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Telecoms demand: measures for improving affordability in developing countries

A toolkit for action

Main report

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The World Dialogue on Regulation for Network Economies (WDR) facilitates an international dialogue to generate and disseminate new knowledge on frontier issues in regulation and governance to support the development of network economies.

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Abbreviations

ARPU Average Revenue Per User
BITDA Before Interest, Tax, Depreciation and Amortisation
BOP Bottom of Pyramid
CEE Central and Eastern Europe
CIS Commonwealth of Independent States
CPE Customer Premises Equipment
CSO Community Service Obligation
CSR Corporate Social Responsibility
EU15 European Union (first 15 members)
FDI Foreign Direct Investment
FYR Former Yugoslav Republic
GDP Gross Domestic Product
GNI Gross National Income
GSA Global Mobile Suppliers Association
GSM Global System for Mobile Communications
GSMA GSM Association
GSR Global Symposium for Regulators
ICT Information and Communications Technology
ID identification
ISDN Integrated Services Digital Network
IT Information Technology
ITA Information Technology Agreement
ITU International Telecommunications Union
LIRNE Learning Initiatives for Reform of Network Economies
LSE London School of Economics
MCO Minimum Cost of Ownership
MENA Middle East and North Africa
MMS Multimedia Messaging Service
NGO Non Governmental Organisation
OTAR Over the air refill
PC Personal Computer
PCO Public Call Office
PIN Personal Identification Number
PSTN Public Switched Telephone Network
SG Study Group
SIM Subscriber Identity Module
SMS Short Message Service
TCO Total Cost of Ownership
UASL Universal Access Service Licence (India)
USAL Under-Serviced Area Licence (South Africa)
US0 Universal Service Obligation
USD United States Dollar
USF Universal Service Fund
USP Universal Service Provider
USSD Unstructured Supplementary Services Data
VAT Value Added Tax
VSAT Very Small Aperture Terminal
WLL Wireless Local Loop
WSIS World Summit on the Information Society

Executive summary

This report is addressed to a wide range of people in and around the telecoms industry. It may prove useful in various ways. For example:

- Investors may note the wide variation in potential demand found in our review of survey research, and seek business cases which are firmly based in sound research and with forward-looking marketing strategies.
- Readers from the telecoms industry may find some new ideas and challenges in the collection of innovative marketing approaches.
- Regulators in developing countries will find a proposed approach to promoting affordable telecoms, together with examples of what other regulators are doing.
- Consumer groups and public interest advocates can apply the findings to their own situations, and approach their local industry representatives and regulator in support of best possible local developments.

We start from the idea of *universal service and universal access*, which is widely seen as having three essential components: availability, accessibility and affordability.

Our focus is affordability. We believe that within any given scenario of overall income and price levels, marketing factors can play a significant role in improving affordability. Furthermore, they are relatively easy to deploy, sometimes even leading to a 'win-win-win' situation (where industry gets more profits, consumers get more service and the regulator gets more praise). This report therefore aims to highlight and spread awareness of such tools for improving affordability. It goes without saying that their use should not detract from other relevant efforts, in particular to intensify competition, to introduce lower cost technology and to bring control of undertakings closer to consumers and communities.

Over the last decade, the rapid growth of cellular service has brought phone service for the first time within physical reach of huge populations. And advances in technology, especially but not only GSM, have both brought down costs and provided practical means to target affordable telephony packages accurately at almost everyone within cellular coverage. Two key features of GSM underlie these conclusions – its cost structure, and its software-based service provision.

The report highlights tariff, service and marketing innovations which can make some use of telephony affordable even to people with very low budgets. Micro-prepay is seen as especially significant. For most operators, it is technically and financially easy to deploy – arguments against it are mainly of a commercial nature. It is suggested that regulators in countries where micro-prepay does not soon appear will need to be satisfied on the reasons for this.

The phenomenal spread of mobiles has given rise to a perception in some circles that affordability is no longer an issue. The report shows that for large populations this is too simple a reading of the available evidence. A growing number of studies reveals high price elasticity of demand for telephone service in developing countries, which suggests that some operators may be rewarded by more adventurous pricing than is current. While the focus of the report is not on further extension of coverage, the evidence would support arguments for wider telephony coverage of developing countries.

The report reviews recent user research and household expenditure surveys to improve understanding of user perceptions of affordability and percentages of income actually spent on communications. It also presents a new analysis of communications spending based on household expenditure surveys in four developing countries. It concludes that all countries, when setting targets and strategies for achieving universal service and access, should take account of their own population's spending patterns. Apparently common patterns are shown

which could warrant further research. There is particular uncertainty over the spending patterns of low income groups.

Our study strongly suggests that the technology exists to enable mobile service to be provided profitably in rural areas of developing countries – which has to mean at prices which are affordable to many if not most rural residents. If existing operators cannot or choose not to offer low-priced service in rural areas, there is a clear case for offering these opportunities to other companies, including to local start-ups with NGO or community support whose primary objective might be service, rather than profit.

Where affordability goals are demonstrably not achievable on a commercial basis, various shared universal service funding schemes, often originally devised for speeding up network roll-out, may be adapted to balance any unfair net cost burden. In many cases, no such device should be needed. In an open market environment, technological advances and far-sighted marketing strategy can do the job, with the regulator's role being one of oversight rather than intervention. Of course, in many countries there is still a long way to go before markets are open enough; but efforts to improve affordability can usefully proceed in parallel with market opening.

1 Introduction

This report is addressed to a wide range of people in and around the telecoms industry. It may prove useful in various ways. For example:

- Investors may note the wide variation in potential demand displayed in chapter 2, and seek business cases which are firmly based in sound consumer research and with forward-looking marketing strategies.
- Readers from the telecoms industry may find some new ideas and challenges in chapter 3.
- Regulators in developing countries will find in chapter 4 a proposed approach to promoting affordable telecoms, together with examples of what other regulators are doing.
- Consumer groups and public interest advocates can apply the findings in both these chapters to their own situations, and approach their local industry representatives and regulator in support of best possible local developments.

The report takes account of comments received on earlier drafts, but remains a snapshot as of January 2006. Proposals for further work (which could including extending and/or updating parts of this report) appear in chapter 5.

1.1 Use of the term "affordability"

The word 'affordable' is in everyday use and generally understood. However, it is almost absent from economics literature[1], where consumers are supposed to maximise their utility subject to overall budget constraints. Buying more of one good and less of another is seen as an expression of preference, rather than a reflection of the feasibility of meeting basic needs. Poverty literature tends to look at sufficiency of overall income to meet overall needs, rather than at affordability of meeting specific needs (though the study of poverty originated the 'percentage of income' approach further explored below[2]).

When the term 'affordability' crops up in debates on telecoms policy and regulation, people with an economics background tend rapidly to translate it into 'sustainability'. Plainly, it is pointless to provide an affordable service if revenues are insufficient to keep the provider in business. To be of use, the service must be sustained, normally by revenues, or in justified cases by external funding. People with an engineering background similarly tend to translate 'affordable' into 'using low-cost technology'. Advances in technology are leading to ever lower-cost communications solutions, which if reflected in prices[3] would improve affordability.

The area where the term 'affordability' seems to be used most naturally is marketing. Advertisements assure consumers that they can afford the latest car, computer or appliance. Marketing literature analyses populations into segments. The 'addressable market' consists of those segments which can be reached by current distribution channels and which can *afford* the goods or services at proposed prices. From marketing language it is a short step to political use; manifestos like to speak of 'affordable' housing for key workers or health care for all.

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[1] An exception in the area of housing is Hancock (1993).

[2] In the UK, the idea of 'fuel poverty' (defined as needing to spend more than 10% of income to keep warm) is used to define affordability for fuel from its opposite. That is, people in fuel poverty are assumed to find fuel unaffordable. The idea relates to the original work of Ernst Engel, who first observed in Saxony in 1857 that poorer families spend a higher proportion of their income on food (an observation which still holds good today). His name has been given to Engel Curves.

[3] K K Gunawardana, among others, has made the point that companies often do not reflect these cost savings in tariffs. See ITU (2002), section 2.5, Generic structure of telecom networks, their costs and usage.

For some of a free market bent, an attempt to provide 'affordable' phone service may have connotations of social engineering through loss-making services. Equally, some campaigners for social justice find equity in access to essential services a more appropriate goal than affordability. Our approach is a practical one, based on the premises that:

- Whether or not a service is affordable to a particular household depends primarily on its price and the household's income[4], though also on other marketing and user factors which we explore further in this report.
- Affordability is linked only loosely to the cost of providing the service. Problems arise if total industry revenues are inadequate to cover total costs, but it is normal practice for classes of users to contribute to revenues and costs in different ways at different times. An affordable price may be below or above the cost of supply (text messages are a good example of the latter).
- Telephony can no longer be viewed as a luxury, for affluent groups only. In most countries, both public and industry will benefit from extending affordable phone service widely and fast, to reach people in all income groups.

We distinguish two levels of affordability (or rather its lack), determined by two effects:

- The 'barrier' effect, which prevents people from owning a phone, or from using shared access phones other than in emergencies.
- The 'inhibitor' effect, which discourages people from making as many calls as they need to even when they own or have access to a phone.

Plainly the barrier effect is the more serious, and it is encouraging to note various recent surveys that suggest that it is reducing or absent in many contexts. We suggest that affordability is only fully achieved once the inhibitor effect is reduced to a level where people make all the calls that they feel are necessary, without cutting back on other essentials.

We acknowledge that availability and affordability of telecoms are sometimes a mixed blessing. Castells et al (2004) touch on some of the problems of modern society that may arrive along with the mobile phone. On balance, however, we believe that affordable telecoms is a worthwhile objective, and we proceed on this assumption.

[4] Throughout this report, examples of prices are quoted in local currency with approximate US$ equivalent based on exchange rates found on www.oanda.com at December 2005. Annex F provides per capita GDPs (in both US$ and PPP US$), from which an idea of typical incomes can be derived for each country.

1.2 Focus and approach of this study

1.2.1 Aspects of universal service and universal access

Figure 1 aims to clarify the scope and focus of this study.

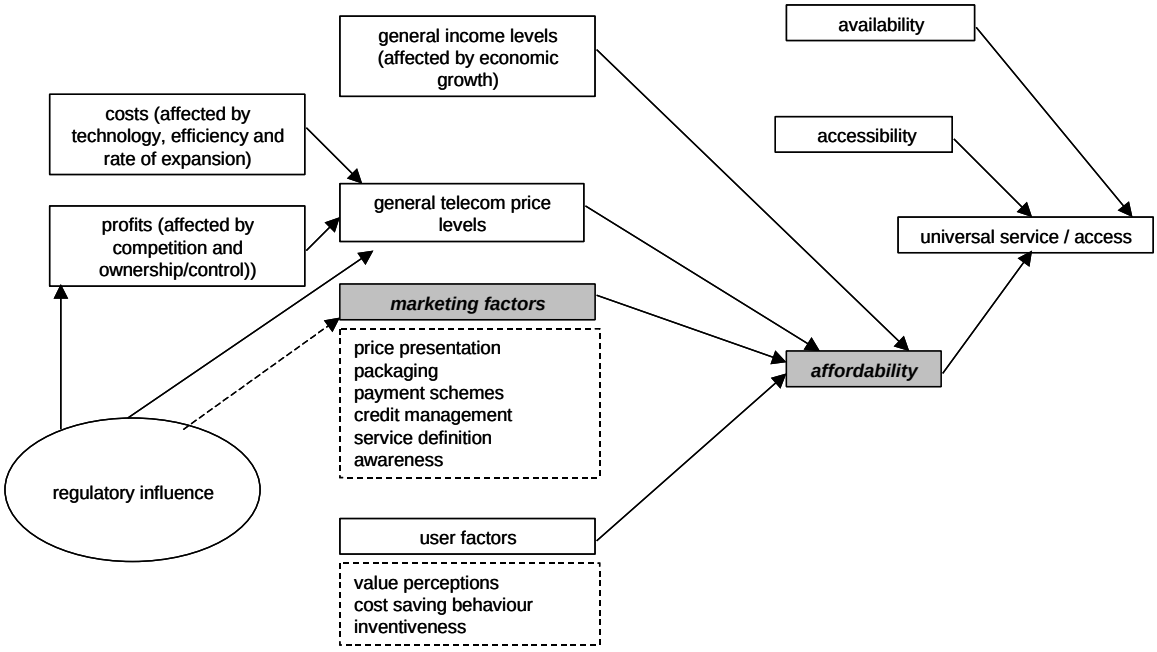


Figure 1 Focus of this study

We start from the idea of *universal service and universal access,* which is widely seen as having three essential components:

- Availability (meaning that service can be obtained in a geographical area).
- Accessibility (meaning that service is accessible to differently abled people).
- Affordability (meaning broadly, in the words of the ITU, that "telephone service should be priced so that most people can afford it"[5]).

Both universal service and universal access have these three components. The difference now usually drawn between them is that universal service means a private phone for every household, while universal access means only reasonably convenient public or shared phones for everyone. The same policies promote progress towards both universal access and universal service, often seen as staged goals along a single path. We discuss this further in section 5.1 below.

Our focus, affordability, is generally seen as depending on two major influences:

- Overall income levels (which rise only slowly as a result of economic growth).
- Overall telecom price levels (which are a function of actual costs and profits, both of which rightly attract much attention).

[5] Note also the approach of Souter et al (2005), which effectively makes access depend on affordability: "Access is available when a citizen can use a public telephone facility within a reasonably convenient distance at a price which is affordable in comparison with the real and opportunity cost of alternatives (such as transport and postal services)".

Of course, higher incomes and lower overall price levels will eventually solve most affordability problems for developing countries. But higher incomes depend on economic growth, which often take decades to make a difference. Lower overall price levels can be brought about sooner, but are often hard to achieve, because of both physical obstacles such as mountains and deserts, and human resistance from vested interests.

We therefore highlight two other areas that affect affordability but receive less attention:

- Marketing factors (including tariff effects) for services for low income groups, such as price presentation, service packaging and payment options.
- User factors, such as value perceptions and cost-saving behaviour.

We believe that, given overall income and price levels, marketing factors can lead to valuable tools for improving affordability. Furthermore, these tools are relatively easy to deploy, sometimes even leading to a 'win-win-win' situation (where industry gets more profits, consumers get more service and the regulator gets more praise). This report therefore aims to spread awareness of such tools for improving affordability. It goes without saying that their use should not detract from other relevant efforts to improve affordability, in particular by intensifying competition, introducing lower cost technology and bringing control of undertakings closer to consumers and communities.

The focus is also primarily on telephony (predominantly mobile, but also fixed) as the first necessary ICT in all countries, with only a short look at Internet.

1.2.2 Relationship between access and affordability

The terms 'market efficiency gap' and 'access gap' came into use after their publication in a World Bank report on universal access (Dymond et al 2000):

- The "market efficiency gap" refers to currently unserved markets which are potentially commercially viable. Liberalisation (with a light and fair regulatory regime) should be enough to ensure that these markets will be served within a few years.
- The "access gap" refers to currently unserved markets which are not commercially viable for the foreseeable future without outside intervention, because of some combination of high cost, low population density and low incomes.

More recently the "access gap" has been conceptually split in two[6]:

- The "smart subsidy zone" refers to those markets which could become commercially self-sustaining within a few years, if they receive initial support (a "smart subsidy")
- The "true access gap" refers to the remaining markets. Providing service here is expected to need outside support indefinitely (typically because continuing satellite bandwidth costs exceed what a small community can pay).

Along with Galperin (2005), we feel that these useful concepts would be better renamed. The "access gap" is more easily thought of as the "affordability gap". Modern technology is capable of providing access anywhere - the only problem is paying for it.

All these markets are geographic in nature. This universal access model focuses on the provision of some service in an area, usually without specific penetration targets. Our focus is on how to raise penetration and use within areas that already have some service, or 'deepening' the reach of universal access to complement its growing 'breadth'. We do this starting from the viewpoint of users.

The levels of universal service and universal access that are appropriate in a country depend on its general level of development. We discuss this more fully in 5.1. This has been

[6] Also by the World Bank and its advisors, especially Intelecon.

described[7] in terms of suiting the policy for universal service and universal access to what the *country* can afford.

This report takes a neutral stance on government subsidies to the telecom sector in developing countries. It would be presumptuous to suggest that telecoms or ICT are more valuable than competing uses of scarce public funds. We note with interest the findings of Souter et al in Mozambique[8]: health clinics, schools, roads, and electricity were all rated much higher than mobile network coverage among respondents' preferences for investments. Only improved access to agricultural information was rated a little lower. Reliable water supply for irrigation and drinking is top priority for innumerable poor communities around the world.

1.2.3 Parts of this study

This study has the following main parts:

- A review of the literature, and current activities and thinking, by Claire Milne, with direction from Robin Mansell and support from Sangeeth Varghese. Findings are presented in this report.
- An analysis by Sebastian Ureta-Icaza of household expenditure survey data from four developing countries. This is fully covered in a companion paper (Ureta 2005) and referred to in 2.2 below.
- A case study of Reliance Infocomm's marketing practices by Sangeeth Varghese. This is fully covered in a companion paper (Varghese 2006) and referred to in 3.3 below.
- Publication of a paper on price elasticity of demand in developing countries by Jeffery Wheatley. This is available as a companion paper (Wheatley 1998) and referred to in 2.5 below.
- Production of a prototype web-based tool for national and international comparisons of end-user prices of typical usage profiles for certain user types (student, artisan etc). Six countries are included in this demonstration version: Canada, India, Sri Lanka, South Africa, Australia and the UK, with a selection of service providers in each country. This work has been led by Chirag Unadkat, and carried out by WESRA India Pvt Ltd. The tool also permits users to input their own usage profiles.

1.3 Recent relevant developments

This section looks briefly at some recent developments which it is useful to have in mind before proceeding to our main analysis:

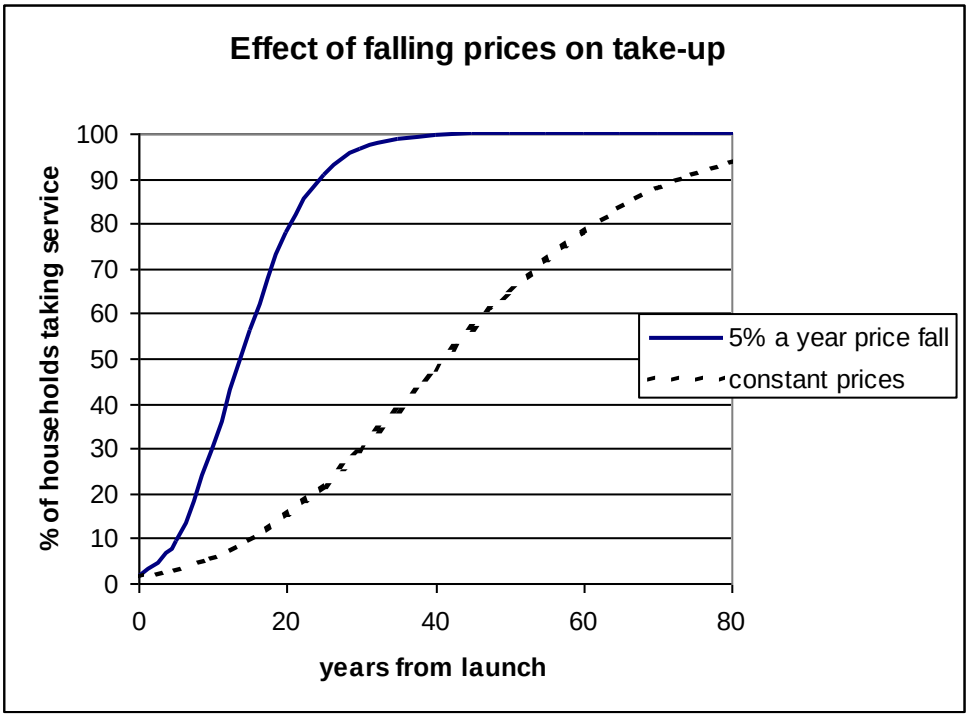
- The dramatic growth in take-up of wireless telephony around the world, fuelled by falling prices and prepay;
- Business movements to market to low-income customers and reduce regulation;
- International activities (involving ITU and the World Bank) and the World Summit on the Information Society process.

[7] For example, in the Cullen International and WIK (2001) study of universal service in EU Accession Countries.

[8] See page 61, Figure 3.2 of Souter et al (2005).

1.3.1 Growth of wireless telephony

The main recent development behind this study is the dramatic growth in wireless telephony around the world. This growth is a product of new technology and (partial) market opening.



Source: study construction, using technique described in Milne (2000)

Figure 2 Faster take-up with falling prices

Figure 2 illustrates the dramatic effect that falling prices can have on speed of take-up of a phone service. The two curves are constructed using a model based on nearly all the same assumptions[9]. The difference between them is that one has a constant minimum annual price of service of US$75, while the other starts this way but the price reduces by 5% a year. The very steep curve between roughly years 5 and 15 of the solid line can be seen as representing the 'wall of demand' that mobile operators in some countries are struggling to keep up with. The dotted line is more representative of historic growth rates for fixed telephony[10].

It is well known that 'lift off' for mobile phones has depended not just on lower prices but, crucially, on the prepayment option successfully pioneered in Portugal and Italy and now accounting for a large majority of mobile subscribers worldwide. Of course, prepayment plans can be structured in a variety of ways, but the industry quickly recognised that recurrent (usually monthly) standing charges were both unpopular and unnecessary[11]. So the features that have contributed to its success in the market are:

[9] Starting with low GDP per capita of US$250 a year, willingness to spend 3% of income on telecoms (and that everyone who can afford the phone gets it), economic growth of 2.5% a year, and a constant level of inequality (Gini index).

[10] This theoretically constructed curve is very similar in shape to the empirical graph for Taiwan shown in Figure 15.

[11] Unnecessary, given the cost structure of mobile networks, where (unlike fixed networks) minimal costs are incurred on behalf of marginal users who make few calls.

- Simple procedure for getting service, needing no credit check, bank account or proof of identity[12];
- Easy budgeting, with known outlay, all of which is usually available for making calls (for whatever duration is permitted).

The initial outlay to acquire a mobile phone, and high minimum credit recharge levels (relative to local incomes), have limited mobile ownership, but call-by-call use of mobile phones has become widespread among non-owners wherever service is available. This sometimes happens on a formalised basis, as in the well-known Grameenphone initiative in Bangladesh[13]. Informal call resale by small entrepreneurs is now prevalent in many markets, as of course is non-commercial phone sharing among family, friends and acquaintances. This means that within mobile phone coverage, entry barriers to phone use have often been reduced to the price of a single call. (We discuss in 2.5 and 3.6 below the implications of actual price levels in these circumstances).

1.3.2 Business initiatives

Also in recent years, marketing to people with very limited purchasing power has become an accepted and often necessary business strategy. C. K. Prahalad's book on 'bottom of pyramid (BOP)' techniques (Prahalad 2005) is the best known description of approaches that were already being adopted by many companies in emerging markets, and are now being followed by many more. The 'single serve' package of shampoo or sauce, typically bought occasionally by a daily paid worker for immediate consumption, has a close analogue in low denomination telephone account top-ups – enough only for a single call or text message. Websites like http://www.nextbillion.net (under the auspices of the World Resources Institute) and the World Council for Sustainable Business Development now make available many case studies of 'what works' in emerging markets.

The BOP movement is related with a general Corporate Social Responsibility (CSR) movement which has also gained momentum in recent years. This in turn is linked with initiatives from business to resist and reduce what they see as excessive regulation. The telecoms industry, and especially mobile operators, are active participants in all these arenas.

Plainly, harnessing business activity to reduce poverty is a good thing, and the right environment for this is vital. But a difficult balance must be struck between giving business enough room to flourish, and allowing it to make excessive profits by exploiting oligopoly power. The GSM Association has published its views on how to regulate tomorrow's mobile market. These are reproduced at Annex D, together with comments from this study, aimed at assisting regulators to achieve this balance.

[12] In some countries, this potential strength is not allowed to be realised – identity checks are still required, generally for reasons associated with control of anti-social or criminal activities.

[13] See for example Grameen Technology Centre (2005).

1.3.3 International activities and WSIS

The International Telecommunications Union (ITU), and in particular its Telecommunications Development Bureau, naturally plays a central role in advancing and spreading understanding of best practice in universal service and universal access. Part of its 1998 report on Universal Access[14] seems still to be the most widely quoted reference on telecoms affordability. Its more recent report on Universal Access (ITU 2003) contains less of substance on this topic, although in the chapter on minimum–subsidy auctions Edgardo Sepulveda underlines its continuing importance:

> **Affordability assessment.** The most critical demand-side factor is affordability. The USF administrator should collect data on individual or household expenditures on telecommunications and other services. Combined with income data (preferably by region and sub-region), this information will give the administrator a good idea of the current and expected affordability of telecommunication services in each region. The administrator can then better determine the required geographic and population coverage that may be required or feasible to contemplate. The affordability assessment should also take into account any potential change in consumer tariffs, for instance as a result of a consumer tariff rebalancing plan.

Following extensive debate and development, the ITU's latest index for measuring e-development, the Digital Opportunity Index (ITU 2005a), has 11 components of which two relate to 'affordability'[15]. However, practical guidance from the ITU on how to improve affordability directly is hard to find[16].

Since 2001, the World Summit on the Information Society (WSIS) process has focused world attention on closing the 'digital divide' and generated a huge volume of documentation. The current study, along with several companion studies under the LIRNE umbrella, is part of the fringe activity generated by this process. With so much going on in parallel, it is impossible for all related activities to be co-ordinated. This report aims to identify some particularly pertinent work-in-progress, but recognises that a proper synthesis of WSIS implications will need much more time.

Business initiatives such as those described in the previous section have in part been met by moves from civil society, including the global consumer movement[17]. During the early preparations for WSIS, planned as an intergovernmental summit, there was considerable debate about the proper role of civil society in the Summit. The umbrella group Communication Rights in the Information Society worked hard for a satisfactory platform for civil society participation, and greatly raised its profile. Similarly, the ITU, originally an intergovernmental organisation, has broadened participation to encompass sector members (typically operators and equipment suppliers). Following a series of conferences with consumer representatives in the Asia Pacific Region in 1999 to 2002, the ITU is now including consumer representation in its annual Global Regulatory Symposium.

The current EU Review of the Scope of Universal Service[18] illustrates the position that consumers have reached in influencing policy. The scope of universal service is an issue which centrally concerns consumers and citizens, but only around 20% of the responses received on this issue appear to be from civil society groups or individual consumers.

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[14] ITU (1998) Chapter 2, Pricing Access, and especially 2.2, Defining Affordability. We discuss this reference further in 2.1 below.

[15] These are the price of 20 hours internet access, and the price of the OECD low user mobile basket, each as a percentage of per capita GNI.

[16] ITU (2001) explains the theory underlying COSITU, the ITU's tool to help people in developing countries to work out sensible tariffs in the absence of good cost data. Its use of price elasticities is scant, and it assumes that people using the tool will already know what constraints are dictated by affordability.

[17] Best represented by the international federation of national consumer societies, Consumers International.

[18] See http://europa.eu.int/information_society/policy/ecomm/info_centre/documentation/public_consult/index_en.htm#universal_service

When most consumers cannot or do not give voice to their own interests, survey research is particularly important in informing policymakers about consumers' situations and preferences. The next chapter looks at what we can learn about telecoms affordability from survey research.

2 Assessing and measuring affordability

It is increasingly recognised[19] that expanding access to telecoms (or ICT, or indeed other infrastructure) should be guided by survey research on people's needs and priorities, and also on demand and affordability assessments. This section looks at aspects of how affordability of telecoms in developing countries can be assessed.

In industrialised countries affordability has been explored in more depth in the context of essential utilities[20]. There is also some literature on measuring housing affordability in these countries: Hulchanski (1995) discusses the appropriateness of using the proportion of income spent on housing as an affordability measure for different purposes. A particularly interesting approach is one to assess energy affordability, which is being piloted in a number of states of the USA by Roger Colton and co-workers (Colton 2003 and Colton 2004). This uses a special (short) household questionnaire to test for the presence or absence of certain effects of lack of affordable energy. The survey findings can be applied to estimate threshold percentages of income at which energy should be regarded as unaffordable.

This chapter is arranged as follows:

- Section 2.1 discusses the main approaches that are used for measuring and assessing affordability of telecoms.
- Section 2.2 presents the main findings of a new analysis of household expenditure surveys in four developing countries.
- Section 2.3 reviews findings of consumer research into percentage of income spent and perceptions of affordability.
- Section 2.4 offers some conclusions on spending patterns from our study of consumer research, household expenditure surveys and other relevant literature.
- Section 2.5 reviews findings of studies of demand elasticity in developing countries.
- Section 2.6 glances at affordability of internet service.

Figure 3 aims to clarify the different types of analysis discussed in this chapter and the main sources of quantitative information which each tends to use, together with references to where they are discussed.

[19] For example, Kenny, Navas-Sabater and Qiang (2002) writing for the World Bank include a section called *Listening to the Poor* proposing the use of both specially designed and general household surveys for these purposes.

[20] For example, Milne (2004) provides an overview and many more references.

Type of analysis	Source of quantitative information			
	Industry statistics (eg ITU)[21]	National household surveys	Telecom consumer research	Other sources
Phone penetration	Yes - 2.1.1	Yes - Annex E		
Percentage of spending		Yes - 2.1.2, 2.2, Annex E	Yes - 2.3.2	
Perceptions of affordability			Yes - 2.3.1	Yes - 2.3.1
Elasticity estimates	Yes - 2.5.2		Yes - 2.5.2	Yes

Figure 3 Types of analysis and sources of information discussed in this chapter

2.1 Approaches to assessing affordability

Three main approaches are in use to measuring and assessing affordability of telecoms:

- Inference from telephone penetration statistics. We look at this approach in 2.1.1.
- Measurement of the percentage of income (or expenditure) devoted to telecoms. We discuss this approach in 2.1.2 and provide some new analysis of household expenditure surveys in 2.2. 2.3.2 provides further information derived from field research on use of telecommunications. (Annex E also provides more relevant data from household expenditure surveys).
- The perceptions of affordability found from views of users and potential users in field research on use of communications. 2.3.1 overviews such findings.

2.1.1 Penetration statistics

Affordability and penetration (take-up) are plainly linked, but not in a simple way. The 1998 ITU report on Universal Access includes a figure[22] plotting household penetration against the price of a basic basket of telephone service as a percentage of household consumption. This showed that in all those countries with household penetration over 80%, a basic service basket costs no more than 2.5% of household expenditures. Conversely, basket costs above 5% of household consumption were associated with penetrations of below 20%.

Kuhlmann (1999) follows the same approach as the 1998 ITU report. In a more detailed look at Mexico, he shows that 80% of households could afford basic service (without long distance service) if they spent 4.5% of income at current prices. The full basket, including an allowance of long distance calls, would however cost 14.2%.

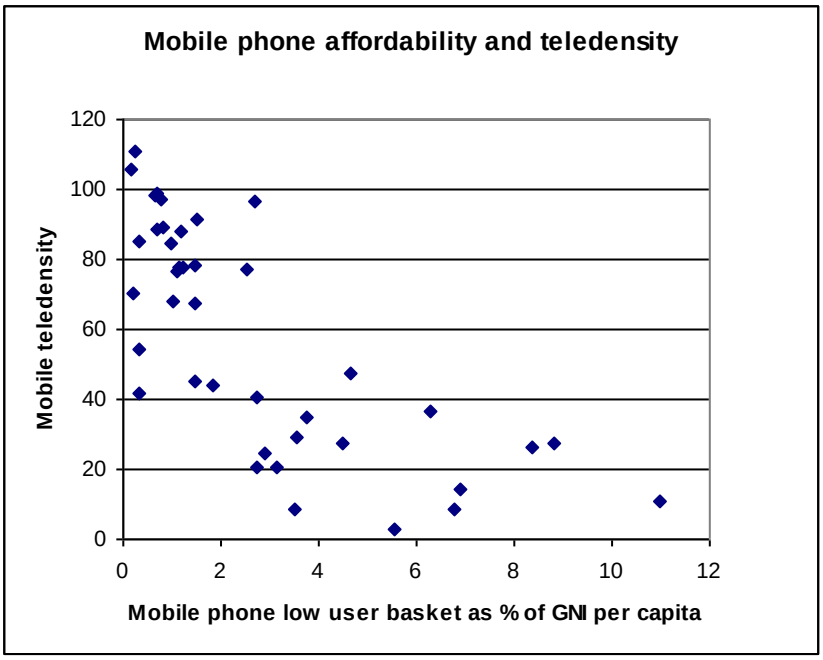
Though the 1998 picture is now only of historic interest, we find the current picture for mobile is very similar. Figure 4 is constructed like the 1998 ITU figure just mentioned, but uses 2004 data[23] and refers to mobile rather than fixed service. The general appearance of this figure is very like the 1998 figure – we see the same downward slope (with plenty of scatter), and the same limit of 2.5% of spending for teledensities of 80% and over[24].

[21] Of course, the information collated by the ITU originates in the countries concerned. Telephone take-up figures are generally supplied by companies in the industry to the regulator for aggregation.

[22] Figure 2.6: Relative affordability and telephone access. Shows 1995 data for some 40 countries.

[23] Again for 40 countries, this time taken from the ITU Digital Opportunity Index publication, June 2005.

[24] The amount of usage in the two baskets is also similar – 830 calls in the 1998 fixed basket, and 660 (calls and SMS) in the 2004 mobile basket. Both axes now are scaled in relation to individuals, whereas on the 1998 figure both were scaled in relation to households. The 40 countries included in Figure 4 are the same as those listed in Figure 18 (where actual basket prices for a year later are shown).



Source: study construction using 2004 ITU data

Figure 4 Mobile phone affordability and teledensity

An affordability target that phone service should cost no more than 0.7% of income has been quoted in some works on universal service. This appears to originate in the following quotation, in the context of the United States in the mid-1990s (Cooper 1996):

> Second, we have observed across time that only when the cost of service drops to less than 1 percent of income in the aggregate does the telephone penetration rate begin to exceed 90 percent. Now we observe in a more disaggregated approach that penetration rates of 99 percent are consistently achieved only when the cost falls to less than 1 percent of income - to about 0.7 percent. Thus 0.7 percent of income would seem to be a target level for cost, if universal service is to be achieved.

There is also an inverse argument, that high levels of penetration imply that the service is universally affordable. This argument appears to be used, for example, by the European Commission in its recent consultation document on the scope of universal service. As the Commission's own market research (Ipsos 2004) shows, the picture is much more complex. With respect to the 19% of EU15[25] households which do not have a mobile phone, affordability is identified as an obstacle for 16% of them overall, and for more in Portugal (40%) and Greece (26%). Affordability is also a reason for not having a fixed telephone for 23% of the EU15 households without a fixed phone. Of course, in high-penetration societies affordability does become a minority problem; but at the same time, because of social expectations, being without service can be a severe deprivation for that minority.

The relationship between percentage of income spent on basic service and penetration is susceptible to quantitative modelling. This enables assumptions to be clarified and the effect of changing input variables to be displayed. The first known published application of this approach to telecom demand forecasting is in an early paper by Björn Wellenius (1970). More recently, similar techniques have been applied in such disparate environments as Egypt's e-readiness project (Soliman 2005) and investment analysis (for example Morgan Stanley 2004). Milne (2000) showed the significant differences brought about by different

[25] The EU15 countries are the 15 countries in the EU before 2004.

levels of inequality of income distribution (measured by the Gini coefficient) at any given average income level.

2.1.2 Percentage of income spent on communications

The percentage of income[26] that people are actually spending or are prepared to spend on communications is often used in measuring affordability, and in fact may itself be referred to as 'affordability' (for example by demand forecasters). In itself, however, such a percentage tells us nothing about user-perceived affordability. Spending 10% of income on a service may mean that the service is very highly valued (possibly, increasing well-being by substituting for other spending), or equally that it is essential and highly priced (possibly, reducing well-being by displacing other desirable spending).

Of course, affordability of communications must be considered in the broader context of other household expenses. Ureta (2005) looks for links between spending on communications and other spending categories, especially transport and ICTs. Possible substitution between transport and communications spending is discussed further in 2.4.4. Another grouping that has had some attention is that of utilities (usually water and sanitation, electricity and gas; now increasingly also telecoms). The percentage of income approach has been used in World Bank circles for assessing affordability of utilities when reforming infrastructure sectors, especially in Latin America[27]. A figure of 15% of income for household utilities together (water, energy and communications) has been taken as a rough affordability indicator, based on various household spending surveys. It is important to note that telecoms access (and consequently expenditure) tends to trail well behind access to other utilities. Figure 5 illustrates this for urban Eritrea, and similar pictures can be found elsewhere (for example Komives, Whittington and Wu, 2001).

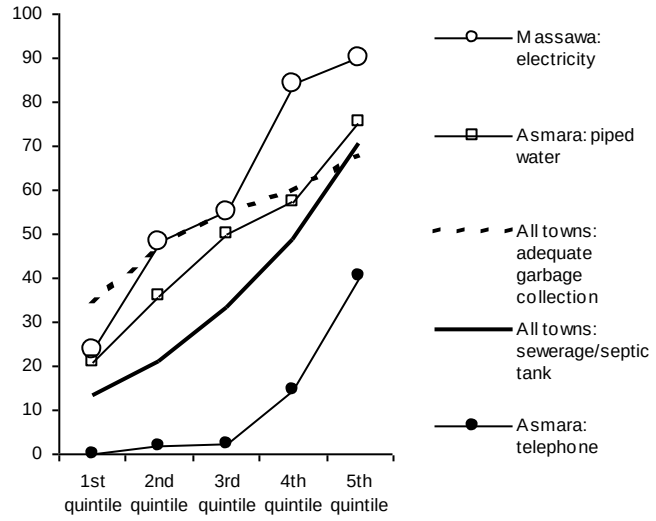
The rule of thumb that between 2% and 3% of household spending is devoted to communications has been current for some time[28], though the 1998 ITU Universal Access report already referred to a figure of 5% as realistic. The study has looked in detail at relevant data to see if the rule should be updated or refined. This is important for two reasons:

- Business cases may be based on revenue streams forecast using these factors.
- The assumption that this percentage (or, often, a higher one) applies to low income groups is influencing approaches to universal service and universal access in many countries.

[26] Or, often and more or less equivalently, proportion of total expenditure.

[27] See for example Foster, V. & Araujo, M. C. (2004); Foster, V. & CEER-UADE (2004). The WIDER infrastructure reform programme has also produced several relevant papers.

[28] An accessible reference to this (and to the scatter diagram of 1999 ITU data showing telecoms revenues as a percentage of GDP on which it is based) is Module 6 of the Telecommunications Regulation Handbook, Infodev and McCarthy Tétrault 2000.



Source: Arneberg & Pedersen (2001), Figure 3.21

Figure 5 Access to utilities in urban Eritrea in 1996/1997, by income quintile

This study explored the relation between telecoms spending and household spending along three main avenues:

- A new analysis of household expenditure from four developing countries (Albania, Mexico, Nepal and South Africa), looking for relationships between communications spending and other variables (Ureta 2005). This is available separately and its key findings are summarised in 2.2.
- A review of the growing body of recent consumer research into use of telecommunications in developing countries, which throws light on perceptions of affordability as well as on amounts spent. This is presented in 2.3.
- A collection of available relevant evidence from published household expenditure surveys. Some figures from around 20 countries at varying levels of development are presented as Annex E.

The conclusions from all three avenues are presented in 2.4, drawing also on other relevant sources.

2.2 New analysis of four household expenditure surveys

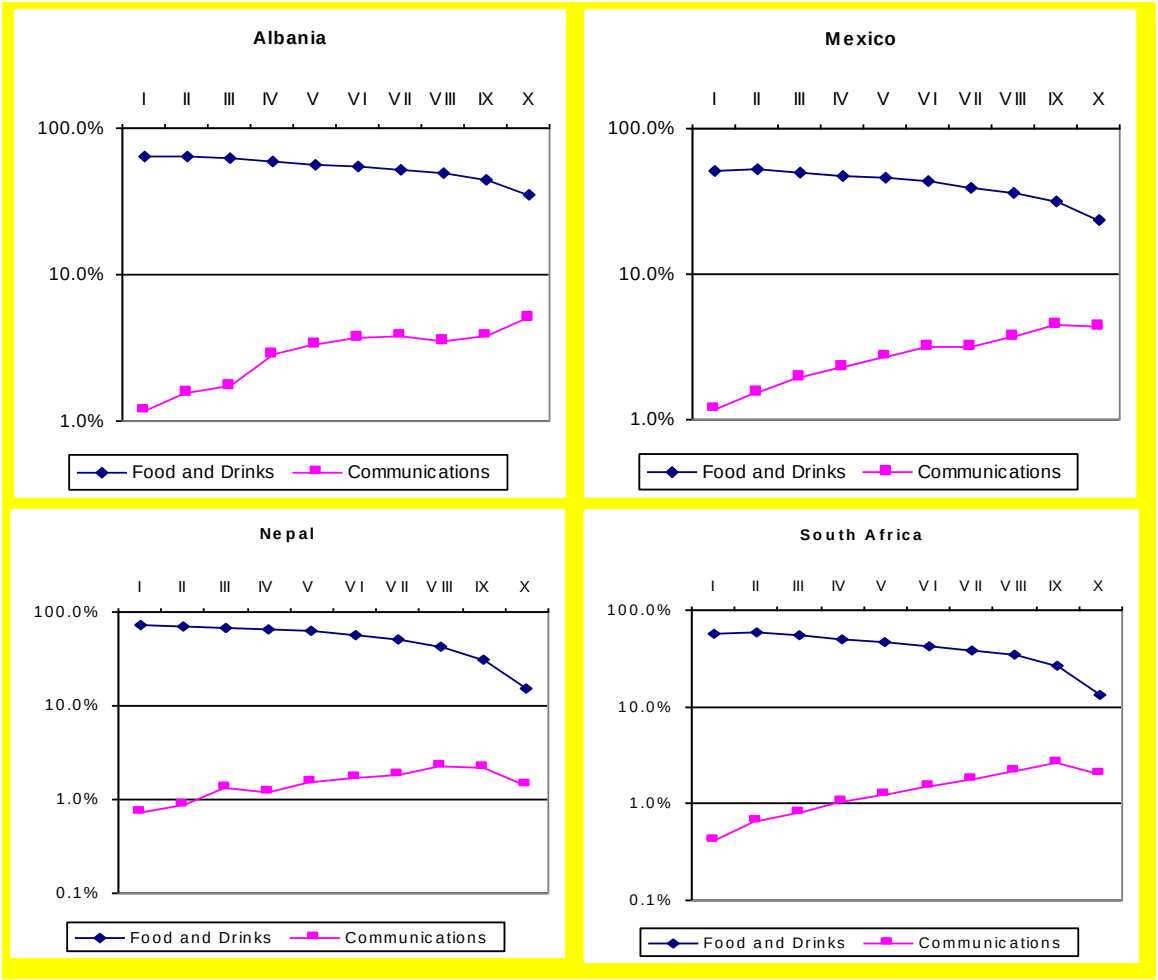
A major part of this study was a special analysis of household communications expenditure patterns in Albania, Mexico, Nepal and South Africa as revealed by existing household surveys[29]. The analysis investigated spending levels against different household characteristics (such as age, gender and level of education of household head, and location), and looked for relationships between communications spending and other categories of spending. A major finding was the very high level of variability in spending at the household level, despite the expected correlations with urban location and level of education.

Certain empirical regularities did however emerge, and these are summarised in Figure 6, Figure 7, and Figure 8. These all show how percentage household spending varies as overall consumption level increases. Thus:

[29] The four countries were chosen by the availability of household survey datasets under 5 years old that enable communications spending to be separately identified, and then for their broad geographic spread.

- Figure 6[30] demonstrates Engel's law about food taking a falling proportion of spending as households become better-off and illustrates how the falling proportion of spending on food is mirrored by a rising proportion of spending on communications (and of course other non-essentials).
- Figure 7 shows the contrast between the common pattern of household spending in our four study countries and that in selected developed countries.
- Figure 8 presents a hypothetical synthesis of these patterns, taken over a larger group of income levels than is represented in any one country (note that the numbers on the left-hand scale here are purely indicative).

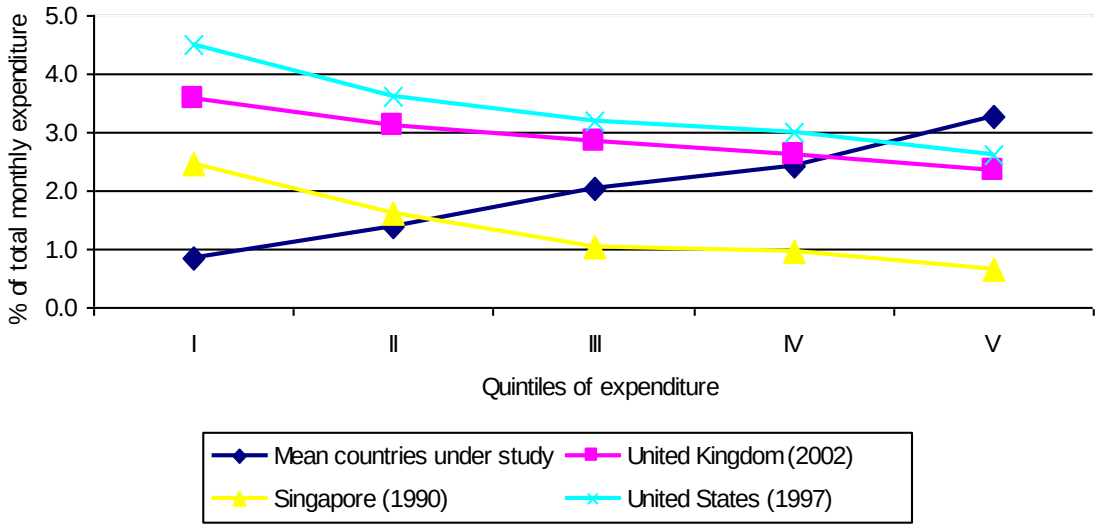
It is tempting to speculate that the downturn in percentage household spending that we see in the top decile for Nepal and South Africa in Figure 6 may be a turning point such as the one shown in Figure 8. However, it could also result from the particularly varied spending patterns of the top deciles in these countries, or simply from data problems. More investigation would be needed in order to find out.



Source: Study construction (Sebastian Ureta)

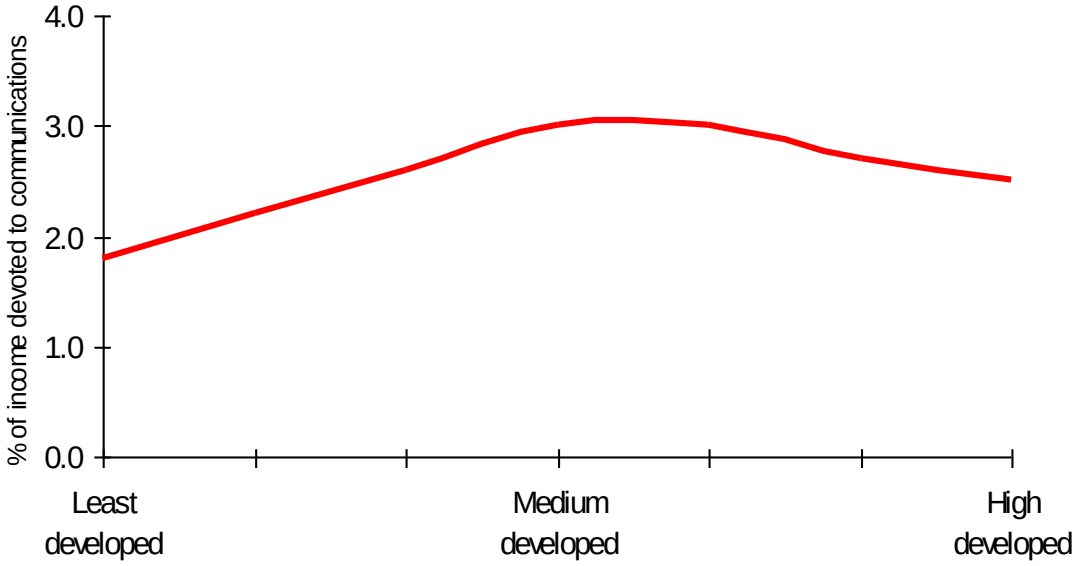
Figure 6 Spending on communications and food in four developing countries

[30] Note the logarithmic scale in these graphs. The Roman numerals across each graph are deciles of total household expenditure.



Source: Study construction (Sebastian Ureta)

Figure 7 Spending on communications in developed and developing countries



Source: Study construction (Sebastian Ureta)

Figure 8 Possible synthesis of communications spending patterns

2.3 Consumer research

In this section we look at findings of various demand surveys, with particular reference to user perceptions of affordability and percentage of income spent. Perceptions of affordability are closely related to the quantitative measurement of demand elasticities, which we discuss in 2.5.

The demand surveys available to this study were carried out for a variety of reasons, most commonly to increase understanding of how and why people in developing countries use the

phone, with a view to influencing policy. Each provides a mass of valuable information. Here we can only extract specific items that shed light on our affordability theme; we refer interested readers back to the originals for full contexts[31].

In recent years, telecom and ICT strategy projects supported by the World Bank have often included a demand study component. Typically, the client for such projects is the national ministry or regulator, and the findings are often not made publicly available. For example, demand studies have taken place in the Dominican Republic, Lesotho, Mongolia, Nepal[32], Russia and Uganda.

In parallel, the industry is carrying out its own market research. Even the fact of the research having been done is generally regarded as commercially confidential, let alone its contents. Unusually, Nokia has announced (Nokia 2005b) that it has carried out market research among 1600 users and non-users in each of Argentina, Indonesia, Russia and the Ukraine, and 2000 in India.

The findings of each survey are described together in 2.3.1 (perceptions of affordability) or 2.3.2 (percentage of income spent), with the surveys loosely grouped by these two main themes, depending on which seems more important.

2.3.1 Perceptions of affordability

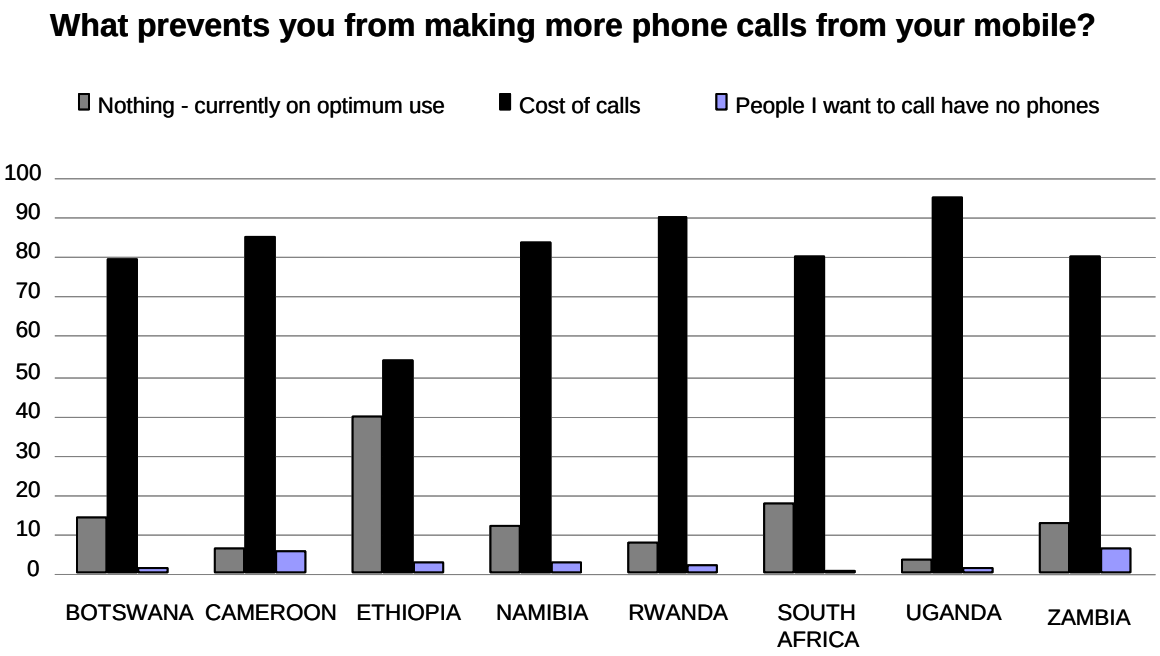
A ZEF survey of Grameenphone users in Bangladesh in 1998 (Bayes et al 1999) showed that 32% of 622 respondents found high rates were a problem (while 66% cited disconnection during calls), and 37% of 265 respondents who suggested solutions asked for lower rates (compared with 34% who asked for improved quality). Richardson et al (2000), also surveying Grameenphone users, found that lower rates were only third priority among phone users (after access to directories and to phone cards), and were not the main obstacle to use for non-users (who, rather, felt they had nobody to call). However, Richardson's users used the phone only for vital purposes, such as securing remittances, and not for social calls.

Chowdhury (2001) interviewed villagers in both Bangladesh and Peru about their public phone service. Only in Peru (where call prices were regulated) were questions asked about respondents' view of these prices. Overall, 42% considered prices too high and 56% considered them reasonable. Interestingly, the main difference of opinion here was not between poor and non-poor respondents, but between villages with and without a public phone – 59% of those with a phone nearby considered prices reasonable; though 20% of these people also cited "costly calls" as a disadvantage of the service, making this rank as the second disadvantage, after "restricted calling hours" (27%).

In contrast, many recent surveys (such as Intelecon's recent Nigerian one (Intelecon 2005), and the LINK Centre's research in 10 African countries (Gillwald et al 2005)) show respondents overwhelmingly claiming that service is affordable; and making purchase decisions based on factors other than price (eg quality or brand name). However, they still typically say they would make more calls if prices were lower, as illustrated in Figure 9 (based on LINK Centre surveys in Africa) and Figure 10 and Figure 11 (based on surveys in South Asia).

[31] In particular, the recent study by Souter et al in Gujarat, Tanzania and Mozambique has produced not only a report of over 400 pages, but also a rich database containing the findings of the more than 2,300 full interviews carried out, which can be used for further analyses. The SARI project in Tamil Nadu (Blattman et al 2002) has also made available the full findings of their over 600 long interviews.

[32] The study in Nepal (by ODC with Antelope Consulting and others) has been carried out in parallel with the current study. Some figures from it are included in Annex E



Source: presentation by Steve Esselaar of early version of Gillwald et al, 2005.

Figure 9 Perceptions of call costs in Africa found by LINK Centre study

World Talk commissioned a survey (Drishtee 2005) of 257 people in three districts in different parts of India to find out how much people would be prepared to pay to access valuable information (which could save them a trip to town) over the phone. Their findings, summarised in Figure 10, suggest strong price sensitivity.

Will use	Definitely	Occasionally	Rarely	Not at all	Total
Rs 10 (23 US¢)	7%	31%	51%	11%	100%
Rs 7 (16 US¢)	21%	41%	32%	7%	100%
Rs 5 (11 US¢)	65%	18%	13%	3%	100%
Rs 4 (9 US¢)	94%	1%	4%	1%	100%

Source: Drishtee 2005

Figure 10 Usage intentions by price for telephone information service in India

The recent study by LIRNEasia of *Telecom use on a shoestring* in India and Sri Lanka[33] included some questions on perceptions of call prices and behaviour change if prices were halved. Figure 11 summarises the answers to these questions across the whole survey (3,199 respondents). The respondents were chosen to have incomes below approximately US$100 a month and to have used the phone within the previous 3 months. “Prices high” includes those responding that prices were high, very high or extremely high. The headings “Would (not) change” refer to answers to a question about their calling if prices were halved. “Would change” includes all those saying their calling would increase.

We see that although a majority claim that fixed phones and public access phones (which include public call offices, public payphones and post offices) are affordable, still a similar

[33] Thanks to LIRNEasia for pre-publication access to their forthcoming findings, which will be available through their website.

proportion would use these phones more if prices were lower. In the case of mobiles, a large majority find that prices are high and 79% would use mobiles more if prices were lower.

	Prices affordable	Would not change	Prices high	Would change
Fixed phone	56%	47%	38%	48%
Mobile phone	23%	20%	73%	79%
Public access phone	59%	42%	39%	57%

Source: LIRNEasia 2006

Figure 11 Cost perceptions and change intentions if price halved in Sri Lanka and India

The main reported finding of the Nokia market research in 5 developing countries is that non-users do not believe they can afford a mobile phone, and are most concerned about the total cost of ownership (handset plus running costs). To some extent their price perceptions are mistaken – often they have not kept up with recent price falls.

2.3.2 Percentage of income spent on communications

Bertolini (2002 and 2004) reports on a demand survey carried out in 1999 among 170 households (120 users and 50 non-users) and other informants in three neighbouring communities in rural Ghana. A screening survey of 410 households was first carried out to find out the proportions of user and non-user households, and 48% proved to be users (defined as using the service at least once a year). The 120 interviewed user households spent on average 5.1% of their total expenditure on telecoms. The percentage that would apply for the whole population (users and non-users) must be lower than this, say between 3% and 4%[34].

Bertolini also reports that 90% of users make calls at attended public call offices (PCO). The one unattended card phone booth in the survey area was used by only 18% of users, even though calls there were much cheaper than PCO rates, because of the large outlay required to buy a phone card and difficulties in getting the cards (also the booth was often out of order).

At this time, supply was constrained and the new WLL operator Capital Telecom was offering lines, but these were seen as 'only for the rich' because both initial payment and monthly rental were very much higher than the Ghana Telecom equivalents.

Blattman and colleagues (2002) surveyed 614 households, 10% of the population, in a rural area of Tamil Nadu in 2001. They report:

> Among all households, total ICT expenditures are 3% of average income, or 8% of household rice expenditures (the latter is a good metric against which to measure the comparative size of media and communications expenditures, since in most households, rice expenditure accounts for nearly one-half of all expenditures). Among ICT consumers (i.e., those households reporting positive expenditures), expenditures were approximately 16% of labor and agricultural income, or 31% of rice expenditures. Thus, ICT expenditures are comparatively large in this region. In general, literacy, occupation, distant family members, phone ownership and the presence of a post office are the most influential variables in determining communication expenditures. A 1% increase in income is associated with a 1.11% rise in phone expenditures. Communications expenditures expand in direct proportion to income, which reveals the importance of such communication for

[34] If total expenditure were evenly distributed among users and non-users, we would estimate this percentage as 48% of 5.1%, or 2.5%. If non-users were all so poor that their expenditure was negligible, the percentage would be 5.1%. The survey also shows that users tend to be better off than non-users, but not overwhelmingly so, which leads to our estimate.

even poor, rural households. Second, while the effects on usage of literacy (+21%) and family members away (+17%) are still strong, caste is now also a moderate determinant of phone usage (+7%) and expenditures.

Souter et al (2005) provides the figures in Figure 12 for expenditure on telephony as a percentage of total income. The researchers point out that these figures are indicative only, for reasons such as the difficulty which low-income households have in identifying income; seasonal variations in income; and variations in sample composition.

	India (Gujarat)	Mozambique	Tanzania
Lowest income	5.6%	4.2%	13.9%
Low income	5.2%	2.8%	9.5%
Medium income	5.3%	2.1%	7.1%
Higher income	4.3%	1.0%	5.7%

Source: Souter et al 2005

Figure 12 Spending on telephony as a percentage of income in three countries

Maja Micevska writing in Torero and von Braun (2006) analyses household survey data collected in 2000 from Laos, Bangladesh and Peru. The patterns of spending on telecommunications are consistent with those found by this study (see 2.2) – that is, highly variable at the individual level, but with share of total spending on average rising with income until a certain level of prosperity is reached.

The Vodafone survey in South Africa (Samuel et al 2005) found 134 mobile phone users who were prepared to estimate their income and mobile phone expenditure. On average they reported spending 10% to 15% of income. However, the researchers say these figures should be treated with caution because respondents did not generally say that mobiles were among their top three expenditure items, which are known to be food (around 50% of income), and fuel and housing (each 7% to 8%).

Intelecon (2005) have recently carried out a large national demand survey in Nigeria, including 5,616 household interviews in 24 states. This leads to an estimate that overall, rural Nigerians will spend 8% of their income on telecoms. 92% are reported to believe that phone services are affordable and a majority to favour improved quality over lower price (rural and lower income people are *slightly* less concerned about quality – 30% favour lower prices, compared with 20% of urban respondents). 94% would like a mobile handset of their own but only 75% could afford 5,000 Naira (US$40) for a used handset and only 70% would budget more than 500 Naira (US$4) a month for its use, even though there is apparently a willingness to spend more on public phones.

2.4 Findings about patterns of spending

2.4.1 Spending by low income groups

Most of the findings of these investigations are mutually supportive, but there is one area of apparent conflict. It is hard to reconcile the findings of the household survey analysis, which shows the lowest income groups spending very little (whether absolutely or proportionately) on communications, with the findings of several recent specific surveys of telecoms demand which show a willingness to spend amounts in the region of 10% of income, even on the part of the lowest income groups. As income elasticities for telecoms in developing countries are generally agreed to be greater than 1, the proportion spent by upper income groups should be higher still.

Possible explanations include:

- Under-representation of the very poorest groups in the telecom demand surveys, possibly by design (as they may have little to say about telecoms), or through respondent self-withdrawal or interviewer bias.

- Over-statements in telecoms demand surveys of amounts being spent, or aspirations to spend not being borne out in reality. The household expenditure surveys are less prone to over-estimation of communications spending, since they give no special prominence to this over other types of spending.
- Differences over what should be included in a measurement of income, and varying accuracy in achieving this[35]. In general the household expenditure surveys are better placed than the demand surveys to estimate income accurately, as they can (for example) allow for in-kind consumption and imputed rent.
- The household expenditure surveys are less recent than some of the demand surveys, and growth in cellular use is not yet reflected in them. The next round of surveys may more closely match the recent telecom demand surveys. Because of the volume of processing involved, there is often a year or more between these surveys and their publication.
- Interview techniques also affect answers. For example, in a Peruvian study (Gonzalez 2004), closed questions[36] about whether respondents would subscribe to service at certain prices led to results around 4 percentage points (or 15%) higher than open questions.
- At the same time as saying that service is affordable, many respondents say that they would make more calls if prices were lower. In other words, while the initial barrier of making any use of the service has been broken, price remains a significant inhibitor of use.
- Similarly, a preference for improved quality over decreased prices may point to poor service quality as much as to satisfaction with prices. Improved quality can also save money – failed call attempts, dropped calls and low transmission quality all cost money as well as causing nuisance.

Of course, precisely because the poorest groups (say, the lowest quintile or two) have such low incomes, even the highest estimates of their total communications spending account for only a small proportion of the total market, especially in very unequal societies[37]. Similar total market estimates can be reached using quite different estimates of the spending of these groups.

Even if their own current spending is negligible, however, these people may still be of commercial interest. If they have access to a phone, they may well receive many more calls or messages than they send; and their future usage may be much larger than their current usage. Apart from commercial interest, some regulatory authorities may be required to take account of the communications needs of all, including the lowest income groups.

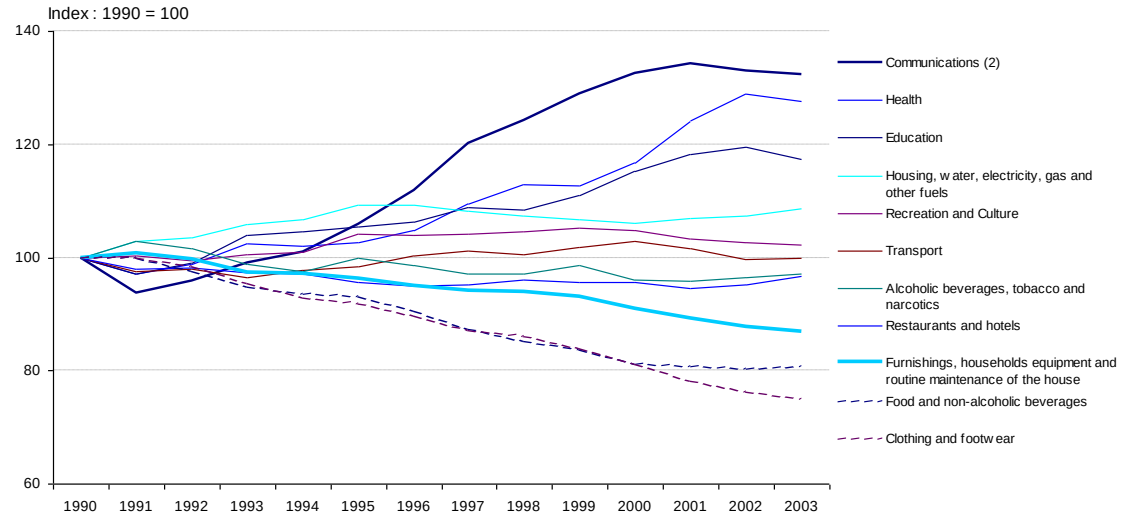
2.4.2 Rise in importance of communications spending

The OECD has published evidence of a significant long-term rise in importance of communications spending by households relative to other types of spending in its member countries. This is shown in Figure 13.

[35] Intelecon's Nigerian study aims to correct for this factor but still comes up with very high percentages of income.

[36] Closed questions permit only a limited range of answers (typically yes, no, don't know). Open questions permit the respondent to express himself or herself more freely.

[37] In a country with a high Gini index of 0.6, the poorer 50% of the population account for only 18% of the spending – the same proportion that is spent by the lowest 25% in a country with a low Gini index of 0.2.



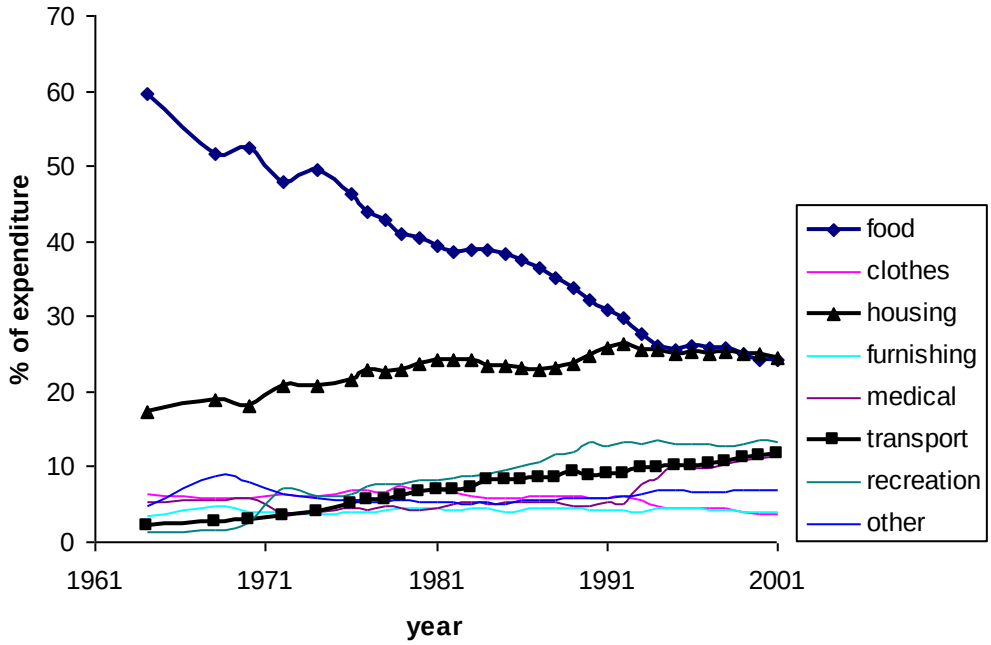
Source: OECD Communications Outlook 2005 Figure 2.2

Figure 13 Rising importance of communications spending in OECD countries

Information like that for OECD countries is not generally available for developing countries. It is only recently that household surveys in developing countries have started to identify communications as a separate category – previously it was often aggregated with transport, and sometimes with housing and/or utility spending. However, the evidence available to this study suggests that there may be a similar trend in countries at all levels of development:

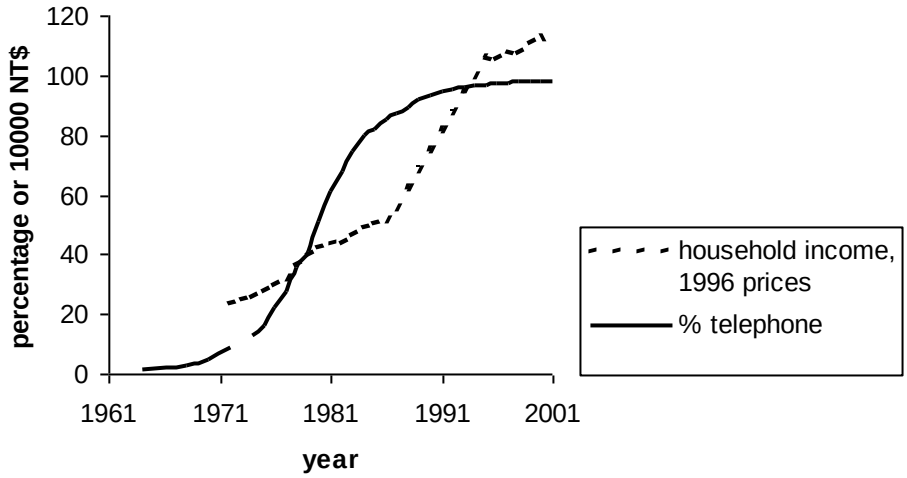
- Figure 14 shows changes in the composition of household spending in Taiwan over a 40-year period during which it moved from developing to developed status. Here, the 'transport' spending category includes communications and has risen in importance.
- Figure 15 shows how household telephone penetration has grown following a classic S-curve, from 1.5% in 1964 to 98% in 2001. It is clear that the proportion of household budget devoted to communications spending must also have risen significantly during this critical transition phase.
- Other studies of international regularities in household consumption spending, notably by Selvanathan and Selvanathan, show similar patterns in developing countries. For example, their work in Sri Lanka (2003) shows that the 'transport' category rose from 6% of household spending in 1975 to 15% in 1995. In South Africa (2004) they find a less marked rise, from 12% in 1965 to 18% in 1995.
- In our data annex, wherever we have comparable data from two periods for any country they show a rising trend. For example, the data from Chile show a rise from 1.4% to 2.9% in overall percentage spent on telecoms between 1987 and 1997, those from Lithuania an increase from 1% in 1996 to 2.7% in 1999, and the data from Bulgaria a rise from 0.9% in 1992 to 1.5% in 1998 (alongside an increase in teledensity from 27% to 32%).

We hypothesise that communications is rising everywhere as a percentage of household spending. Furthermore, we hypothesise that communications is rising as a percentage of household spending for all income groups. For lower income groups in developing countries, this increase is driven by new take-up of telephony. For higher income groups in developed countries, the increase is driven by new higher value applications. For intermediate income groups (those with higher incomes in developing countries and lower incomes in developed countries), price rebalancing and rising usage are also relevant factors.



Source: own analysis of figures in report on Survey of Family Income and Expenditure, 2001, Directorate-General of Budget, Accounting and Statistics, 2002

Figure 14 Long-term changes in composition of household spending in Taiwan



Source: own analysis of figures in report on Survey of Family Income and Expenditure, 2001, Directorate-General of Budget, Accounting and Statistics, 2002

Figure 15 Long-term changes in household income and telephone penetration in Taiwan

2.4.3 From luxury to necessity

We observe the following apparent empirical regularities in patterns of spending by income/expenditure quintile:

- In industrialised countries, communications has the characteristics of a necessity (income elasticity less than 1) – the proportion of household spending devoted to communications decreases as total spending increases (although absolute spending increases).

- In developing countries, communications has the characteristics of a luxury (income elasticity greater than 1) – the proportion of household spending devoted to communications increases as total spending increases.
- Our data in Annex E also include a few examples of middle-income countries with fairly even spending patterns across income groups (Hungary 1997, Lithuania 2000, Cyprus 1980-1).

The time and manner of transition between luxury and necessity states is unclear. The Selvanathans' (1994) study of transport and communications spending in Australia and the UK between 1960 and 1986 shows that during that period, communications was still a luxury in the UK but had already become a necessity in Australia. Later UK data (examples are given in the data annex) shows that by the 1990s communications was a necessity in the UK.

Tying this together with the previous section suggests that:

- In developing countries, rising communications spending reflects the increasing availability of telecoms, its luxury status and rising prosperity (and in some cases, typically former communist countries, overall rising prices).
- The continuing rise in spending in industrialised countries, in spite of falling prices and comms having attained necessity status, reflects increasingly pervasive use (especially of internet) and increasing substitution from other spending types, such as transport and entertainment.
- With rapid industry development, we may expect these industrialised country trends to be followed also in developing countries. There is anecdotal evidence of middle-income people in these countries struggling to pay for using their mobile phones, which for them have become "an essential luxury" or "an expensive necessity".

2.4.4 Transport substitution

The level of substitution from other sources remains unclear and deserves further study, especially as new and increased spending on communications by low income groups is often linked to supposed savings in other areas, especially transport. For example:

- The Vodafone study (Samuel et al 2005) of mobile phone users in Tanzania and South Africa found 50% to 70% of respondents claiming that their mobiles led to large savings in travel time and/or cost. Only 10% of small businesses in Egypt identified such benefits, however.
- Sebastian Ureta's analysis of spending in four developing countries for this study found no clear relationships between spending on communications and spending on transport or ICTs.
- Bertolini[38] also surveyed the relevant literature, and attempted to identify travel substitution benefits in his own Ghana survey. The results of both exercises were inconclusive.
- The Selvanathans' (1994) study of transport and communications in Australia and the UK between 1960 and 1986 found positive pairwise substitutability of different sizes between public transport, private transport and communications.
- Souter et al (2005) in Gujarat, Mozambique and Tanzania found some travel substitution, but also some additional spending. Asking respondents whether they were travelling much less, less, no change, more or much more in the last two years (and weighting the proportions answering accordingly with scores –2, -1, 0, 1 and 2) led to mean scores of –

[38] Bertolini (2002) section 2.3.2.2, ICTs and transportation; section 5.2, Benefits from space and time bridging

0.7 for Gujarat, -0.2 for Mozambique and –0.3 for Tanzania – which indicate some overall saving. (These effects were not explicitly linked to using telephony but were on balance attributed to it).

In developed countries, travel resulting from the use of ICTs has often been found to be as great as travel saved by ICTs[39]. There is no reason to expect the picture in developing countries to be simpler.

2.4.5 Conclusions

Our overall conclusions from this area of study are:

- The percentage of household spending devoted to communications is very variable, not only at the household level but also by social group and by country. It is also generally rising. The figures shown in this study may be indicative, but ideally each country should survey its own situation (and companies considering entering new markets would be well advised not to rely on global averages for forecasting purposes).
- There is particular uncertainty over the spending patterns of low income groups. Very low percentages found in some household expenditure surveys may well be obsolete. On the other hand, very high percentages found by some recent telecom demand surveys may well be biased towards higher telephone users and not apply uniformly across the groups in question. Although some households spend heavily at public telephones, higher spending levels are strongly related to phone ownership and may point to shared use by more than one household. Phone-owning households may be compensated for the use of their phone by people from non-owning households through forms of barter, which would rarely show up in surveys[40].

2.5 Elasticities of demand

Along with understanding current spending patterns and their relation to income (which may be described partly in terms of income elasticity of demand), a feel for the price elasticity of demand is important in designing tariff packages to meet specific objectives.

2.5.1 Lack of evidence relating to developing countries

Little information has been publicly available on demand elasticities in developing countries. Infodev's 2000 *Telecommunications Regulation Handbook*, for example, reproduces data from studies in developed countries and cautions against assuming that they will apply to developing countries. The GSMA report *Tax and the Digital Divide*, which includes some elasticity estimates for developing countries, says that its findings are consistent with previous work; however, the results referred to are again all from developed countries[41].

At one time, telephone users in developing countries were confined to business and elite classes, whose attitudes and behaviour were often similar to those of their counterparts in any other country. Wheatley's (1998) account of the situation in an African country in the 1980s is an example, with elasticities similar to those found elsewhere. But once phone take-up and use in a developing country exceeds 10% or 20%, we are breaking new ground -

[39] See for example http://www.globaltelematics.com/ for a North American view and http://www.flexibility.co.uk for a European one.

[40] Goodman (2005), when discussing the impact of mobile phones on social capital, refers to the 'network of reciprocity' associated with phone owners allowing non-owners to use their phones.

[41] The reference is to a study by Frontier Economics for Vodafone in the context of the New Zealand Commerce Commission's consideration of the allocation of the cost of the Telecommunications Service Obligation (TSO), Review of the price elasticities of demand for fixed line and mobile telecommunications services, August 2003. This paper includes 30 pages of tabulated findings of elasticity studies since 1980, and a 3-page bibliography.

users come from a wide spread of backgrounds, and plainly differences from established practice must be expected.

There have even been suggestions of positive price elasticity in developing countries because following conditions of constrained supply, the availability of telephone service is likely to lead to an increase in take-up, even if it is accompanied by price rises. While there is a causal link, in that the higher price generates funds for investment which permit service to be available, from a demand viewpoint this seems a misleading interpretation. If supply permitted, demand would be even greater with lower prices[42].

2.5.2 Relevant formal studies

There is now a growing body of evidence on price elasticity of demand in developing countries, from both formal studies and other sources. We now review this.

Estimates of elasticities are derived by applying a variety of econometric techniques to a collection of data on price and quantity. The data may be international (typically, a few country-level data points from each of some tens of countries) or national (based on household or individual surveys). Naturally, national studies with sizeable samples give very much more reliable and applicable estimates than international studies. The latter mainly indicate orders of magnitude and directions of change.

International data

The recent Vodafone study based on international data (Coyle 2005) recognises that "estimates of the price elasticity of demand are typically quite high, which implies that high call charges could inhibit mobile penetration and usage in some developing countries…Waverman et al (2005) in this report also confirm that price and income elasticities of demand are high". The own-price-elasticity for mobile phones quoted in the Waverman report is –1.5 at 8% mobile penetration, the average level for developing countries[43]. This figure is repeated in the GSMA tax report, alongside the estimates used in its own model (derived independently from international data by Frontier Economics) of 0.50 for elasticity of mobile penetration with respect to variable costs, 0.54 and 0.76 for elasticity of mobile minutes with respect to price per minute for post-paid and pre-paid customers respectively, and 1.04 for elasticity of legitimate handset sales with respect to the price of legitimate handsets[44].

In 1998 Jeffery Wheatley estimated a price elasticity for basic service for developing countries of –0.66 (standard error 0.15). His method was a second-order regression, against a basic basket price, of the residuals of a first-order regression of penetration against GDP per capita for 40 developing countries for which ITU data were available[45].

Lurdes Martins (2003) analysed 1980 and 1985 data for 74 countries, both developed and developing, and found price elasticities for telecoms significantly greater in developing countries than in developed countries.

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[42] A true positive price elasticity of demand is associated with high status goods sold into affluent markets (caviar, designer clothing etc). While having a phone line, and especially a mobile phone, has some cachet, the service itself is not in this high status category. (Mobile phone handsets and other electronic gadgets may be).

[43] Interpreting this analysis is complicated, as the authors have used a transformed version of mobile penetration, and used revenue per mobile subscriber as a proxy for price.

[44] The authors include several caveats, and advise particular caution in relation to this last estimate because of the small sample size.

[45] This previously unpublished work, which includes useful tutorial material as well as a review of demand elasticities published before 1998, is being made available as an additional element of the current study.

National data

Nokia (2005c) states that price elasticities in low-income markets are high, as part of its argument for the profitability of reducing total cost of ownership. The research and analysis on which this claim is founded remain unpublished.

Torero, Chowdhury, and Galdo (2002) show willingness-to-pay higher than current tariffs based on surveys in both Peru and Bangladesh, and conclude that subsidies may be unnecessary for rural operators. However, like the Village Phone Replication Manual (Grameen Technology Center 2005), which makes a similar point, this analysis does not address the total volume of calls which consumers will wish to make at this tariff. Rather, survey respondents are asked how much they would be willing to pay for a single call. Replies should therefore reflect valuations given respondents' current usage levels - in the case of non-users, the value of their first call, which could of course be very high.

Two national demand studies made available by the Colombian regulator (CRT 2005) include several price elasticity estimates, including some for mobile service which are less than –1 (and gives the range –0.9 to –2.0 for fixed-to-mobile calls). Fieldwork included 1759 interviews.

The Peruvian regulator Osiptel has also made available national studies of demand for both fixed and mobile telecoms among lower income groups (Gonzalez 2004). The report includes a range of empirically derived elasticity estimates (based on 1604 household interviews) and comments that the elasticities found are far higher than those generally reported in the literature, and often well above 1 in absolute value, especially at higher price levels. It finds that industry revenues would be maximised by charging fixed line rentals below those actually charged, and recommends special social tariffs or shared lines for increasing penetration. See also Box 1.

Peru's mobile handset prices are the most significant factor holding back the expansion of mobile telephony, Osiptel President Edwin San Román said. Osiptel came to this conclusion after conducting a survey among low-income inhabitants in Lima and five other regions. "We found that one of the barriers for new mobile users is the handset cost. If the prices could be reduced to 30 soles (US$ 10), we could see a larger number of new users," San Román said.

He also pointed out that handset makers have announced new products with prices as low as 100 soles, and operators' subsidy policies should help to reduce this by as much as 50%. The survey also determined that if fixed-line providers could devise a flat rate plan for 25 soles, they could have close to one million new users. San Román also hinted that the market might be able to support five or more mobile operators.

Source: Business News Americas (via Intelecon regulatory news service) 30 March 2005

Box 1 Peru: Handset prices slowing mobile subscriber growth

Intelecon's Nigeria study (2005) came up with a price elasticity of demand of –0.93.

Other evidence

Some of the user studies discussed above (for example the World Talk study discussed in section 2.3.1), while not permitting formal elasticity estimates, are strongly indicative of high price sensitivity and likely high price elasticity.

Anecdotal material supplements the few published formal elasticity studies. For example, we hear that for CMHK in 2004 in Hong Kong, a 27% average revenue per minute decrease led to a 49% increase in minutes of use; and when Celtel reduced tariffs between Kinshasa and Brazzaville by one third, traffic increased tenfold. Rao and Kumar (2000) relate how fixed line tariff reductions led to monthly revenues increasing by a factor of 2.6 between September 1999 and August 2000 at Parvathagiri Exchange in Andhra Pradesh.

Price elasticity may relate to outlay at one time as well as to price per unit of use. The MOCCA report (2005) and other sources including August Kowero (personal communication) and Smith (2004), all highlight how phonecards or phonecalls can substitute for other discretionary spending (for example on beer) once the denominations are low enough.

2.5.3 Conclusions

Common sense suggests, and all the evidence supports the view, that the lower incomes prevalent in developing countries lead to greater price sensitivity and higher (that is, more negative) price elasticities of demand, at least once penetration starts to reach lower income groups. Numerical estimates of elasticities vary widely, both because of real differences among the populations studied and their circumstances, and because of methodological differences.

Overall, the significance of these findings is that price cuts may be rewarding to operators in terms of revenue and even profits, as well as to consumers. Certainly, regulators considering price levels need to be aware of elasticity effects.

We offer the following hypothesis, which is consistent with the evidence reviewed for this study.

When phone service is first available in a village, people of all income levels are willing to pay call prices measured in US dollars rather than cents. This is because the phone can save lives in emergencies, and can save money, for example on bus fares to town. Even people who live on a dollar a day will borrow, if they must, to make such calls. But the number of calls that fall into these 'essential' and 'money saving' categories is limited. This means that in the early days of call price reductions, roughly the same number of calls will be made, and overall revenues will fall – in other words, price elasticity of demand is low.

With much cheaper service, however, a new range of applications for phone calls is likely to develop, including relationship maintenance, simple convenience and even (especially for young people) fun. Once call prices come within the range of daily spending money for lowest quartile households (typically, US 10 cents or below for an entire call or message), and, importantly, payment mechanisms permit such spending to take place as and when people have those few cents in hand, usage volumes will greatly multiply. Price elasticity of demand will rise rapidly towards 1 (reflecting a fixed budget allowance for making calls) and may even exceed 1 for a period, as a proportion of the market that has some discretionary spending money chooses to divert it from small non-essentials (such as sweets or cigarettes) to phone calls.

2.6 Affordability of internet

As stated above, internet is not the prime focus of this study. The study by Souter et al (2005) shows that internet is very much a minority interest in the rural communities studied in three low-income countries. Attempts to provide affordable internet access in developing nations have often proved unsustainable through lack of demand – for example, Galperin (2005) tells of this in Argentina and Benjamin (2001) in South Africa. We can however glance at the situation in Europe.

In Macedonia 89% of households do not have home internet access. When asked why not, the following percentage responses were obtained.

Reason for not having internet access	%
Have access elsewhere	15%
Don't want	9%
Equipment too expensive	63%
Access too expensive	55%
Lack skills	22%
Language problems	12%
Other reason (including unsuitable content)	10%

Source: Pilot survey on usage of information and communication technologies carried out in 2004 by the Republic of Macedonia State Statistical Office (496, May 2005)

Figure 16 Reasons for not having home internet access in Macedonia, 2004

We may compare these responses with those below for the 61% of EU15 households without internet access.

Reason for not having internet access	%	Maximum %	Mininimum %
No PC or means of connecting at home	41%	48% (France)	17% (Netherlands)
Household is not familiar with Internet	31%	41% (Greece)	14% (Netherlands)
Concerned about the cost	17%	23% (Portugal, Germany)	5% (Netherlands)
Have access elsewhere	9%	17% (Sweden)	5% (Netherlands, Luxembourg)
Plan to get in next 6 months	9%	33% (Netherlands)	5% (Portugal)
Concerned about unsuitable content	3%		
Other reason	5%		

Source: EU Telecoms Services Indicators 2004, Ipsos

Figure 17 Reasons for not having home internet access in EU15, 2004

It is clear that financial barriers remain serious in the less affluent environment, even if in more affluent environments other barriers such as unfamiliarity now loom larger.

3 Tools for improving affordability

This section looks at ways in which service providers can improve affordability, whether they offer fixed telephony (3.5) or mobile telephony (3.1, 3.2 and 3.3). It also discusses ways in which users themselves save cost (3.4) and at how shared service (whether fixed or mobile) can help (3.6).

In the old world of fixed telephony, there has been a concern that special 'affordable' tariffs designed to benefit restricted groups would also attract others ('free-riders'), leading to unnecessary total cost. Two main approaches have been used to counter this: limiting eligibility for the tariffs (for example, to people in receipt of certain benefits) and limiting the amount of usage which is possible at the special tariff. Both are illustrated by the Bulgarian example shown in Box 7 in section 3.5.2.

In the mobile world, all that has changed. More accurately, we are speaking of the world of software-based service provision, of which modern mobile systems are the best current example. The variety of basic and value-added features that these systems permit is endless. One important development for affordability that we discuss in detail in 3.2 is micro-prepay, and some other innovative services are illustrated in 3.3.

These features provide great scope for designing affordable service packages whose take-up will be self-limiting because they are only attractive to a well-defined target market. For example, special rates could be available only through individually prepaid over-the-air e-refills, and accounts using them could be unable to take advantage of certain high-value content offers. The lifetime value of customers for the affordable packages can be maximised by upgrade offers. Going further, Chen and Pau (2004) foresee how affordable telecoms could be brought about in China by individual tariffs in a community context, using technology which already exists.

3.1 Mobile

The "mobile explosion" of the past decade is well known; in 2002 world mobile connections overtook fixed lines, and they are likely to stay ahead for the indefinite future. What is less publicised is that the rate of mobile growth has been slowing down. Markets in rich countries are reaching saturation (sometimes with more than 100 mobile connections per 100 people). In many poorer countries, however, large populations still remain eager for service, but affordability is now constraining take-up.

Over the past two years, partly in connection with the WSIS process, different stakeholder groups have been putting forward various points of view on the situation. For example:

- The GSM Association (GSMA), as the premier trade body for cellular operators worldwide, has commissioned and sponsored a considerable body of work[46] leading to results such as:
  1. Three Ovum studies on the economic benefits of mobile services (in the EU, India and Latin America)
  2. The report *Tax and the digital divide*, advocating lower levels of taxation on mobile handsets and services in developing countries, in the interests of increased take-up of mobile and increased economic growth.
  3. The Emerging Markets Low Cost Handset Initiative, which is leading to supplies of new mobile handsets at ever lower price points – a basic Motorola model will be available in early 2006 at a wholesale price of under US$30.

[46] All GSMA material referred to is available on its website at www.gsmworld.com

4. A set of 'ten key lessons' on how GSMA members feel mobile should be regulated. These are reproduced as Annex D, together with comments from this study aimed at complementing the lessons from a public interest viewpoint.

- Vodafone has published its report *Africa: the impact of mobile phones*[47] and continues to sponsor research on related themes. The overall message is that the impact of mobile is highly positive for all social segments as well as for economies as a whole.
- Mobile equipment suppliers are also spreading the word that technological advance is making it possible for cellular service to be provided profitably almost anywhere, even in remote and poor rural areas of developing countries. This study has focused on materials provided by Nokia, which has carried out quite large-scale market research, but recent publications by Ericsson and Alcatel carry similar messages (see below).
- Investment analysts continue to recommend many cellular companies in emerging markets as exciting growth stocks. They recognise the companies' expansion into lower income market segments as both necessary and probably rewarding, with lower ARPU[48] not necessarily meaning lower margins. They also warn, however, of the dangers posed to investors by 'irrational competition' (which typically occurs if a player steps out of line on pricing).

Because it usefully sums up many points of relevance to this study, we quote at length from a Nokia study summary before going on to consider prices and costs of mobile service.

3.1.1 Affordability Line

A study in 2004 by Nokia called *Affordability Line* investigated the factors affecting mobile penetration rates in emerging markets. The published summary of the Nokia study is largely reproduced below[49].

> Thirty-seven middle and lower income nations were researched from Latin America, Asia, Eastern Europe, the Middle East and Africa. Possible barriers looked at that might affect mobile penetration rates included the income levels, the availability of credit, tax and duty levels, call and sms tariff rates, prepaid refill affordability and ease of access, interconnection costs, the availability of calling party pay schemes, population coverage, regulations and the state of market liberalization.
>
> The research found that approximately 80% of the differences in penetration rate could be attributed to differences in average personal income levels between countries. This is intuitively clear; the more purchasing power individuals have, the more likely they are to have the possibility of the entering the mobile telecommunications market as consumers.
>
> The study then factored out the effect of differences in average personal income levels between nations. The findings of the study suggest that countries irrespective of income can enjoy higher mobile penetration if barriers are lowered.
>
> Clear regional differences emerged from the study. The East and South-East Asian region showed the highest penetration rates in relation to private consumption levels per head, followed by the CIS/ Eastern Europe, Latin America and the MENA region. Sub Saharan Africa and South Asia showed the lowest penetration rates in relation to private consumption per head.
>
> Within each region, certain "star performer" countries showed much higher penetration rates in relation to private consumption levels per head than the average for the region, showing that regional differences may be resolved by the introduction of telecommunications friendly policies.

[47] Referred to in this report in sections 2.3.2, 2.4.4, 2.5.2, and 3.1.2. Vodafone has also kindly supplied to this study an outline of its mobile microfinance project in Kenya and Tanzania, undertaken with DFID support. It has however proved impossible to meet anyone from Vodafone to discuss their research programme and related activities.

[48] Average Revenue Per User, a much-used conventional measure of company performance.

[49] With slight adaptation, selection and highlighting by this study.

The study then looked at common factors that might link the success of the nations showing the highest penetration rates relative to private consumption per head in each of the regions. The star performers in each region were the Philippines in East & South East Asia, Bolivia in Latin America, Kenya in Sub Saharan Africa, India in South Asia, Ukraine in CIS/Eastern Europe and Morocco in MENA.

The study found that the star performers consistently had lower than average call tariff rates than their region. They also all showed lower than average minimum prepaid refill levels and a higher availability of e-refills than was normal for their region. Star performers all contained an average or greater than average number of network operators. They generally had lower levels of customs duties, lower absolute service tax levels and higher population coverage levels than the regional average. Bolivia, Ukraine and Morocco all allowed higher than average permitted FDI levels, whilst India had greater access levels to calling party pay schemes than its neighbours. The evidence clearly indicates that lower barriers do result in higher mobile penetration rates.

Star performer countries were all found to have proactive policies to support the development of telecommunications. For instance, Kenya has identified ICT as one of the five sectors it hopes will revitalize the economy, whilst India is the only ITA[50] signatory in South Asia.

3.1.2 Mobile prices and costs

The wide variation among countries in mobile prices has attracted a lot of comment. For example, Figure 18 shows a factor of 15 between the lowest and highest prices for the same service basket in different countries[51]. Given that the technology used is very similar, this naturally raises the question of whether some operators are charging too much, because of either inefficiency or excessive profits. Just as naturally, the operators reject suggestions that their prices are too high, pointing to intense competition, difficulties attracting investment and so on. A fully informed view on this important issue requires access to information which only the operators possess, and which they regard as commercially confidential.

There is, however, relevant material in the public domain from which it may be possible to piece together a reasonable view of what mobile service needs to cost. An initial attempt to do this has been made for the current study and is presented in Annex C for discussion. In this section we outline key points from some other relevant sources before presenting our own initial view.

Country	Price	Country	Price	Country	Price	Country	Price
Hong Kong	2.19	Turkey	6.59	Korea	14.06	Peru	22.41
India	2.51	Thailand	6.67	Venezuela	14.37	Brazil	23.52
China	3.67	Canada	7.34	South Africa	14.87	Germany	24.05
Indonesia	3.96	Poland	7.45	Sweden	15.63	Netherlands	24.62
Philippines	4.00	Israel	9.25	Czech Rep	16.66	Belgium	24.96
Taiwan	4.96	Argentina	9.96	Australia	18.34	Austria	26.51
Singapore	5.73	Colombia	10.37	UK	19.08	Japan	28.04
Egypt	5.77	USA	11.77	Chile	19.21	France	30.25
Malaysia	5.81	Hungary	13.76	Denmark	19.86	Switzerland	32.07
Russia	6.36	Italy	14.01	Spain	21.45	Mexico	33.17

Source: ITU 2005b

Figure 18 Price of mobile 'low user' basket in US$ per month, August 2005

[50] ITA: Information Technology Agreement (on reduction of tariff barriers to trade in IT products)

[51] The demonstration tariff comparison tool developed as part of this study also shows wide price discrepancies among different providers within a single country.

GSMA: Tax and the digital divide

The GSMA's taxation study has drawn attention to the benefits of reducing taxation on mobile handsets and services. These benefits are expected to be achieved through higher take-up and use because of lower total cost of ownership (TCO), so one would expect similar benefits from reductions in TCO achieved in other ways. Figure 19 shows the split of TCO among three major components: taxation, handsets and service price, in 19 developing countries as analysed by the GSMA. The GSMA has been able to pay attention to the first two of these, but the third, service price, accounts for more than half of TCO in all but one of these countries.

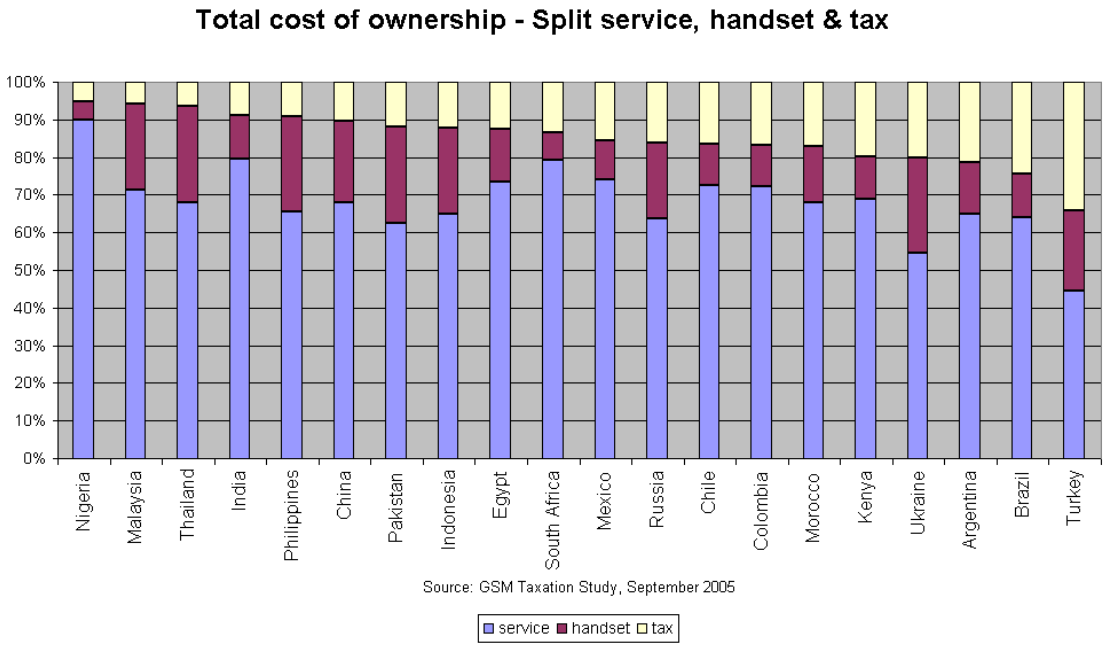

Figure 19 Split of total cost of ownership of mobile phones in 19 developing countries

Nokia: Prerequisites for profitable entry business

Nokia has produced a substantial amount of documentation[52] aimed at helping operators to implement the sort of low-cost service that featured in its Affordability Line study (including over-the-air e-refill and other features targeted at low-income customers). Nokia (2005c), *Prerequisites for profitable entry business*, ties together much of this material and concludes that, while it is perfectly possible to serve customers with an ARPU of €5 a month profitably, ARPU is not the most appropriate measure to use when assessing low-income market segments – rather, absolute profits are more useful (to which every new customer can make a positive contribution). Besides using the lowest-cost network (correctly engineered for the specific situation), ways of lowering cost include e-refill and customer self-care, which contribute to reducing churn (and thereby saving customer acquisition and retention costs) as well as themselves saving cost directly.

Alcatel: Developing sustainable business models for rural network operators

This is the title of a chapter of a report jointly sponsored by Infodev and Alcatel (2005) as part of the WSIS process. Using Mali as a case study, the report presents a profitable GSM business model for areas with population densities down to 3 people per square kilometre,

[52] Mostly available at http://www.nokia.com/A402191

assuming each handset is shared by 3 households and has revenues of US$3 a month (ie US$1 per household). The payback time, at 7 years, is longer than the norm for Africa, but equally the conditions (of a sparse and poor rural population) are unfavourable.

Ericsson (2005) has also contributed its conviction (without published numbers) that GSM can provide a low enough cost solution for everyone, especially with a regulatory requirement for infrastructure sharing in rural areas.

SIDA: Profitable universal service providers

This study by independent consultants Scanbi-Invest (funded by SIDA) looks at investment costs and business models for providing GSM service to rural populations in Tanzania. They conclude that small rural operators would be viable with network sizes from 20,000 subscribers, using franchising, prepaid accounts only, very low priced local calls (based on local switching), and revenues from calls made by people calling from outside the service area or visiting it.

Vodafone: Africa - The impact of mobile phones

There are a few statements about cost in this Vodafone-sponsored collection of papers. None of them refers to data supplied by Vodafone. Waverman et al say that it has been estimated that a mobile network costs 50% less per connection than a fixed network, and that it also benefits from smaller scale economies and greater modularity. Diane Coyle also comments that installation costs are up to six times lower than those for fixed lines in India.

3.1.3 Conclusions

Our brief overview of recent publications strongly suggests that the technology exists to enable mobile service to be provided profitably in rural areas of developing countries – which has to mean at prices which are affordable to many if not most rural residents. If existing operators cannot or choose not to offer low-priced service in rural areas, there is a clear case for offering these opportunities to other companies, including local start-ups with NGO or community support whose primary objective might be service rather than profit. To help with modelling the costs of such opportunities, in Annex C we say how reported costs vary between regions of the world and between network operators and how actual costs are likely to vary according to network use, geography and technology.

The overall level of mobile prices in a country depends on many factors, among which the necessary cost of providing service is not dominant. The single largest factor is probably marketing strategy or “what the market will bear”, in the light of prices offered by fixed and other mobile operators. It is normal for mobile prices to start relatively high at service launch and reduce as better-off market segments are saturated, and as competition intensifies. To a significant extent, operators can choose when and how to address less well-off market segments.

The cost structure of mobile networks suggests that there is considerable scope for operators to sell the use of spare capacity at low prices, to the benefit of low-income users. Low off-peak call prices are familiar in fixed networks and just as applicable in mobile ones. More excitingly, unlike fixed networks, the marginal costs of a connection are close to zero once infrastructure is in place. This means that connections with very low outgoing revenue can be profitable, especially if they generate incoming revenues. Services based on the SMS and USSD systems (such as text and voice messages, customer self-care, and reverse charging) have effectively zero usage cost, so any revenue they generate is pure profit.

This section has been phrased largely in terms of GSM mobile services, because they now account for a large and growing share of telecom connections, especially in the developing world. Two key features of GSM underlie the conclusions relating to affordability – its cost structure, and its software-based service provision. Similar arguments will also apply to other technologies that may share or surpass GSM’s advantages in these two respects, such as

CDMA[53]. They also apply to fixed wireless access using GSM and similar technologies. Hammond and Paul (2006) provide a useful summary of current wireless technology options and costs.

An important disadvantage of GSM from the affordability viewpoint is the way it uses spectrum, which has limited the number of competitors and the amount of competition in many countries. More spectrum-efficient technologies which permit more open competition, and uses of currently vacant frequency bands, hold great promise, but it will take time for them to realise scale economies approaching those which GSM's huge spread has made possible.

3.2 Micro-prepay

Micro-prepay has been mentioned several times already in this report. As it looks like a development that could have as big an impact for lower income groups as prepayment itself, we discuss it in more detail in this section.

Micro-prepay comes in various forms and different terms are in use, which we explain as follows:

- Micro-prepay is the ability to add small amounts of credit to a prepaid account; because physical vouchers and plastic cards cost a significant amount[54] to produce and distribute, micro-prepay usually relies on e-refill (which eliminates vouchers and cards).
- E-refill is the ability to add credit to a prepaid account without using physical vouchers or cards. It may take place in a face-to-face cash[55] transaction with an airtime dealer, or use over-the-air refill (OTAR).
- Over-the-air-refill (OTAR) is the ability to add credit to a prepaid account remotely, using an electronic transaction capability. It relies on the customer having access to another source of electronic credit to draw on, which may be some kind of "bank" account or may be another customer's prepaid mobile account.

Micro-prepay may be made available only through dealers, in which case standard top-up denominations are pre-specified. In its most powerful form, customer-to-customer credit transfers of any size are allowed. The usual customer interface is a special SMS menu; behind this lies software which can now be installed and integrated with an existing GSM system for around US$1.2m.

The pioneer of micro-prepay has been Smart Communications in the Philippines, who describe these services in the 2004 PLDT Annual Report as follows:

> In May 2003, Smart introduced *Smart Load*, an "over-the-air" electronic loading facility designed to make reloading of air time credits more convenient for, and accessible to consumers. These "over-the-air" reloads, which have both voice and text functions, are packaged in smaller denominations of Php30, Php60, Php115 and Php200 (respectively US$0.54, US$1.08, US$2.07, US$3.60), but have shorter validity periods of three days, six days, 12 days and 30 days, respectively. Starting with just 50,000 outlets when it was launched, *Smart Load*'s distribution network now encompasses over 700,000 retail agents, approximately 90% of which are micro businesses. As at December 31, 2004, approximately 97% of *SmartBuddy* subscribers and 93% of *Talk 'N Text* subscribers were

[53] In the bands used by mobile phones, lower frequency spectrum allows better radio propagation and hence fewer base stations, an important economy especially in areas of low revenue density. CDMA has often used 450MHz compared with the 900MHz or 1800 MHz typically used by GSM – see documents from the CDMA Development Group (CDG) at www.cdg.org. In late October 2005 both Nokia and Ericsson announced plans to produce GSM equipment suitable for the 450 MHz band during 2006.

[54] One estimate is an average of 20 US cents per card.

[55] Or, where dealer and customer have a good personal relationship, short-term credit. (See Sharon Smith's case study (Smith 2004)).

using *Smart Load* as their reloading mechanism. In 2004, *Smart Load* has accounted for approximately 71% of sales derived from reloads.

In December 2003, Smart introduced *Pasa Load* (literally meaning "transfer load"), a derivative service of *Smart Load* that allowed for Php10 (18 US¢) load transfers to other *Smart Buddy* and *Talk 'N Text* subscribers. On January 25, 2004, denominations of Php2, Php5 and Php15 (4, 9 and 27 US¢) were added to the *Pasa Load* menu. All *Pasa Load* denominations have a one-day expiry period. We believe that *SmartLoad* and *Pasa Load* encourage subscribers to stay within our cellular network instead of churning and re-subscribing at a later time. *Pasa Load* was also made available to Smart postpaid subscribers beginning April 18, 2004 with identical denominations to those offered to prepaid subscribers. The denominations have a similar one-day load expiry. The sender is billed the amount of the load and a Php1.00 (2 US¢) transaction fee which is added on top of the monthly service fee…. The introduction of *Smart Load* helped mitigate the decline in net ARPU due to a lower dealer discount of 5% applied to over-the-air loading compared to 10% for prepaid cards.

A valuable source for more information on Smart's experience is Sharon Smith's case study (Smith 2004). This also highlights Smart's mobile banking services, the small business opportunities created by the Smart Load distribution system, and the important role of text messages in the Philippine mobile market, where they account for 50% of Smart's revenues from prepaid customers. (The popularity of text messages may depend on, among other factors, high literacy, use of a simple character set such as the Roman alphabet, and manual dexterity).

The varying validity periods associated with low-value reloads or credit transfers are worth noting. Along with varying dealer commissions and credit transfer fees, these provide other dimensions for tailoring packages to target markets.

Other Asian countries where micro-prepay has been introduced include Indonesia, India, and Thailand. Investment analysts (for example, Cititgroup Smith Barney 2005; Morgan Stanley 2005) have reacted enthusiastically to the phenomenon.

Nokia (2004) explains how micro-prepay can increase revenues by enabling people with low cash balances to fit their spending more precisely to their actual limits. It also provides a chart showing mobile penetration versus minimum top-up denomination as a percentage of GDP per capita for 19 developing countries in all continents, with the expected downward slope: low top-up denominations are linked with high penetration, and vice versa. There is anecdotal evidence from various countries of usage increases when top-up denominations have been reduced.

According to Nokia (2005a), although e-refill has started in Asia, its success is not linked to special Asian factors, and it could be equally successful elsewhere, for example in Kenya, where a market study has taken place. However, Deutsche Bank (2005), in considering prospects for micro-prepay in Latin America, conclude that it is at least two years away, because:

- There is not enough spare network capacity to cater for the expanded market that micro-prepay would bring about.
- Subscriber numbers continue to grow steadily without needing a boost from micro-prepay (whereas in Asia, growth was starting to slow down).
- SMS is less popular in Latin America than in Asia, which reduces the attractiveness of micro-prepay (small top-ups can pay for several SMS or a single short voice call), especially as Latin American pre-paid tariffs remain as high as US$1 a minute.
- A Brazilian rule that operators must make universal service contributions based on their subscriber numbers is a disincentive to acquiring low-revenue subscribers; possible regulatory interference with operators' disconnection procedures would be another disincentive.

Other reasons why operators might delay introducing e-refill or micro-prepay include:

- The initial investment could be a problem for a small or cash-strapped operator.
- There could be an adverse reaction from existing prepay voucher distributors.
- High penetration may already have been achieved (but the cost saving of abolishing physical vouchers may still make the move worthwhile).
- Simple lack of interest in on the part of management in serving the market segments to which micro-prepay will appeal.

From the viewpoint of this study, we conclude that:

- Micro-prepay is a powerful and obvious tool for improving affordability.
- For most operators, it is technically and financially easy to deploy – arguments against it are mainly of a commercial nature.
- It will probably arrive in some form in most developing countries within the next few years – it only takes one operator to perceive a benefit from its introduction, and then others in the country will need to follow suit.
- Regulators with a concern for affordability should discuss micro-prepay with their operators, and consider whether any regulatory barriers to its introduction can be lowered. If micro-prepay is not planned, regulators will want to understand why.

3.3 Other mobile innovations

3.3.1 A dynamic market

This section of the toolkit is just a collection of examples of innovative mobile services and tariffs which may be useful for improving affordability. It can be no more than a source of inspiration for a short time, because new developments are always happening, as Box 2 illustrates. A website for sharing such information on a continuing basis would be much more useful.

The variety of tools for affordability of mobile service makes them hard to classify. Below we arrange them under the following headings:

- Reducing initial payments
- Reducing ongoing usage payments
- Control of outgoings
- Service innovations.

The section closes with a look at marketing techniques, including material from a case study carried out for this report of the successful Indian operator Reliance Infocomm.

Tunisia based GSM operator, **Tunisiana** has launched its `Please Call Me' interactive USSD service for pre-paid users. This service enables pre-paid customers lacking credit to send a free SMS message requesting to be called by the recipient, opening previously inaccessible revenue sources for network operators. Named `Otlobni,' which means `Call me' in Arabic, the service has been widely publicized and well received among Tunisiana customers with a reported 200,000 users employing the service within the first week of functionality. In the second week that number doubled to almost 400,000 users.

Gambia's second mobile operator **Africell** has just launched a GSM payphone product called Wahtan (chit-chat in Wolof) in association with Unique Solutions. The first phase has been to give 20 telecentres the payphones which they are offering at US0.03 cents a minute compared with US0.06 cents a minute on a mobile. The rates could become even cheaper in the second phase. The second phase is to roll out more widely to the 1000 telecentres in the country. The third phase is to work with an NGO to give the payphones to unemployed youths who would get 10% of the income taken.

A third operator **Nedjma** (Wataniya Telecom Algerie) started operations in August 2004. Nedjma entered the market with a different positioning - a multimedia operator with aggressive promotions e.g. free minutes at activation, 100 free MMS, free calls during the evenings.
The fast evolving market and the entry of a third operator forced Mobilis and Djezzy (the Orascom brand) to improve their service offerings and cut tariffs. Hence, there was a need to develop new offers and segment the market.
The main action taken by Orascom Telecom was to launch a separate brand under the name of Allo, targeting budget users at low prices; and to position Djezzy as the value brand. Brand Allo now stands at 18% of the total market, exceeding Nedjma in market share. This unique action - which wasn't seen even in the relatively more developed markets in the region, like Egypt or Morocco - helped Orascom to hold on to its lead position overall and reduced the effect of Nedjma's aggressive price war.
Allo was able to acquire share despite very low media spends compared to the other leading telecoms brands. In fact, Orascom's branding strategy has inspired the other two operators to develop their own low-price offers - Mobilight from Mobilis; and Star from Nedjma.
The current price of a Star card, for example, is 400 AD (equivalent to US$ 5.7), compared to a Nedjma card which sold at 2900 AD (equivalent to US$ 42) at launch in September 2004.
As a result, the market climbed to 10 million subscribers by October 2005 - a net increase of 102% over December 2004. The peak growth occurred during the summer period when 2 million lines were sold during two months (July-August) alone, increasing mobile penetration to over 30%.

Source: Balancing Act newsletter, http://www.balancingact-africa.com, Issue 284, 04.12.05

Box 2 Some recent African mobile market developments

3.3.2 Reducing initial payments

Low-priced new phones (now under US$30) are being provided through the GSMA Emerging Market Handset Initiative. Another way of making this initial expense more acceptable is Maroc Telecom's offer of a free phone in return for a commitment to spend 100D (around US$10) a month on airtime for a year.

Microfinance and hire-purchase schemes allow customers to pay for phones by manageable instalments. There are various microfinance initiatives; Grameenphone is a well-known example where the owner pays back an initial loan out of profits from selling phone calls. (These phones, specially designed for robustness and to facilitate resale, are not, however, low-priced). Hire purchase is a traditional way for people with low incomes to acquire durable goods, and it is used for mobile phones in parts of Latin America – with low risk for the lender, as the phone can be disconnected if an instalment is unpaid.

Second-hand and under-the-counter phones also have significant shares of the handset market. The GSMA taxation report[56] estimates "black" markets at 39% of the total handset market for all their study countries, varying regionally from 15% in the Asia-Pacific to 66% in Central and Eastern Europe. Despite recent appeals for more recycling of electronic goods, it

[56] GSMA 2005, Exhibit 11

has been estimated that no more than 5% of discarded handsets from high-income markets find their way to developing country markets, so there is ample room for growing competition between new and used handsets.

Separately available SIM cards, together with (often second-hand) SIM-unlocked phones, are a well-known low cost entry route to mobile subscription. The SIM cards themselves cost little enough to produce that they may be sold just for the nominal value of the initial calling credit they contain (for example, the Ace Card of Telekomsel in Indonesia). As noted below, cost-conscious customers often choose to have more than one SIM card so they can take advantage of the best rates on each; separate SIM cards can also help people to share a handset.

SIM-locking new phones (so that they only work with the initial SIM card) is however a well-known commercial practice, supported by the argument that the dealer needs to recover handset subsidies or other up-front incentives. Full consumer information on SIM-unlocking options is essential.

3.3.3 Reducing ongoing usage payments

Variable call tariffs, for example by time of day or by area, are familiar from traditional fixed network tariff structures but less common in mobile. For example, “local call charges” are being offered to people in certain rural areas by Mobikom-Kavkaz and by Mobinil in Egypt, in recognition of lower incomes in those areas. Lower prices for on-net calls offer another dimension of variability that can be used creatively, whether by operators or by users (see 3.4).

A short charging unit (typically, per second charging) again is not new, but is not yet offered by all mobile operators. It is generally seen as enhancing affordability (even if it is introduced in a revenue-neutral way) because it removes the risk of notching up another whole minute’s charge by speaking for just a little too long.

The subsection closes with an example from Australia in Box 3 of how people can **earn airtime credit by receiving calls.**

In an Australian first, pre-paid mobile customers can earn up to $50 per month in mobile credit just by answering their mobile phone.

Telstra's Head of Consumer Marketing, Ms Jenny Young, said the new offer rewards customers with five cents credit for every full minute someone calls them from any type of phone in Australia. The extra credit of up to $50 per month can be used like any normal recharge credit.*

Called Telstra Pre-Paid Plus Call Credits, the offer means that a pre-paid customer that receives three four-minute calls a day could add up to $18 credit to their account each month. A customer that receives eight four-minute calls a day could add up to $48 credit each month.

For more information about Telstra Pre-Paid Plus Call Credits, phone Telstra on 125 8880 or visit www.telstraprepaidplus.com (06 July 2005)

* The extra credit is transferred to the customers' account each month on their anniversary date, provided they have a positive credit balance on that date. Credits can start being earned after a customer activates the service by making their first call or sending their first text message.

Note: One Australian $ is around US$0.75

Source: Telstra

Box 3 Australian first: Talking on your mobile can now earn you credit

3.3.4 Control of outgoings

Prepaid service itself is no longer an innovation, having been introduced more than a decade ago and already proved immensely successful in relatively low-income markets. As already discussed, from the customer viewpoint it has two main advantages:

- Straightforward sign-up procedures with no need for a credit check or a bank account.
- Easy budgeting, with no possibility of exceeding a known outlay.

It is also advantageous for operators, who save billing and collection costs, and often benefit from paid-for but unused minutes[57].

Some fixed operators have experimented with pre-payment, but it is much less suited to a tariff structure with continuing rental charges than to one where only usage is paid for.

The expiry period of prepaid credit, and the period during which an unused phone (or rather, SIM card) remains live, are important variables. The longer these are, the lower the minimum total cost of ownership becomes and the more light users will be recruited to a system. The shorter the validity of prepaid credit, the more like a rental it becomes. A Jamaican example is shown below. Regulators may or may not want to influence these periods (see the discussion of the Brazilian experience in 4.4).

It is a basic tenet of consumer protection that customers should be clearly told in advance of purchase what these periods are, and of course that they should be accurately adhered to. In addition, regulators will wish to confirm that networks have high enough availability and quality to let credit be used before it expires.

Call price information can be valuable for cost-conscious customers. Most operators allow prepaid customers to check their balance by a free call or SMS. Nokia's *prepaid tracker* service enables the customer to have the price of the last call and the current balance displayed automatically on the handset.

SharedPhone is a South African initiative, also trading in Nigeria. Special phones include SIM cards with menus designed to make it easy for the owner to buy airtime from any supplier and resell it at his own chosen rates. It is marketed as "a business in your pocket".

[57] Sometimes known as the 'mustard effect' (supposedly, mustard manufacturers have made more money from the mustard sold but left unused than from mustard actually consumed).

Digicel Jamaica's top-up options

Please remember that you have 90 days in which to top-up your Digicel Flex account after the expiration of each FLEXcard or FLEX E voucher. If you fail to do this, your account will be deactivated. You will be able to receive calls but will need to top-up in order to make a call. If your account remains dormant for an additional 30 days, your account will automatically be terminated which means you will have to purchase a new SIM card and a new number will be provisioned.

Card Value ($)	Expiration Date
$100.00	21 days after top-up
$200.00	28 days after top-up
$300.00	35 days after top-up
$500.00	42 days after top-up
$1000.00	120 days after top-up
$5000.00	150 days after top-up

Note: Jamaican $100 is approximately US$1

Source: http://www.digiceljamaica.com/products/flextext.php?ref_page=digiflex

Figure 20 Example of varying top-up expiry periods (Digicel Jamaica)

3.3.5 Service innovations

Short Message Service (SMS) is another by now familiar tool which itself can hardly be called an innovation. However, it is providing a route to many other innovative services (for example micro-prepay), as discussed above.

SMS are usually charged for on a flat rate per message basis, regardless of the actual length of the message. The fact that the total cost of the message is known in advance enhances its affordability, in a similar way to prepaid.

The actual level of this flat rate can be extremely low while SMS remains a profitable service. (Each message uses a tiny amount of system capacity compared with even a short voice call). An allowance of free SMS can therefore be a useful promotional extra. Free 'call me' SMS (where any revenues are generated by the return call) are being offered, for example, by Monet in Montenegro and Tunisiana in Tunisia (see Box 2). Maroc Telecom offers free SMS between midnight and 8am.

Higher priced SMS can also be used as a payment mechanism for content or other value-added services. An interesting offer by Smart was fixed-price calls, where 3 or 5 minutes of talk time could be arranged in advance by an SMS charged at 10 or 15 Php (18 or 27 US¢), with an automatic cut-off after that time.

Audio messaging is a new service that will enable people to send spoken messages in a similar way and for a similar cost to SMS text messages. This service has a special appeal for people with low literacy. As with SMS, once received, messages are stored in the handset, so they can be replayed any number of times without charge and even outside mobile coverage. This service is being sold as *BubbleTalk* by Digi in Malaysia at a price of RM0.10 (3 US¢; a normal SMS is charged at RM0.07 or 2 US¢) to send a 30-second message (message retrieval is free).

Mobile payment and banking services, while not in themselves directly enhancing affordability, are important new services that can add considerable value to a mobile phone subscription and help to justify its cost. These are being developed especially in sub-Saharan Africa, where conventional banks and credit cards are scarce. Celpay service in Zambia and Democratic Republic of Congo is a good example. Such services can be used for receiving

remittances from relatives working in other countries, typically at much lower prices than alternative remittance services.

Push-to-talk (GSA 2005) is a new service being developed for groups of friends or colleagues who want to stay permanently "switched on" to each other. Though it will initially be sold as a high-value service in affluent markets, because it does not need simultaneous two-way transmission it will be low cost to provide, and could eventually be sold cheaply in developing countries. However, ultimately voice over IP, with the encoding techniques used by 3G networks, should be at least as cost effective and more convenient.

Limited mobility services, such as those offered by Little Smart in China[58], typically allow mobility only within a home area. The technology is almost identical to that used for full mobile services (and costs of service provision are correspondingly very similar). It is the service restriction that enables the offering to be positioned as a substitute for fixed service, and priced accordingly.

3.3.6 Marketing techniques

Any systematic marketing will start with a **market segmentation**. The MOCCA report (2005) offers the following simple segmentation as a starting point for mobile services in developing countries across all world regions:

- The wealthy few for whom price is not an issue, who want the best available technology.
- The "masses", or the large chunk of the population who are part of the formal economy. This segment can include small office workers or self-employed individuals such as plumbers, taxi drivers, or carpenters. These people will generate a low ARPU and will need a low cost device with low cost airtime.
- People outside the formal economy, in remote areas or the very poor in towns and cities. They will need very low cost solutions and possibly shared usage services.
- The government as a user of mobile and wireless services to reach the citizen.

Plainly, each segment needs quantification in each country, and can itself be further subdivided.

Awareness building activities can also contribute valuably to new take-up. For example, in Uganda a big party celebrates the availability of new coverage. Fixed line companies can of course do similar things – Capital in Ghana keep chiefs and sub-chiefs informed of expansion programmes, and hold awareness festivals to educate customers (Gamos 2003).

Arguably, when coverage arrives in an area, there is a case for an **introductory offer** of voice mail boxes (with associated phone numbers and prepay account facility) at zero rental. The voice mail box owner only needs payphone or shared handset access to collect messages. As soon as these numbers are known to contacts outside the newly covered area, they can start to generate revenues by receiving calls. Electronic credit transfer (eg from relatives in town) could enable new voice mail box owners to make calls without any initial payment. This could be a profitable service in its own right, and continue in place as a very low cost service for the lowest income users. Doubtless many users, having experienced the benefits of telephone communications, would soon get their own handsets.

As part of this study, **a case study** (Varghese 2006) has been carried out of innovative practices by the Indian operator Reliance Infocomm. Figure 21 shows how the Pioneer offer in December 2002 went radically beyond comparable market offerings at the time. Box 4 provides an overview of Reliance Infocomm's cost minimisation, sales and marketing strategies.

[58] This is described in section 3.3.4 of Castells et al 2004.

We conclude this section with Box 5, on 'mobile for life' offers which appeared in India just as this report was being completed. This may be read as an addendum to the Reliance Infocomm case study; as a reminder of the market dynamism mentioned at the start of the section; and as a pointer towards our discussion in chapter 4 of the role of the regulator.

Reliance Infocomm Pioneer Offer (2002)	**Existing GSM mobile offers**
Handset bundled with service	Handsets to be purchased separately
Free Digital Phone	GSM handsets starting from $167
Unlimited free incoming calls	Charged incoming calls
15 second pulse	1 minute pulse
0.8 cents/minute long distance Reliance network calls	Long distance calls charged 20 cents upwards.
Free value added services like voice mail, call wait, call hold, call divert, CLIP, conferencing.	All value added services charged separately
Free text messaging	Text messages charged at 5 cents upwards
GSM handset exchange scheme for long distance time	No handset exchange scheme
Built in contract for 3 years	No contract as such
Rental of $13, but 400 minutes of free usage.	Rentals starting from $8, but no free minutes
Free Rworld data applications	No data applications
Rconnect – Internet through Mobile	No provision for connecting to the Internet

Source: Varghese 2006

Figure 21 Comparison of Reliance Infocomm Pioneer offer with existing GSM offers

Minimum Cost Strategies:

- Sharing of all parent company resources like office space, engineering skills and human resources.
- Centralised management of resources.
- Synergy with the group company Reliance Telecom to ensure traffic and revenues from day one.
- Hard negotiations with vendors to ensure rock bottom prices.
- Initial offering limited to only 2 handset models per brand ensuring mass production and marketing advantages.
- Provision of multiple services like landline, broadband, IPLC, VPN and IDC through the same network, ensuring minimum cost per service and maximum revenues.
- Overcoming of license fee by procuring basic license instead of mobile license.

Sales Strategies:

- Discounts for employees and their referral connections.
- Discounts for shareholders and their referral connection.
- Dhirubhai Ambani Entrepreneurship Programme – a new direct channel of 200,000 (proposed) self employed people to generate hype and increase availability.
- Presence in grocery stores, gas stations, music stores, departmental stores, street side vendors, bookshops, hotels and restaurants.

Advertising Strategies:

- Branded as IndiaMobile to cash in on patriotic feelings.
- Bundling of handsets with service.
- Reliance Infocomm branded mobile phone instruments.
- Advertisements based on Bollywood movies and cricket – pulse of India.
- Co-branding with mobile instrument makers – reduced ad and promotional spend.
- Signages on Reliance Infocomm owned telecom towers.

Product Strategies:

- Product development focused on every section of society
- Rworld – Java enabled data applications suite.
- Rconnect – Internet connection through mobile.
- Market information on Mobiles with tie up with NCDEX.
- Wireless Point of Sales – Expansion of number of merchant outlets accepting credit cards. Tie ups with major banks.
- Vehicle tracking system.
- Dhirubhai Ambani Developers Programme – Open source programming to gather momentum on product development.

Customer Service Strategies:

- Centralised service.
- 24 by 7 service.
- Service offerings in 10 languages.
- Immediate activation of new connection.

Source: Varghese 2006

Box 4 Reliance Infocomm strategies

India's mobile operators are outbidding each other with New Year offers of a mobile "for life", under which a number would remain operational forever with a one-time fee and near-zero recurring costs. The rush of such schemes for the holiday season has raised some concern with the telecoms regulator, which is studying the viability of the offers.

The string of offers began with a hugely successful scheme by India's second-largest CDMA provider Tata Indicom, which ran a limited time plan offering a handset and two-year in-coming call validity for 2,500 rupees (US$55) - the so-called "non-stop" mobile offer. Subscribers could recharge with any denomination for outgoing calls. Without recharges, the phone would only receive calls for two years.

The Tata offer still exists and has even been criticised as predatory pricing. But it has now been topped by the biggest CDMA player, Reliance Infocomm, and by all the GSM operators, which have launched cards valid for "life" with a one-time payment of Rs999 (US$22).

Under most of the "for life" schemes, the number is always valid for incoming calls. Subscribers need to recharge for outgoing calls or at least once every six months but this recharge could be as low as Rs10 (US$0.22). Mahanagar Telephone Nigam Ltd. (MTNL) was the last to launch such an offer: The state-run operator on Monday launched a scheme under which it offers a connection for Rs900 (US$20) with Rs100 (US$2.20) of outgoing call time, apart from an always-on incoming facility.

The Telecom Regulatory Authority of India (TRAI) is looking into the schemes. TRAI welcomed such economical connectivity, but its concerns included spectrum availability, the importance of number portability and the meaning of ‘life time’.

Source: adapted from articles by Jagdish Rattanani, for Total Telecom, January 2006

Box 5 Indian operators launch 'mobile for life' offers

3.4 User cost-saving behaviour

Many observers have noted the ingenuity and inventiveness with which new technologies are often used in developing countries. This section collects a few examples of cost-saving behaviour in relation to phone use. The phenomenon could warrant further research, whose findings would be of interest to operators for service package design and to policy-makers for insight into side-effects of policies.

A LIRNEasia (2005) research module carried out in parallel with this project in Sri Lanka and India found a perhaps surprisingly low use of obvious cost saving strategies, given views expressed on tariff levels. Close to three-quarters of respondents are careful about local call durations, but only 19% of mobile users with access to fixed phones also use mobiles to receive messages but return calls on fixed lines. A third of mobile owners in the Sri Lankan sample make calls off-peak. The researchers suggest that low use of cost saving strategies is tied in with low overall use, with nearly all calls having a high importance to the user – so there is little room for discretion.

Qualitative researchers of mobile phone use in South Africa (Miller et al 2005) report:

> Mobile telephone ownership is high even amongst disadvantaged populations, 28% of the rural households interviewed owned a mobile phone, compared with 29% in the urban research context. Low incomes create an intricate dynamic between cheap ‘container’ phone outlets in urban areas or stand-alone commercial phones in rural areas and more expensive mobile phones. Typically calls are made at commercial phone points, whilst calls are received on mobile phones. Though making a call may mean a walk of 30 minutes to an hour in rural areas to the public access point, the small saving this generates is significant and makes it worth it.

The team researching Jamaica under the same overall research project report another cost-saving usage pattern:

> Most Jamaicans purchase pre-paid phone cards, which they use to make a series of short calls (an average of 19 seconds). These short calls indicate to the recipient that they are remembered and

thus sustains the connection until the time when there is a more specific reason to have more sustained contact, such as a visit to the person, a request for money or information or the establishment of a friendship or sexual relationship.

The Research ICT Africa team (Gillwald et al 2004) report another common practice, the use of multiple SIM cards (which has the side-effect of artificially inflating subscriber numbers):

> In some countries such as Cameroon, … customers carry several SIM cards which are used interchangeably to reach colleagues and families on different lines to avoid exorbitant termination fees on different networks.

Many researchers report on the practice of 'beeping', that is, using a pre-determined number of rings to convey a message to the recipient (such as "I am setting out for home now" or "please call me") without incurring any charge. The Gamos/CTO team (2003) discuss the practice as observed in Botswana, Ghana and Uganda:

> Overall, 38% of the total sample regularly beep, using public access points. 32% of the total sample beep from private providers, and 15% from booths, reflecting the overall preference for teleshops as a public point of access. The popularity of beeping is reflected in the "success rate" - the proportion of beeps returned to customers using both booths and telephone shops is similar, at 40%. The proportion of successful beeps made from personal mobile phones is slightly higher at 45%, but these people call back only 34% of people who beep them, confirming that people in rural and low-income areas are less willing to pay for a call. 'Beeping' is particularly prevalent in Uganda because it requires 'caller ID' facilities which are available, effectively as standard, on the GSM phones which dominate that national market.

3.5 Special fixed network tariffs

In an increasing number of countries, wireless services now have much wider availability and take-up than fixed services among all income groups. When this is the case, the main focus for affordability should probably be these wireless services. It may be much less relevant to worry about affordable fixed network tariffs, where the fixed network has a small and static customer base.

This section looks at the implications for affordability of tariff rebalancing. We then offer a 'toolkit' of examples of special tariffs, in two groups: traditional (mainly postpaid), and prepaid. The prepaid tariffs normally require more sophisticated technology and have therefore become available more recently.

Many of these special tariffs have been introduced either to fulfil regulatory requirements, or to pre-empt such requirements being imposed. The next chapter, on regulation, discusses regulatory intervention.

3.5.1 Higher rentals from tariff rebalancing

In some countries, however, relatively high take-up of fixed lines had already been achieved before the arrival of mobile. Where (as is often the case) line rentals are well below costs, rapid rebalancing to reflect costs can lead lower income customers to give up their lines. This is bad for the phone company, which loses revenues without any significant corresponding reduction in short-run costs, and bad for the customer, if low-priced mobile phones are not yet available in the area. The countries of central and eastern Europe and the CIS are good examples of this state of affairs. David Townsend writing for the ITU[59] suggests that as part of tailoring more general approaches to the specific needs of this region:

> ….Targeted low-income financial support would be an appropriate policy option in these countries. In particular, as tariff rebalancing policies are implemented, there may be large numbers of long-term basic telephone service users who may be in jeopardy of dropping off the network. This would be directly contrary to universal service goals, even though rebalancing should ultimately encourage greater investment and market efficiency. Some form of subscribership stabilisation

[59] Annex 4, Univeral Access/Service Challenges and Lessons from the CIS/CEE Region, David Townsend, in ITU (2003).

policy, through a combination of vouchers, subsidised tariffs, or “lifeline” services should be considered as a key component of both tariff and universal service policy.

Kočiško (2005), speaking from the viewpoint of the fixed line incumbent in Slovakia, makes the case that ‘hard’ rebalancing is no longer possible and must be replaced by ‘soft’ rebalancing (using optional calling plans, service upgrades and so on). Otherwise there is a risk of losing the fixed line network, when it is needed as part of the drive for broadband. Kumar and Singh (2000), addressing the fixed line rebalancing problem in India, recommend the use of a Fund to decouple subsidies from cost-based tariffs (along with other regulatory actions).

3.5.2 Traditional affordability measures for fixed lines

Figure 22 summarises the range of standard and **special tariffs** found by Cullen International’s recent monitoring exercise in **South East Europe**. The low user tariffs generally have fairly low usage limits, above which units are charged at a higher rate so that they rapidly become more expensive than the standard tariff.

All these countries aspire to EU accession and are adopting the EU electronic communications regulatory framework as part of their preparations for entry. Fixed network tariffs are being rebalanced, but as the figure shows, in several countries probably still have some way to go. Maintenance of low user and special social tariffs is a way of defusing political opposition to rebalancing, as well as a practical step to retain fixed network subscribers.

Country	Standard monthly rental (€)	Nominal value of call units included in standard monthly rental (€)	Eligibility for low-level rental	Low-level monthly rental (€)	Nominal value of call units included in low-level monthly rental (€)
Bosnia & Herzegovina (BH Telecom)	1.64	100 pulses each of 180 seconds, worth 1.33	Special social category[60]	0.26	50 pulses each of 180 seconds, worth 0.67
Bosnia & Herzegovina (Telekom Srpske)	2.30	80 pulses each of 180 seconds, worth 1.22	Special social category	1.15	300 pulses each of 180 seconds, worth 4.58
Bulgaria	5.37 (or 5.11 for party line)	40 minutes local calls, worth 1.06	Any low user	3.32 1.59	30 mins local calls, worth 0.79 20 mins local calls, worth 0.53
Bulgaria			Institutions for people with disabilities	1.79	600 local calls, worth 15.84
Croatia	7.82	1.30	Anyone using under 120 mins	5.87	120 mins worth 2.70
Romania	6.40	60 minutes worth 1.85	Any low user	4.90	
Serbia	2.56	150 pulses worth 0.63	Any low user	1.92	150 pulses worth 0.63
Montenegro	2.56	-	Any low user	1.92	-
FYR Macedonia	5.79	-	Any low user	3.59	-
Turkey	5.62	-	Any low user	3.52	100 pulses worth 4.21

Note: 1 € (euro) is around US $1.2
Source: Cullen International, Country Comparative Report on Monitoring of Telecommunications Service Sector in South East Europe, August 2005

Figure 22 Special fixed network tariffs in South East Europe

Limited minutes (a monthly call ceiling which cannot be exceeded) is another approach to keeping **post-paid fixed lines** affordable. This has not proved popular because of its rigidity. An annual '**budget account**' where a predictable (averaged) bill is payable each month, with a balancing payment at the end the year, may be preferred. Allowing longer **periods for settling bills** is another measure that may help people with payment problems, or who must travel to make a payment.

Residential fixed line tariffs in Colombia have for many years been structured around a set of *estratos* (income groups, assessed largely on the basis of home location) and are designed so that higher-income subscribers may pay two or three times more for the same service than lower-income subscribers. Figure 23 illustrates how one of the larger local phone companies, ETB, implements this arrangement for two of its local service plans – Plan 110, where 110 call minutes are included in the monthly rental (the call charge applies for minutes above 110), and the Unlimited Plan, where unlimited local calls are included in the monthly rental. The arrangement has been seen as desirable not only for social reasons, but also to take advantage of significant spare fixed line capacity. However, increasing phone

[60] Families of war-dead soldiers, disabled veterans, blind and disabled people.

take-up by the lower *estratos* together with migration to mobile of the higher *estratos* are making this system unsustainable.

Estrato	Limit on contributions (receipts)	Household take-up goal	% of population (based on Medellin)	Monthly rental (Col pesos) Plan 110	Call charge (Col pesos) Plan 110	Monthly rental (Col pesos) Unlimited Plan
1	(50%)	25%	9%	6,200	60	20,350
2	(40%)	75%	34%	7,400	60	22,100
3	(15%)		32%	10,000	91	39,000
4	-		12%	10,000	91	41,500
5	20%		9%	12,000	110	49,800
6	20%		4%	12,000	110	49,800

Source: Tariffs: ETB; Limits/goals: CRT; population: Dept of Antioquia
Note: 1,000 Colombian pesos are around 46 US¢.

Figure 23 Colombian estratos system

3.5.3 Prepaid fixed line tariffs

Maltacom's Easyline prepaid service is unusual in offering a rental-free fixed line to anyone who wants it. The only condition for maintaining service is that a residential customer must make at least Lm38 (US$100) worth of calls annually (for business customers, the minimum requirement is Lm85 (US$223). The installation charge is Lm24 (US$63) (or existing postpaid customers may migrate free of charge). Local calls are charged at a premium of around 25% on standard rates, and international calls at around double standard rates. Calls must be made by dialling a special number and entering a PIN to authorise the use of prepaid credit.

For comparison, Maltacom's standard residential service carries a monthly rental of Lm2.57 (US$7) and includes 20 free pulses a month.

Maltacom also offers an exceptionally generous social tariff, whose beneficiaries pay only Lm0.50 (US$1.32) a month rental and are entitled to a rebate of Lm30 (US$79) a year against rental and local calls. This tariff is only for a maximum of 5,000 customers nominated by the Social Security Department.

Telkom South Africa also offers a **prepaid fixed line option**. In this case call charges are the same as standard lines, but a weekly or monthly rental is also charged (at a 38% discount on the standard rental).

Other fixed line incumbents are starting to offer **prepaid fixed line tariffs** as their systems permit (a software platform is needed). For example, TTCL in Tanzania has such a tariff in the capital only, with no rental and local calls charged at a 10% premium. BTC in Botswana also has a no-rental prepaid fixed line tariff with calls to fixed lines charged at a 50% premium; similar to prepaid mobiles, the line must be used at least once every 90 days to avoid disconnection.

3.6 Shared access

In “shared access” we include:

- Public payphones run by a phone company, where members of the public buy service a call at a time.
- Resale of fixed or mobile service on a commercial basis, normally by an individual who contracts with the phone company for service and sells calls to members of the public at a mark up.
- Connections (fixed or mobile) shared formally by separate households, each of which has a direct relationship with the provider.
- Informal sharing of fixed or mobile connections, where a single subscriber makes his phone available to others to use on whatever terms he chooses – possibly for payment, but often as a favour.

All these forms of sharing greatly improve affordability simply by making single calls available, without any regular outlay (or, in the case of formal shared service, with much reduced regular outlay). Compared with this advantage, the actual prices charged for calls are secondary, and receive little attention. As discussed in section 2.5, however, high call prices may unnecessarily limit demand, especially in the medium term – in the face of high prices, people may restrict calling to cases of emergency and immediate economic gain, and fail to build habits of ‘normal’ use.

Public payphones have long been the staple of universal access provision. The pioneering universal access programmes pursued in Chile and Peru, and others which have built on such experience, have been framed in terms of a requirement to provide at least one public payphone in each unserved location. Public payphones are usually in independent structures (kiosks or shelters), unattended, with mechanisms for accepting either cash or cards. Their advantages may include relative privacy, any-time availability and regulated prices. Disadvantages for users tend to include lack of human support (making it hard to receive incoming calls), payment difficulties (such as faulty coin acceptance mechanisms or absence of local card retailer), and uncongenial surroundings[61]. From the supplier’s viewpoint, payphones are costly to provide and maintain.

A useful benchmark price provided by Edgardo Sepulveda[62] is a public payphone tariff of 10 US cents a minute. This has been found to be acceptable in Latin American communities with typical annual income levels of US$500 a head.

Commercial resale

A widespread alternative to public payphones is ‘phone shops’ offering phone calls on a small business basis. Telephony (and/or other communications, eg internet or fax) may be the main business involved, or it may be simply a sideline, for example in a general store. Such businesses have been well-established in ‘shop’ premises for years in developing countries wherever fixed lines have been available. Calls are sold at a (sometimes regulated) mark-up over what the proprietor pays to the operator.

Along with the recent spread of mobile phones has come the ‘phone shop’ based on mobiles. There is a range of business models. At one end are purpose-designed mobile phones such as Grameenphone, or special SIM cards such as the one used in the South African SharedPhone, which may be provided from permanent or semi-permanent premises (such as a stall under a tree). At the other end is informal resale by an itinerant vendor using his

[61] These statements draw on several of the consumer research reports mentioned in 2.3 and in particular on Gamos and CTO, 2003.

[62] ITU (2003), Annex 3.

own ordinary handset. Nokia's *prepaid tracker* service (displaying the price of each call, as mentioned in 3.3) would be a good tool for such informal resale.

The advantages and disadvantages for users of phone shops tend to be the opposite of those mentioned above for public payphones. What they lack in privacy they gain in convenience. They are lower-cost to provide and maintain than public payphones, and can more easily be added or extended to cater to growing demand. Typically, end-user prices are higher than those at public payphones, leaving a margin for the reseller.

Formal shared lines

The fixed 'party line' is a single exchange line shared among neighbours, each with an extension at home and able to make and receive calls independently, but only while the line is not in use by someone else. In developed countries decades ago, this used to be a way of providing some service in the face of capacity shortages. In some countries with extensive fixed line infrastructure (such as Eastern Europe/CIS or parts of Latin America) it is still a sensible expedient, with advantages for both the phone company and the subscribers involved, each of whom should pay only a part of the full line rental.

Similar formal sharing arrangements are possible for mobile handsets, but do not seem to be developed as yet. For example, a single SIM card could cover several separate accounts each with its own telephone number (and distinctive ringtone). This would enable a group of people who work in the same place to share the initial cost of a single phone.

Informal shared lines

We have already commented in 3.4 above on users' inventiveness, and informal line sharing is another good example of this. At some risk of dubious legality or reliability, a handyman with do-it-yourself domestic phone wiring can extend a single fixed exchange line around a group of dwellings, enabling both the benefits and the costs to be shared. Friends may each have their own SIM card to use in a single shared mobile phone. And as we have discussed earlier, simply allowing other people to use your phone (with or without payment or other form of reciprocation) is common practice where phones are scarce. Wirzenius (2002) explains well how useful informal sharing can be, especially of mobile phones, with particular reference to Cambodia.

4 Regulatory actions

4.1 An overall approach for regulators

Telecom regulators in most countries have a responsibility for universal service and universal access, though some have gone much further than others in elaborating how to fulfil this responsibility. To regulators who are charged with improving affordability and have not yet worked out how to go about it, this study offers the following suggestions:

- Study existing data, and where this is lacking consider carrying out new surveys, to understand users' needs for telecom service availability, price and quality, and how far these needs are being met.
- Define and set targets for affordability based on these findings, after consulting user organisations, the industry and the public at large. Figure 24 illustrates an approach to setting affordability targets that could be translated into prices, given a knowledge of income distribution and spending patterns (such as is provided by household surveys).
- Ensure that these targets and relevant achievements are widely known. Support users and user groups in understanding their buying options and getting the best buy.
- Where achievement falls short of targets, discuss with the industry why this is; ensure that any regulatory barriers to progress (such as technology-based market entry restrictions, high licence fees or inequitable interconnection arrangements) are reduced as fast as practicable.
- If progress remains unsatisfactory, consider alternative approaches which may include:
    1. Offering financial support for affordable service in particular areas or to particular social groups (the support should be awarded according to clear criteria).
    2. Placing specific obligations related to affordability on industry participants, in ways that do not reduce or unbalance competition.
    3. Ensuring that suitable groups representing community interests have the opportunity to take part in the provision of telecoms services in their areas.

Sections 4.3 and 4.4 include illustrations of approaches by regulators in different countries, as a source of interest and inspiration.

Country income bracket	Target percentage of households that can afford own phone	Target frequency of phone use that others can afford
Lower middle income country	90%	Weekly for lowest 10%
Low income country	60%	Weekly for 30%, monthly for lowest 10%
Very low income country	30%	Weekly for 50%, monthly for lowest 20%

Source: study construction

Figure 24 Illustrative affordability targets

4.2 Overcoming objections

This section looks at various objections that may be raised to pursuing affordable telecoms, in a simple question-and-answer format. The reader wanting a deeper treatment is referred to Estache (2004), which includes both an extensive discussion of the economics of infrastructure regulation and many further references.

Q1. Affordability is primarily a social objective, while regulation is primarily an economic activity.

A1. This is true, and countries vary in how far they want their regulators to pursue social objectives, as well as in what those social objectives are. But there are also conventional economic reasons for promoting affordability. For example, a larger network benefits all users (the externalities argument); and Ramsey pricing points to mark-ups that are inversely proportional to price elasticity. Such arguments are discussed in many texts – see for example Wheatley (1999).

Q2. Won't commercial operators require every customer to be profitable every year, which would rule out their taking on customers expected to generate less revenue than their costs?

A2. Some operators may think this way. Others aim for profits over a longer period than a year, recognising that low spenders can only grow into higher spenders if they have the chance to get used to the benefits of phones. Some operators sensibly take account of revenues from calls that a customer receives as well as those that he makes.

Also, the cost of serving a customer can be calculated in several different ways. There is no one "correct" cost calculation – the best method depends on the objective. The regulator should understand what cost calculations have been done using what input data.

Q3. Aren't higher fixed line rentals essential, to avoid an access deficit and enable fair competition?

A3. This is often true. But the total amount of money collected is more important than what its parts are called. A minimum spending level, which can include a calling allowance, works just as well as a 'rental'. And the point above about cost calculations is important here too. Real local costs can differ greatly from international benchmarks.

Q4. You recommend differentiated tariff packages that will be attractive to particular groups. Wouldn't these amount to "undue discrimination", which is wrong?

A4. A recent World Bank book (Kessides 2004) is reassuring on this point:

> Uniform pricing and regulatory prohibition of price differentiation can seriously undermine revenue adequacy by limiting the ability of infrastructure operators to exploit demand characteristics and extract more revenue from high-value customers. As an alternative, demand-differentiated pricing can alleviate the need for radical tariff rebalancing. If an economy is to benefit from market liberalization, infrastructure entities must be allowed to compete with flexible prices and terms. Prices will best serve the public interest if they are allowed to vary among classes of users in accordance with the value of service and in response to the marginal costs of service. The need to set some prices low to retain business means that other prices should be allowed to be higher to secure adequate revenue.
>
> In telecommunications, for example, policymakers should permit the rapid installation of new telephone lines - wired or wireless - based on prices that reflect differences in the value of service and clear service backlogs. In addition, customers who place more value on a service should contribute more revenue to cover unattributable, fixed, and common costs. By offering discounts with nonlinear prices to noncaptive customers, the utility will be able to recover the costs of the local loop with marginal access prices much closer to incremental costs and keep all customers in the network, benefiting all.

Q5. But this sounds very much like cross-subsidisation, which we need to eliminate.

A5. Cross-subsidisation is a normal business practice. Profit margins always vary from one product line to another and one customer group to another. Cross-subsidisation only becomes a problem for regulators when it has anti-competitive effects. This situation is much more likely to arise in relation to business and high-spending residential customers than in relation to the low-income groups for whom affordability is an issue. Air fares are a useful analogy – people on a plane have often paid very different amounts for essentially the same service.

Q6. How can mobile phones be key to affordable services for poor people, when they are still clearly a status symbol for rich people?

A6. The same network infrastructure can provide service packages that will work with different types of handset, and will appeal to different groups.

4.3 Regulators' definitions of affordability

As has already been explained, many countries have an official policy of pursuing affordable telecoms but do not say explicitly what they mean by this, or how it is to be achieved. This subsection gives some examples of approaches to definition that different regulators have used.

USA: dictionary definition

In 1997 the US Federal Communications Commission discussed the definition as follows (FCC 1997 section V), based on looking in a dictionary:

> The definition of affordability contains both:
>
> - an absolute component ("to have enough or the means for"), which takes into account an individual's means to subscribe to universal service, and
> - a relative component ("to bear the cost of without serious detriment"), which takes into account whether consumers are spending a disproportionate amount of their income on telephone service

The FCC reference goes on to look at the factors to be considered when assessing whether affordability has been achieved; besides the price of concessionary Lifeline service and incomes, these include the size of the local calling area.

Philippines: continual improvement

Box 6 shows a proposed definition of universal access for the Philippines, including a new angle on affordability – that it should be continually increasing.

> Universal Access is the availability in all urban and rural areas of a minimum set of telecommunications services, which are reliable and affordable, whereby:
>
> **Availability** (of telecommunications services) means the physical presence, within reasonable distance, of adequate telecommunications terminal equipment linked to a fully-interconnected network,
>
> **Reliable** means that the service meets the quality standards prescribed by the appropriate regulatory body, and
>
> **Affordable** means that an increasing portion of the populace is able to bear the reasonable cost of the service, either through market forces or with government intervention.
>
> Source: Philippines DOTC 2001.

Box 6 Recommended Philippines Definition of Universal Access

Bulgaria: an operational approach

Box 7 summarises the main provisions of Bulgaria's regulation on affordability. This is similar to the approaches adopted by several EU15 members[63], in that:

- Affordability is not explicitly defined; instead the principles and specific measures for achieving it are given (as in, for example, the UK).
- It is based on adjusting (by an amount related to inflation) the level of tariffs for low users existing at the date of the regulation (as in, for example, France).

- Principles: covering costs, geographic averaging, substitutability with alternatives, relation to current prices taking account of inflation
- Overall price cap on basic fixed telephony, with Price Control Factor in range (-2.5% to +2.5%) to achieve stability and predictability
- Rentals have sub-cap of 20% price rise a year
- Telephone directories may be charged for only at rates that cover net losses (if any) plus a margin of 15%
- Special fixed network tariff packages must include:
    1. Low-user tariff with approved rental and 10 low-price impulses a month, but more expensive for later impulses so that it offers no saving to people using over 30 impulses
    2. Tariff for people with disabilities including 50 free impulses a month, and 50% of normal connection fee
    3. Tariff for approved social entities including 300 free impulses a month
- Changes may be introduced if an operator provides special tariffs to more than 17% of its customers
- Operators may be reimbursed substantiated net losses arising from providing special packages

Source: study summary of Methodology For The Conditions And The Order Of Determining The Affordability Of The Price Of The Universal Telecommunications Service, *Prom. SG. 78/7 Sep 2004*, CRC

Box 7 Main provisions of Bulgarian affordability regulation

[63] More detail on EU members' approaches and a history of BT's low user tariffs can be found in Milne (2000a).

South Africa: identifying needy groups

South Africa is unusual in having attempted to define affordability-related targets for both household-level and publicly accessible telephony (Universal Service Agency 1998). Constant uncertainty about the legal framework and industry structure, and continually changing realities on the ground, have made it hard to conclude this long-running discussion (Mkhize 2003). Box 8 illustrates the analytic approach that has been taken. An obvious question raised here is how far a Universal Service Fund based on 0.16% of revenues could go towards providing the different forms of support identified. It seems likely that rigorous prioritisation will be needed.

Demand And Affordability In South Africa

Affordability is core to Universal Service policy in South Africa. There are 5 generic categories of users within the telecomms sector.

- Group 1 – Users who can afford the national aggregate price and are supplied with telecomms services. (No subsidy needed)
- Group 2 – Users who can afford the national aggregate price and are supplied with telecomms services, but in a high cost spatial location. (Operator needs subsidy).
- Group 3 – Users who are supplied with telecomms services but cannot maintain and/or maximize their utilization. (Users need support). Support could be in the form of financial relief or customised CPE.
- Group 4 – Potential users currently lacking service and located throughout the country, and are unlikely to afford a telephone now or the foreseeable future. (Users need subsidy).
- Group 5 - Potential users who can afford the national aggregate price but not currently supplied with requested telephone services. (User do not need subsidy).

0.16% contribution to the Universal Service Fund should be utilized to provide subsidy.

Source: adapted from Mkhize (2003)

Box 8 South African analytic approach

Since the late 1990s, South Africa has been something of a test-bed for universal service and community service obligations (CSOs). The requirement on Telkom to provide over 1.6 million new fixed lines in under-serviced areas has not been a lasting success: although these lines were provided, many of their customers were disconnected after defaulting on payment. A more successful CSO has been the requirement on cellular operators to provide community service telephones in under-serviced areas. These public payphones in fixed locations, charged at regulated rates, are widely provided and well used. It is still too soon to assess the success of the new special-purpose Under-Serviced Area Licences (USALs).

Jordan: customer needs

Box 9 shows the current proposed definition for an affordable tariff in Jordan. Below we discuss likely steps to implement such tariffs. This definition is notable for its degree of detail, for being framed in terms of customers' incomes, and for being based on market research. The research, carried out in 2004, included 2,500 interviews with household heads, both with and without phones, biased towards rural areas and low income groups[64].

The TRC will use the following set of criteria to judge whether a tariff is affordable.

Relative to the monthly income of the lowest 10th percentile household group by income:

(a) The initial payment, excluding the cost of the telephone handset, is no greater than 10% of monthly income.

(b) The average monthly expenditure that is necessary to continue to make and receive calls is no greater than 2% of the monthly income.

(c) The smallest payment increment for purchasing additional units of service is no greater than 5% of monthly income.

In addition, the tariff should be available without a check of the credit worthiness of the prospective subscriber.

Notes:

1. The initial payment for a fixed telephone service is the connection charge. The initial payment for a mobile telephone service is the activation charge.
2. Average monthly expenditure necessary to continue to make and receive calls for a post pay service is the monthly rental. Average monthly expenditure for a prepay service is more difficult to define. Many prepay cards have a limited life. After a certain period any credit on the card is automatically cancelled. The average monthly expenditure for a prepay mobile service is the price of the prepay card divided by the number of months from activation to cancellation of credit by the service provider. For example, a 3 JD card that lasted three months would require average monthly expenditure of 1 JD per month.
3. The smallest payment increment for a post pay service is the monthly rental. The smallest payment increment for a prepay service is the price of the lowest price prepay card.
4. All payments, prices and expenditure exclude sales tax and other taxes.
5. For the purposes of this definition, the income of the 10th percentile household group by income will be taken as that estimated by the Department of Statistics. The TRC's estimate of the 10th percentile household income is 167JD per month, based on information provided by the Department of Statistics using 2003 data. The TRC is proposing this base for the calculation of payments and expenditure to ensure that any changes in income levels in society are automatically taken into consideration in determining whether a tariff is affordable.

Source: TRC Jordan (2005)

Box 9 Proposed definition of an affordable tariff in Jordan

4.4 Regulators' actions to help achieve affordability

As we have seen, some countries' definitions of affordability are implicit in their statement of how to go about improving it. In this section are some further examples of regulatory actions directly in support of affordability.

Of course, many other regulatory activities may indirectly influence affordability. The forms of liberalisation, interconnection arrangements, and licence conditions such as infrastructure sharing and roll-out targets are all important and relevant, and thoroughly discussed

[64] David Hughes, Intercai Mondiale, personal communication, 18 November 2005

elsewhere. We do not explore them here[65], other than to point to the significant potential contribution to revenues from better-off callers, often in cities or other countries, to worse-off recipients of calls. These can be formalised and legitimised as a 'network externality' (giving expression to the benefit to existing subscribers of new marginal subscribers joining the network). Such contributions commonly accrue to network operators through interconnect charging, but they may also appear as credits to the called party, who can then call more than he would otherwise have done (see the Australian example in Box 3).

A related issue is calling-party-pays tariffs for calls to mobile phones. Many developing countries have changed from receiving-party-pays to calling-party-pays tariffs with positive effect on mobile penetration, because people with low incomes typically receive more calls than they make (and dislike being liable for charges for inbound calls that they cannot control). However there are also arguments that receiving-party-pays tariffs are better longer term because they foster more calling from mobiles. Littlechild (2006) explores the topic and concludes that there is much to be said for a bill-and-keep interconnect solution.

There is a considerable literature on the broader topic of universal service and universal access in developing countries, with widespread agreement on the advantages of liberalisation. Debate continues on how far market forces should be left to guide network rollout and pricing, and when and how regulators should intervene to speed up the achievement of targets for universal service and universal access. Biggs (2003) provides a useful overview based on 18 country case studies, and concludes that government or regulatory involvement is necessary to ensure that important public priority groups are fully included in the benefits of telecommunications[66]. By now, however, it is clear that (at any rate in low income countries[67]) mobile operators must be an integral part of any solution[68]. For historic reasons, some of the country examples given below relate to fixed network service. However, their principles are relevant to mobile service also.

We are now starting to see approaches that use mobile service as the vehicle for affordability. For example, in the last year, the Brazilian regulator Anatel has required that the expiry period of a standard recharge card be extended from 90 days to 180 days. This is to be sold alongside a full range of cards with commercially determined expiry periods. This decision was debated in a public hearing and opposed by the operators, though supported by consumer groups.

A technology-neutral solution is being followed in Romania. The regulator ANRC decided to allocate 35% of the Universal Service Fund to subsidise low income families' fixed line connections. Families with income below a certain threshold and wishing to take advantage of the subsidy had to apply for it by a deadline in November 2004. The amount available was divided by the number of applicants (around 500,000) to arrive at a subsidy of about €10 per household per year. The money is made available to designated universal service providers (who may be fixed or mobile) and is deducted directly from beneficiaries' bills.

We have mentioned above (Box 5) Indian 'tariffs for life'. The regulator TRAI rapidly issued a consultation document (TRA India (2006a) on these tariffs, voicing concerns about whether they could constitute predatory pricing or undermine mobile number portability, as well as on what 'for life' should really mean. Its conclusions (TRA India 2006b) have focused on consumer protection aspects (clarity and soundness of the offers), with the other concerns set aside.

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[65] Useful information and viewpoints on these topics are provided by Wirzenius (2004) and Dymond (2004).

[66] Parker et al (2005) provide a complementary but less detailed review, over more countries, a longer timespan and all infrastructure sectors.

[67] Mobile services are not currently part of the European Union USO. The European Union's Review of the Scope of Universal Service is currently reconsidering the position both of mobile service and of mobile operators in relation to universal service.

[68] The arguments have been well put by, for example, Wirzenius (2002) and Oestmann (2003).

Ireland: consumer information

Box 10 illustrates one thing that all regulators may consider doing, irrespective of any actual intervention; namely to inform consumers in simple language of how affordability is managed and what provisions exist to help them with phone costs. Another example is the Pakistan Telecoms Authority's Consumer Awareness Bulletin and a similar initiative by the Tanzanian regulator TCRA[69], which tabulate different providers' tariffs.

Affordability is currently maintained through a combination of a Price Cap mechanism and the Low Users Scheme. The Department of Social, Community and Family Affairs also operates a Telephone Allowance scheme.

What is a price cap?

The Price Cap ensures that *eircom* cannot increase the prices of a basket of services by more than the rate of inflation. Amongst the services included is the provision of telephone (PSTN) and ISDN lines, local, national, operator and fixed to mobile calls. The existing Price Cap was imposed on *eircom* in February 2003 (for a period of 3 years).

What is a low users scheme?

The main aim of the 'Low Users Scheme' is to limit any increases in the size of telephone bills for all customers who have a relatively low level of usage. The *eircom* scheme works as follows: if a user spends on average less then €11 a month on calls alone, they can now pay an initial subscription fee of €22.50 (incl. VAT) per month. This will include line rental, local, national, fixed to mobile and international calls up to a value of €5.00 (incl VAT). It should be noted that once a customer exceeds the €5.00 worth of free calls they will pay double on calls up to €6 - €11, after which they will revert to standard call rates.

What is the Telephone Allowance scheme?

The Telephone Allowance is a payment towards your telephone bill which covers basic line rental/equipment (if applicable) charges and up to €40.82 (plus VAT) worth of calls in each two-monthly billing period or €20.41 (plus VAT) if you are billed monthly. If you have a hearing or vision impairment, the Allowance covers the cost of renting a special telephone, subject to availability. The allowance can only be awarded if the telephone is registered in your name.

The Telephone Allowance scheme is not limited to *eircom* customers. You should contact your service provider to find out if they are taking part in the Telephone Allowance scheme.

Note: 1 € (euro) is around US $1.2

Source: askcomreg.ie – the consumer website of the Commission for Communications Regulation

Box 10 Affordability in Ireland

[69] http://www.pta.gov.pk/index.php?option=com_content&task=view&id=546&Itemid=565 and http://www.tcra.go.tz/Market info/mobile tariffs.htm

European Union: bill control

Universal service providers in the EU, may be required to provide not only special social tariffs but also bill control and payment features such are shown in Box 11.

Facilities for control of expenditure

- Itemised billing
- Selective call barring for outgoing calls
- Pre-payment systems
- Phased payment of connection fees
- Disconnection for non-payment of bills only after due warning

Source: European Union, Universal Service Directive Annex 1

Box 11 Special affordability features mentioned in European legislation

Philippines: tariff menu

Box 12 shows a proposal from the Philippines policymaker for offering customers a range of fixed network tariffs with different charging approaches and payment mechanisms.

DOTC Universal Service Benchmarking Report 2000

Proposed MENU
Type A : Current fixed monthly fee
Type B : Lowly monthly fee with per minute charge
Type C : Lower monthly fee with per call charge
Type D : Lower monthly fee with prepaid card
Type E : No monthly fee with per minute charge
Type F : No monthly fee with per call charge
Type G : No monthly fee with prepaid card
All plans to include an option with or without customer premise equipment and the prices reduce with the exclusion

Source: Heceta, K (2001). Major Regulatory Challenges, presentation, National Telecoms Commission

Box 12 Philippines proposed tariff menu, 2000

Jordan: reserve powers

Box 13 shows the proposed approach for achieving the affordable tariffs shown in Box 9 in Jordan. The expectation is that market forces will lead to such tariffs, but in case they do not, TRC has reserve powers to require them and a mechanism for compensating operators accordingly. Based on responses to the consultation, it seems likely that the final regulations will be similar to those in the draft. It also looks likely that affordable tariffs will be provided by the industry without the regulator needing to require them[70].

The TRC will seek to ensure that affordable tariffs are implemented in the most efficient manner possible and preferably by the market without intervention by the TRC.

The TRC intends to review the availability of an affordable tariff yearly with the next review to be completed by 31st December 2006. Should the TRC find that there is no affordable tariff based on the above affordability criteria, the TRC will inform Government and propose the implementation of an affordable tariff by licensees dominant in a relevant market, provided that the licensee is able to implement the affordable tariff in a cost based manner as determined by the TRC.

If no licensee is able to provide a cost based affordable tariff, the TRC will propose to Government that each Universal Service Provider (USP) be required to offer such a tariff in its area. The net cost of such a required and approved tariff shall be included in the calculation of the net cost of the universal service. The effect of obligating a USP to provide an affordable tariff may be to reduce average revenue per line and this change would be taken into account in the USO net cost calculation,

In defining an obligation to provide an affordable tariff under Government USO Policy, the TRC will take account of the requirement in the Policy not to add unnecessarily to the USO burden. The TRC will do this by ensuring that groups to which it is to be made available have a high proportion of low income households or individuals, and that by making this tariff available to these groups, the service does not then become available to groups that are not economically disadvantaged.

To this end, the obligated tariff would be a low usage tariff having low fixed charges and relatively higher call charges than a 'standard' tariff. Such a tariff favours subscribers that make only limited use of a telephone service such as low income households or individuals. A low usage tariff does not favour the economically advantaged who tend to make a larger number of calls, and therefore pay more for the service than they would under the 'standard' tariff. As a consequence, low usage tariffs tend to be used by lower income groups rather than higher income groups. While still being 'available' to those that are not economically disadvantaged, adoption would be expected to be low.

Source: DRAFT REGIME ON THE UNIVERSAL SERVICE OBLIGATION, Amman, 14 July, 2005, Telecommunications Regulatory Commission (accessed at www.trc.gov.jo)

Box 13 Introduction of an affordable tariff in Jordan

[70] David Hughes, Intercai Mondiale, personal communication, 18 November 2005

Jamaica: mobiles do the job

The outcome of the recent universal service consultation in Jamaica, which included consideration of affordability as summarised in Box 14, is more hands-off still. The Office of Utilities Regulation concludes that the low minimum cost of ownership of mobile phones means that affordability is being achieved, and that no regulatory intervention is required.

Affordability – [In its consultation] the Office highlighted a number of measures that could be used to address the affordability concerns of current and potential subscribers. These include call barring, limited minutes, prepaid service and low user package.

Since the entrance of the first new operator in the mobile market in April 2001, the number of mobile subscribers have increased significantly, from approximately 0.33M to well over 1.5M up to March 2004. Information received by the OUR reveals that over 90% of these subscribers are on a prepaid plan. In addition, these customers enjoy the benefit of staying connected to a mobile network for up to sixty (60) days before being disconnected without making and/or receiving a call. Further, the customer now has almost total control over his bill. Based on the current options offered by mobile operators, the customer can choose to spend as little as JA$120 over a two month period on a prepaid plan.

Data from the Planning Institute of Jamaica (2003) reveal that households in the poorest quintile are opting for mobile service and are spending less per month using this service compared to the fixed line where they have to pay a fixed monthly charge. (This charge is currently $500 for customers on the standard package and $340 for those on the low user package on the CWJ network. A recent study conducted by the OUR revealed that approximately 86% of the households across the Island have at least one single line voice telephone (fixed or mobile) in their homes. Households with both fixed and mobile account for 38%; mobile only represents 55%; and fixed only 7%). The monthly fixed charge serves as a deterrent to the take up of the service since customers have no control over paying this fixed amount. The OUR therefore, during the consultative process, urged CWJ to introduce a prepaid platform to its fixed line service thus affording subscribers the option of prepaid or postpaid packages.

Recommendation – The prepaid option for mobile service is currently addressing issues of affordability with respect to single line voice telephony service and therefore the Office recommends no regulatory intervention in this market at this time.

Division of Universal Service Fund – Given the current funding constraint of 5% of industry revenues, CWJ is proposing that only 1% of this amount goes toward expanding service to the unserved, while the remaining 4% should be used to ensure continued access for customers with affordability problems. [No other comments shown on this issue and no recommendation made].

Source: Adapted from Toward Universal Service/Access Obligation for Telecommunication Services in Jamaica, Recommendation of the Office of Utilities Regulation to the Minister of Commerce, Science and Technology, May 2004

Box 14 Affordability consultation in Jamaica

5 Summing up and next steps

5.1 Stages of affordability

The 'stages' model[71] for universal service and access policy has been widely quoted during the last decade, and continues to be used as a framework for thinking about appropriate policy at different levels of economic and network development. Consideration of stages of network rollout is still conceptually sound, although some other features of the model are now out of date. One of the biggest changes over this period has been the extent to which affordability is a realistic objective for universal service and access policy. To conclude this study, we therefore suggest some updates to the table which summarises the stages model, shown as Figure 26. As before, the stages overlap and the entries in the table are only illustrative.

Over this period wireless technology has spread rapidly all over the world. The effect of this on the model is that each stage of network development is now available to countries in a lower income bracket than was previously possible. This change is summarised in Figure 25. Wide geographic reach (with teledensities of at least 10 per 100) is now thought to be achievable on a purely commercial basis even in low income countries like Nepal and Nigeria. Mass market take-up – the 'wall of demand' as private service comes within physical and financial reach of average households – is happening in lower middle income countries like Albania and the Philippines.

	Stage 1: network establishment	**Stage 2: wide geographic reach**	**Stage 3: mass market take-up**	**Stage 4: network completion**	**Stage 5: network enhancement**
1998	Low income	Lower middle income	Upper middle income	High income	High income
2005	Very low income	Low income	Lower middle income	Upper middle income	High income

Source: study construction

Figure 25 Changing match between economic level and network development

Previously, affordability considerations only started to enter the picture (usually implicitly) as part of pricing for mass market take-up in upper middle income countries, and appeared explicitly only in the context of home phone service for everyone at the network completion stage in high income countries.

As we have discussed earlier in this report, during the past decade or so, telephone service that is not just available but also affordable to everyone (whether on a dedicated or shared basis) has become an aspiration in very many countries. Notably, during this period, the European Union has adopted and developed a regulatory framework for universal service which incorporates the idea of affordable access for all, although it is left to each Member State to determine the meaning of affordability. And the ten newly acceded EU Member States, although far less prosperous than the earlier EU15, have taken on this part of the framework without demur.

[71] A form of this model was first published in Cave, M, Milne, C, Scanlan, M, Meeting universal service obligations in a competitive telecommunications sector, Report to DGIV, CEC, March 1994. A revised version benefited from discussion at the 1997Telecoms Policy Research Conference before publication in 1998 in the form now drawn on. The ITU 1998 World Telecom Development Report on Universal Access reproduced a similar table.

However, only few countries have developed clear statements of what they mean by affordable access for all. This study has shown that a country can articulate far-reaching yet achievable affordability objectives at almost any stage of development. The last four rows of Figure 26 illustrate how this may be done. The columns in the figure represent overlapping development stages, and the entries are merely indicative of what may typify each stage. The original figure was based on the history of today's developed countries; today's developing countries are following varying routes.

In the first stage, which we have called *network establishment*, telephone penetration is so low that traditional alternatives such as post, messengers and personal visits are still prevalent. Desirable though phone service may be, it cannot be described as a social necessity. Subscribers are either businesses or relatively well-off individuals. The driving policy goal is to attract investment. The focus for affordability will be to ensure that moderate rates are offered from publicly accessible phones, so that people without their own phones but who can access a public phone (probably only in towns) can make occasional calls without hardship.

In the next stage, which we call *wide geographic reach,* a typical ambition is to provide service in all towns or villages exceeding a certain population. This will mean reaching far into the countryside, but not yet to the smallest or most remote settlements. Attracting investment remains a prime concern, though it may now be joined by a strong desire to spread access much more widely for both economic and political reasons. As there is now more network capacity, it may be advantageous to start to stimulate demand. Affordability objectives may therefore include lower rates from publicly accessible phones, as well as private packages that are attractive to households which, while relatively well-off by their own country's standards, are far from affluent in Western terms.

It is only in stage 3, *mass market take-up,* that telephone service starts to be of real social importance, and affordability of some service usage to everyone is a reasonable and achievable goal. By now telephone coverage reaches a high proportion of the population and private take-up is accelerating rapidly. Phone use is well-understood and social expectations of phone use are rising. For example, employers may ask employees to phone in if they are too sick to come to work. At this stage, affordability objectives can reasonably include private packages that will be attractive to below-median income earners, as well as universally affordable public access.

The later two stages are proper to high income (developed) countries, and as such will not be discussed here.

We believe that tools such as have been illustrated in this study can be used to achieve goals of this kind, without the need for funding from outside each country's ICT sector. Where affordability goals are demonstrably not achievable on a commercial basis, various shared universal service funding schemes, often originally devised for speeding up network roll-out, may be adapted to balance any unfair net cost burden. In many cases, no such device should be needed. In an open market environment, technological advances and far-sighted marketing strategy can do the job, with the regulator's role being one of oversight rather than intervention. Of course, in many countries there is still a long way to go before markets are open enough; but efforts to improve affordability can usefully proceed in parallel with market opening.

	Stage 1: network establishment	Stage 2: wide geographic reach	Stage 3: mass market take-up	Stage 4: network completion	Stage 5: network enhancement
Typical teledensity[72]	0 to 5 per 100	1 to 20 per 100	10 to 40 per 100	30 to 60 per 100	Over 70 per 100
GDP per capita range	Very low income	Low income	Lower middle income	Upper middle income	High income
Business take-up	0 - 30%	20% - 80%	70% - 100%	100%	100%
Household take-up	0 - 10%	5% - 30%	20% - 85%	75% - 100%	98%
Public telephone access[73]	Under 50%	40% - 80%	60% - 95%	90% - 100%	98%
Typical phone company preoccupations	Large scale capital investment in new technology.	Technical network improvements.	Growing the network.	Growing call revenues (marketing).	Profitability.
Main constraints on network expansion	Investment funds, appropriate technology and skills.	Limited demand due to high prices (cf incomes) and use of alternative communications	Manpower for plant installation to meet mass demand (waiting lists).	Affordability of service to poorer households.	Market appeal.
Universal service goal type	Technological (acquire new technology).	Geographic (maintain regional parity).	Economic (stimulate economy).	Social (achieve political cohesion).	Libertarian (individual right to communicate). Promote knowledge economy
Examples of universal service and universal access goals	Long distance service linking all major centres; public telephones where demand warrants.	Telephone service available in all places over a certain population; widespread adoption of telephony in business.	Widespread residential take-up of telephony; meet all reasonable demands for telecoms.	Telephone affordable to all; telephone service adaptable to special needs (eg of disabled people).	Everyone can meet basic communication needs; public access to advanced services (esp education, health).
Typical public policy measures (universal service)	Licence conditions on network rollout.	Profitable licences subject to unprofitable obligations.	Control speed of price rebalancing. (fixed) Maximise wireless coverage (mobile)	Targeted subsidies.	Identify and meet non-market demand.
Typical funding source for USOs	Donor support	Self-generated by each operator	Shared industry USF (awarded competitively)	Net costs often too small to bother sharing	Special interest funds (eg region, disability)
Importance of telephony	Alternatives to telephony still prevail (post, travel)	Status symbol; also valued highly by poor for use in emergencies	Vital practical tool for majority	Phone access a social necessity	Individual access a social necessity

[72] The ITU's definition of effective teledensity (the higher of fixed and mobile teledensities) is appropriate here.

[73] Access to public or shared telephone service, as a percentage of people without private access

	Stage 1: network establishment	Stage 2: wide geographic reach	Stage 3: mass market take-up	Stage 4: network completion	Stage 5: network enhancement
Affordability focus – shared access	Keep shared telephone access rates moderate	Reduce shared telephone access rates	Shared telephone access must be affordable to everyone	Shared telephone prices may rise as private access prevails	Shared telephones disappear as individual phones prevail
Affordability focus – private access[74]	Household phone packages targeting relatively well-off (q5)	Household phone packages targeting salaried workers (q5, q4)	Household phone packages target skilled workers (q4, q3, q2)	Household phone packages target low paid workers (q2, q1)	Broadband internet access affordable to all who want it

Source: study update of table in Milne (1998)

Figure 26 Stages of affordability in terms of network development

5.2 Next steps and further work

This study overviewed a broad area. It has highlighted a number of specific topics where further work may be useful, interesting or both. For example:

- There is a large and growing body of developing country communications user research, much of which is relevant well beyond its immediate purpose. This study has only identified a small subset of findings from some of the available studies. A **catalogue of published communications user research**, outlining the topics and methodology of each item, would strengthen understanding of consumer demand and needs. It would also be a guide to where new work is most needed and how best to carry out new surveys. Survey funders could encourage findings to be published and added to the catalogue.
- **Further analysis of household expenditure survey data** could throw useful light on common features of spending patterns across countries with similar characteristics, and in particular on the needs and capacities of low income groups.
- We do not know enough about **elasticity of demand in developing countries**. This study has shown that it is a mistake to rely on old findings from developed countries. New work should look at how demand can vary not just with income and price, but also with other factors such as the denomination of outlay.
- More data on user needs and demand elasticities (preferably including time-series data following the same users over a number of years) would be valuable for several purposes. Among these would be more **rigorous quantitative demand modelling** (whose theoretical basis has yet to be developed).
- An authoritative published study of the **cost structure of wireless telecoms,** and how it is changing, would be of great value in promoting affordability.
- This study and others have pointed to a role for small enterprise, NGO and community participation in providing affordable communications. Such organisations may lack expertise in choosing the best technology for their application. An **impartial technical and business expert advice service** for them could make a real difference.
- The prototype **tariff comparison tool** should be enhanced to cover many more countries, and kept up to date. This would be of value both in helping consumers get a 'best buy', and letting policymakers see how price levels compare across countries.
- International communications statistics (such as those collected and published by the ITU) should include suitable **affordability measurements for telephony**.

[74] In this row, q5 to q1 stand for income quintiles (highest to lowest)

- The collection of **examples of innovative marketing** approaches in this report is small and will date rapidly. It would be of greater continuing value if expanded and updated. One possibility worth exploring would be a 'Wiki'-style open (but moderated) website that anyone could contribute to.

We draw attention also to the structured research agenda put forward by Parker et al (2005), which aims to improve understanding of how regulation can best support poverty reduction across all infrastructure sectors.

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Annex B Acknowledgements

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The project team are:

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Annex C Examining mobile costs

This Annex looks at mobile costs (and mobile revenues, to some extent) from three perspectives:

- Comparing different regions of the world, using information drawn from the Wireless Intelligence data base for many different network operators.
- Considering particular network operators, using information drawn from their annual reports.
- Suggesting how different factors influence costs, using information derived from experience of network design by ourselves and others.

Wireless Intelligence: comparisons between different regions of the world

Wireless Intelligence is a venture between Ovum and the GSMA, endorsed by the CDMA Development Group (CDG). It assembles quarterly key performance indicators from about 900 mobile network operators in about 200 countries. The data base is far from complete, as often operators have provided only some indicators for some quarters. Also, some indicators important for our purposes are missing. (Among these missing indicators is the number of SMS messages, which is important for revenue figures but not important for cost figures, as we indicate later.)

Despite its limitations, the data base is the most comprehensive source of information on the performance of mobile network operators. Figure 27, Figure 28 and Figure 29 illustrate some of the deductions that can be made from it for revenues and expenditures averaged over 2002-2004[75].

Figure 27 shows that revenues and operating expenditures are both higher in richer countries than in poorer ones. Curiously, new subscribers appear to offer better margins than existing ones in Western Europe and, to a lesser extent, in other rich regions of the world[76].

[75] Similar figures can also be provided per minute of use instead of per subscriber, but too few operators have provided indicators of minutes of use to make such figures representative in enough regions of the world.

[76] The indicators for operating expenditures are provided Before Interest, Tax, Depreciation and Amortisation (BITDA), so they do not take account of finance and other related costs. However, some operators, but not all, also quote 'net' revenues instead of 'gross' ones (and other operators have tax holidays), so taxes are sometimes taken into account. Moreover, multinational operators often do not provide figures on a national basis, or even on a regional basis, so they have been omitted from the comparison. For these and other reasons such figures as these must be treated cautiously, though variations between regions are significant enough to withstand detailed amendments to some of the data.

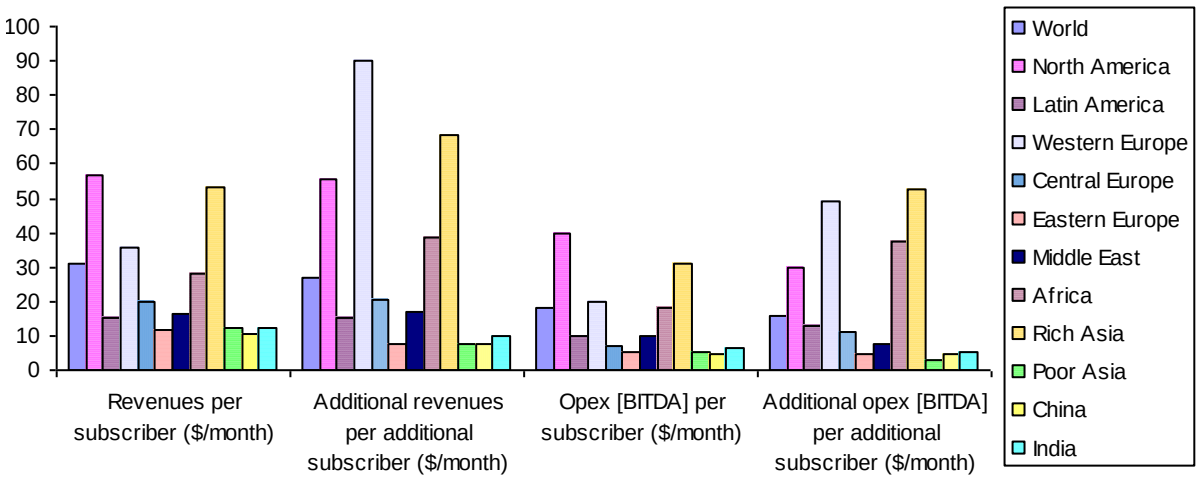

Figure 27 Revenues and operating expenditures per existing and per new subscriber

Figure 28 shows a similar divergence in reported capital expenditure on new subscribers. In rich regions of the world, the figures for capital investment may be heavily influenced by investment in 3G and by the saturation of the market for 2G (with the effect that the number of net additional subscribers is low)[77].

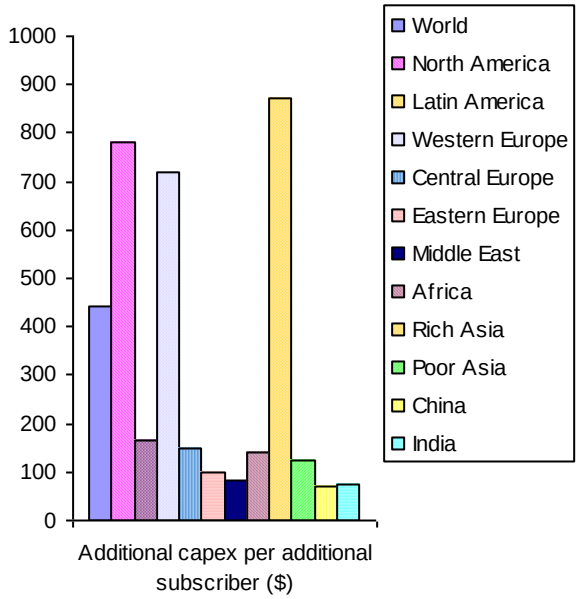

Figure 28 Capital expenditures per new subscriber

Figure 29 shows payback times derived from the reported capital expenditure, operating expenditure and revenue. It appears to conflict with the widespread view that investors in Africa require very short payback times.

[77] Some indicators do not represent some regions of the world fully. In particular, the indicators for capital expenditures over the period deal with three or four network operators in the Middle East (one of which is much larger than the others) and deal with between five and nine operators in Africa. Distortions in the figures relating capital expenditures to subscriber numbers may be especially severe, because of the time lags arising as networks develop.

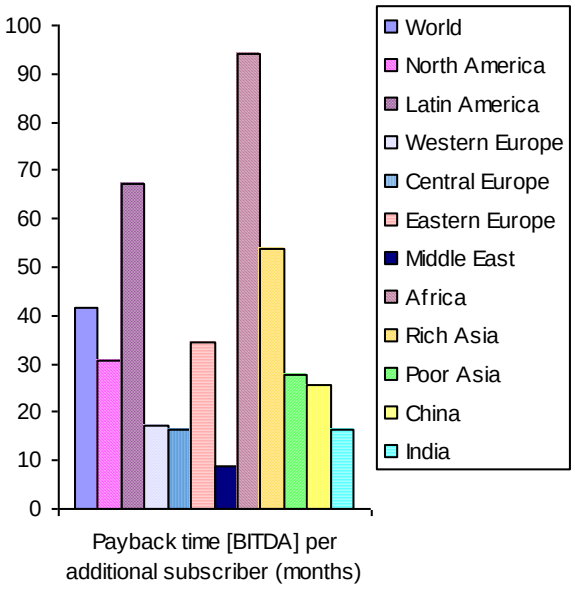

Figure 29 Payback times per new subscriber

Annual reports: considerations of particular network operators

Figures calculated from the Wireless Intelligence indicators can be supplemented by information on categories of revenues and expenditures in the annual reports of network operators[78].

For instance, for 2004, in rounded figures that are in many cases corroborated by the Wireless Intelligence indicators:

- Additional capital expenditures vary between 10% (MTN South Africa) and 60% (Bharti Tele-Ventures and MTN Nigeria) of revenues before tax, depending on the extent to which the network is already built out. Perhaps 70%-80% of those capital expenditures are due to access networks and 20%-30% is due to core networks and support systems (as in the Alcatel and SIDA studies, for example).
- Operating expenditures vary between 40% (Smart, Globe Telecom and Telkomsel) and 80% (MTN South Africa) of revenues before tax, depending on the extents to which customer acquisition and retention costs are reduced (for example, by having e-refill and not having handset subsidies) and to which interconnection is treated by the rule that 'senders keep all'. Finance and other related costs (including interest, taxes, depreciation and amortisation as well as provisions and foreign exchange transactions) might be 40% of operational expenditures.

There are several ways of obtaining revenues. In particular, as proportions of revenues:

- Handset revenues vary between 0% (Smart) and 12% (MTN South Africa).
- SMS message revenues vary between 2% (MTN Nigeria) and 50% (Smart).
- Roaming and interconnection revenues vary between 2% and 5%.

[78] Unfortunately many annual reports are not very useful, for our purposes at least, and those that are useful categorise their revenues and expenditures in different ways and in some cases aggregate figures for fixed networks and mobile networks. So far the most useful to us have been those of PLDT (in the Philippines, including Smart and Piltel), Globe Telecom (in the Philippines), Telkomsel (in Indonesia), Bharti Tele-Ventures (in India), Telemig (in Brazil) and MTN (in South Africa and Nigeria). Even for them we have had to make some simplifications and interpretations of the figures.

There are related variations in operating expenditures. As proportions of operating expenditures:

- Roaming and interconnection costs vary between 10% and 20%.
- Network operations and maintenance costs vary between 10% and 30%.
- Personnel costs vary between 7% and 10%.
- Goods sold costs vary between 6% and 23%.
- Sales and marketing costs vary between 5% and 27%.

Figure 30 tabulates information about these network operators extracted from the annual reports and expressed in a form intended to help with understanding the cost factors.

			Smart and Piltel	Globe Telecom	Bharti Tele-Ventures	Telkomsel	Telemig	MTN South Africa	MTN Nigeria
Revenues									
	Own customers								
		Customer equipment					9%	12%	1%
		Subscriptions							
		Calls							
		Messages	48%	41%		25%	5%	6%	2%
	Other customers		2%						
		Roaming				3%			
		interconnect				2%			
Incremental capital expenditure			28%	23%	63%	4%	27%	10%	59%
	Networks								
		Access equipment and links							
		Core equipment and links							
		Support systems							
		Accommodation							
	Government								
		Licensing and spectrum							
Operating expenditure			32%-40%	37%	66%-88%	42%	59%	81%	72%
	Networks								
		Access equipment and links	2%			12%		8%	7%
		Core equipment and links							
		Support systems							
		Roaming							
		Interconnect	3%					16%	8%
		Accommodation							
		Transport							
		People							
	Overheads								
		Advertising and marketing	4%			2%		22%	8%
		Sales incentives							
		Purchasing incentives	10%			4%		13%	4%
		Billing and collection							
		Accommodation	1%			1%			
		Transport							
		People	3%			6%		5%	5%
	Finance							15%	24%
		Depreciation and amortisation	10%			16%			
		Interest			6%				
		Provisions	1%						
	Government								
		Tax	1%						
		Licensing and spectrum							
	Exceptional items								
		Asset impairment	1%						
		Foreign exchange transactions	4%						

Figure 30 Revenues and costs as percentages of overall revenue for some operators

Network design: suggestions about cost factors

Figure 31 indicates in general terms how operating costs are influenced by particular factors for wireless networks, using the same cost categories as Figure 30. Cells where there are significant influences of factors on costs are shaded; individual factors and costs themselves may make different contributions to overall costs. Relative magnitudes of the costs are outlined above for particular operators in particular years; in some cases they are also suggested by the Nokia and Alcatel papers described in 3.1.2. The effect of the some of the factors on hypothetical networks are discussed in the SIDA study described in 3.1.2.

			Subscriber numbers	Traffic (Minutes of use per year)	Coverage (Sq Km)	Terrain	Frequency (MHz)	Service quality
Operating expenditure								
	Networks							
		Access equipment and links		■	■	■	■	■
		Core equipment and links		■	■			
		Support systems	■	■				
		Roaming		■				
		Interconnect		■	■			
		Accommodation	■		■		■	
		Transport			■	■	■	■
		People	■		■	■		■
	Overheads							
		Advertising and marketing	■		■			■
		Sales incentives	■		■			
		Purchasing incentives	■	■				
		Billing and collection	■		■	■		
		Accommodation	■		■	■		
		Transport			■	■		
		People	■		■	■		■
	Finance							
		Depreciation and amortisation	■	■	■	■		
		Interest	■	■	■	■		
		Provisions	■					
	Government							
		Tax	■	■				
		Licensing and spectrum			■		■	
	Exceptional items							
		Asset impairment						
		Foreign exchange transactions						

Figure 31 Dependence of costs on various factors

In quantifying the cost factors we would typically take minutes of use as a conventional measure of the traffic carried by a voice network (though not by a multimedia network). However some operators, led by Smart, have pricing strategies that encourage the use of SMS messages instead of phone calls. (For instance, they may arrange that the cheapest e-refill is not enough for a phone call with a useful length but is enough for several SMS messages.) Assessments of such strategies might need to make SMS messages correspond with minutes of use for phone calls, for the purposes of examining their costs and revenues. There are various possible correspondences; for instance 480 SMS messages can be said to correspond with 1 minute of use[79]. Generally the correspondences confirm that SMS

[79] An SMS message with the maximum 160 characters requires a 144-octet protocol data unit, if the 7-bit encoding is used. This is typically carried in a standalone dedicated control channel; there may be 8 such channels in a time slot. One phone call occupies one time slot unless the (poor quality) half-rate codec is used, in which case two phone calls occupy one time slot. To first approximation, 8 full-length SMS messages can be transmitted through a time slot in 1 second, so 480 such messages are equivalent to 1 minute of use. This is arguably an overestimate, as it ignores constraints on the provisioning of standalone dedicated control channels. It also concentrates on

messages can be tens or even hundreds of times more profitable than phone calls having corresponding minutes of use: though networks supporting many SMS messages need particularly careful design they are not fundamentally different from other GSM networks.

the access bandwidth requirements, ignoring (for example) the need for the SMS centre hardware and software.

Annex D Regulating mobile markets

This Annex reproduces the GSMA's website publication 10 Key Lessons from the GSM Association: How To Regulate Tomorrow's Mobile Market, interspersed with *study comments in italics*.

More regulation while competition is increasing? That does not sound right, according to the GSM Association. Instead, given the innovative nature of 3GSM, its embryonic status and the current lack of market and legal certainty, regulatory forbearance is advisable.

Below a set of key principles - recently approved by our GSMA Regulatory Advisory Panel - as food for thought:

1. Regulators should continue to seek a balance between the benefits and costs of intervention, on the one hand, and regulatory forbearance, on the other.

An overly interventionist approach, which could lead to short-term benefits, could potentially stifle a dynamic market process with inevitable and adverse competitive, economic and even social consequences on the longer term. In general, competition is deemed to be a better approach to economic efficiency than regulation, and the regulators must encourage sustainable competition for the long term.

Study comment: Agreed. However, many regulators are charged with meeting social as well as economic goals. Universal service programmes typically address those markets which are not expected to be well served on a purely commercial basis. Operators wishing to minimise regulatory intervention would be well-advised to do all they can to serve low income markets.

2. Regulation should be based on clearly defined goals and policy objectives and should be kept to the minimum necessary to meet these objectives.

Once effective competition is established or there is a reasonable prospect of an effectively competitive market in the near term, regulatory forbearance should prevail (with competition law providing appropriate safeguards).

Study comment: Whatever the level of competition, consumer protection objectives remain (and may increase in importance, for example if selling methods become over-aggressive). Sector-specific consumer protection may well still be necessary even if and when sector-specific economic regulation is no longer needed.

3. Regulators should acknowledge that 'normal' competitive markets reflect a range of operator return and should not intervene in competitive markets where one or more operators' return appears to be above the 'norm'.

In the mobile market, the reality is that some operators have made good returns (on invested capital), while others have not. This situation is not of itself a cause to regulate away 'excess profits'. If a regulator judges from the highest standard, and regulates accordingly, then the less performing companies will unavoidably hit, thus further reducing already inadequate returns and threatening long term competitive development.

Study comment: the combination of high profits (however well-earned they may be) and restricted entry opportunities to an oligopolistic market is bound to excite suspicion of excess profits. Governments and regulators should aim to maximise market openness, in particular by making available suitable spectrum to enable new competitive entry. In so doing they will of course be reducing regulation, in this case for spectrum.

4. Regulation should fit (reflect) the market situation and balance the micro and macro views.

For example, when in certain cases mobile termination or roaming charges may appear high to regulators in certain countries, these cannot be judged in isolation.

Study comment:Agreed. There is a lamentable dearth of data in the public domain to permit informed debate on actual costs and justifiable charges. Only the operators can supply this information.

5. Regulators should be publicly accountable and act in a transparent way.

Regulatory intervention should only be imposed after an appropriate public consultation process, which in most cases, will include market definition and assessment and a further assessment as to the appropriate regulatory remedy. A full right of appeal both on grounds of law (substance) and procedure (process) is an essential element of the checks and balances, which are necessary between operators and regulators.

Study comment: Reasonable levels of accountability and transparency can usually be achieved without the procedural panoply called for here. Full market review processes are hard work for even well-resourced regulators in rich countries. The balance that the GSMA advocates elsewhere is needed here too. While maintaining transparency, regulators must be able to act quickly in the public interest and to minimise the need for retroactive remedies.

6. Governments should adopt licensing practices that encourage new investments in telecommunication infrastructures and facilitate competition within the sector.

Un-harmonized license award procedures together with varying license conditions/obligations may lead to varying investment incentives in national markets and may eventually give rise to some discrepancy with respect to the levels of mobile service developments. Licensing policies and procedures must be applied judiciously since not only they can influence market entry but also the post-entry conditions affecting competitiveness and market development. For auctions to contribute positively to economic welfare, they must meet a set of stringent preconditions (all potential bidders must be fully informed as to any Government imposed terms and conditions, including fees and changes to fees). When designing auctions, policy-makers should seek to achieve efficient resource allocation rather than primarily aiming to raise surplus government revenue. High license fees in some developed countries may constrain the ability of operators to invest in developing countries.

Study comment: Agreed. It is also important that licence terms and conditions do not constrain future competition.

7. Spectrum should be allocated on the basis of achieving economically efficient, competitive and structurally desirable outcomes rather than to extract monopoly rents from the industry.

If the market is the best allocator of scarce resources, as most economists would argue, it is important that countries should be able to develop their own spectrum trading arrangements. In principle, regulators should allow for secondary trading of spectrum within planned internationally frequency allocations, after a thorough consultation process with the industry (i.e. mobile operators) evaluating the advantages and disadvantages of spectrum trading.

Study comment: Agreed. Such consultation should also include consumers and the general public, and decisions should be based on a public-interest analysis that would include consideration of licence-exempt uses of spectrum..

8. The feasibility and commercial desirability of sharing of facilities and infrastructure is a matter, which is operator and market specific.

In certain circumstances, sharing can be beneficial by, for instance, driving efficiencies through accelerated network rollout, the potential elimination of unnecessary cost duplication and the minimization of certain adverse environmental impacts. Accordingly, regulators should enable commercial negotiations on facility sharing among mobile operators to proceed subject however to license conditions not prohibiting the proposed form of sharing and competition not being materially and adversely impacted by the proposed form of sharing.

Study comment: Agreed. Regulators should also have reserve powers to encourage or even require infrastructure sharing if there is a clear public-interest case for it and market forces are not bringing it about.

9. Restrictions on the deployment of mobile networks should be based on science and substantiated studies, and not in response to 'public concern' which is without scientific basis.

Study comment: Agreed. Similarly, mobile operators' advertising material should be strictly factual and avoid any emotional dimension.

10. Adequate consumer safeguards against the inappropriate use of customer data are in place in most countries.

In overseeing the implementation of those safeguards, regulators should balance the interests of consumers to data privacy, on the one hand, and timely and easy access to services and information on the other. Further, regulators should look first to relevant self-regulatory industry initiatives to achieve those objectives.

Study comment: Privacy concerns and safeguards vary greatly from place to place. Regulators need to consult the public and citizen/consumer representatives on the correct balance for their own country. To be credible and effective, self-regulatory initiatives would need to be transparent and involve public interest representatives.

Annex E Data from various countries on household expenditures on telecoms

This annex brings together household expenditure statistics from a range of countries and periods. This collection draws mainly on statistical offices' published reports, which provide different data breakdowns. The statistics below are therefore not systematic. However, several countries provide particular information which may be illuminating. For example, Sri Lanka covers postal spending, Chile splits payphones from other phones, and Albania and South Africa split mobile phones from fixed phones. The few available time series are of particular interest.

For several reasons, the figures are not easily comparable across countries. In particular, total household income or expenditure is defined in different ways (and within any one definition may suffer from significant inaccuracies, especially in countries with large informal economies). They should rather be viewed as illustrative of available statistics and ranges of values.

Key

Q1 is the lowest quintile (20%) of the population ranked in terms of income or expenditure, and so on up to Q5 which is the highest quintile. So Q1 are the poorest 20% and Q5 the richest 20%.

D1 is the lowest decile (10%) of the population ranked in terms of income or expenditure, and so on up to D10 which is the highest decile. So D1 are the poorest 10% and D10 the richest 10%.

B1, B2…are income bands other than quintiles or deciles, in increasing order.

Unless otherwise indicated, the figures shown for spending on telecoms by households with their own phones are estimates that ignore spending outside the home (eg at payphones). This means that they are somewhat biased upwards, but we have only used this technique where we have reason to believe that this is a fairly small effect.

Table of contents

Albania 2002-2003

Monthly spending (lek)	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	All
Telephone spending	6	28	81	132	211	229	404	393	646	1176	3306
Mobile phone spending	55	130	151	398	565	748	850	989	1401	3887	9173
Total spending	10201	15993	19650	23254	27002	31044	35425	42354	54414	109040	368377
Percentage spending											
Telephone as % of total spending	0.1%	0.2%	0.4%	0.6%	0.8%	0.7%	1.1%	0.9%	1.2%	1.1%	0.9%
Mobile phone as % of total spending	0.5%	0.8%	0.8%	1.7%	2.1%	2.4%	2.4%	2.3%	2.6%	3.6%	2.5%
Total	0.6%	1.0%	1.2%	2.3%	2.9%	3.1%	3.5%	3.3%	3.8%	4.6%	3.4%

Source: Sebastian Ureta-Icaza's analysis of data from 2002-3 Albania Panel Survey (INSTAT 2003)

Australia 1984-1999

	Q1	Q2	Q3	Q4	Q5	All
Weekly telecoms spend ($ Au)	9.03	11.45	12.58	13.67	15.64	12.47
% of expenditure	5.95	3.23	2.12	1.50	0.97	1.72

Source: Household Expenditure Survey 1993-4

Telecoms expenditure as % income, by quintile, over time

	Q1	Q2	Q3	Q4	Q5	All
Survey 1 1984	3.6	2.2	1.5	1.1	0.8	1.3
Survey 2 1988-9	4.5	2.5	1.7	1.3	0.9	1.4
Survey 3 1993-4	5.9	3.2	2.1	1.5	1.0	1.7
Survey 4 1998-9	7.9	3.7	2.7	1.9	1.3	2.1

Source: Household Expenditure Surveys

Botswana 1993-1994

% of expenditure on telephone

	B1	B2	B3	B4	B5	B6	B7	B8	B9	B10	B11	All
Towns	0.0	0.0	0.3	0.3	0.3	1.6	0.9	2.6	1.2	3.4	2.2	2.0
Villages	0.1	0.2	0.5	1.3	0.5	0.9	1.9	1.1	1.3	1.8	1.5	1.3
Rural	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1
All	0.0	0.1	0.2	0.5	0.3	0.9	0.9	1.5	0.9	2.3	1.9	1.4

Source: Household Income and Expenditure Survey 1993/4

Bulgaria 1992-1998

Average percentage of household money expenditure on communication

Year	1992	1993	1994	1995	1996	1997	1998
Telephone expenditure (%)	0.9	1.1	1.1	0.9	1.0	1.3	1.5
Teledensity (per 100)	27.4	28.5	29.5	30.5	31.7	32.3	32.9
% households with a phone				77.4	80.8	82.0	84.6

Source: Expenditure – Household Budget Statistics, National Statistical Institute, Sofia, 1998

Teledensity, household penetration - ITU

Chile 1987 and 1997

Percentage of Household Expenditure On Utilities 1987

	Q1	Q2	Q3	Q4	Q5	All
Water	2.15	1.63	1.33	1.05	0.68	0.98
Electricity	4.52	3.67	3.22	2.63	1.73	2.38
Residential phone	0.49	0.47	0.74	1.28	1.55	1.29
Payphone	0.07	0.09	0.11	0.14	0.08	0.08
Total, telecoms	0.56	0.56	0.85	1.42	1.63	1.37
Total	7.23	5.86	5.39	5.10	4.03	4.73

Source: Publicación Cuarta Encuesta Presupuestos Familiares 1987. Volume 3. INE

Percentage of Household Expenditure On Utilities 1997

	Q1	Q2	Q3	Q4	Q5	All
Water	2.35	1.73	1.43	1.14	0.77	1.14
Electricity	3.79	3.01	2.50	1.97	1.31	1.94
Residential Phone	3.38	3.32	3.44	3.10	1.95	2.62
Payphone	0.17	0.14	0.15	0.10	0.06	0.09
Mobile phone	0.02	0.03	0.08	0.14	0.26	0.17
Total, telecoms	3.57	3.49	3.67	3.34	2.27	2.88
Total	9.70	8.23	7.60	6.46	4.35	5.95

Source: Datos preliminares Quinta Encuesta Presupuestos Familiares 1997.

Cyprus 1980-1981

	B1	B2	B3	B4	All
Comms spend (mils/2 wks)	1,016	1,215	1,371	2,094	1,446
Comms spend (% of total spend)	0.88	0.77	0.82	1.01	0.88

Source: Household Consumption Expenditure Survey 1980-1, Dept of Statistics and Research, Ministry of Finance, August 1982.

Eritrea 1996-1997

Transport and communications overall 2% of urban household spending, 1% for lowest quintile of urban residents.

Source: Urban Households and Urban Economy in Eritrea: analytical report from the urban Eritrean household income and expenditure survey 1996/97, Marie W. Arneberg and Jon Pedersen, FAFO 2001

Ethiopia 1995-1996

Urban only	B1	B2	B3	B4	B5	B6	B7	B8	B9	B10	B11	B12	B13	B14	All
Comms spend (amount)	43.4	26.8	4.2	2.8	8.9	6.4	7.0	11.2	20.4	19.3	49.3	115.5	158.6	283.4	29.8
Comms spend (% of total spend)	0.8	0.4	0.1	0.1	0.3	0.2	0.2	0.3	0.4	0.3	0.7	1.4	0.7	0.8	0.5

Source: Report on 1995/6 household income, consumption and expenditure survey, vol.1. Central Statistical Authority, Statistical Bulletin 170. January 1997.

These figures are provided mainly to show that they are available. Their fluctuations suggest small cell sizes, and correspondingly high margins of error. Still, we can probably infer both that spending levels on comms are extremely low across all income levels, and that even the poorest groups have non-zero comms spending.

The relatively high spends shown at the lowest household income bands are partly associated with smaller household size (that is, some of these households are overall better off than many households with higher incomes and more people).

Four former communist countries 1996-1998

Share of telephone expenditure in household expenditure (%)

	All households			Households with a phone		
	All	Non-poor	Poor	All	Non-poor	Poor
Armenia	0.37	0.33	0.46	0.65	0.58	0.82
Croatia	0.81	0.85	0.64	0.95	0.93	1.07
Russia	0.93	0.56	1.77	2.1	1.15	5.12
Ukraine	0.23	0.22	0.24	0.62	0.59	0.62

Data collected by World Bank Utilities Study from various household surveys, 1996-8.

“Poor” here indicates the lowest one-third of the population in income terms, and “non-poor” the upper two-thirds

Israel 1979-1980

	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	All
Post and phone spend (amount)	8	15	18	22	30	34	40	35	44	46	29
Post and phone spend (% of total spend)	0.8	1.0	1.0	1.1	1.3	1.5	1.5	1.2	1.4	1.2	1.3
% of households with own phone	18.6	37.7	53.3	59.7	60.1	68.4	72.5	79.5	81.6	84.3	61.5
Post and phone spend as % of total spending, households with own phone	4.0	2.8	1.9	1.9	2.2	2.2	2.1	1.5	1.8	1.4	2.0

Source: Family Expenditure Survey 1979/80, Part B, Family Budget by Income Level. Central Bureau of Statistics Special Series no. 711, 1983.

Hungary 1997

	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	All
Annual telecoms spend (HUF), all	4884	7047	8477	9191	9602	10952	12301	13912	16103	23413	11587
% with fixed telephone	47.2	54.3	59.4	59.9	65.2	66.3	69.6	75.6	82.4	88.1	68.8
Net per capita income at top of decile (k HUF)	132	1631	186	209	233	259	301	324	395	-	
% of expenditure, telephoned	4.1	3.3	3.0	2.9	2.5	2.5	2.3	2.2	2.0	1.9	2.4
% of expenditure, all	2.0	1.8	1.8	1.7	1.6	1.6	1.6	1.6	1.7	1.7	1.7

Source: Statistics (first 3 rows) from Hungarian Statistical Office. Last two rows calculated assuming average household size of 2.7 and decile average income at midpoint of range; except D1 where it is assumed to be 0.7 of the top of the range, and D10 where it is assumed to be 1.3 of the bottom of the range.

Jamaica 2001

	Q1	Q2	Q3	Q4	Q5
Mean Household Size	5.23	4.34	3.58	3.15	2.26
Monthly Household Expenditure on Telecom Services JA$	1112	1209	1344	1522	2090
Telecom Expenditure as a % of Total Household Monthly Expenditure	7.7	6.3	6.0	5.9	5.3
Telecom Expenditure as a % of Total Household Monthly Disposable Income	6.7	5.5	5.3	5.2	4.6
Electricity Expenditure as a % of Total Household Monthly Disposable Income	5.0	4.5	5.1	4.5	3.5
Water Expenditure as a % of Total Household Monthly Disposable Income	3.2	2.5	2.7	2.7	2.0
Total Utilities Expenditure as a % of Total Household Monthly Disposable Income	14.9	12.5	13.1	12.4	10.1

Source: Jamaica Survey of Living Conditions 2001, Planning Institute of Jamaica and Statistical Institute of Jamaica (as reproduced in OUR 2002 consultation document)

Lithuania 2000

	1996	1997	1998	1999
Comms spending as % of total spending	1.0	1.3	2.2	2.7

Source: Household income and expenditure survey 1999, A350, Statistics Lithuania 2000

	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10
Comms spending (L per head per month)	2.1	4.2	5.9	6.6	7.2	8.0	10.2	13.3	15.3	25.2
Comms spending as % of total spending	1.6	2.1	2.4	2.3	2.2	2.1	2.3	2.6	2.4	2.3
% of households with phone	42.4	59.0	64.3	69.9	70.7	72.6	81.6	84.6	81.1	89.7
Comms spending, households with phone	5.0	7.1	9.2	9.4	10.2	11.0	12.5	15.7	18.9	28.1
Comms spending as % of total spending, households with phone	3.8	3.6	3.7	3.3	3.1	2.9	2.8	3.1	3.0	2.6

Source: Household income and expenditure survey 1999, A350, Statistics Lithuania 2000

Macedonia 2004

	B1	B2	B3	B4	B5	B6	B7	B8	B9	B10	All
Comms spending (D/year/household)	828	2455	6260	10931	14648	19712	20707	31295	28358	47768	15122
As % of total spending	1.6	2.3	3.5	4.4	4.6	5.1	4.5	5.9	4.7	4.8	4.5

Source: Household consumption in the Republic of Macedonia, 2004; RoM State Statistical Office, 497, June 2005

	2002	2003	2004
% of households with fixed phone	83.2	88.0	86.3
% of households with mobile phone	19.9	31.3	49.7

Source: Household consumption in the Republic of Macedonia, 2004; RoM State Statistical Office, 497, June 2005

Mexico 2000

Monthly spending	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10
Communications spend (P)	23	60	105	156	224	319	400	586	955	1819
Communications %	1.2	1.6	1.7	2.9	3.3	3.7	3.8	3.5	3.8	5.1

Source: Sebastian Ureta-Icaza's analysis of data from Encuesta Nacional de Gastos de los Hogares (INEGI 2000)

Nepal 2003-2004

	Q1	Q2	Q3	Q4	Q5
Average total comms spend, zero journey time to phone booth (NR/year)	249	300	1,651	3,003	10,006
Average total comms spend, 0 to 30 mins journey to phone booth (NR/year)	67	159	650	1,570	6,028
Average total comms spend, 0 to 30 mins journey to phone booth (% of total consumption)	0.2%	0.4%	1.3%	2.2%	3.3%
Percentage of total comms spend by those with 0 to 30 mins to phone booth which is regular	47%	32%	75%	80%	86%

Source: Analysis by Claire Milne of data from Second Nepal Living Standards Survey, Central Bureau of Statistics

Note: "0 to 30 minutes journey to phone booth" was used in this analysis as a proxy for the availability of telephone service, whether public or private. (No households with private telephone service had more than 30 minutes' journey to a phone booth). "Regular" spending here means spending on home telephone facilities (private service).

Peru 1997

Metropolitan Lima	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	All
Telecoms spend, all households	14	49	137	145	307	376	471	664	745	1624	452
Telecoms spend, households with a phone	451	777	874	709	760	825	844	852	952	1676	1028
% of households with a phone	3.1	6.2	15.5	20.8	40.6	44.8	55.2	78.7	78.4	97.3	44.4
% of expenditure, telephoned	8.2	10.6	9.5	7.0	6.5	6.0	5.3	4.4	3.9	4.0	5.1
% of expenditure, all	0.3	0.7	1.5	1.4	2.6	2.7	3.0	3.5	3.0	3.8	2.2

Source: Encuesta Nacional de Niveles de Vida 1997

Singapore 1987-1998

	B1	B2	B3	B4	B5	B6	B7	B8	B9	B10	B11	All
Monthly comms spend ($)	10.7	13.5	16.1	17.7	19.9	20.6	27.6	30.8	32.2	34.1	57.2	18.9
Comms spend (%)	2.8	2.1	1.8	1.4	1.2	0.9	1.0	0.9	0.7	0.6	0.7	1.2

Source: Report on household expenditure survey 1987/8, Department of Statistics, August 1990

South Africa 1997 and 2000

Telephone expenditure as a percentage of total expenditure, 1997

	Q1	Q2	Q3	Q4	Q5	All
Telephone rental and installation	0.23	0.58	0.80	0.85	0.58	0.65
Telephone calls	0.72	1.17	1.92	2.21	2.33	2.22
Total telephone expenditure	0.95	1.75	2.72	3.06	2.91	2.87

Source: CSS Statistical Release, 27 March 1997, as quoted in *A telecommunications universal service policy framework for defining categories of needy people in South Africa,* a report for the South African Telecommunications Regulatory Authority by Stavros Stavrou assisted by Khumbulani Mkhize, DRA Development, Durban, April 1998.

Monthly spending, ZAR	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	All
Telephone	11	27	46	76	107	172	248	389	731	1514	3322
Mobile phone	1	3	3	7	19	27	53	122	266	1035	1536
Percentage of spending											
Telephone	0.4%	0.5%	0.6%	0.8%	0.9%	1.1%	1.1%	1.3%	1.4%	0.6%	0.8%
Mobile phone	0.0%	0.1%	0.0%	0.1%	0.2%	0.2%	0.2%	0.4%	0.5%	0.4%	0.4%
Telephone and mobile phone	0.4%	0.6%	0.7%	0.8%	1.0%	1.2%	1.4%	1.7%	1.9%	0.9%	1.1%

Source: Sebastian Ureta-Icaza's analysis of data from the Income and Expenditure Survey (Statistics South Africa 2000)

Sri Lanka 1995-1996

Spending in R/month	B1	B2	B3	B4	B5	B6	B7	B8	B9	B10	B11	B12	B13	B14	All
Postal spending – whole country	0	0	2	2	3	3	5	6	7	9	11	11	18	46	9
Telephone spending – whole country	0	0	0	0	3	1	2	1	4	10	18	25	114	483	26
Postal spending – urban	0	0	0	1	0	1	7	5	5	7	10	11	15	67	14
Telephone spending – urban	0	0	0	0	0	2	5	1	13	17	38	50	196	561	100

Source: Sri Lanka Consumer Finances and Socio Economic Survey 1996/7 Part II, Expenditure and Consumption. Central Bank of Sri Lanka.

Thailand 2000

	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	All
Monthly comms spend (baht)	4	10	24	36	56	102	168	299	484	986	217
Comms spend (%)	0.11	0.22	0.47	0.62	0.82	1.27	1.74	2.47	3.20	3.56	2.2

Source: 2000 Report of Household Socio-economic Survey, National Statistical Office

United Kingdom 1998-1999 and 2002-2003

1998/9	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	All
Weekly telecoms spend (£ UK)	3.90	4.40	4.80	5.60	6.10	6.80	7.00	7.80	8.90	11.80	6.80
% of expenditure	3.6%	3.1%	2.6%	2.5%	2.3%	2.0%	1.8%	1.7%	1.6%	1.5%	1.9%
% with no fixed telephone	18.4	10.0	5.4	5.1	4.9	3.1	1.0	0.3	0.3	0.2	4.9

Source: Family Expenditure Survey 1998-9; fixed and mobile telephones included

2002/3	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	All
Weekly telecoms spend (£ UK)	5.00	5.50	7.10	8.50	9.00	10.30	10.80	12.90	14.40	17.60	10.10
% of expenditure	3.7%	3.2%	3.2%	2.9%	2.7%	2.6%	2.4%	2.4%	2.3%	2.0%	2.5%
Increase of % since 1998-9 (% point)	0.1	0.1	0.6	0.4	0.4	0.6	0.6	0.7	0.7	0.5	0.6

Source: Family Expenditure Survey 2002-3; fixed and mobile telephones included

United States 1994

1994	Q1	Q2	Q3	Q4	Q5	All
Annual telecoms spend ($ US)	455	591	672	761	963	689
% of expenditure	3.2	2.8	2.4	1.9	1.6	2.1

Source: Consumer Expenditure Survey 1994

Percentage of families with a telephone by family income, November 1983

Income less than ($US 000)	5	7.5	10	12.5	15	17.5	20	25	30	35	40	50	75	>75	All
% with a telephone	71.7	82.7	88.2	89.7	92.1	94.6	95.7	96.9	98.0	98.8	99.0	99.2	99.4	99.4	91.4

Source: FCC Monitoring Report CC Docket no 87-339, July 1990

Annex F Country GDP per capita figures

Country	GDP/cap US$ PPP	GDP/cap US$	Country	GDP/cap US$ PPP	GDP/cap US$	Country	GDP/cap US$PPP	GDP/cap US$
Albania	4,582	2,434	Germany	29,204	33,099	Pakistan	2,372	577
Algeria	6,716	2,601	Ghana	2,428	451	Panama	6,763	4,806
Angola	2,608	1,580	Greece	20,387	18,995	Papua New Guinea	2,211	660
Antigua and Barbuda	12,116	11,790	Grenada	8,293	4,692	Paraguay	4,223	1,170
Argentina	11,982	4,132	Guatemala	4,048	1,966	Peru	5,385	2,379
Armenia	3,075	868	Guinea	2,024	375	Philippines	4,652	1,084
Australia	29,814	29,761	Guinea-Bissau	816	204	Poland	12,264	6,373
Austria	32,059	35,861	Guyana	4,625	1,035	Portugal	19,340	16,658
Azerbaijan	4,321	1,237	Haiti	1,647	650	Qatar	27,028	33,586
Bahamas	18,435	18,190	Honduras	2,637	1,062	Romania	7,957	3,277
Bahrain	17,668	13,764	Hong Kong SAR	29,239	24,581	Russia	10,301	4,750
Bangladesh	1,939	418	Hungary	16,338	10,896	Rwanda	1,274	189
Barbados	15,932	10,747	Iceland	32,843	44,133	Samoa	6,119	1,821
Belarus	7,202	2,992	India	3,019	652	São Tomé & Príncipe	1,534	372
Belgium	30,007	34,081	Indonesia	3,661	1,093	Saudi Arabia	11,888	10,795
Belize	6,665	4,120	Iran	7,631	2,608	Senegal	1,825	745
Benin	1,170	583	Ireland	37,894	46,335	Serbia & Montenegro	5,156	2,820
Bhutan	3,289	859	Israel	21,575	16,987	Seychelles	11,784	8,892
Bolivia	2,926	1,137	Italy	28,670	29,648	Sierra Leone	628	207
Bosnia & Herzegovina	7,035	2,167	Jamaica	4,087	3,003	Singapore	25,384	25,176
Botswana	10,399	5,713	Japan	29,165	36,486	Slovak Republic	14,877	7,963
Brazil	8,594	3,311	Jordan	4,461	1,988	Slovenia	21,587	17,660
Brunei Darussalam	15,171	14,366	Kazakhstan	7,859	3,185	Solomon Islands	1,759	534
Bulgaria	8,909	3,325	Kenya	1,084	489	South Africa	10,585	3,886
Burkina Faso	1,241	424	Kiribati	2,516	768	Spain	23,911	24,627
Burundi	762	103	Korea	19,515	14,649	Sri Lanka	4,107	1,052
Cambodia	1,775	327	Kuwait	13,673	19,288	St. Kitts and Nevis	11,941	8,546
Cameroon	1,889	860	Kyrgyz Republic	1,905	413	St. Lucia	5,206	4,095
Canada	33,104	32,073	Lao PDR	1,972	421	St. Vincent & Gren's	6,585	3,719
Cape Verde	5,690	2,161	Latvia	11,197	6,150	Sudan	2,221	643
Central African Rep	1,255	356	Lebanon	5,752	5,434	Suriname	5,871	2,785
Chad	1,860	567	Lesotho	2,149	546	Swaziland	5,161	2,043
Chile	10,981	5,742	Libya	9,618	5,317	Sweden	29,544	38,451
China	5,791	1,352	Lithuania	12,837	6,796	Switzerland	30,366	49,246
Colombia	6,741	2,119	Luxembourg	65,120	69,056	Syrian Arab Republic	3,711	1,386
Comoros	1,704	554	Macedonia, FYR	7,438	2,570	Taiwan	25,982	13,926
Congo, Dem Republic	639	122	Madagascar	847	263	Tajikistan	1,068	275
Congo, Republic	1,135	1,401	Malawi	676	174	Tanzania	672	323
Costa Rica	9,427	4,484	Malaysia	10,449	4,701	Thailand	7,851	2,807
Côte d'Ivoire	1,459	859	Maldives	7,008	2,355	Timor-Leste		400
Croatia	11,792	7,764	Mali	936	435	Togo	1,433	357
Cyprus	20,150	19,008	Malta	21,203	13,144	Tonga	6,877	2,226
Czech Republic	17,148	10,708	Mauritania	2,042	452	Trinidad and Tobago	12,297	10,117
Denmark	33,252	45,015	Mauritius	12,690	5,421	Tunisia	7,988	3,052
Djibouti	1,817	822	Mexico	9,726	6,566	Turkey	7,302	4,637
Dominica	5,931	3,772	Moldova	2,163	665	Turkmenistan	6,190	2,784
Dominican Republic	6,503	2,014	Mongolia	1,948	547	Uganda	1,509	296
Ecuador	3,979	2,168	Morocco	4,080	1,576	Ukraine	6,045	1,589
Egypt	4,049	1,118	Mozambique	1,365	294	United Arab Emirates	19,599	20,960
El Salvador	4,457	2,063	Myanmar	1,466	135	United Kingdom	28,877	36,977
Equatorial Guinea	22,288	6,235	Namibia	6,625	2,333	United States	39,711	42,076
Eritrea	1,056	157	Nepal	1,380	246	Uruguay	12,733	3,874
Estonia	14,284	8,885	Netherlands	29,663	35,393	Uzbekistan	1,734	376
Ethiopia	749	121	Netherlands Antilles	22,837	17,435	Vanuatu	3,053	1,440
Fiji	5,927	2,199	New Zealand	22,466	23,276	Venezuela	4,725	4,014
Finland	29,095	35,242	Nicaragua	2,582	794	Vietnam	2,685	528
France	28,145	33,126	Niger	857	273	Yemen, Republic of	704	553
Gabon	6,402	4,911	Nigeria	959	528	Zambia	894	461
Gambia, The	1,919	284	Norway	40,784	53,465	Zimbabwe	2,304	277
Georgia	2,702	927	Oman	16,751	10,292			

Source: International Monetary Fund World Economic Outlook database – all figures for 2005.