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Researching ICT-Based Enterprise in Developing Countries: *Analytical Tools and Models*

RICHARD HEEKS

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Institute for Development Policy and Management
University of Manchester, Arthur Lewis Building, Manchester, M13 9PL, UK
Tel: +44-161-275-2800/2804 Email: idpm@manchester.ac.uk
Web: http://www.sed.manchester.ac.uk/idpm/dig

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Richard Heeks
Development Informatics Group
IDPM, SED, University of Manchester, UK
richard.heeks@manchester.ac.uk

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Abstract

This paper provides a guide for those researching ICT-based enterprises in developing countries. Examples of such enterprises would include telecentres, cybercafés, mobile phone shops, Internet service providers, software companies, IT training firms, IT consultancies, hardware assemblers, data entry operators, and so forth. This may also be called the IT or ICT sector, or the digital or knowledge economy.

The paper offers a series of "lenses" – i.e. analytical frameworks – through which to investigate these enterprises. They move from basic classificatory models to those that can analyse competitive strategy, impact, context and the enterprise lifecycle. In each case, the paper provides an explanation of basic concepts, and a sense of what research using the particular framework would offer.

Introduction

One can analyse ICT- (information and communication technology-)based enterprises in developing countries at various different levels.

At the level of the individual, research tends to focus especially on entrepreneurship drawing, for instance, on psychology in order to understand the characteristics that make up a successful entrepreneur. At the level of organisational systems, research can focus, for example, on the way in which new technology is being applied in the enterprise. At the level of the organisation, there is a rich variety of models and theories. A number of these look at the organisation within its environment: resource-based theories of the firm, for example, look at the interactions between enterprises and the social actors from whom they derive input- and output-related resources; contingency theory looks at the match and mismatch between external environment and internal systems. Finally, there are enterprise-based analyses that operate at both a sectoral and national level, such as some versions of competitiveness theory.

As described here, enterprise theory draws from a wide variety of disciplines. Economics, management and psychology form a strong basis, but ideas from disciplines such as sociology and geography are also found.

Together, these can provide insights into issues such as:
- the basic operational character of the ICT-based enterprise as a business;
- the economic sustainability and viability of the ICT-based enterprise, including its competitiveness vis-à-vis other enterprises;
- strategies to be adopted by the enterprise to help ensure survival and growth;
- the broad impact of the enterprise, particularly in economic terms; and
- the nature of the context within which the enterprise operates, and the impact of this context on the enterprise.

To help with research on these topics, the paper is structured in the following way. Part A looks at basic indicators used to classify ICT-based enterprises, and this continues in Section B with some more specialised ways to classify enterprise. Business strategies are considered in Section C, particularly those related to cost and scale economics. Section D covers the impacts of ICT-based enterprises from a wide range of perspectives; a range that is increased in the next section through consideration of the context within which these enterprises operate. Section F highlights those factors that impact various stages in an ICT-based enterprise's lifecycle – "birth", growth, and "death". Finally, Section G presents some other research tools that may be of use.

Research in General

There follows below a more detailed exploration of various different approaches to researching ICT-based enterprises (IBEs). In general terms, data can be gathered from IBEs in three main ways:

- *Ask*: i.e. use an interview or questionnaire. Within the enterprise, this will typically be the owner of the enterprise, or one of the managers, or staff members. Outside the enterprise, this would involve other stakeholders like suppliers, customers,

competitors, support agencies, consultants, sectoral analysts, etc. In some cases, it could be appropriate to interview as a group.

- *Read*: i.e. use document analysis. This could involve higher-level records, such as trade association magazines or reports, or consultant/academic analysis of the relevant ICT-based segment. Or, it could involve enterprise records, such as accounts or meeting minutes.
- *Observe*: i.e. use observational analysis. This could involve analysis of a process (such as seeing how a service like data entry is delivered, or seeing how the owner makes decisions), or simple observation (such as seeing how many staff are working in the enterprise).

Occasionally, data-gatherers might also *Act*, by participating in some part of the enterprise's processes.

Each of these methods individually may have shortcomings: those asked may be unwilling to answer, or may accidentally or deliberately give an incorrect answer; written records may not exist or may be partial; what is observed may not be representative. To overcome this, "triangulation" helps: combining data from different methods and sources. Likewise, trust helps, which may depend on how the research is presented, and the contact channels made use of. Finally, for reasons of cost and speed, most research on ICT-based enterprises is cross-sectional: a single snapshot at one particular time; however, longitudinal research conducted over a significant time period may be much more revealing: Storey (1994), for example, argues that it takes a decade to properly observe the employment impact of an enterprise.

Whatever the approach used, good practice dictates that the ICT-based enterprise researcher should explain to readers how their data was gathered.

A. Basic Classification of ICT-Based Enterprise

Enterprises can be classified according to some very basic criteria; often contrasting dyads or positions on a continuum. For ICT-based enterprises, one of the most fundamental is that of intensive vs. extensive uses of ICTs (Narasimhan 1983). "Intensive" means application of ICTs to pre-existing processes and outcomes, such as computer-controlled production machinery or delivery of government services via the Internet. "Extensive" means application of ICTs to new processes and, hence, to new products and services. In this paper, we define ICT-based enterprises as those involving extensive application of ICTs. They represent new economic activities arising from the advent of ICTs including:

- *ICTs as an enterprise output*: production of hardware, software and telecommunications products.
- *ICTs as a primary, processing technology*: provision of data entry services, ICT-based business services, sale of mobile phone calls, software customisation, ICT-based distance learning, etc.
- *Other ICT-related support activities*: provision of computer training, consultancy and other services.

Put more simply, we can ask of any enterprise the question, "Would this enterprise exist without ICTs?". If the answer is "no", then that is an extensive entity: an ICT-based enterprise. The three-way schema just offered is one initial means of classifying such enterprises, the classification relating to the role played by ICTs in the enterprise.

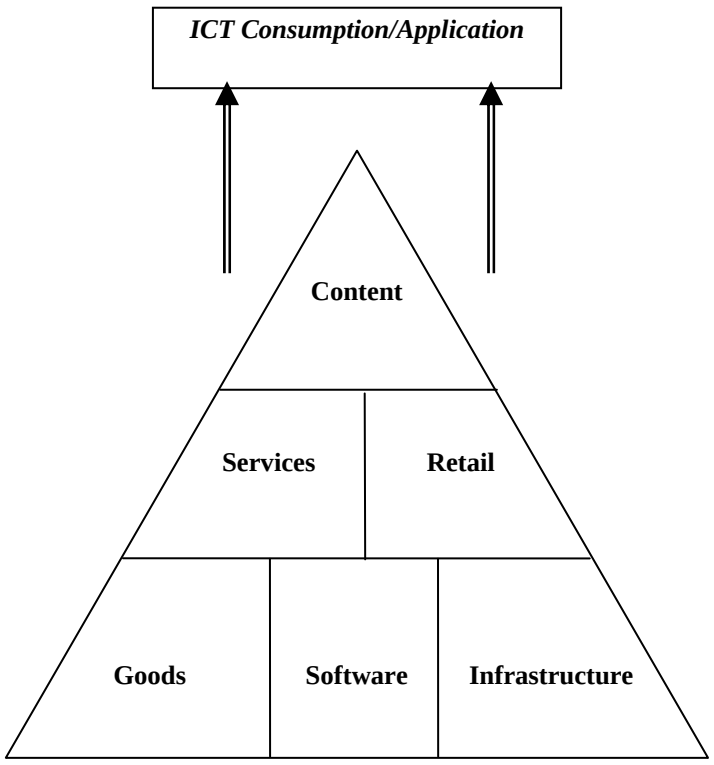
Other basic classificatory schema that can be used to distinguish within the overall ICT-based enterprise category include:

- *Goods vs. services outputs*: the former being simply defined as the production of "anything you can drop on your foot". Most ICT-based enterprises fall into the services category, producing something intangible like a set of data entered into a database. However, some IBEs are manufacturers; for example assembling personal computers. There are important differences between goods and service enterprises – for example, about the nature of competition or about the relationship to consumers – that make this classification quite widely used. However, some IBE outputs – such as software – sit at the intersection between goods and services, having features of both, which can reduce the value of this classification.
- *Producer vs. consumer outputs*: producer items are used by other enterprises for further processing; they can be capital items (machinery used to make other goods) or intermediate items (used as inputs for further processing). Consumer items are made for direct consumption and are sometimes divided into wage items that everyone requires, and luxury items that consumers may want but do not need for basic survival. ICT-based enterprises can fall into any of these categories but seem likely to be concentrated in intermediate producer and luxury consumer outputs. The nature of this market has implications for issues such as competition and stability, and understanding the market is fundamental to understanding issues such as prospects for growth or strategies for marketing.
- *Type of output*: one can be even more specific than the two preceding output schema, dividing enterprise output into, say, hardware or software or IT training, etc. The three types of IBE initially described in this section – based on ICTs' role as output, as primary processing technology, or in some other role – can also be

used as a means for differentiating the type of output produced. We can combine these to create an overview categorisation for IBEs, breaking the overall sector down into six overlapping sub-sectors (adapted from Wong 1998, Molla 2000 and Heeks 2006; see Figure 1):

- *Goods*: production of ICT consumer goods such as computer hardware and digital telecommunications, plus ICT producer goods: both capital goods (e.g. automated machinery for manufacturing PCs) and intermediate goods (chips, motherboards, hard disk drives, DVD drives, etc used in computer manufacture).
- *Software*: design, production, marketing, etc. of packaged and customised software.
- *Infrastructure*: "development and operation of enabling network infrastructure" (Wong 1998:325); both foundational telecommunications plus value-added networking services.
- *Services*: professional services not covered in other categories such as consulting, training and technical services.
- *Retail*: sale, re-sale and distribution of ICT goods, software and infrastructure and related services.
- *Content*: production and distribution of data content, including back-office processing and digitisation.

Figure 1: Typology of IBEs Within ICT Sub-Sectors



- *Type of market*: the three categories just given represent views on type of market. Another is the difference between subsistence and commodity production, discussed below in the section on "form of production". Yet another is export vs. domestic market orientation. Most ICT-based microenterprises, for example, sell

- *Ownership*: the most commonly-used distinction in ownership is that between public and private ownership, with the majority of IBEs likely to fall into the private sector. Another aspect is that of sole vs. cooperative vs. public/shareholder ownership: IBEs are divided between these categories. There may or may not be foreign ownership, and this might be sole or joint venture. The nature of ownership has important implications, such as for decision-making within the enterprise, for enterprise goals, for the location of enterprise benefits, etc.
- *Location*: a common distinction is that between rural or urban location. ICT-based enterprises in rural areas are likely to face greater challenges, for example in sourcing production inputs such as finance, labour and equipment, and in locating customer markets. On the other hand, bringing non-farm income into rural areas is often seen as having a significant value in addressing poverty and in reducing rural—urban drift.
- *Registration*: this is the distinction between formal enterprises (registered with some government agency), and informal enterprises. Following a flurry of interest in the 1970s and 1980s, there has perhaps been rather less focus recently on the issue of registration. Nonetheless, there are still important differences to take into account. Formal sector ICT-based enterprises tend to face official regulatory and taxation costs that informal sector enterprises avoid. On the other hand, informal IBEs may not qualify for assistance available to formal enterprises, and may be subject to petty harassments.

A1. Classification According to Size/Scale of Production

A particularly important issue to understand from an economic perspective is the scale of production in an enterprise since this has a direct bearing on the costs of production, and on the competitiveness of an enterprise vis-à-vis others operating in its market. This will be discussed in greater detail when looking at costs and production.

Here, we note that scale of production can be defined in terms of the volume of units produced in a given timescale. For a goods-oriented ICT-based enterprise, such as a hardware assembly firm, this measure is relatively straightforward: you can measure scale in terms of the number of computers assembled, say, per week. For services-oriented IBEs, assessment of production scale may be much harder if there is no clear "unit" of output. For an IT training firm, you could measure the number of trainees handled per week but even this presents comparison problems if one firm runs just one-day training programmes whereas another runs one-month programmes: you would need to devise a measure of something like "trainee-hours". Similar, or worse, difficulties would be faced in estimating scale of production for a data entry firm or for a firm undertaking IT consultancy.

Because of these problems and for other reasons – each measure is enterprise type-specific so you could not compare scales of different ICT-based enterprises; smaller enterprises may lack the records that permit scale estimation; and output measures may vary considerably over even short time periods for smaller firms – definitions of

scale tend to rely on different measures that are more visible/measurable, more stable and more comparable:

a) *Number of employees*. Reviewing a series of scale definitions (Fadahunsi 1990, Akhouri 1990, Mead 1994, Storey 1994, Elaian 1996, Morris et al 2001, Harvie & Lee 2002, ILO 2008), we can see that the dominant means for scale definition is to use the proxy of number of employees (often specified more exactly as the number of full-time equivalent workers). Whilst eminently criticisable in terms of its relation to scale of production, particularly for enterprises where new technology plays a significant role, the universality and continuity of this measure speaks to its ongoing value.

b) *Capital assets*. The second most widely-used criterion for scale is that of assets/investment. Typically this is expressed in terms of the value of fixed assets or capital in the enterprise. For an IBE, one would typically start by looking at the investment in ICTs within the enterprise, and then add in any other equipment that was central to the productive process (such as assembly tools for a hardware assembly firm). Some consistency is needed over the variance that may exist between the amount invested and the current market value. ICT values depreciate quite rapidly so what cost, say, US$10,000 two years ago could be valued at less than half that amount now. Piracy must also be taken into account since software obtained at very low cost may actually be worth far more: one must therefore be clear whether it is cost or value of assets that is most important.

While both this and number of employees represent a continuum, many classifications pick some arbitrary point at which to distinguish enterprise types: such as micro from small, small from medium, medium from large. For example, some classifications define microenterprises as being those with fewer than ten workers; or small as being those with less than US$50,000-worth of fixed assets.

c) *Sales/turnover*. Another criterion that relates directly to size/scale is output; measured, for example, in terms of the value of sales achieved per year, also known as "turnover" (this, of course, is different from output measured in terms of how much is produced, since not all output may be sold). Although useful as a basic enterprise characteristic, this is not often used in formal definitions of enterprise size.

d) *Other size-related criteria*. Other items that have been used only rarely in formal definitions of enterprise size include market (e.g. selling only in the local area); ownership (e.g. local ownership); management (e.g. lack of any management level other than the owner); and technology (e.g. no use of power). None of these is seen as particularly relevant to understanding the scale of production in ICT-based enterprises.

A2. Other Indicators

The issue of enterprise lifecycle will be discussed in more detail below. Here, we will just note that a proxy for position within the lifecycle from birth through growth and development to death is enterprise age. IBE start-ups (which we might proxy as those

less than 12 months old) require quite different strategies from those which are in a more mature stage.

Financial analyses of enterprise rely quite heavily on a whole raft of indicators that can be applied to ICT-based enterprises, such as:

- *Profits*: the excess of income over costs in the enterprise, typically for a given year. Levels of profit – both in absolute terms and as a proportion of overall sales (the profit margin) – give a very strong insight into the workings of an ICT-based enterprise. For formal enterprises there may be a difference between gross (pre-tax) and net (post-tax) profit.
- *Costs*: can be calculated either as the total expenditure of the enterprise, or broken down into "cost of sales" (the direct costs of producing the particular good or service; these are typically the variable costs of labour and raw materials) and "overheads" (the indirect costs of running the enterprise, which tend to be fixed – i.e. they stay much the same regardless of how much the enterprise produces – they include things like costs of management and administration, rent, and equipment costs).
- *Productivity measures*: these typically divide output by input to give an insight into the strength or weakness of the ICT-based enterprise's main production process. Common measures include annual income divided by the number of employees (a measure of labour productivity), and annual income divided by capital assets (a measure of capital productivity)
- *Export orientation*: the percentage of total sales that are made up from exports.

Other measures that might be employed, particularly in more formal IBEs include (ASK n.d.):

- *Other assets*: other "fixed assets" owned such as land, buildings, vehicles; other "current assets" such as cash and bank account contents plus stocks of outputs and debtors who owe the enterprise money.
- *Liabilities*: both "current liabilities" that the enterprise owes short-term (creditors, taxes, bank overdrafts) and "non-current liabilities" that the enterprise owes long-term (long-term loans or hire purchase).
- *Other measures*: armed with these basic measures, all sorts of financial indicators can be calculated, such as the "return on capital" (profits divided by capital used); "asset utilisation" (sales divided by total assets); "current ratio" (number of times that current assets cover current liabilities); and "gearing" (various measures which look at the ability of a firm to pay off its debts).
- *Share price*: for those firms that have a stock exchange listing one can look at the share price or, more usefully, the total value of shares held.

A3. Grounded Approaches

All of the classifications and indicators given above are top-down; that is, they are prescribed in advance by someone external to the enterprise. However, there is an alternative: to take a grounded approach that gets those involved with the ICT-based enterprise to provide their own descriptive and classificatory data (Storey 1994). This can be as simple as just asking those involved to describe the enterprise, or it can delve a little more deeply into personal constructs by asking what makes the

enterprise similar to, or different from, other enterprises. Such an approach is not suitable for the type of positivist approaches to IBE research that seek to aggregate data from multiple enterprises and/or which seek to compare groups of enterprises. However, it will be useful if researchers are trying to understand in depth the viewpoints and perceptions of, say, ICT-based enterprise entrepreneurs or workers.

A4. Entrepreneur Characteristics

The indicators outlined so far focus on the enterprise, not the entrepreneur; yet there is a significant literature arguing that entrepreneur characteristics make a fundamental contribution to the enterprise. This issue is discussed in greater depth in the section on lifecycle analysis. Here, we can note that issues of motivation and experience seem more important than more readily identifiable characteristics such as age, sex, and membership of particular social groups. Nonetheless, it will be useful to gather some basic data about the entrepreneur when researching ICT-based enterprise.

A5. Summary Checklist

Each of the various dyads or continua offered above have their various different uses and values. There is therefore no one right set of classifications to be used with ICT-based enterprises. However, a basic set of background data on an ICT-based enterprise might include the following:

a) Type of output: the specific segment of ICT-based production in which the enterprise operates.
b) Age: time period since the formation of the enterprise.
c) Location: whether rural, peri-urban or urban.
d) Number of employees: full-time equivalents for regular members of staff.
e) Turnover: the volume of sales in the most recent full year.
f) Profit/Loss: if possible, some sense of the relative balance of income and expenditure in the most recent year.
g) Assets: a listing with best estimates of value of the productive equipment and other assets owned by the enterprise.
h) Ownership: the nature of ownership, including location of owners.
i) Entrepreneur: age, sex, education.
j) Market: where the output from the enterprise is sold, including the balance between export and domestic sales.

All of these are *static* measures, but *dynamic* measures are likely to provide a truer picture of the "health" of the enterprise. Such dynamic measures would include growth (or decline) in workforce, turnover, and profits/losses; they would also include technological capability, discussed in a later section.

B. Other Enterprise Classification Models

B1. Classification According to Entrepreneurial Motivation

Adapting the ideas of Grindle et al (1989) and Mead (1994), one can categorise ICT-based enterprises in terms of the motivations and context of the entrepreneur involved. We develop a three-way categorisation that is particularly relevant to micro/small ICT-based enterprises:

- *Survivalists* are those who have no choice but to take up the income-generating activity because they have no other source of livelihood. Income provided may be poverty-line or even sub-poverty-line. Most "entrepreneurs" in developing countries are of this type, and Mead describes them as "supply-driven": forced into enterprise by push factors related to their poverty and lack of opportunity. Because of the skill and investment barriers typically associated with ICT-based enterprises, relatively few are likely to fall into this category.
- *Flyers* are true entrepreneurs who have taken up enterprise because they see opportunities for growth. Income levels may meet more than basic needs, and enterprises may graduate to the medium-scale category. Only a very small proportion of developing country small entrepreneurs fall into this category, but they may form a rather larger proportion of IBE entrepreneurs given the barriers noted above that must be overcome for entry into ICT-based production, and given the association of ICTs with dynamism. Mead describes them as "demand-driven": pulled into enterprise by factors such as the opportunity for profit.
- *Trundlers* fall in between the two other groupings and represent those whose enterprise turnover is roughly static and who show no great desire or no great capacity to expand. Income provided will be enough to meet basic needs. These form the second-largest group of small entrepreneurs in developing countries, and their stasis reflects the relative lack of strong external push/pull factors.

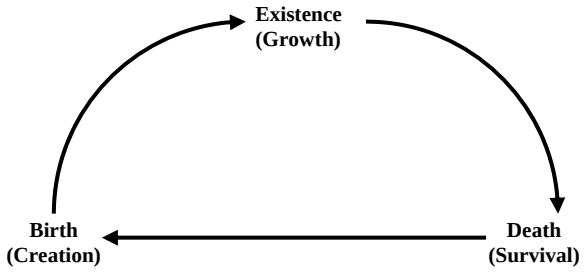
This approach to classifying ICT-based enterprises lacks the relative precision or, for some, quantitative basis of other classification schema offered above. It will generally require some depth of discussion in each enterprise. However, it has a strong value in helping to understand the nature of an ICT-based enterprise. Thus, it can help in understanding the trajectories and interventions that are appropriate to a particular enterprise. For example, in working with a survivalist IBE it would likely be an error to employ typical business interventions such as market research or venture funding on the assumption of a growth trajectory. Instead, it might be more relevant to look at welfare-related interventions, and at ways of delivering security rather than growth.

These classifications are also valuable because they are a reminder of the importance of context and external factors in shaping the nature and development path of an enterprise. By contrast, most of the other classificatory schema listed so far are inward-looking.

Finally, they have a value because, as noted elsewhere, those ICT-based enterprises that are flyers seem to have a greatly disproportionate impact, for example in terms of employment generation (Mead 1994). Conversely, those firms that are survivalists are more a reflection of economic failure rather than economic success.

B2. Classification According to Lifecycle Stage

Figure 2: The Enterprise Lifecycle



In basic terms, one can envisage a three-stage enterprise lifecycle (see Figure 2):

- *Birth*: the start-up of the enterprise. Figures do vary considerably but some enterprise surveys have shown 15-25% of any given group of enterprises will have started up within the previous year (Storey 1994, Liedholm & Mead 1999).
- *Existence/Growth*: for a number of reasons (including contributions to efficiency and employment, and greater likelihood of survival) growth is preferable to just static existence. Growth is most often defined in terms of growth in turnover and/or growth in number of employees. Studies of small enterprise in developing countries indicate that most enterprises do not grow. Aggregate employment growth is thus often a reflection of growth in the number of enterprises rather than size of enterprises. In the absence of demand growth, this just means ever-more firms chasing ever-smaller slices of the same pie. those that do grow, grow very little. Mead (1994) found of micro (<5 worker) enterprises, only around one quarter had added even a single person to their workforce during a ten-year period, and only 1% had grown to become a larger-than-10 worker enterprise. Nonetheless, while growth is rare, it is also very important. There is tremendous variation between sectors but Liedholm & Mead (1999) estimate that around half of firms in the 10-50 worker category started life as micro-enterprises with less than 5 workers.
- *Death*: most enterprises fail, especially new and small enterprises. Estimates vary considerably but 50% gone within three years and 75% within ten years would not be untypical (Storey 1994, Liedholm & Mead 1999).

In researching ICT-based enterprises, an important initial categorisation will be to identify whether particular enterprises are:

- a) just at the point of start-up: identifiable fairly easily from the age of the enterprise (a typical measure is to say start-ups are those less than one year old); or
- b) existing without growth, or c) existing with growth: identifiable from a combination of age of enterprise and, where present, dynamic figures on turnover/employee numbers; or
- d) about to cease operations: harder to identify than the other categories, though may be revealed by the entrepreneur if, say, they are shortly to close the enterprise due to retirement or employment elsewhere.

The value of this classification comes partly in relation to impact: as already noted above and as discussed further below, ICT-based enterprises at different lifecycle stages have different impacts. The classification can also be used in relation to enterprise interventions: either external interventions such as support from an enterprise agency, or internal interventions such as strategic initiatives. Start-up firms require different interventions to those that help an existing firm to grow or that help a dying firm to survive. Finally, we also discuss below factors affecting firms at different lifecycle stages: those factors are different for the different stages.

Alternative Stage Models

The lifecycle model presented above is so generic as to be indisputable. However, there are more detailed enterprise stage models presented by some analysts, such as the two examples given in Tables 1 & 2.

Table 1: Atkinson & Meager (1994) Enterprise Stage Model

Stage	Employment Description
1. Start-up	Beginning the enterprise
2. Entry threshold	Decision to take on the first worker
3. Delegation threshold	Employment of the first manager
4. Formalisation threshold	Movement away from ad hoc recruitment to greater formalisation
5. Functional threshold	Employment for the first time of a personnel or recruitment specialist

Table 2: Scott & Bruce (1987) Enterprise Stage Model

Stage	Top Management Role	Management Style	Organisation Structure
1. Inception	Direct supervision	Entrepreneurial, individualistic	Unstructured
2. Survival	Supervised supervision	Entrepreneurial, administrative	Simple
3. Growth	Delegation/co-ordination	Entrepreneurial, co-ordinate	Functional, centralised
4. Expansion	Decentralisation	Professional, administrative	Functional, decentralised
5. Maturity	Decentralisation	Watchdog	Decentralised functional/product

Research can be undertaken that seeks to classify ICT-based enterprises according to stage of such models. Having done this, the research might typically investigate the other characteristics of that stage; for example, checking whether the managerial description given in the model was found in enterprises and then either drawing conclusions about the enterprises or about the model.

An alternative would be the creation of a new stage model, based on the observed lifecycle development and characteristics of a particular set of ICT-based enterprises. The purpose of such models would need to be clarified – are they merely a descriptive representation of what is, or do they claim predictive powers (e.g. that enterprises will migrate from one stage to the next, or that all enterprises from a broader population at

a given stage would share the same characteristics found in the existing observations)?

B3. Classification According to Form of Production

Historical analyses of enterprise (e.g. Anderson 1982, Bernstein 1983, Uribe-Echevarria 1991) outline a series of different enterprise types that have developed over time. These can be used to put an ICT-based enterprise into one of a series of categories through which that enterprise's state of development and its place within the development chronology can be understood.

The developmental stages of enterprise can be described in terms of dyads:

i. Subsistence vs. commodity production

Subsistence items are those produced for direct consumption without entering a process of market exchange. Subsistence production typically refers to production within the household by and for itself. Subsistence production tends to focus on production to meet basic needs and, hence, is most often thought of in agricultural terms – producing food – and in terms of "domestic labour": cooking, washing, fetching water, childcare. However, it can also cover production of other basic needs items such as housing materials, clothing and agricultural implements.

The key difference between commodity and subsistence production is that, whereas subsistence production involves production and consumption within the same unit (household or possibly community), commodity production involves production and consumption within different units. It therefore requires some formalised mechanism for exchange between these different units – a form of market – because the two units (e.g. two individuals based in different communities) lack the dense social ties on which subsistence production relies. Markets can operate on the form of exchange of goods (barter) but most commodity production relies on an exchange value for the goods expressed in monetary terms.

Almost by definition of the notion of enterprise, almost all enterprise would be seen as commodity production. ICT-based enterprises would likely without exception be seen as commodity production.

ii. Petty commodity production vs. capitalist commodity production

Bernstein (1983:61) defines five main characteristics of petty commodity production (which, historically, arose before capitalist commodity production):

- Linkages with markets and wider social division of labour; i.e. they undertake exchange with others via barter or money, and there is specialisation between different units such that some produce one type of goods, others produce other types.
- Producers have access to the means of production; i.e. they own the tools that are used in production of goods or services.
- Use of household labour; i.e. they do not make use of paid/waged workers.
- Production to satisfy basic needs known as "simple reproduction"; i.e. they only provide goods and services necessary for the maintenance and continuation of life.

- Small scale of production; i.e. they do not produce large amounts or use complex technologies.

As we have seen, the first characteristic differentiates commodity from subsistence production. The second differentiates an enterprise from an ordinary wage worker. There may be some instances in which an entity that appears to be an ICT-based enterprise is actually "disguised wage labour" (Rainbird 1991): provided with the means of production – the ICTs – by a larger capitalist enterprise which makes use of the final outputs in return for a payment; often a piece-work payment. The apparent "enterprise" therefore just contributes labour in return for a wage.

It is the final three characteristics that distinguish petty commodity from capitalist commodity production. Subsistence production can gradually develop into first simple and then specialist petty commodity production as more and more of a good or service originally produced for subsistence is produced in surplus and exchanged via the market. This concept of rooting in subsistence and focus on simple reproduction eliminates ICT-based enterprise from this petty commodity production (PCP) categorisation. Likewise, one may see Bernstein's association of small-scale of production with simple technologies as also placing ICT-based enterprise outside the PCP category.

What slightly complicates the picture is that the over-riding defining characteristic of capitalist commodity production is its purchase of all key inputs *including labour* from the market. ICT-based enterprises that rely on non-wage labour (e.g. just the owner, or a family-based, or cooperative-based concern) therefore sit on the slightly awkward boundary between petty and capitalist commodity production. This would be particularly true where they are in a milieu of other enterprises of similar size – e.g. in a poor community – where those other enterprises clearly represent developments from subsistence production, e.g. in production of food.

In general, though, most ICT-based enterprises would be regarded as capitalist commodity producers, and as well integrated into market relations, with all the positive and negative implications that brings for growth, vulnerability, the challenge of scale economies, class development, gender relations, etc.

C. Competitive Strategy and ICT-Based Enterprise

From the business literature (e.g. Porter 1985), we can identify three main strategies that ICT-based enterprises may adopt in an attempt to be competitive: low-cost, differentiation, and rescoping. We will now investigate each in more detail, but with the main emphasis on the low-cost strategy and its viability to IBEs in developing countries given that many of those may be small, yet competing with much larger multinational enterprises in the same sector.

C1. Low-Cost Strategy and Scale Economics

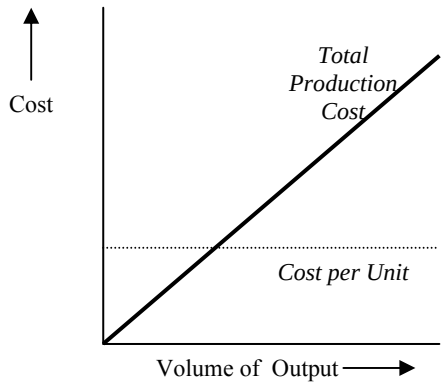
A very straightforward approach to understanding whether or not an ICT-based enterprise has a low-cost strategy is to compare the prices of its goods or services with the price of equivalents provided by other enterprises. An investigation can then be undertaken into the source of any price differentials.

More systematic investigation could start with an understanding of "economies of scale". Economies of scale exist "where a firm can lower the cost of each unit of output by producing more units" (Sayer 1985:10); meaning that firms producing larger amounts have a competitive advantage because they can produce each item more cheaply than a smaller producer (see Box 1).

Box 1: Economies of Scale Explained

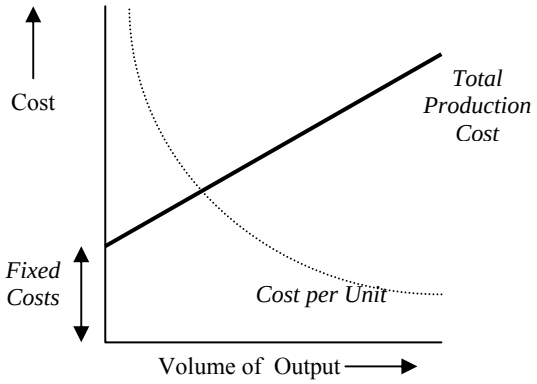
When producing a good or service (a unit of production), some input costs are *variable*; that is, for each extra unit produced the cost of the inputs rises proportionately. Take an enterprise assembling PCs: the cost of the hard disk drives (and all other components) is a variable cost – for each extra PC produced, the enterprise has to buy-in one extra hard disk. This is true whether we are thinking of increasing production from one PC per week to two PCs per week, or from 999 PCs per week to 1,000 PCs per week: the extra cost per PC is always the same.

If all production costs were variable, there would be no economies of scale. The per-PC costs would be the same for a firm that produced one PC per week as they are for a firm that produced one thousand PCs per week and, in cost terms, neither would have a competitive advantage over the other (see figure below).



However, in most ICT-based enterprises there are other types of input costs that are *fixed*; that is, for each extra unit produced, the cost of the inputs does not rise proportionately. Taking the case of the PC-assembly enterprise, fixed costs could include things like the cost of: any assembly tools used, the building, lighting and heating, and management staff. One fairly easy way to identify fixed costs is to ask the hypothetical question, "What costs would this enterprise incur even if it produced absolutely nothing: no goods or no services?".

Scale economies arise because of fixed costs, so identifying fixed costs in an IBE helps identify possible sources of scale economies. Let us take the example of a PC assembly firm with one manager who costs, say, US$20 per week. If the firm produces just one PC in a week, then the entire management cost is borne by that one computer. Put another way, the overhead costs of management are US$20 per unit PC and, to cover its costs, the firm would have to add that cost to the price it charges for its PCs. But, if the firm increases the scale of production to, say, ten PCs per week, then it can divide out its overhead costs between all those units. Looking at just the overhead cost of management, this would now drop to just US$2 per unit PC. If it scaled up further, to make 100 PCs per week, the overhead cost of management would fall to US$0.2 per unit PC. The figure below shows the cost/output graph where some fixed costs exist alongside the variable costs.



Many large manufacturing (goods-producing) firms have strong fixed costs, locked up in things like research and development investments, design investments, expensive production equipment, and costly marketing. This will be true of some large hardware-producing ICT-based enterprises. However, it will not apply to the majority of small goods-producing IBEs in developing countries, which will have cost structures not that dissimilar from service-related IBEs. Both are likely to have fixed costs relating mainly to buildings, management/administration and some investment in ICT equipment. Both are likely to have variable costs relating to labour. The only particular difference between goods and services firms is that goods firms will also have variable cost materials (like the disk drive and other components for the PC-assembler.)

Scale economies have two implications for ICT-based enterprises.

First, there may be an optimal scale of production: the number of units (goods or services) that the firm can produce which gives it the greatest spread of overheads

over units produced (i.e. the lowest fixed cost per unit). An approximate approach to understanding this is to identify the main fixed costs and then to estimate their production capacity: what is the maximum number of units that can be produced by the current production technology; what is the maximum number of units that can be produced within the current building; what is the maximum number of units that can be produced with the current number of management/admin. staff; etc. Current production levels can then be compared to the estimated maxima to see how close to its limits the enterprise is. (To understand this idea, you must see that there are limits to all fixed costs: the PC-assembly firm in Box 1 could not increase production to one million PCs per week with just that one manager; they would need to add more managers and that would then add to their fixed costs in incremental steps depending on the maximum number of PC units produced that any one manager could supervise.)

Second, all other things being equal, a large-scale producer will produce at lower cost than a small-scale producer. In pure economic terms, then, the small-scale producer is likely to go out of business. So how can small-scale ICT-based enterprises compete and survive? They can do so if one or more of four "counter-scale" conditions apply; conditions that can be investigated through research:

a) *Very limited presence of scale economies*. If the cost structure of a particular segment is made up largely from variable costs with few fixed costs, then the impact of scale economies will be limited. This would typically be where a production process is highly labour-intensive and where opportunities for automation (which, in economic terms, means turning variable labour costs into fixed capital costs) are limited. Development of custom software or resale of mobile phone calls potentially falls into this category.
b) *Blocks on scale economies*. These are blocks that prevent large-scale producers from entering a market. The blocks could be legislative (e.g. "market reservation" for small firms), or they could be more "natural" such as a market that is too small for large-scale producers to notice, or too volatile for them to risk entering. An example might be IT training in a small town: too small and remote to attract a large firm in.
c) *Cost compensations countering scale economies*. These could be factors that push costs down for small-scale IBEs, such as: government subsidies or incentives for small firms; greater labour cost productivity achieved, for example, through paying lower wages or getting longer hours from workers compared to those in a larger firm; avoidance of other costs associated with large firms such as taxes or licence fees or other regulatory costs; or use of cheaper materials than those used by large firms. An example might be a small IT training firm that pays its staff much less than a large firm, and only provides one PC per two trainees compared to one PC per trainee in a large firm. Alternatively, these could be factors that push costs up for large-scale IBEs: these are known as "scale diseconomies" and they arise when a large firm has so many people, machines, materials, etc. that the management systems required to co-ordinate all these things become very expensive. Finally, there may also be cost compensations if competing large firms are underutilising the capacity of their fixed-cost investments; for example, if some of the PCs in a large telecentre lie idle for much of the day.
d) *Non-cost compensations countering scale economies*. These are qualitative factors that counteract scale economies, making customers willing to pay a premium. These could arise because there are important social connections

between the IBE entrepreneur and his/her customers. Or that strong local knowledge allows the small IBE to produce a service better suited to customer needs than that of a large producer. Or that the small IBE can provide the timing of a service or can provide credit that a large producer will not.

Analysis of counter-scale conditions can provide either a general understanding of the economic context in which an ICT-based enterprise is operating, or a specific understanding of competition for an individual enterprise. This analysis can either take a fairly static perspective, seeing how things are at present, or a more dynamic view that sees how factors are likely to change in future (e.g. a spread of automation or reductions in regulatory pressures on large enterprise or liberalisation of local markets leading to stronger emergence of scale economies in a sector).

Overall, an understanding of scale economies can be central to understanding from a competitive perspective whether a planned or start-up ICT-based enterprise can become operational, and whether an existing IBE can survive. It does, of course, pre-suppose some knowledge of other, competing IBEs operating in the same market.

C2. Other ICT-Based Enterprise Strategy

If ICT-based enterprises in developing countries cannot compete on cost, then they must turn to other strategies such as differentiation and rescoping. The chances of a true differentiation strategy – producing a new good or service – are extremely unlikely for such enterprises since they are almost always imitative rather than innovative firms (see, for example, Heeks & Nicholson 2004). Non-cost strategies will therefore tend to rely on serving a particular niche market where cost can somehow be kept at bay: the potential for such strategies has, then, already been discussed in the material just above on counter-scale conditions b) and d).

D. Impact Analysis of ICT-Based Enterprise

There may be official statistics – either from government or from trade associations – on overall impact of enterprises, including ICT-based enterprises. Such data is useful, but it must be treated with caution because the great majority of enterprises are un-registered. To give some examples of the impact this has:

- Official statistics using registered employment in Zimbabwe showed small/medium enterprises employed around 24,000 people; a simultaneous on-the-ground survey estimated the true number of SME employees to be around 1.6 million (Rasmussen & Sverrisson 1994).
- Estimates on the number of people working to produce online game goods and services in China range from 100,000 (Dibbell 2007) to 500,000 (Neff 2007).

When dealing with official statistics, then, they may be more valuable in showing trends – e.g. growth in the number of ICT-based enterprises over time – or, possibly, for comparative purposes – e.g. comparing the ICT sector with other sectors – than for their absolute values.

In some cases, data already mentioned above as part of the basic description can be used to understand the impact of one or more ICT-based enterprises. Examples include:

- numbers employed,
- amounts invested (or value of capital assets),
- sales, and
- exports.

These can be understood either in absolute terms (i.e. "this IBE has created ten jobs during its existence") or relative terms (i.e. "IBEs now account for 5% of all employment in the town").

D1. Employment Creation

The employment created by ICT-based enterprises is seen as a key measure of impact, particularly in developing countries which have high levels of under- and un-employment. Figures can just be taken at face value, measured in terms of the number of jobs found within ICT-based enterprise. However, several other employment issues can be considered by those wishing to understand in greater detail.

a) The type of jobs created

This is typically determined in relation to job content: the level of competencies required to undertake the jobs created within the enterprise. The jobs can be categorised in very broad-brush terms – unskilled, semi-skilled, skilled – or more specific schemes can be used, such as those which rely on the notion of technological capabilities. These are discussed in greater detail in the next sub-section but the main point to note here is that, unless surveys of ICT-based enterprises take these qualitative job factors into account, they will not encompass the true employment impact of these enterprises.

b) Gross job creation vs. net employment growth

When a new ICT-based enterprise starts-up, it will create a certain number of new jobs. However, this does not necessarily mean that it is contributing to an overall growth in employment. Why? Because so many new enterprises fail and, when they do so, the new jobs previously created are lost: this is employment "churn" rather than employment growth. It arises from two main factors (Storey 1994, Liedholm & Mead 1999):

- First, the very high failure rate of enterprises; a failure rate that is particularly high for i) new enterprises as compared to those which have existed for some time, and ii) small enterprises as compared to large. Like all sectors, ICT-based enterprises will have significant numbers of new enterprises (as noted above, general surveys indicate something like 15-25% of enterprises at any given time will have started up with the previous year), and be dominated by micro/small enterprise.
- Second, the fact that the majority of job creation (estimated by Liedholm & Mead 1999 to be 75-80%) comes from enterprise start-up not enterprise growth.

Typical cross-sectional research on IBEs will not reveal this because it does not detect the fact that most enterprises fail to grow and that most enterprises fail. It may therefore paint a falsely-positive picture of the contribution of IBEs to employment.

Putting this another way, those ICT-based enterprises that do grow seem likely to have a disproportionate impact on employment growth: not only do they increase the number of jobs directly but they also help indirectly by avoiding the churn of enterprise failure. Storey (1994), for example using figures from UK manufacturing, estimates that just 4% of firms starting at any given time will provide 50% of employment in 10 years' time because of their survival and growth. Liedholm & Mead (1998a:vi) praise growth-based jobs as "more likely to endure, to yield greater economic efficiency and higher returns" than start-up-based jobs.

c) Investment efficiency of job creation

If the statistical base is available, one can calculate the ratio of fixed assets to employment in an ICT-based enterprise; dividing the value of fixed assets in the enterprise by the number of full-time employee equivalents to get a value of fixed assets per job. Some analysts then use this figure to comment on the efficiency of job creation of the asset investments; for example, to see that investment per job in small enterprises is typically much lower than that in large enterprises, and using this to argue that investment in small enterprise is therefore a much more efficient means of creating jobs than investment in large enterprises; or looking at different sectors to see which requires least investment per job (Akhouri 1990, Christmas 1998).

There may certainly be a value in calculating fixed assets per job for ICT-based enterprises. However, extrapolating from this to talk about investment efficiency of job creation is questionable since it ignores issues such demand constraints and growth, overall enterprise efficiency, and relative opportunity costs between enterprises. In most cases, such extrapolation would also require comparative figures from other enterprises or sectors.

d) Indirect job creation

Most studies of ICT-based enterprises would only take into consideration the job creation in that enterprise. However, as contextual analysis of stakeholders and value chains helps indicate, the creation, survival and growth of one IBE may have several

knock-on effects that indirectly create jobs: in the supplier firms which provide equipment, materials or services to the IBE; in the customer organisations which are made more efficient by the goods or services the IBE produces; and in the jobs of those employed through the consumption of goods and services by employees of the focal IBE (from house cleaners to local shopkeepers to car manufacturers).

e) Pay

For the workers involved, a key impact of the job they hold with an ICT-based enterprise will be their pay. If an IBE is more of a household/petty commodity production endeavour (see discussion above), then there may be little or no direct pay involved: general income will just accrue to the household overall (which, typically, will involve uneven distribution of financial benefits; for example, along gender lines). In other cases where social rather than capitalist relations still dominate the employer-employee relationship, there might just be a payment of "chop money" sufficient to cover food and transport but little more.

In many IBEs, though, there will be waged labour and estimates can be made of the income received by employees. A little care does need to be taken on this to clarify the actual level of income received. There may be a difference between gross income paid by the employer and net income received by the employee. The difference could be formal deductions such as tax or social security payments. There could also be less formal deductions, such as an employer claw-back of costs incurred for employee equipment or clothing. There may also be differences between core pay and total income/financial benefit due to fringe benefits such as holiday and sick pay; pension contributions; health benefits; or assistance with costs such as transport, food or even housing. There may also be payments in kind, such as provision of meals. Essentially, the more detailed the researcher's investigation, the more accurate a picture of true financial benefits is likely to emerge.

f) Job quality

Although pay is commonly seen by most employees as the single most important job characteristic, there are many other aspects of the jobs created in IBEs that make up the overall employment impact of these firms. These include:

- Job security: cited by Mead (1994) as second only to income as a valuable job characteristic, and clearly related to the susceptibility to failure of the enterprise.
- Working hours: which, if higher than the norm, may counteract any pay advantage.
- Training: an issue that is critical to the skills-intensive ICT sector.
- Health and safety: an issue which may not be of great significance in the mainly services-based ICT enterprises.

Full investigation of IBE employment impact would cover some or all of these issues.

D2. Innovation, Learning, Knowledge and Technological Capability

Closely related to the issue of developing technological capability, mentioned above, and also to one strand of debate on competitive strategy is the issue of building knowledge and developing innovations in ICT-based enterprise. This is an area receiving increasing attention in the development literature as a spillover from growing research in industrialised countries (Wignaraja 2003b, Heeks 2008a).

Lall (1987) identifies "technological capability" as a crucial determinant of industrial development, yet one which is ignored by many quantitative-oriented researchers. Although this variable does not lend itself to outright measurement, some kind of scale can be drawn up for the technological capability of enterprise jobs/workers, as shown in Box 2. This scale can also be modified to suit specific types of ICT-based enterprise (for a software-related example, see Heeks & Grundey 2004; for a computer games-related example, see Heeks 2008b).

Box 2: Scale of General Technological Capability

Level 1. Non-production operational capabilities
- 1a: Using the main production technology involved in producing the enterprise's goods or services
- 1b: Choosing the technology
- 1c: Training others to use the technology

Level 2: Non-production technical capabilities
- 2a: Installing and troubleshooting the technology

Level 3: Adaptation without production
- 3a: Modifying the finished good or service to meet local consumer needs

Level 4: Basic production
- 4a: Copying the main production technology to make new examples
- 4b: Assembling the main production technology
- 4c: Reproducing the entire main production technology to create a new production site using existing products and processes

Level 5: Minor production modification
- 5a: Modifying the product and production process to meet consumer needs

Level 6: Production redesign
- 6a: Redesigning the product and production process to meet local consumer needs
- 6b: Redesigning the product and production process to meet regional/global consumer needs

Level 7: Innovative production
- 7a: Developing a new product with production process innovation to meet local consumer needs
- 7b: Developing a new product with production process innovation to meet regional/global consumer needs
- 7c: Developing a completely new production process
- 7d: Transferring a new production process to other producers

Source: adapted from Narasimhan (1984), Lall (1987), and Schmitz & Hewitt (1991).

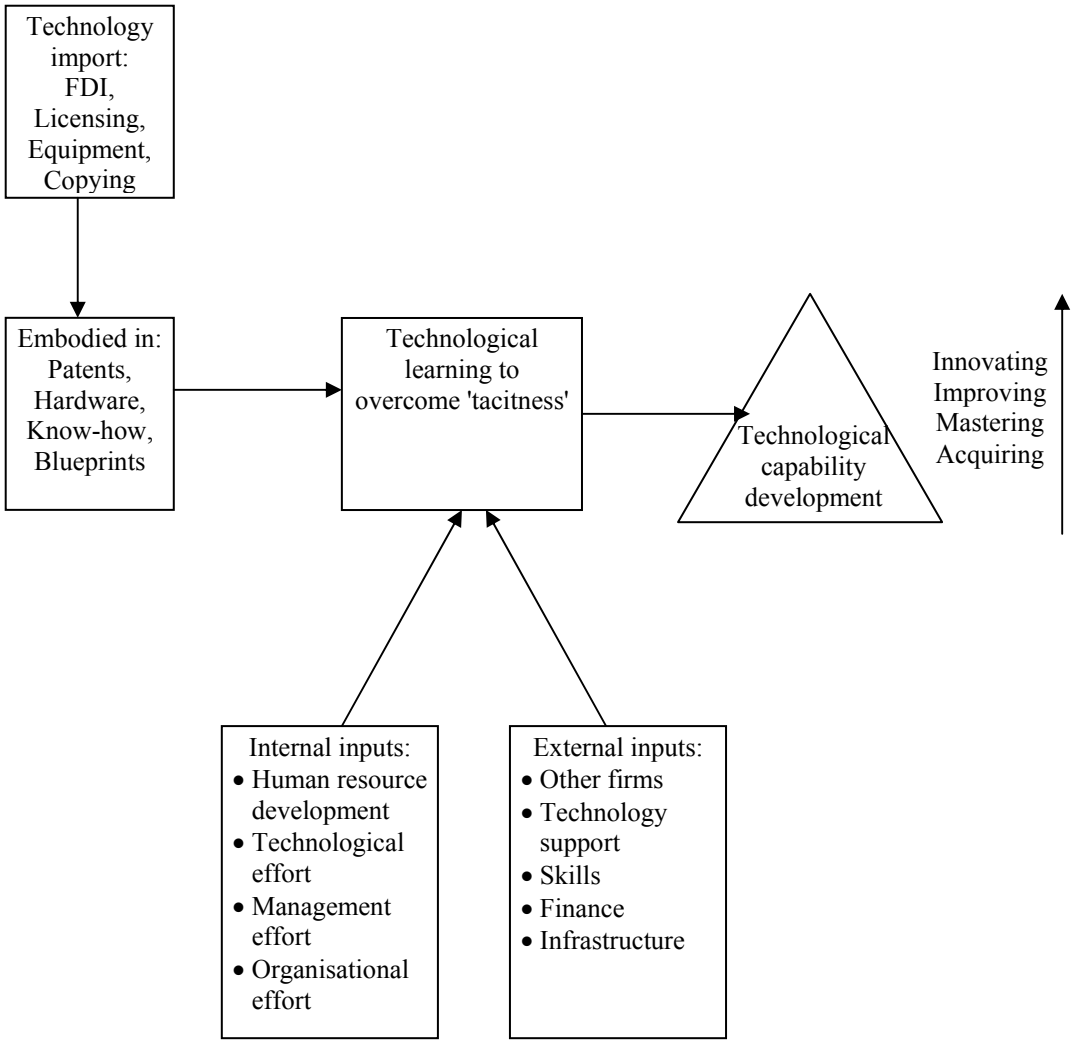
Following Lall (1987), one may define technological capability as the general ability to undertake the broad range of tasks outlined in Box 2, and technological development of an ICT-based enterprise as growth in the capability as defined by movement up the categories and regardless of whether or not the final stage is

attained. These capabilities are actually embodied in the skills and experience of individual workers, often seen as the most critical resource for ICT-based industries (Kumar 1988). In this case, technological development will be the accumulation of increasingly skilled workers.

Where ICT-based enterprises are found to be creating jobs with relatively low skill requirements and/or relatively low technological capabilities, this has both a good and bad aspect. On the upside, relatively low-skill jobs tend to provide employment for the group – the low-skilled – who suffer most from under- and un-employment. They can therefore, for example, provide a fairly direct link to poverty alleviation. On the downside, supply of low-skilled labour exceeds demand in developing countries, leading to poor pay and conditions being associated with such jobs. Equally, firms that rely on low-cost, low-skill labour tend to be competitively more vulnerable than firms which have jobs involving higher levels of technological capability (Porter 1990).

If there is a particular interest in understanding learning, innovation and development of technological capabilities in IBEs, then a more detailed approach can be taken that investigates the antecedents of learning and growth in capabilities. A model of learning and development of technological capabilities is presented in Figure 3 (Wignaraja 2003b).

Figure 3: Model of Enterprise Learning and Development of Technological Capabilities



On the basis of this model, one can see a requirement for full research would be an understanding of the national innovation system within which a particular ICT-based enterprise sits: the competitors, clients, suppliers, national technology/training bodies, and other relevant institutions that can contribute to learning and capability accumulation within an IBE. Capability building is also "affected by a host of national policy and institutional factors. … [*including*] macroeconomic stability, outward-oriented trade and investment policies, ample supplies of general and technical manpower, ready access to industrial finance and comprehensive support from technology institutions" (Wignaraja 2003b:26).

Looking at this list, one may already see that enterprises in developing countries face constraints to learning and capability accumulation. Further constraints, seen particularly by smaller IBEs, include lack of capital, low and fluctuating levels of demand, lack of a starting base of "techknowledge" (Mazibuko 1996) and tendency to increase efficiency by squeezing labour rather than through technological innovation (Christmas 1998). Thus, research in this area may focus on the constraints rather than achievements of IBE innovation – as already mentioned, most developing country IBEs are imitators rather than innovators.

D3. Other Impact Areas

Development of Entrepreneurship

There is a substantial literature on entrepreneurship, which can be drawn on for research into ICT-based enterprise in developing countries. Some entrepreneur issues for IBEs are discussed in the section below on lifecycle stages.

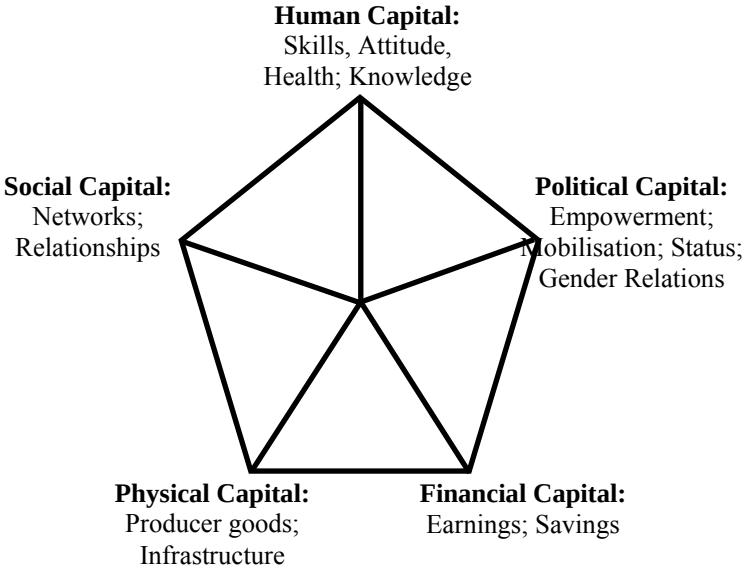
Poverty Alleviation/Livelihoods

A direct way of understanding the impact of ICT-based enterprises on the livelihoods of the poor is to investigate who is employed in the enterprise, focusing on the impact of income generated by their employment. A poverty focus would look specifically at any of those employed who currently or previously had very low income and/or asset levels. A rather broader focus – in line with the discussion above about indirect employment creation – would trace indirect impacts through connections in related firms in the value chain, and through the effect of expenditure by enterprise employees. Broader still would be a cut-down livelihoods approach. This is discussed in greater detail by Arun et al (2004) but, in brief, it would cover the livelihoods "assets pentagon" (though replacing natural with political capital), to look at the impact for each individual of IBE work on five types of capital (see also Figure 4):

- *Human capital* represents the skills, knowledge, ability to labour and good health that together enable people to pursue different livelihood strategies and achieve their livelihood objectives.
- *Social capital* is the genre of social resources upon which people draw in pursuit of their livelihood objectives, networks and relationships based on trust, reciprocity and exchanges.

- *Physical capital* comprises the basic infrastructure and producer goods needed to support livelihoods.
- *Financial capital* denotes the financial resources that people use to achieve their livelihood such as available stocks, which can be held in several forms such as cash, bank deposits, liquid assets such as livestock and jewellery, or resources obtained through credit-providing institutions and regular inflows of money, including earned income, pensions, other transfers from the state, and remittances.
- *Political capital* covers all issues related to power from individual empowerment to power relations vis-à-vis others in terms of, for example, gender and community

Figure 4: Livelihoods Assets



Gender Relations

Employment in enterprise is often seen as particularly beneficial for women and, potentially, for development more generally. For example, in many situations a greater social value tends to be placed on the creation of income for women as compared to income for men because women tend to spend a greater proportion of income under their control for investment or for family welfare and less on personal consumption.

On the other hand, involvement of women in ICT-based enterprise can merely reflect and reproduce, rather than challenging, the dominant gender relations in society (Arun & Arun 2002). Hence, women in ICT-based enterprises may find themselves paid less than men in equivalent work and/or restricted to less skilled, lower paid jobs and/or subject to subordination to men within the workplace and/or placed in jobs which are more likely to be lost during times of change in the enterprise (*ibid.*, see also Baud & Bruijne 1993).

Only by careful, gender-sensitised research in IBEs will a full understanding be developed of, for example, comparative incomes of men and women, comparative job content and job quality, the welfare value of comparative income, issues of self-

esteem and empowerment and subordination, etc. This is discussed in greater detail by Morgan et al (2004).

Environmental Impact

As noted elsewhere, the majority of ICT-based enterprises in developing countries are service-focused, thus reducing their direct likely contribution to pollution. However, all enterprises may contribute indirectly through their use of energy and transportation, and some – such a those involved in the creation of ICT components – can be direct polluters. All ICT-based enterprises also have an environmental footprint because of their consumption of resources: in most cases, this will be reflected in their consumption of energy and their use of ICTs. ICT-based enterprises have a smaller footprint than traditional enterprises but, nonetheless, it is still appropriate to research their environmental impact (Marletta et al 2004). Further guidelines on environmental impact assessment of enterprises can be found from Pallen (2003).

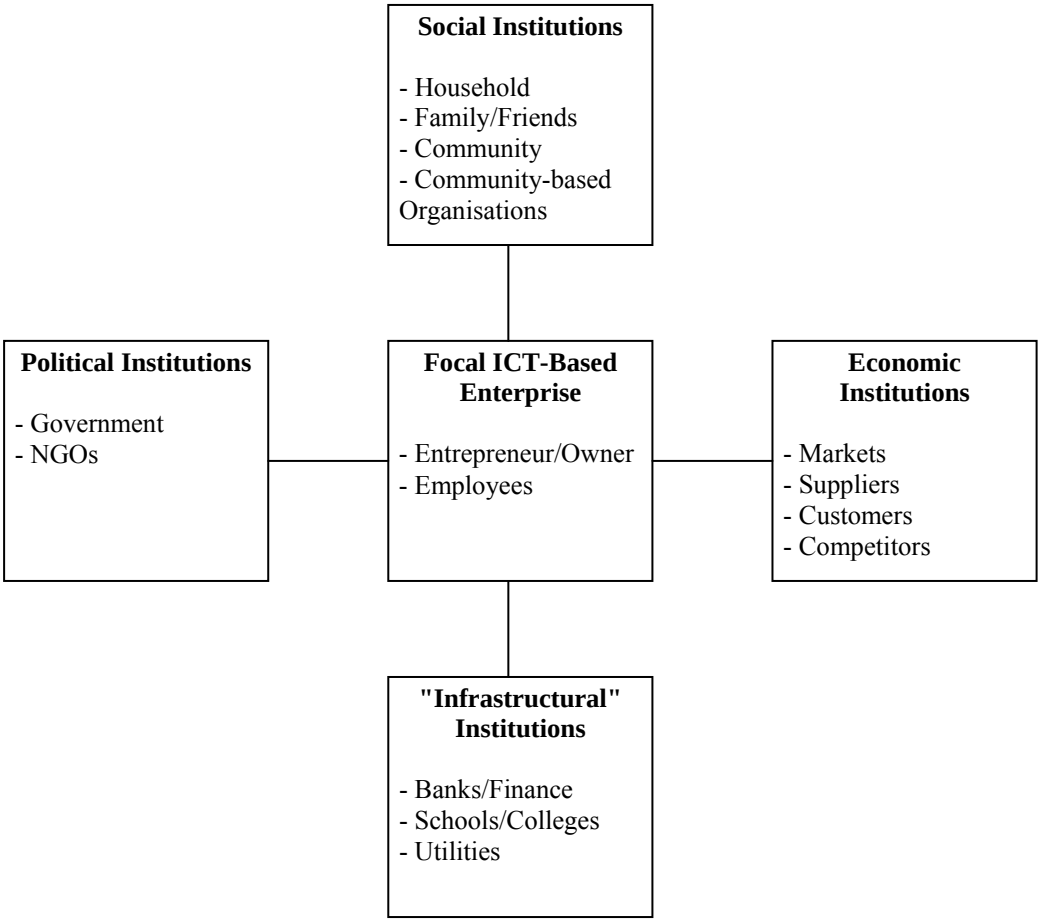
E. Contextual Analysis of ICT-Based Enterprise

As described in the next section on lifecycle factor analysis, the context within which an ICT-based enterprise operates has an important impact on that enterprise. It may thus equally be important to research the context of the enterprise. Various aspects of this are described in this section.

E1. Stakeholder Analysis

A preliminary view of stakeholder institutions affecting ICT-based enterprises is provided in Figure 5. This draws from the typical PEST (political, economic, socio-cultural, technological) checklist for contextual factors. Technological institutions have not specifically been included here but would include ICT suppliers and locally-relevant ICT training and R&D institutions.

Figure 5: Stakeholder Framework for ICT-Based Enterprises

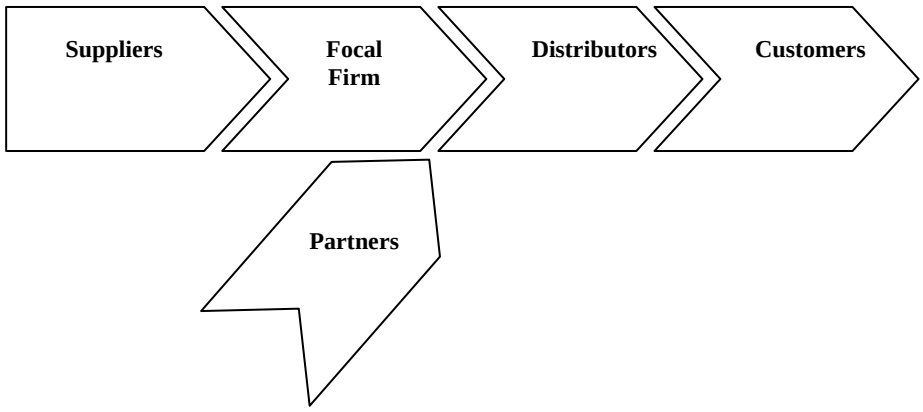


Simply listing the stakeholders is of relatively limited value. Instead, the interest would be in understanding the nature of the relationship between stakeholders and the focal ICT-based enterprise; for example, the extent to which those relationships either enable or constrain the focal enterprise. One framework for this would be the resource-dependency perspective (Pfeffer & Salancik 1978; for a sample application

to IBEs, see Heeks 2008b). This understands the extent to which enterprises are controlled by external actors in terms of resources, and it is particularly useful for understanding situations where an external actor or actors has some important relation to the focal ICT-based enterprise – a supplier, a customer, a pressure group, etc.

Of particular interest from an enterprise perspective is the sectoral value chain (see Figure 6, adapted from Porter 1985). This focuses just on the economic institutions that form the ICT-based enterprise's context. As with other relations, the nature of the relations are of more interest than simply their existence. Questions to be asked in research relate to the importance of particular value chain relations, and the strengths, weaknesses and dependencies that they deliver for the focal enterprise.

Figure 6: ICT-Based Enterprise Value Chain



E2. Enterprise Support Agency Analysis

Many ICT-based enterprises in developing countries may come into contact with enterprise support agencies: organisations whose remit is to assist the development of enterprise in the country. Historically, such agencies were public sector, but increasing numbers are from the NGO and private sectors.

A first issue may be to understand what impact these agencies have on the IBEs: are they significant actors in the provision of, say, supply inputs, or is IBE development largely independent of such agencies. If it can be established that enterprise support agencies do or could play a role in IBE development, then those agencies may themselves be a legitimate and worthwhile focus for research.

Basic Support Agency Research

A basic investigation of enterprise support agencies would ask some of the following questions (developed from Buzzard & Edgcomb 1988, Grindle et al 1989; greater detail on applying these to agencies can be found in Duncombe et al 2005):

i. Type: what type of agency is this?
It could be:

- an international NGO (likely to be well-institutionalised, with a commitment to particular models of enterprise assistance);

- a local NGO (tending to be smaller, more focused, less formal, and more dependent on one funding source than an INGO);
- a cooperative (that may be well-committed but could have performance challenges);
- a bank (likely to be large and very business-oriented but conservative in dealing with the ICT sector and/or with start-up and small enterprises);
- a government agency (which may be both institutionalised and politicised);
- a business association (likely to be locally focused with a strong business orientation); or
- a private sector provider (which may be small but with a strong business orientation).

ii. Goal: what is the goal of the agency?
Goals may vary along an axis from highly welfare-oriented to highly business-oriented. They may or may not focus on particular needs or groups.

iii. Clients: which groups does the agency assist?
Agencies may target particular enterprises in terms of their size, age (e.g. start-ups or existing enterprises), sex or age of entrepreneur, sector, location, etc.

iv. Support: what services for enterprise does the agency provide?
Agencies most often provide, or facilitate access to, enterprise inputs such as:
- finance,
- consultancy/advice/information,
- training,
- technology and technological assistance,
- land/premises,
- other infrastructure, and possibly
- raw materials.

Other services they can provide include:
- Social welfare: creating savings clubs; health and education development; other community development.
- Demand intervention: assisting enterprises with sales; intermediating between the enterprise and its clients; purchasing enterprise outputs.
- Enterprise networks: creating/enabling associations and co-operatives; enterprise networking.
- Policy advocacy: lobbying government.

A simple descriptive approach will outline which of these services the agency provides for ICT-based enterprises.

Advanced Support Agency Research

Moving on from the descriptive-type of work outlined above, research into agencies supporting ICT-based enterprises can evaluate those agencies in two main ways:

i. The blueprint approach

This takes a generic model or checklist and applies it to the agency and its work as the basis for evaluation. Some such models focus mainly on the capacities and other factors internal to the agency. One such example is the analysis matrix developed by Edgcomb & Cawley (1993), summarised in Box 3.

Box 3: Support Agency Analysis Matrix
(from Edgcomb & Cawley 1993)

Provides a ready-made framework matrix, including indicators, for analysis of support agencies:

- Vision: executive leadership, board of directors, strategic planning, approach
- Capacity: organisational structure, information systems, personnel policies, staff development
- Resources: fundraising policies and practice, credit policies, budgeting and financial projections, accounting, portfolio management
- Linkages: government relations, peer networks, international and donor partners

Alternatively, a rather more externally-oriented approach would evaluate more directly the services provided by the agency. An example is given in Box 4.

Box 4: Measuring Business Development Service Performance
(adapted from McVay 1999)

- Scale (e.g. no. of enterprises utilising the service)
- Outreach (e.g. no. of enterprises served owned by women/by the poor)
- Impact (e.g. % of enterprise clients who use service as intended; % of enterprise clients reporting business benefits)
- Cost-effectiveness (e.g. total transaction costs to use service)
- Sustainability (e.g. payback period of investment in service)

The advantage of following a blueprint approach is that there are many agency evaluation checklists available "off-the-shelf", and that most of these only require research within the agency itself. The disadvantage is that they take a "one size fits all" perspective that may not be appropriate, particularly when considering support for ICT-based enterprises which are relatively new and somewhat specialised in their support needs.

ii. The contingent approach

A contingent approach takes a quite different starting point from the blueprint approach. Instead of prescribing a single checklist, it argues that the most effective support agencies will be those which share similarities with the enterprises they seek

to assist (Gibb & Manu 1990). Hence, the more similar an agency is to ICT-based enterprises, the more likely it is to be effective in its support. Conversely, the more different the agency to the enterprise, the less likely it is to be effective.

One can measure similarity and difference along a number of continua, and it may make sense to begin not with the type of checklist suggested next but with an effort to identify what the dimensions of contingency between enterprise and agency are. If not, then one suggested checklist is that provided by Miller & Masten (1993), which uses three main dimensions:

- People: age; sex; education; background; incentive; facility/skills; worker type; experience.
- Structure: needs; sectoral focus; resources; approach and location of operation; rewards.
- Process: motivation; orientation and scope; management style; market served; function.

For example, taking the sub-dimension "Education", research would investigate the degree of match or mismatch between the educational levels of agency staff and the educational levels of enterprise staff. Similarly, on "Management Style", one would investigate the style of managers in both the agency and the ICT-based enterprises (one usable typology for this would be that of Goss (1991): fraternalist – paternalist - benevolent autocracy – sweating). Again, the degree of match or mismatch would be assessed.

After all sub-dimensions have been investigated for both agency and enterprises, then some overall sense of fit can be generated, providing a high-level view of whether or not the agency is likely to be an effective facilitator for ICT-based enterprises. If not, one can investigate further to see if there are, or could be, any compensating actions that could be taken to try to bridge the lack of fit between agency and enterprises.

E3. Other Contextual Analysis

Government/Policy Context

The state typically has three main roles vis-à-vis private sector ICT-based enterprises (Heeks & Grundey 2004):

- Supplanting: owning and running ICT-based enterprises itself.
- Regulating: setting legal constraints on the running of IBEs.
- Promoting: providing supportive inputs to assist the operation of IBEs.

Contextual analysis of government's role will begin by describing the extent of government action along all three of these dimensions.

It should be recognised that there may be more indirect governmental impacts (from general policies) than direct impact (from specific policies for the ICT sector). A summary checklist of potential policy areas would include (adapted from Haggblade et al 1986 cited in Grindle et al 1989):

1. Trade policy: import tariffs and quotas, export taxes/subsidies, foreign exchange rates and controls.
2. Monetary policy: money supply, interest rates, banking regulations.

3. Fiscal policy: government expenditure (infrastructure, direct investment in enterprises, provision of services, transfers); taxes (corporate income, personal income, payroll, property, sales).
4. Labour policy: legislation on minimum wages and working conditions, social security, public sector wages.
5. Output prices: consumer and producer price controls.
6. Direct regulatory controls: enterprise licensing and registration, monopoly or other ownership controls, land allocation and tenure, zoning, health.
7. Human and physical infrastructure policy: investments in training, power, water, transport, telecommunications.
8. ICT-specific policy: ICT-specific trade (e.g. import of computers, export of ICT-based goods and services), regulatory (e.g. limits on use of ICTs) and infrastructure (e.g. networks, ICT training) policies plus legal policies on ICTs (e.g. on e-commerce).
9. Enterprise-specific policy: promotional or other measures for particular enterprises (e.g. small or locally-owned).

This represents a substantial list – each line item could itself cover many different policies – requiring a very major research effort simply to identify the policies let alone determine their impact. More manageable research would approach the issue from one of two directions. Either a particular policy domain would be selected and studied to determine its impact on the ICT-based enterprise. Or, research would start at the level of the enterprise itself, identifying where policy could be seen to have a significant impact (though this naturally prejudices in favour of direct as opposed to indirect policy impacts).

Labour Market Context

For those with a particular interest in labour and employment in ICT-based enterprise (see also discussion above about employment impacts), then analysis of the external labour environment may be valuable. That analysis might include researching issues such as the gap between supply and demand for the type of labour employed in the enterprise; the nature of training provision; the involvement of trade unions and their role; and labour-related promotional and regulatory policies.

F. Lifecycle Analysis and Success/Failure Factors for Enterprise

Lifecycle analysis of ICT-based enterprises is concerned with identifying the factors both inside and outside the enterprise which impact one or more of the three main lifecycle stages (see Figure 2 above):

- *Birth analysis*: this looks at the factors which affect the likelihood of start-up of ICT-based enterprises. This tends to be generic analysis (i.e. looking at an industry segment or a location rather than at the likelihood that one specific enterprise will start up).
- *Growth analysis*: this looks at factors which affect the likelihood of growth of ICT-based enterprises. This can be used to analyse either groups or individual enterprises.
- *Survival analysis*: this looks at factors which affect the likelihood of survival (i.e. the likelihood of avoiding closure) of ICT-based enterprises. It, too, can be used to analyse either groups or individual enterprises.

As with other types of research discussed here, work can be conducted using an *inductive* approach – gathering data on a particular group of ICT-based enterprises and then developing factoral models based on those factors found to affect the particular lifecycle stage under study. Alternatively, a *deductive* approach can be used that accepts an existing factoral model and investigates the presence/absence of those factors in relation to the focal enterprises. This may then either predict the likely impact on birth/growth/survival, or observe the actual impact and then draw conclusions about the initial model.

For use with the second approach, we offer here not a model based on research into ICT-based enterprises, since this has been found to be too limited at present, but a model based on research into small enterprises, with a particular emphasis on evidence from developing countries. Table 3 summarises those factors found to impact the three lifecycle stages.

We can summarise this data in a number of ways. For example, the list below summarises those factors that are all positively associated with some aspect of the enterprise lifecycle: with start-up (B) and/or growth (G) and/or survival (i.e. protection against failure) (S):

- *Demand*: the existence of market demand and the perception of greater than current earnings (B&G&S).
- *Entrepreneur*: unemployment (B); experience in small enterprise (B); management experience (B&G); personality/motivation of entrepreneur (B&G); level of education (B&G); family history in business (B).
- *Inputs*: minimisation of barriers to finance; skills/labour; technology; information; other inputs (B&G&S).
- *Enterprise*: sound finance (G&S); breadth of product/customer range (S); positioning and innovation (G&S); business planning (G); youth of enterprise (G); growth (S); manager recruitment (G); multiple founders (G); size (S).
- *Context*: unemployment levels (B); disposable income/GDP growth (B); some government policies (B&G).

Table 3: Summary of Factors Influencing the Enterprise Lifecycle

	Birth Rates	Growth	Survival
Demand Factors			
Market demand	+ +	+ +	+ +
Perceived greater than current income	+ +	+ +	+ +
Entrepreneur Factors			
Unemployment	+ + (+)	–?	?
Previous small enterprise experience	+ +	0	?
Previous experience of same sector	0	0	?
Entrepreneurial personality	+	+	?
Motivation	?	+	?
Educational attainment	+(?)	+(?)	+?
Family history in business	+	0	?
Previous managerial experience	+	+	?
Marketing experience	?	+?	?
Sex	+?	–?	–?
Membership of immigrant or other marginalised group	+?	?	?
Training	+?	+?	?
Cultural factors	=?	=?	?
Age	0	0?	?
Input Factors			
Barriers to finance	– –	– –	– –
Barriers to skills/labour	– –	– –	– –
Barriers to technology	– –	– –	– –
Barriers to information	– –	– –	– –
Barriers to premises, land, production inputs, and infrastructure	– –	– –	– –
Enterprise Factors			
Sound enterprise financing	?	+	+
Product and customer range	?	0?	+
Positioning and innovation	?	+	+
Enterprise growth	n.a.	n.a.	+ +
Business planning	?	+	?
Enterprise age	n.a.	–	!
Recruitment of managers	?	+	?
Operational sector	=	=	0?
Ownership and form of enterprise	?	=	?
Enterprise size	–	?	+ +
Other Contextual Factors			
Unemployment levels	+ +	–??	?
Overall wealth	0	0	?
Increase in disposable income (or GDP growth rate)	+	?	?
Urban/rural location	+?(urban)	=	?
Proximity of other small firms	+	?	+
Government policy	=	=	?
Current contextual trends	=	=?	?

Key:
+ +: strong positive association
+: some positive association
0: no association
–: some negative association
– –: strong negative association
=: an association but too complex to simplify as either positive or negative
?: too few studies or too much disagreement to be certain
n.a.: not applicable

Sources: Grindle et al 1989, Smallbone 1990, Dawson 1991, Vivarelli 1991, Rasmussen & Sverrisson 1994, Storey 1994, Smallbone & North 1996, Liedholm & Mead 1998, Perren 1999

This type of listing could be used for an investigation of the internal and external environment to see how many of the conducive factors to enterprise development were present. One might, for example, just look at one or two factor clusters – say, just the entrepreneurs. Even so, as listed, this would represent quite a generic approach in relation to lifecycle stages. An alternative would be to home in just on particular lifecycle stages. Thus, the following list identifies just those positive factors that relate to a particular stage:

Birth:
- The existence of market demand and the perception of greater than current earnings.
- Entrepreneur unemployment, experience in small enterprise, management experience, personality, level of education, family history in business.
- Minimisation of barriers to finance, skills/labour, technology, information, other inputs.
- Unemployment levels, disposable income/GDP growth, some government policies.

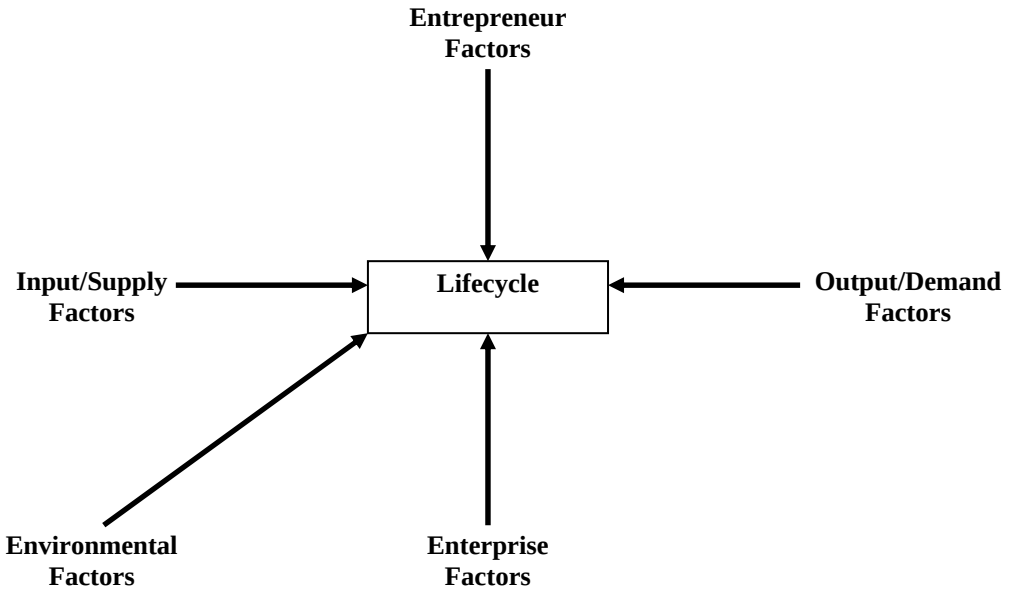
Growth:
- The existence of market demand and the perception of greater than current earnings.
- Entrepreneur management experience, motivation, level of education.
- Minimisation of barriers to finance, skills/labour, technology, information, other inputs.
- Enterprise sound finance, positioning and innovation, business planning, youth, manager recruitment, multiple founders.
- Some government policies.

Survival:
- The existence of market demand and the perception of greater than current earnings.
- Minimisation of barriers to finance, skills/labour, technology, information, other inputs.
- Enterprise sound finance, breadth of product/customer range, positioning and innovation, growth, size.

Explaining Enterprise Lifecycle Factors

As summarised in Table 3 and in Figure 7, we can identify five main factor clusters that impact the enterprise lifecycle:
- Factors related to demand for outputs from the enterprise.
- Factors related to the entrepreneur him/herself.
- Factors related to the inputs an enterprise needs in order to function.
- Factors related to the nature or running of the enterprise.
- Factors related to the environment within which the enterprise operates.

Figure 7: Enterprise Lifecycle Cluster Factors



Below, we describe the factors in slightly greater detail.

Demand-related factors
These are "pull" factors that would induce people into ICT-based enterprise if a) there is a demand (in addressing a new market or in addressing an existing market in some way more competitively than existing producers), and b) the income from supplying this market is perceived by the entrepreneur to be a sufficient additional incentive over and above present circumstances to induce and sustain enterprise activity. These issues seem to be absolutely central as determinants of start-up, growth and survival (Storey 1994, Perren 1999). While there are quantitative aspects to these factors (e.g. actual level of output as a surrogate for demand, and actual income), there are also qualitative aspects to their measurement (e.g. the entrepreneur's perceptions about demand and income).

Entrepreneur factors
These are "push" factors that impel people into ICT-based enterprise. Being unemployed (or having no immediate income source) is a fairly obvious and very strong factor pushing people into start-up (Smallbone 1990). Previous experience in small (rather than large) enterprise is also associated with start-up, as are having previous family or managerial experience in business (Storey 1994). There are continuing arguments about whether an "entrepreneurial personality" exists, but it seems likely that any personality effect is very much context- and culture-specific. Few entrepreneur factors seem to link to the survival of an enterprise, though some personality, motivation and experience factors do relate positively to growth (Perren 1999). Overall, these entrepreneur factors are largely qualitative and gathered through interview with the entrepreneur/head of an ICT-based enterprise. Some elements – such as personality-related factors – can be investigated through standard questionnaires.

Input factors
Inputs such as money, labour, technology, etc are essential to the functioning of an ICT-based enterprise. While there may be specific effects (e.g. a direct contribution of particular types of labour or technology to growth), in general terms these inputs are facilitators rather than drivers. Hence, it is their absence – or barriers to accessing inputs – that mainly affects enterprise; being negatively associated with all lifecycle stages. It is possible to undertake quantitative, economic assessment of some input factors, but one would mainly research these by a combination of interview and observation within an ICT-based enterprise, and with surrounding stakeholders.

Enterprise factors
The most significant effect observed is that of enterprise growth and size, both of which are positively associated with ICT-based enterprise survival. For example, a comparison of the smallest vs. largest enterprises sees differentials of 2-6 times in the rate of failure (Storey 1994). Other quantitative enterprise factors linked to survival and growth including a range of financial indicators, such as those discussed earlier in the paper, which many financial institutions use to assess the "health" of an enterprise. Some strategic issues – which are generally investigated qualitatively – have also been found associated with growth or survival, such as the diversity of products or markets, and the degree of innovation within the enterprise. Of course, association is not the same as causation. This is an issue particularly in looking at growth. For example, the link between growth and business planning could arise because firms which grow large feel a need to plan, rather than that planning causes firms to grow large; i.e. it could be that growth causes planning not vice versa.

Other contextual factors
As seen already at the individual level, general unemployment levels are also positively associated with enterprise start-up. So, too, is proximity of other small firms: probably caused by a combination of high failure rates plus high rates of small firm experience. The effect of wealth on IBE lifecycle stages is unclear. It is fair to say that government policy is generally agreed to have an effect but the nature of this effect is contested; for example by those with a generally neo-liberal, market-oriented perspective as compared to those with a generally statist, interventionist perspective. These issues are investigated through a mix of quantitative and qualitative research, some of which would draw on general economic and political sources.

Summary

In summary, lifecycle factor analysis can be very helpful in understanding the likely trajectory of an ICT-based enterprise. Research on enterprise in developing countries has had a tendency to be too generic and supply-oriented, particularly focusing on inputs of money or skills. Lifecycle analysis is a reminder that three other issues deserve treatment. First, the entrepreneur themselves as much as the particular IBE they find themselves in at a given time: enterprises come and go, but entrepreneurs typically keep going. Second, the issue of demand: even with all other factors in place an ICT-based enterprise cannot start-up or survive or grow unless there is some demand for what it produces. Demand analysis must therefore form at least part of the analysis portfolio. Third, context: there are so many factors affecting an IBE that their balance and impact will vary from context to context, suggesting that factor analysis must go hand-in-hand with the type of context analysis described above.

G. Other Analytical Tools for Researching ICT-Based Enterprise

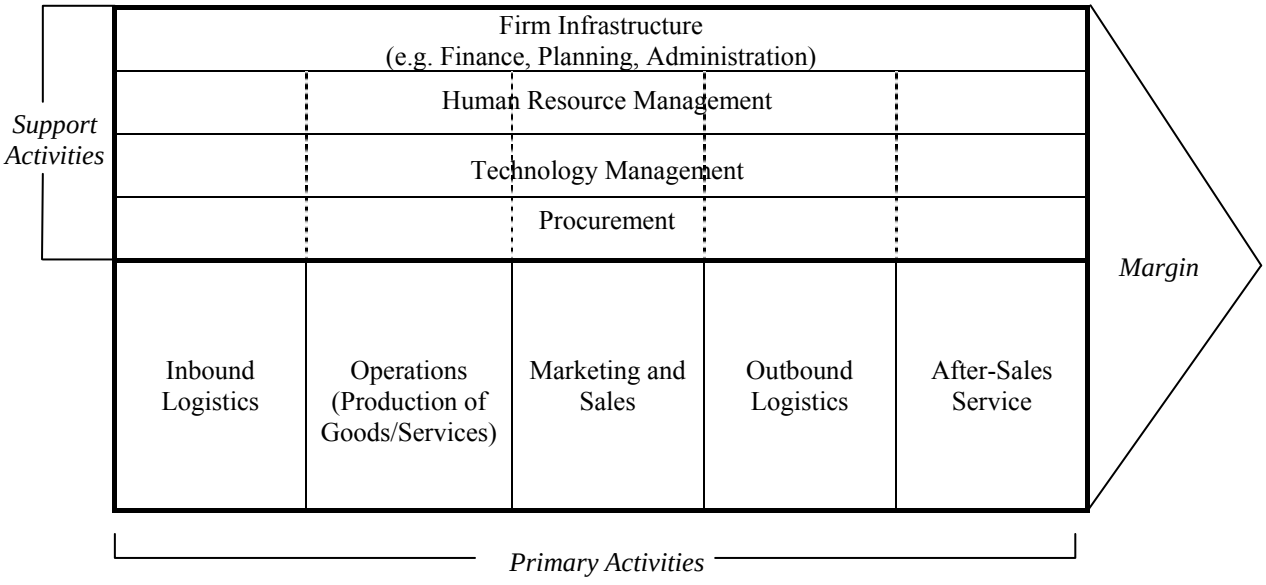
G1. SWOT

A straightforward technique for understanding current and future trajectories for an ICT-based enterprise is SWOT. This simply analyses the internal strengths and internal weaknesses of the IBE (as perceived by various stakeholders), and the external opportunities and threats that may arise within the enterprise's context (again, as perceived by various stakeholders). SWOT can be applied in a more or a less rigorous manner, but it does offer a fairly clear snapshot of the enterprise, including one that can be used for comparative purposes.

G2. Internal Value Chain

Porter's model for the sectoral value chain was described above. This is matched by an internal value chain model that can be used as a basic tool for analysing the activities in an ICT-based enterprise (see Figure 8, adapted from Porter 1990). Porter particularly differentiates primary activities, which relate directly to the delivery of the enterprise's core goods or services, from support activities which are secondary processes that make primary activities possible.

Figure 8: The Enterprise Value Chain



The value chain model can be used simply as a descriptive framework, describing what happens in the ICT-based enterprise under each one of the nine activity headings. Alternatively, it can be used in a more investigative mode: asking about strengths and weaknesses of each of the nine areas, or asking about balance (e.g. balance of effort between support and primary activities).

H. Conclusion

This paper has taken a largely (though not exclusively) business-oriented perspective on researching ICT-based enterprises; a perspective that offers a very varied set of issues, models and tools for use. Perhaps the only danger is that a business approach can be – or can be seen to be – alien to the true needs and context of certain ICT-based enterprises, such as those based in poor communities, where welfare rather than business, where vulnerability rather than opportunity, are seen to be the watchwords.

At root, there is an argument here of a disjuncture between business and poverty; a disjuncture perhaps seen as partly rooted in Western notions of enterprise that mismatch conditions in developing countries. However, there are growing counter-arguments that draw on the emergent "business in development" domain (see Lema & Hesbjerg 2003, Wignaraja 2003a, Binder et al 2007). This domain – while not signed up the Washington consensus and neo-liberalism – sees business and enterprise as vital to poverty reduction; indeed, at its most forceful, it sees enterprise as the only route to delivery of the Millennium Development Goals on poverty. We would thus argue that research on ICT-based firms from a business perspective is fully commensurate with an interest in poverty and livelihoods.

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