods framework based on the concept of the 'information chain' (Heeks, 1999).

Fig 2. Information and Communication Processes in the Livelihoods Framework



Information is a resource upon which technologies act. Information can be understood in terms of a staged process. The model suggests that raw data (disorganised and unprocessed information concerning trends, shocks and seasonality) needs to be accessed, assessed and applied in some manner before it can be considered as usable information that can be acted upon. In order for the information chain to function, environmental components must also be present. These include overt resources (money, skills, technical infrastructure), embedded/social resources (trust, motivation, knowledge, power) and relevant raw data

(Heeks, 1999). Embedded resources are also required for the poor to assimilate the content of information that is communicated to them, and to provide a contextual understanding for the poor of the sources of that information (World Bank 1998).

Accessing data from the wider environment will be critical to assessing the vulnerability context. For example, by assembling climatic data, processing it into a usable form, and communicating it to the rural poor as part of early warning systems that can protect against natural disaster. Another example would involve accessing data from the poor themselves by gauging the importance of different income-generating activities to rural households, and assessing how seasonal or market fluctuations may impact upon livelihood outcomes, and then to feed that information back to the rural poor in order that they can act upon it.

D2. Assets

An understanding of assets is concerned with analysing peoples' strengths. Again information has an analytical role in terms of how we can measure the assets of the rural poor, and a functional role in terms of how information can be used to strengthen assets. Assets should be viewed not as distinct entities, but as interdependent. As such, information can be considered as a resource that cuts across all forms of capital assets. However, as indicated earlier, information processes for the rural poor are strongly influenced by social processes, and hence strengthening social capital is a key requirement.

Social capital describes the features of social organisation that serve to coordinate actions between (market) actors. It describes the norms, the trust and the extended networks that underlie much income-generating activity in rural areas (Lyon, 2000; Fafchamps, 1999; Humphrey & Schmitz, 1995). Social capital not only describes the infrastructure of social relations that serves to coordinate actions, but also the information that is transmitted between actors via their social networks (Granovetter, 1993). Thus, it follows, that those who are excluded from such networks are those that are less likely to participate in entrepreneurial-type activities. Conversely, evidence suggests those with the most up-to-date and accurate information will be more able to participate, and make better returns on such activities (Lyon, 1999; Daniels, 1999).

Human capital needs to be strengthened alongside social capital (e.g., by enhancing entrepreneurial capabilities in order that the rural poor can participate in local markets). Other forms of capital – financial, natural and physical (including ICT infrastructure) – are less central to building the knowledge and capabilities of the rural poor. They are, however, essential inputs for the rural poor, who will require information concerning their availability and access (Duncombe & Heeks, 2002).

D3. Structures and Processes

Using an ICT analogy, structures have been likened to hardware – the public, private and non-governmental organisations that set and deliver policy, that deliver goods and services, and conduct a wide range of functions that affect livelihoods. Processes are akin to software

– political, economic, social, legal and cultural mechanisms that govern how structures interact with groups and individuals (DFID, 1999). Processes that impact upon the lives of the rural poor include the market, government policies, legislation, trade agreements, etc. Again we can identify two key roles for information. First, information required for analysis of structures and processes to assess their impact upon the lives of the poor. Second, information that allows processes to be carried out – for example, the information required to facilitate markets, to enact policy to frame legislation or implement agreements. There is also a requirement for communication, to facilitate: a) access by the rural poor to the transforming structures and processes; b) influence by the rural poor on the transforming structures and processes.

It is also important to recognise the relationship between the transforming structures and processes and assets (Fig 2). Assets can be strengthened directly (by the poor themselves) or indirectly (through the transforming structures and processes). Thus, information can be applied and acted upon by the rural poor directly or by the mediating institutions and organisations that influence the lives of the poor. Thus, we can assess a potential role of ICT in two main ways: firstly, though direct means, by suggesting ways in which ICT can strengthen the assets of micro-entrepreneurs; secondly, through indirect means, by suggesting ways in which ICT can strengthen the capacity of relevant institutions and intervening organisations.

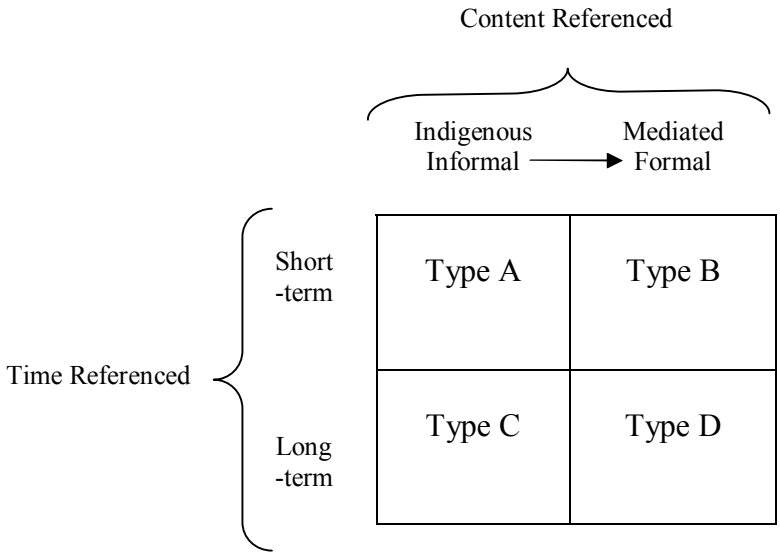
D4. Livelihood Strategies and Outcomes

Chapman and Slaymaker (2002) suggest a dual role for information in contributing to livelihood strategies. The first role relates to *long-term* capacity building such as through education, training and technical support, such as has been traditionally provided through government run extension services. Within a livelihoods perspective a broader role can be added: information for enhancing the long-term rights and entitlements of the rural poor in areas such as health, education, participation and empowerment. The second role relates to information concerning *short-term* decision-making. As previously indicated, evidence suggests that this type of information is likely to be gained predominantly via social networks. Information, therefore, can be seen to play a dual role: a) informing and strengthening the short-term decision-making capacity of the poor themselves; b) informing and strengthening the longer-term decision making capacity of the institutions and organisations that facilitate, assist or represent the poor.

For understanding the role of ICT within livelihood strategies, a second distinction can be drawn between formal and informal information (Duncombe & Heeks, 2002). The rural poor hold informal information as *indigenous* knowledge. Davenport and Prusak (1998: 5) define such knowledge as 'a fluid mix of framed experience, values, contextual information, and expert insight that provides a framework for evaluating and incorporating new experiences and information. It originates and is applied in the minds of knowers'. Formal information, on the other hand, is more likely to be mediated through formal structures and processes. Formal information is that which is recorded and available in a structured form – such as technical information from manuals, market information from a market report, official government information or information accessed via the Internet.

Combining the two aforementioned two-dimensional constructs creates a matrix as shown in Fig 3.

Fig 3. Typology of Information Roles for Livelihood Strategies



Within the matrix, information falls into four distinct categories:

- Type A. Short-term information that serves the immediate day-to-day decision-making needs of the rural poor and enables participation in social networks (those that govern rural markets, for example).
- Type B. Short-term information that serves the immediate day-to-day decision-making needs of the rural poor but which is mediated through the structures and processes (the institutional and organisational environment) within which they operate.
- Type C. Longer-term information that serves to strengthen social capital assets, and extend the reach of the rural poor (to more distant markets, for example).
- Type D. Longer-term information mediated through the organisations that are seeking to strengthen the other assets (human, financial, physical, natural) of the rural poor (through the provision of resources such as training, micro-finance, ICT or material inputs, for example).

Within the model we draw a distinction between the macro-level institutions that govern (market) behaviour and the meso-level organisations that interface more directly with the rural poor. Both play a role in mediating information, and both can act to reduce risk and lessen vulnerability. The model also draws a distinction between the assets of the poor. On the one hand, the forms of social capital required to interact effectively with organisations and institutions; and on the other, forms of human, financial, physical and natural capital (resources) required in order that the poor are able to respond, and thus create their own livelihood strategies. The model also recognises that information is an *a priori* need that comes ahead of ICT for the rural poor. Information requires assessment and application (either directly by the poor or indirectly via mediating organisations) as well as access, and it

is recognised that use of ICT will require 'a lot of overt resources including a telecommunications infrastructure to provide network access, an electrical infrastructure to make the ICTs work, a skills infrastructure to keep all the technology working, money to buy or access the ICTs, usage skills to use the ICTs, and literacy skills to read the content.' (Heeks, 1999, p7). As Heeks (ibid.) points out, 'the poor simply do not have these resources, and the greater the degree of poverty the less likely you are to have access to such resources'.

The following section applies the livelihoods approach to analysing ICT applications for rural micro-enterprise in a developing country context: taking Botswana as a country case study.

E. Application of the Livelihoods Framework to Analyse ICT Applications for Rural Micro-enterprise in Botswana

In order to carry out the analysis, data has been extracted from a series of studies of the rural micro-enterprise sector conducted in Botswana during the latter half of the 1990s (Liedholm & Mead, 2002; Wikan, 2000; Duncombe and Heeks, 1999; SMME Task Force Report, 1998; Lisenda, 1997; Daniels & Fisseha, 1992).

E1. Background

During the first 20 years of independence (1965-85), Botswana showed the most rapid rate of real economic growth (GNP per capita or total GDP) of any country in the world, albeit from a low base. Although presenting a positive case of modern African development, Botswana is still constrained by considerable problems of poverty, inequality and deprivation. Estimates from the mid-1990s indicated that 47% of individuals still existed below the national income poverty line (or 38% of households) and it is not surprising that Botswana has been described as a country of poverty amidst plenty (Wikan, 2000). However, Botswana represents a useful case study of ICT application for rural micro-enterprise due to the existence of: a) a largely rural-based population that participates in a broad range of micro-enterprise activity, b) a rapidly expanding and modern communications infrastructure, and c) a government that has made a strong commitment to poverty reduction through the expansion of the enterprise sector.

In Botswana, micro-enterprises are defined as having less than 6 workers including the owner and annual sales of less than P6000 (US$1,250) (SMME Taskforce Report, 1998). Approximately 70% all micro-enterprises in Botswana, in the late 1990s, were located in rural areas, with the majority located in the more populous north east of the country or in villages and settlements close to the main arterial routes. Most micro-enterprises were unregistered, with 75% owned and run by women from residential premises. A large number of rural micro-enterprises were involved in small-scale manufacturing (predominantly textiles & clothing, traditional crafts, and fabrication) but the majority (65%) were involved in retailing and personal services, with only a small proportion processing and selling agricultural outputs (Lisenda, 1997). This makes Botswana untypical of other developing countries, primarily because it has no developed cash crop sector (Liedholm & Mead, 2002).

In the late 1990s, 'recorded' micro-enterprise activity in Botswana was estimated to constitute approximately 50,000 micro-enterprises in total. Notwithstanding the large number of micro-enterprises identified, evidence indicates that self-employment and family business were (and still are) relatively uncommon in rural areas of Botswana, with only 5-7% of female-headed household members participating in economic activity involving micro-enterprise, compared with 8-13% gaining incomes from paid employment (CSO, 1996). There is also a large pool of highly survivalist activity based around small-scale agricultural production that goes largely unrecorded. This rural informal sector has been identified in a detailed study of rural livelihoods conducted by Wikan (2000) and showed that the contribution of rural micro-enterprise to the incomes of the very poor in Botswana is virtually non-existent.

ICT Access and Affordability

Data on access and affordability differentiates between socio-economic groups and is derived from the household income and expenditure survey (HIES) of 1993/94 (CSO, 1996). This data deals with ownership of ICT (fixed-line telephone, radio and television) by households, and can be compared with previous HIES data from 1985/86 (Table 1: overleaf). Economic resources are measured according to average monthly income in Pula. Very low was defined as an average of P205 (US$85) per month; low, P409 (US$169) per month, and better off, P1479 (US$611) per month, calculated on a 1994 average exchange rate of 2.42 Pula per Dollar.

Table 1. Ownership of Communication Facilities by Households in Botswana (1985 and 1994)

	Number of H/holds	1985/86			Number of H/holds	1993/94		
		% with Phone	% with Radio	% with TV		% with Phone	% with Radio	% with TV
Location								
Urban	53279	9.02	67.76	15.45	87419	18.18	80.3	35.31
Urban Village	45614	2.55	68.51	1.80	67218	7.39	83.43	11.81
Rural	123494	0.13	43.54	0.25	136973	0.34	67.72	3.60
Income Group								
Very low	48710	0.00	32.8	0.00	65494	0.26	59.52	2.53
Low	62282	0.00	49.65	0.37	80085	2.02	70.29	5.11
Better off	111396	5.50	66.63	8.20	146031	13.38	84.74	26.02

Source: (CSO, 1996)

The increase in telephone ownership over the period was in line with the overall increase in tele-density for the country as a whole. Whilst the number of urban households with telephones doubled, the number of rural and urban-village households rose by a factor of three. This of course was from an extremely low base, and in 1993/94, only 0.34% of homes classified as rural owned a telephone. When the figures are analysed according to income group, a small increase in telephone ownership amongst very low and low-income groups is apparent over the time period, rising from a base of zero. There have been larger increases in TV ownership, and high levels of ownership for radio receivers – the possession of which shows much less variation according to income. The evidence also shows (although the data is not shown in these charts) that telephones and televisions are mostly owned by households whose main source of income is wage earnings.

Also of interest are HIES statistics relating to patterns of expenditure by households. Choices of poor households are constrained because a large proportion of household expenditure is required to meet basic needs. Households with very low or low incomes spent a far larger proportion of their total income on food and clothing compared with households that are better off. The proportion of income spent on housing is fairly constant between urban-based socio-economic groups, but the largest differentiation is found with regard to transport and communications. Low-income households only spent 0.6% of their total income on communications (post and telephone usage), whilst high-income households are shown to have spent 2.82% (CSO, 1996). Rural dwellers spent the least on communication services – only 0.12% of total monthly expenditure.

Even though levels of ICT provision and use rose rapidly in Botswana over the time period, there were still wide access and affordability gaps between income groups. Telephony is a minimum requirement to access broader networks of information delivered via ICTs, and for the majority, direct access via personal ownership was clearly unobtainable. This evidence suggests that communal models of access and access via intermediaries remain the only viable alternatives, not only for those who exist below recognised poverty lines, but also for the majority of the non-poor whose level of income is far from sufficient to afford individual ownership. The insurmountable nature of the access gap is now widely accepted in Botswana as in other developing countries, and national policy goals previously defined in terms of 'universal access' have now become goals of 'shared access'.

E2.The Vulnerability Context

As outlined, vulnerability is concerned with trends, shocks and seasonality. A key report on the nature and extent of poverty in Botswana (CSO, 1996) stated that the key factor that has reduced poverty levels in Botswana is the trend towards urbanisation alongside rapid increases in formal-sector employment opportunities (with a large proportion of employment growth taking place in urban-based micro and small-scale enterprises). Unlike much of Africa, urbanisation in Botswana is positively associated with rising per capita incomes and there is greater prospect of increased urbanisation in Botswana also leading to substantially increased access to higher levels of infrastructure and resources for those that migrate to the capital city (Gaborone) or the larger towns.

Persistent poverty is largely a feature of rural areas and the extent of vulnerability of rural households varies considerably according to regional location. Much of Botswana is arid or semi-arid and those who seek to conduct entrepreneurial or survivalist economic activity in rural areas are constantly vulnerable to the shock effects of drought, causing crop failures and wasting of livestock (thus cutting off supplies of inputs to survivalist activities). High levels of vulnerability in rural areas has also been exacerbated by economic and political factors, such as the imposition of border controls in many parts of the country that have restricted cross border trade, communications and movement of labour (Wikan, 2000; Kruger, 1998).

Thus, in most areas of Botswana the populations of remote rural areas are reducing. This means that the vast majority of recorded micro-enterprise activity has become concentrated in

or around rural villages and towns. This trend is seen as largely positive given that better access to markets and resources is afforded. Survivalist activity, on the other hand, is a result of endemic poverty, and tends to be spread more evenly according to the location of that poverty, with a large proportion concentrated in more remote and underserved areas.

E3. Assets

The nature and extent of the assets of the rural poor are a measure of their incomes and capabilities, as well as their access to resources and infrastructure. We can consider each capital asset in turn, drawing upon evidence from Botswana to assess the factors that are applicable to ICT applications for rural micro-enterprise.

Social Capital
Markets for rural micro-enterprise in Botswana are predominantly local, with access to customers facilitated through networks of contacts in the immediate locality. Generally speaking, such networks are under developed in Botswana (Duncombe & Heeks, 2002; Lisenda, 1997). Local informal networks are essential, but evidence also shows that reliance on them can restrict entrepreneurial activity – particularly for those that wish to extend their market reach into urban areas (Duncombe & Heeks, 1999). Such enterprises may wish to access formal credit facilities requiring written applications. They may wish to collect information on market prices within urban areas. It may be necessary to look further afield for raw materials, comparing prices and availability of inputs. Reliance on informal networks that generate poor quality information can also fail survivalists – the poorest and most disadvantaged entrepreneurs such as female-headed enterprises whose social networks are small and knowledge poor (Duncombe & Heeks, 2002).

Human Capital
The quality of the human resource base has been recognised as Botswana's most significant structural weakness. This is not surprising given the comparatively short history of education and training in Botswana. In 1994, 88% of all micro-enterprise owners had only primary or no education, and only 1% had some form of tertiary education (Lisenda, 1997). 90% of all rural micro-enterprises kept no effective records – including financial records (e.g., cash book, expense ledger, etc) but also other records of transactions such as invoices or receipts. Evidence suggests that less than 10% of Botswana's school leavers had access to any form of vocational training. This suggested little or no scope for ICT applications in a business support role particularly in rural areas (Duncombe & Heeks, 2002).

Financial capital
Previous surveys of the micro-enterprise sector identified lack of financial capital as the greatest perceived constraint for rural micro-entrepreneurs (Lisenda, 1997; Daniels and Fisseha, 1992). 89% of all trading micro-enterprises had never received credit, but had established their businesses largely through informal credit and personal funds. Thus, most micro-enterprises had no access to finance and those surveyed generated average annual turnovers of only US$1,250. It was also found that only 7% of micro and small-scale business owners were aware of most finance and business assistance programmes; and only

27% were aware of the availability of capital expenditure grants delivered via the government financial assistance policy (FAP) despite extensive publicity campaigns (Lisenda, 1997).

Physical capital
Large-scale investments in Botswana during the 1980s led to the rapid expansion of a digital fixed-line telecommunications infrastructure into the main urban centres, the major towns and large villages within the country during the 1990s. Botswana has invested in a highly sophisticated fibre-based transmission network together with a series of high capacity digital exchanges. Botswana Telecommunications (the national incumbent operator) has also embarked upon a rural telecommunications programme extending fixed line services to those previously unconnected. Thus, access to telecommunications networks is considerably better in Botswana than many other sub-Saharan African countries. In addition there has been rapid development of private mobile digital networks. However, as outlined earlier, for the majority of the poor in rural areas both affordability and access are largely insurmountable constraints. Other physical constraints experienced by rural micro-enterprise included lack of transport, material inputs, labour deficiencies, inadequate tools and machines, inadequate business premises and lack of access to utilities (including electricity and water). However, these were reported to be less critical than those related to finance and markets (Lisenda, 1997).

Natural capital
Although the natural capital assets of the rural poor in Botswana are primarily made up of land (small holdings and cattle post lands) and livestock (cattle, goats and donkeys) such assets do not provide a significant volume of inputs into rural micro-enterprise activity. This is reflected in the type of occupations that are chosen by rural micro-entrepreneurs that tend to be those that source material and natural resource inputs from external sources, predominantly as imported inputs (e.g., cloth, metals, timber) sourced via wholesalers or through direct cross border trade. This does, however, create an increased demand for communications and transport.

E4. Structures and Processes

Historically, government has played a key role in rural micro-enterprise support in Botswana, acting through research and training networks, integrated field services (IFS), agricultural extension services as well as local government. It is now generally accepted in Botswana that government – through such 'top-down' extension services – does not represent the most effective body for co-ordinating and administering the implementation of policy in the enterprise development sector. It is particularly poor at disseminating information within a market environment, and lacks the experienced personnel who are able to effectively interact with entrepreneurs (Levitsky, 1989).

Thus, policy changes during the latter half of the 1990s have seen a gradual diminution in the role of government, and instead, the promotion of partnership or exclusively private sector solutions for the delivery of rural services. For example, training provision, rather than being delivered directly by government agencies, is licensed to private sector providers, and validated by independent agencies. There is a gradual move, therefore, toward livelihood

strategies that are either market-based – involving private suppliers of inputs and utilities (including telecommunication and ICT services) or community-based – involving, for example, producer groups, stakeholder groups and micro-finance organisations.

Rural areas of Botswana have seen benefits from private sector involvement. There are now more locally owned businesses offering information and communication services. By definition they are economically viable. If they are not profit making they will not survive, and will, therefore, need to provide services (including information and ICT-based services) that are in demand within the community, and for which people are prepared to pay. It is true, however, that the market approach excludes the very poor, who are unable to pay for such services. For this reason there has also been growth in non-commercial community-based activities supported through external funding.

ICT has a potential role in transforming such structures and processes. New networks of communication have the power to bypass pre-existing hierarchies, and empower private, community-based or mass-media organisations that can interface with rural micro-enterprise more effectively. In this respect, digital ICTs (digital radio, mobile telephony, email and the Internet) have the potential to build horizontal networks that can serve to link community-based partners and stakeholders. However, there is a danger that ICT can become a tool of powerful interests in the community and further exclude the poor. This has been experienced in other African countries with regard to rural tele-centres, where issues of ownership and control have come to dominate the establishment of such facilities, with the potential to create mismanagement and corruption, leading to the diversion of resources away from the needs of the poor.

E5. ICT Applications for Livelihood Strategies

Wikan (2000) provides little or no evidence of micro-enterprise activity for the majority of the poor in Botswana. For the rural poor in Botswana, therefore, the most common diversified strategy for sustaining livelihoods is to combine non-monetary incomes from subsistence farming with income from agricultural surpluses (seasonal) and intermittent wage labour, as well as the additional income sources outlined earlier. This suggests, that as well as focusing on micro-enterprise, livelihood strategies that involve ICT will need to take into account the full range of income generating activities that contribute to livelihood outcomes.

Appropriate Technologies for the Rural Poor
ICT applications that can be used directly by the rural entrepreneurs need to serve their immediate information needs, their day-to-day decision-making requirements, and enable participation in the social networks that form the basis of informal and localised rural markets. In this respect, all the evidence suggests that communication should be prioritised ahead of information provision (Duncombe & Heeks, 2002). The thirst for communication in the rural areas of Botswana is reflected in the high level of demand for new telecommunication services. A study published by McKerney (2003) suggests much higher levels of usage of telephony (both fixed line and mobile) than is suggested by the data on ownership from the HIES (1994). In 'rural no-access' areas (areas where predominantly poor people lived with no direct access to telecommunication services) the study points toward

regular use of phones by 75% of the sample surveyed. Respondents indicated they were prepared to travel large distances in order to use telephone services, via a range of access methods including booths (public payphones), tele-shops, and private fixed or mobile lines. The purpose of calls was recorded as predominantly to friends and family (70%), a large proportion of which concerned arranging financial remittances. Approximately 15% of respondents indicated that they were using telephones for business purposes.

There is also evidence that ICT has the potential to reduce the transaction costs associated with the exchange of information relevant to rural micro-enterprise activity (Duncombe & Heeks, 2002). ICT (primarily via telephony) can reduce the time (and hence costs) associated with receiving market information (such as prices) and the costs of conducting and agreeing transactions (Lyon, 2000). For example, many micro-enterprises in Botswana made use of rural telephone services for arranging delivery and collection of goods. However, without means of delivery (transport) provision of telecommunications proved less useful. Census data showed that in 1994, only 8.5% of rural households owned a vehicle (rising from 4.8% in 1986). However, the key advantage of telecommunication services for micro-enterprise was that they supported real time communication and a two-way flow of information.

Radio is still the most popular means for disseminating information to rural areas in Botswana. It is effective for dissemination of transmutable information (i.e., information that can be gathered from different sources and re-distributed widely). Examples included information about improving agricultural productivity through new methods, new technologies, improved seeds and livestock methods, as well as more general information concerning weather conditions or market opportunities. Kenny (2000: 8) observes that radio as a method of information delivery has several advantages: 'firstly, both the radio unit and programming and delivery mechanisms are among the cheapest forms of mass media. Secondly, radio signals can penetrate remote geographic regions, and any individual with access to a radio set can receive information, regardless of literacy or education level. Finally, rural radio provides region-specific information, easily incorporates local concerns and feedback, and can operate in local languages'. Until other ICTs (e.g., computer-based technologies such as the Internet) can replicate these advantages at the same cost, then it is likely that radio will continue to be the most relevant technology for the rural poor.

Evidence suggests, however, that the basis of rural micro-enterprise information systems in Botswana will continue to be informal and social. Social networks substitute for absent market functions and absent forward and backward linkages to the market. There is, however, an issue of information quality. Although highly valued by micro-entrepreneurs, informal information can be constrained and insular if the entrepreneur's social network is also small, closed and knowledge-poor (Duncombe & Heeks, 2002). Informal information may be particularly deficient for marginalised or displaced entrepreneurs who lack a coherent social network. Informal information is, however, associated with a higher degree of trust, confidence and security. For the poor, sufficient trust to justify decisions will mainly be created through personal contact, through interaction and, usually, through a shared context and proximity to that of the information source. Micro-entrepreneurs who are recipients of information must, therefore, have confidence in the source, and feel motivated to take a certain amount of risk (Heeks & Duncombe, 1999). Economic development dictates, however, that 'entrepreneurial' micro-enterprises are able to break away from being mainly

social entities to being more economic entities. To facilitate this, social capital needs to be strengthened and extended beyond the immediate locality of the micro-enterprise. In order to do this support structures and processes for information and ICT are required at the meso-level and macro level. In this respect the studies raised a number of issues that are outlined in the following sections.

Meso-level Issues

Lack of access and affordability dictates that intermediaries are required to facilitate the use of ICT on behalf of the rural poor. In Botswana, local structures that interface directly with the rural poor are often constrained in the same way as their clients by lack of local infrastructure access, poor skills and lack of financial resources. CBOs and the private sector have generally been quicker at implementing ICT-based systems than government agencies. However, evidence from Duncombe & Heeks (1999) illustrated the limits placed on intermediaries in extending ICT-based networks into rural areas. Problems arose not only because poor entrepreneurs lacked access, but also because they would not act upon and trust information unless it was delivered at a personal level. Therefore, agency staff had to communicate face-to-face with rural entrepreneurs. Notification of meetings, for example, could only be done by physically going to the villages and passing on messages. There were public phones in the villages, but there were often large queues and they were often out of order.

Related to this is the more general need for enterprise-support agencies to understand and to appropriately support their client groups. Evidence suggests that for this to happen, there needs to be a sufficient degree of 'fit' between agency and client along a number of key dimensions including organisational processes, structures, staffing and technology (Gibb and Manu, 1990). Evidence from the Botswana studies indicates that the introduction of ICTs within agencies is reducing this fit, and further distancing them from the rural poor. This reduced the ability of agencies to understand and to adequately support their clients. At the same time, however, agencies were improving their effectiveness in interacting with the urban (modern) sector. This enabled intermediaries to be more effective advocates on behalf of the rural poor, and to interact more effectively with organisational structures and institutional processes at the macro level.

Macro-level Issues

Information supplied at the macro level can overcome or forestall the social inequalities that may constrain rural micro-enterprise activity. Government has the power and capability to disseminate information countrywide. The Government of Botswana plays a strong role in disseminating public good information about health and education, about rights and entitlements. In collaboration with other agencies, government also plays a central role in collecting data that informs poverty reduction strategies at different levels. This is where ICT was found to be playing a strong analytical and functional role: firstly, by providing data concerning key indicators of livelihoods – agricultural development, poverty and other environmental factors. Secondly, by generating information that supported implementation of policy – contributing to monitoring, evaluation, internal management processes, de-centralisation of decision-making, participation, etc.

Macro-level institutions in Botswana have greater capability to provide data of relevance to the micro-enterprise sector, and data in a digital format (as well as other formats). However, considerable caution needs to be exercised when expanding the digitisation of information in a development context. Digital formats – transmitted via email and the Internet for example – may not represent the most appropriate or cost effective means for information dissemination and may only serve to further exclude those who lack access. Botswana is expanding other government-led and institutionalised channels to spread formal data for rural micro-enterprise – such as through the expansion of the media (radio and TV), rural libraries, information centres and extension services – although this study, and others, shows these have low priority for the enterprise sector. Funding of transport and transport infrastructure is probably a more important area of macro policy, and Botswana is progressing rapidly in this respect. All of these ideas address supply of information. Increasing the demand for information will be a more powerful tool to develop the data infrastructure, but will be harder to achieve and will require concerted action in the area of human resources.

E6. Case Study Conclusions

It is evident that the rural poor need to build existing livelihood assets more than they need to access new information. In this respect, the poor need to build trust through their locally-contextualised social networks more than they need access to information via ICT. Rural telecommunications via ICT and new radio formats will likely play an increased role in this regard. Where ICT is used, it should provide a supplement, not substitute, to existing information systems and technologies. ICT can play a significant role in giving the poor a voice. This will be done most effectively through the existing community intermediaries that are held in highest esteem by the poor, for whom ICT can fulfil an important role in building institutional and organisational capacity.

Access to data, possibly via ICTs, is only the first link within the information chain. Of more importance is the usability of the data/information retrieved. Measures will need to be taken to address the assessment and application stages alongside access. Greater provision of relevant quality local content will help. So will general education that builds up relevant knowledge and skills. Falling levels of illiteracy among the 15-24 age group and rapidly rising secondary school completion rates, particularly for women, are causes for optimism in Botswana. However, this generation is more likely to migrate and remain in urban areas. For the rural poor, intermediated models for assessment and application of ICTs are most likely to succeed. This once again reinforces the need for community-based intermediaries that are able to add value to information by providing the necessary additional resources.

The demand for information and ICT in rural areas is increasingly being determined through a ‘regulated’ competitive market and, for many, affordability is likely to be the critical access issue around emerging technologies, such as computer-based ICTs and cellular telephony. This will increasingly be the case as private networks evolve and user technologies, such as mobile and radio telephony, become more adaptable in receiving, processing and transmitting a wider range of increasingly locally-published content. The hope, of course, is that market liberalisation and competition will, over the long-term, lead to lower prices for universal business and household access (ITU, 1999).

F. The Livelihoods Framework: Value, Contribution and Shortcomings

This analysis has taken the livelihoods framework and adapted it to analyse ICT applications for rural micro-enterprise in a developing country context – taking Botswana as a country case study and placing the condition of the rural poor at the centre of analysis and action. In approaching the issues of ICT application for poverty reduction (in this case through rural micro-enterprise) the livelihoods framework helps us to contextualise the analysis. This is important because it enables the researcher to highlight ICT as one variable amongst many, in this case placing all three elements of the analysis (information, ICT and micro-enterprise) into an appropriate theoretical context. It demonstrates that information, whilst a necessary component of micro-enterprise activity, is by no means a sufficient one. More important are the human, social, financial, physical and natural resource-based factors that enable micro-entrepreneurs to enhance their capabilities and reduce their vulnerabilities.

Use of the framework also highlights the extent to which the stated benefits of digital technologies are distanced from the rural poor. This is apparent within an environment where the majority of the poor are already excluded from pre-existing technologies. The livelihoods framework also demonstrates the largely peripheral role (in the case of Botswana) that rural micro-enterprise plays in sustaining the livelihoods of the rural poor. This suggests that the analysis of micro-enterprise is too narrow, and the role of information and ICT should be considered according to a broader portfolio of income generating activities. Thus, the analysis demonstrates both a distancing of micro-enterprise activity, and a further distancing of ICT, from the broader factors that sustain livelihoods.

The analysis has adopted an information first approach by highlighting the key information and communication processes that inform action within the framework. This falls into line with our definition of ICT as an enabling technology. A number of characteristics of information have been highlighted: a) information has both an analytical and functional role within the livelihoods framework, b) information should be considered as part of a dynamic process of change (access, assessment, application and action) rather than as a static resource, c) dynamic information processes can be formal or informal and each is imbued with certain quality attributes, d) information can fulfil both short-term and long-term needs, e) dynamic information processes can be actionable at different levels (micro/meso/macro) and can serve to foster interaction between different levels of activity (i.e., linking structures and processes via assets to the rural poor themselves through channels of communication).

Whilst this paper by no means seeks to present a comprehensive model of information and communication processes for the purposes of analysing livelihoods, it does highlight some deficiencies within the livelihoods framework in this respect. The livelihoods framework does not incorporate information as a cross cutting theme, rather it is treated as a physical asset much like any other asset. This is a false conception of information. As previously outlined, information is an intrinsic part of a dynamic process of activity involving access, assessment, application and finally action. Thus, within the structures and processes that

make up the livelihoods framework, information can be viewed as a lubricant that oils the institutional and organisational wheels. If information is the oil that flows through the structures and processes, then communication is the channel along which the oil flows. This highlights another important characteristic that is better catered for within the livelihoods framework. That is, the idea of two-way communication. By their very nature, livelihoods analyses and strategies involve two-way communication due to their participative and involving methodologies. Evidence presented in the Botswana case study also suggests that technologies that facilitate two-way flows of information (i.e., interaction rather than dissemination) are of greater benefit to the diversification of livelihoods (e.g., by enabling the rural poor to arrange remittances).

Not only does the livelihoods framework take little account of information, it also takes little account of technologies and their role in building livelihood assets. Technology is a mechanism through which people realise the value of their assets by transforming their labour and natural resources into food, shelter, health, income or other desired livelihood outcomes (Albu and Scott, 2001). From our case study evidence there is little indication that new digital ICTs are playing a significant role in the lives of the rural poor. However, there is evidence that as the poor become less poor the extent of distancing is reduced in terms of their ability to access and use ICTs.

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