Mene, mene, tekel, upharsin

Counting mobile phones, SIM cards & customers

Ewan Sutherland

Introduction

The GSM Association has been promoting the success of its members, the mobile network operators, on the basis of massive growth in the number of their customers. At GSM World in Cannes in 2004 the numbers, having just passed one billion, were written on the side of a ship with a laser light shone from the shore. Today at over 3 billion, they can be followed on the GSMA web site, changing each second to simulate the acquisition of new customers.[1] Of these, there are already said to be 32 million "mobile broadband" connections.

In Africa, the number of customers was said to be 270 millions at the end of 2007 (see figure 1). The GSMA forecasts this will rise to over 300 million by the end of 2008 – an increase from 29 to 34 customers per 100 population.[2] However, some of those customers may have been counted more than once and some may be neither citizens nor even residents of the countries in which they are counted as customers.

Figure 1   *The growth of GSM subscribers in Africa*[3]
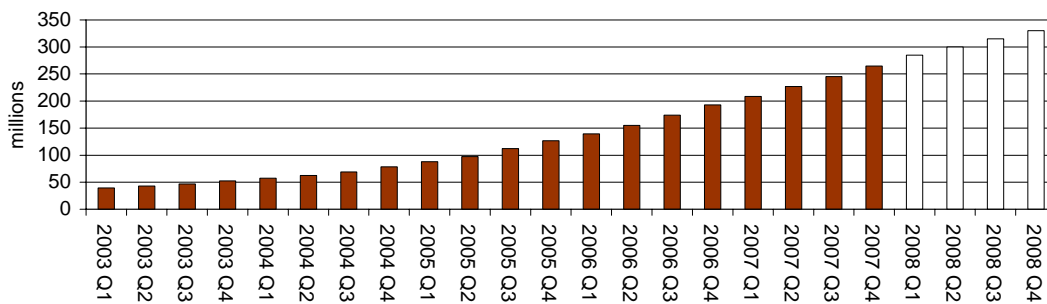
The question policy makers have to address is how to interpret such very large numbers and how they reflect the reality of their countries, cities, towns and villages. In particular they must consider whether they are achieving the Millennium Development Goals (MDGs) for which mobile subscribers per 100 population is a target indicator.[4]

Having a large number of customers looks good for mobile network operators, especially when making a case to government. On the other hand, it reduces the Average Revenue Per

---

[1] http://www.gsmworld.com/news/press_2008/press08_31.shtml
[2] Charles Kazooba "330m Africans will own cellphones in 2008" in *The East African* 31 March 2008
http://www.nationmedia.com/eastafrican/current/Business/biz310220085.htm
[3] http://www.gsmworld.com/news/statistics/index.shtml
[4] http://www.itu.int/ITU-D/ict/mdg/storyline/index.html

User (ARPU), since the total revenues must be spread more thinly, and thus it disappoints financial analysts. In theory this should restrain operators from being too zealous in reporting large numbers of customers.

The term subscriber is used loosely, including both customers who pay a monthly bill, i.e., who have a subscription, and more transient and quasi-anonymous pre-paid customers. It is the latter who are difficult to count, since they buy credit intermittently and make calls as they wish, giving them great flexibility. They may have several SIM cards for different networks. It is that very flexibility which makes it so difficult to convert telephone numbers or SIM cards into individual customers in a way that gives clear and unambiguous results.

It is no longer possible to count active SIM cards, since a single wealthy customer with one telephone number can have different SIM cards in each of: a mobile handset, a lap-top computer, a car and a personal digital assistant. They may also select different networks for voice and for data services becoming, in effect, two customers.

Distinguishing 3G from 2G customers is not easy, since 3G devices will, especially in the early years, often use a 2G network. For most public policy purposes this is not yet important, it is sufficient to bundle together 2G and 3G customers, revenues and traffic. Pressure from financial analysts is sufficient to ensure separate reporting by the operators of 3G, 3.5G, mobile television and non-voice revenues.

The best known problem concerns determining when a SIM card ceases to be active. If no outgoing calls have been made or text messages sent from a telephone number for several months, whether it is three, six, nine or twelve, it would appear reasonable to consider it to be inactive. However, especially for poorer countries, a pattern of inbound calls may justify a number being considered active, because there is revenue from the termination of those calls. For example, children working in a city or in another country may keep in contact with parents in rural areas by calling them, but without the parents making any or only very few calls. One reason operators threaten to deactivate a SIM card is to encourage the customer to buy more credit, but for the very poor this will not work and any incoming revenues would be lost.

Provided the definitions are consistent between operators and over time in a country, then the details are less important. With consistent data it is possible to arrive at a sufficiently accurate understanding of market shares and of churn rates. The market shares must also be checked by comparing customer numbers with traffic volumes and with revenues.

Rising numbers of customers may be presented to government as meaning that problems of the possible unaffordability of mobile services are limited. However, evidence from surveys suggests that there are significant groups who continue to find calls and handsets to be unaffordable.

Key public policy issues are not addressed by raw customer numbers, in particular access:

- in rural areas
- for the poor
- for the disabled

A figure of 100 per cent mobile phone ownership is not possible. There will always be those too young, too old and too disabled to use a mobile phone, some who are too poor, some who elect not to use one and a few in asylums and prisons who are forbidden their use.

This short policy paper considers the reasons why customers might have more than one phone, phone number or SIM card. It then considers the effects of visitors changing their SIM cards when crossing borders. The example of Bulgaria, with 133 per cent teledensity is analysed. Then the example of South Africa with "only" 86 per cent mobile teledensity is examined. Finally, conclusions are drawn concerning the value of raw customer numbers and of surveys of households.

Multiple phones and SIM cards

The reasons for a customer having different SIM cards and telephone numbers include:

- overcoming patchy or poor network coverage
- avoiding network congestion
- saving money by making on-net calls
- benefitting from discounted or bundled tariffs for voice or for data
- receiving calls or voicemail to an older number

It requires detailed research in each national market to identify the relative importance attached to each of these.

In countries where the perceived quality of the networks is not good, either where the coverage of individual operators is poor or where congestion is considered likely, customers will carry more than one SIM card so that they can switch to a network on which they can make a call.

Given substantially lower charges for calls to numbers on the same network, customers can have considerable incentives to switch to a particular network in order to make a particular call. They may switch back and forth between networks for different calls.

Operators often issue SIM cards with special offers, such as free on-net calls or a bundle of free SMS. These can be sufficiently attractive for customers to switch SIM card, even without changing networks. In some instances offers on handsets are sufficiently enticing for customers to abandon an older device.

A survey by the European Commission in late 2006 found that 79 per cent of a large sample of citizens had at least one mobile phone. This figure compares with operator results that suggested 103 customers per 100 people.[5] With an EU-25 population of around 460 millions, that would mean 100 million customers were unaccounted for.

The survey found significant numbers of EU citizens who had both a personal and a business mobile phone (see figure 2), complicating the interpretation of customer statistics. The variations in the numbers of these dual-phone customers appear to be the result of differences in national tax systems concerning employer liability for the benefit in kind of personal calls and cultural differences in the willingness to answer calls to a work number outside office hours.

---

[5] EC (2007) 12th Implementation Report. COM(2007) 155. Brussels: European Commission.

Figure 2   *Ownership of mobile phones in the European Union* (September 2006)[6]
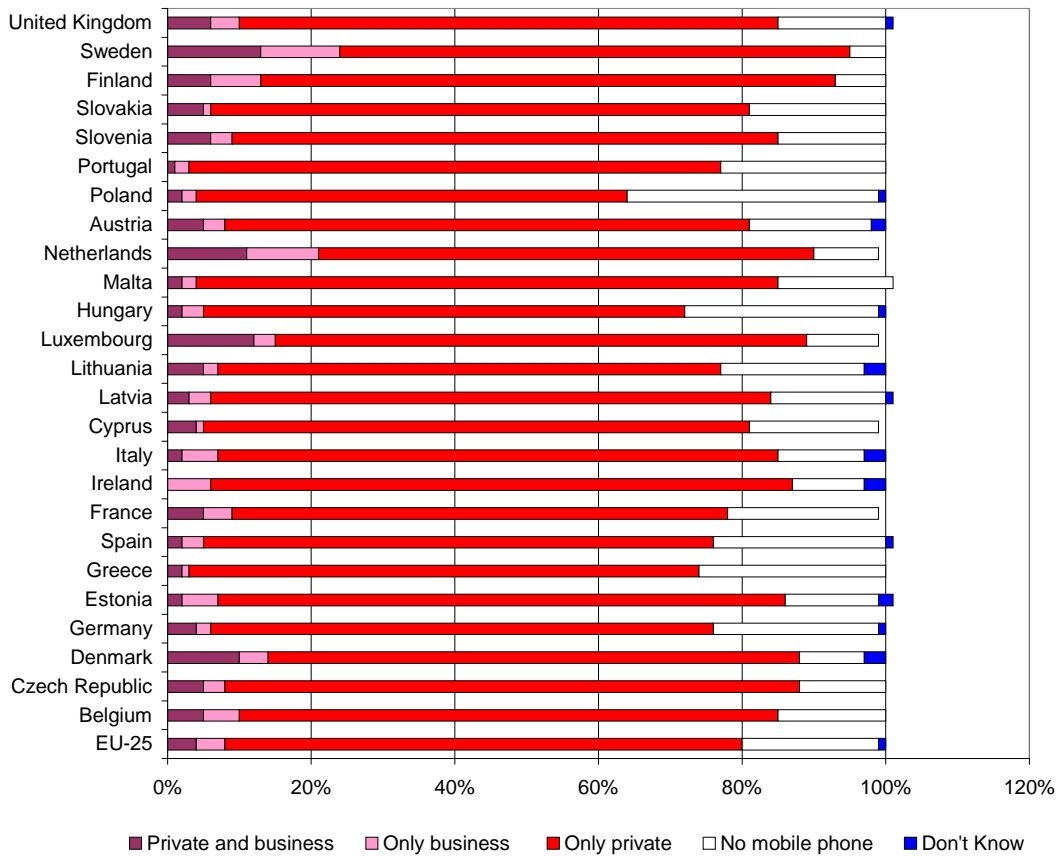
Significant numbers of people in the EU did not have a mobile phone, even in wealthy countries such as Denmark and the Netherlands. In poorer countries such as Hungary and Poland those without a phone were much more numerous reflecting unaffordability.

Mobile teledensity in a country does not appear to be a good predictor of the number of people without a mobile phone (see figure 3). Despite some countries having very high levels of mobile teledensity, these data raise concerns about social exclusion and reaffirm the need to consider special measures to widen access.

Figure 3   *Citizens with no mobile phone in the European Union* (September 2006)[7]
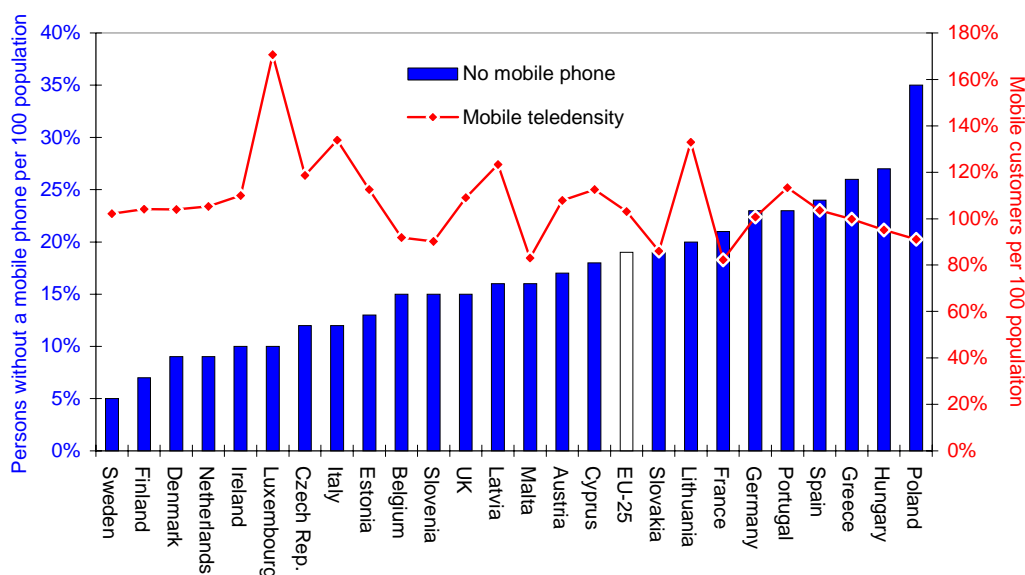
The Lao People's Democratic Republic and the Kingdom of Thailand share a long common border, mostly formed by the Mekong River. A large number of Lao citizens work in Thailand and many Thais visit Lao PDR as tourists, creating a demand for cheap telephony from Lao PDR to Thailand. Some citizens in Lao PDR purchase a SIM card for a Thai network for which they can obtain coverage in areas close to the border. For example, in Vientiane, the capital city, the Thai radio masts are visible across the Mekong. The concern of the authorities in Lao PDR is that the Thai operators have constructed their networks in order to maximize the traffic they obtain in Lao PDR. Here a second SIM card is obtained indirectly from a foreign operator in order to obtain cheaper "national" rates when in another country. Moreover, some Lao PDR residents are being counted as customers by the Thai operators.

At Study Group 3 of ITU-T the question of such cross-border activities was raised in 2007 by the Republic of Togo and again in 2008 by the Tariff Group for Africa, representing the African nations.[8] The potential economic damage to domestic operators of foreign networks obtaining such traffic and thus revenues was noted and a proposal made for penalties to be levied, based on the extent of the coverage penetrating another country.

There are sound reasons why an individual would wish to have more than one active mobile telephone number. Some of the reasons are of little or no concern in public policy, provided their effects can be accounted for in overall customer numbers and in measures of market competition and development. However, some reasons, such as poor network quality, inadequate coverage, distortions in tariffs and the retention of old numbers in the absence of mobile number portability, would suggest that regulatory interventions ought to be considered.

---

[7] Special Eurobarometer: Roaming Special Eurobarometer 269 / Wave 66.1 – TNS Opinion & Social
March 2007. Brussels: European Commission.
[8] TAF Group Contribution to help resolve the question of mobile network cross-border penetration
March 2008. COM 3 – C 29 Rev.2 – F. Geneva: International Telecommunication Union.

Plastic roaming

Regular travelers can engage in "plastic roaming", that is changing their SIM card on arrival in a foreign country to one from a local operator, they may even carry a stock of such cards.[9]

In Morocco and Tunisia there are two separate effects. One group comprises primarily Belgian, French and Italian citizens with holiday homes in North Africa who are likely to buy a local SIM card for use during their regular visits. The second group comprises the children and grand-children of Moroccans and Tunisians, living and working in Belgium, France and Italy who keep an active SIM card from North Africa for their visits there. Consequently, there is significant counting of two groups of non-residents.

The islands of Mauritius and Seychelles are popular holiday resorts, receiving in 2005 761,000 and 129,000 visitors respectively, compared to populations of 1.2 million and 82,000.[10] Given that these are not low cost destinations, tourists can be expected to make substantial contributions to the revenues of the mobile network operators by conventional international mobile roaming and also by plastic roaming. Counting foreign tourists and the owners of secondary homes as customers distorts the apparent level of mobile phone ownership in the permanent population. However, the revenues boost the operators and thus help to sustain commercial operations and competition in SIDS.

The mobile network operators know their revenues from conventional inbound and outbound roaming, though they may not wish to make these explicit for fear of regulation. With plastic roaming, they should be able to make estimates, based on the locations at which the SIM cards are sold and the geographical and temporal patterns of their use.

Bulgaria

One of the newest members of the European Union (EU) is Bulgaria, formerly a member of COMECON and the Warsaw Pact. It has undergone rapid social and economic changes since 1989. The GDP per capita is still only 38 per cent of the EU-27 average, while the GNI per capita (allowing for PPP) in 2006 was $10,140, compared to $11,710 for South Africa.[11]

One of changes was the introduction of competition in telecommunications, resulting in a considerable growth in mobile telephony. Mobikom was the first cellular service launched by Cable & Wireless using NMT 450 MHz in the early 1990s. Today there are three well established operators offering GSM and, more recently, 3G services (see table 1).

Table 1   *Mobile services launched in Bulgaria*

operator	owner	GSM	UMTS	HSDPA	customers (M)
Mobitel	Telekom Austria	1995	2006 Q1	2006 Q1	5.1
Globul	OTE	2001	2006 Q3	2006 Q3	3.7
Vivatel	BTC/AIG	2005	2006 Q1	2007 Q2	1.4

---

[9] The author presently has recently active pre-paid SIM cards for operators in Belgium, Lao PDR, South Africa, Thailand, the UK and the USA.

[10] Source: World Tourism Organisation.

[11] http://siteresources.worldbank.org/DATASTATISTICS/Resources/GNIPC.pdf

The population of Bulgaria was 7.6 million in 2007, down from 8.3 million a decade ago. This is not due to a decline in the birth rate or rising death rate, rather it is due to migration. Following the fall of communism in 1989, large numbers of citizens took the opportunity to move abroad, this increased from January 2007 when they were able to move to many of the other European Union member states. Consequently, there are between 1.0 and 1.5 million Bulgarians resident in other countries, many of whom maintain active links with their families and friends, making regular visits home.

Another consequence of EU membership, combined with the availability of cheap flights, has been considerable growth in the property market. Apartments and villas on the Black Sea coast and near skiing resorts have been constructed and sold to non-Bulgarians, who are resident only for part of the year in their second (or third) homes.

Telekom Austria reported that its subsidiary: "Mobiltel increased its customer base by 19.5% to 5.1 million customers at the end of December 2007 compared to end of 2006."[12] That would appear to mean that two-thirds of the resident population was associated with a single operator. Yet its market share was reported to have declined from 52.5 per cent at the end of 2006 to 50.3 per cent at the end of 2007. This was possible because the mobile penetration level had, apparently, reached 132.8 per cent "as many customers in Bulgaria owned more than one SIM card".

At the beginning of 2006 a survey of households in Bulgaria, reported that only 53 per cent had a mobile phone (see figure 4). This compared to an EU-25 average of 79 per cent, 61 per cent with both fixed and mobile and 18 per cent with only mobile.

Figure 4   *Households with voice telephony in Bulgaria[13]*
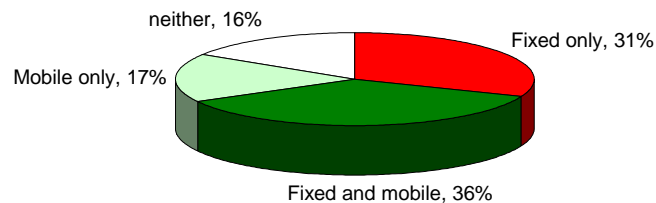
The implausibly high number of customers appears to be explained by:

- Bulgarians in residence in foreign countries
- foreigners with a secondary residence in Bulgaria
- Bulgarian residents with multiple SIM cards
- long-distance truck drivers, business travelers, tourists and other visitors

While the numbers, even when they add up to 133 per cent, may be sufficient to determine market shares, they are of little value for public policy, raising more questions than answers.

---

[12] Telekom Austria report for 2007 Q4.
[13] Eurostat (2006) E-Communications household survey. Special Eurobarometer 249, Wave 64.4 - TNS Opinion & Social. Brussels: European Commission.

South Africa

The market for mobile telephony in South Africa appears to be approaching saturation. MTN estimated there were 86 mobile phones per 100 population at the end of 2007. However, an assessment relies on the numbers provided by the operators, which are reported in different ways and at different times. Tables 2 and 3 show data from Vodacom and MTN, taken from recent annual reports, while Table 4 shows data from Cell-C.

Table 2 *Vodacom customers in South Africa (thousands)*

	2007	2006	2005	2004	2003
Post-paid	3,013	2,362	1,872	-	-
Pre-paid	19,896	16,770	10,941	-	-
Community services	95	30	25	-	-
Total	23,004	19,162	12,838	11,346	8,725

Note: as at 31 March of year.

The policy of Vodacom had been to disconnect inactive pre-paid SIM cards after seven months where there was no revenue generating activity. A telephone number abandoned by its customer may continue to generate revenue for an operator if people call that number, even accidentally, and leave messages on voicemail. Consequently, if there is only call forwarding to voicemail Vodacom will disconnect the number after thirteen months. The effect of introducing this second rule was to remove 2.9 million pre-paid "customers" from Vodacom reports in September 2007.

Table 3 *MTN customer numbers in South Africa (thousands)*

	2007	2006	2005	2005-03
Post-paid	2,493	2,288	1,784	1,391
Pre-paid	12,306	10,368	8,596	6,610
Total	14,799	12,483	10,380	8,001

Note: as at 31 December of year.

Table 4 *Cell-C customer numbers in South Africa (thousands)*

	2007-H1	2006	2005	2004
Post-paid	1,144	753	556	360
Pre-paid	2,166	1,900	1,900	1,600
Community centres	110	42	22	10
Total	3,420	2,695	2,478	1,961

Sources: Media Briefing, August 2006 and Press Release 7 August 2007.

Operators encourage customers to generate revenue for them with incoming calls. They offer a free service in which a message "Please Call Me" can be sent to another customer.[14] The cost is recovered from the responding calls.

There has been sufficient rivalry amongst the operators for special offers to appear, with customers in supermarkets able to buy a SIM card for ZAR 3. Combined with other special offers or discounted and free calls, it creates an environment in which SIM cards become disposable and interchangeable items.

A number of active SIM cards exist in special SIM-boxes. These have been used by some service providers to bypass the high call termination rates, taking calls from a fixed telephone or from a corporate network and routing them directly onto a mobile network.

Even assuming the number of active mobile phone numbers in South Africa is known, determining the teledensity requires an accurate figure for the population. Given the troubles in many African countries, South Africa acts as a temporary home for a large number of emigrants and refugees, not all of whom are formally registered. In particular, estimates of the number of refugees from Zimbabwe are uncertain, but could be over three million or one quarter of its population. Adding only the Zimbabweans would reduce the headline mobile teledensity from 86 to 79 per cent.

The number of real customers in South Africa is very difficult to determine, given the inconsistency of the data reported by the operators. The CEO of MTN complained when presenting the financial results in 2007, that his competitors kept changing their numbers so that he could not give an accurate market share. The poor quality of some parts of the network and the discounting of tariffs give customers sound reasons for having additional SIM cards. The notional figure of 86 mobile phones per 100 people, obscures the very real economic challenges in ensuring the widest possible access to the service in a large and diverse country.

Public policy

Accurate data are essential in public policy in order to allow a proper understanding of market developments. Accepting operator numbers of mobile customers is a straightforward and rapid process, though a few operators are still inclined to treat all data as "commercial in confidence". However, these are just a beginning and surveys are essential to provide even an adequate picture of developments.

Network operators can provide information about geographic coverage of their networks, outages, congestion, dropped calls and the like. These have to be audited and supplemented with data measured by neutral third parties.[15]

The concerns of the disabled, the blind, the deaf and, increasingly, the elderly, are best addressed by surveys and by directly engaging with their collective organizations. In this way needs can be accurately identified and, with the operators, solutions can be found.

The issue of affordability is one that concerns both ministries and regulators, though some are also worried that efforts to drive down prices will require excessive competition that

---

[14] See, for example http://www.vodacom.co.za/services/callme_about.jsp
[15] Ewan Sutherland (2007) "The regulation of the quality of service in mobile networks" *info* **9** (6) 17-34.

might reduce the profitability of the operators. It is important to be able to compare tariffs within a country and with similar countries – typically this is done with the OECD mobile baskets.[16] Tracked over time and with appropriate comparisons, it is possible to monitor the level of charges. When linked to survey data showing spending on telecommunications and the reasons given for restricting use of or not using mobile telephony, it is possible to identify the gap between market prices and socially desirable levels of access in order to find possible solutions.

The assumption had been that people do not know the level of mobile termination rates and made calls regardless. There is at least circumstantial evidence of consumers holding SIM cards from different networks and different tariff plans in order to save money on calls to specific numbers. Equally, the absence of mobile number portability creates a cost to customers of retaining old numbers in order not to miss messages from friends and business contacts. These are clearly worth further study.

There is an enormous amount of work that requires to be undertaken to dig down beneath a headline figure such as 86 or 133 per cent mobile teledensity in order to understand both the market dynamics and the social phenomena. Without sequestrating vast amounts of data from operators, this can only be done by means of surveys of individuals and households.

Conclusion

While it is relatively easy to obtain numbers of recently active customers from mobile network operators, such numbers may not convey very much information. They can be used as one indicator of relative market shares and can provide a sense of the overall growth of the market.

There are very sound reasons why ordinary citizens wish to have more than one active telephone number. On the one hand this needs to be allowed for in determining the number of customers and on the other it requires investigation by the authorities into the quality of the networks, the tariff schemes being applied and other possible market failures.

The mobile network operators have the advantage over ministries and regulators of very large amounts of data from their day-to-day activities. By using data mining techniques, they can determine patterns of consumer behaviour that allow them to improve their operations and profitability.

Beyond measuring relatively crude growth of mobile telephony, customer numbers provided by the operators quickly cease to be relevant. It is much more important to investigate in detail those groups adopting and not adopting the technology, together with the underlying reasons.

The GSMA count has now reached 3,000,000,000 "connections" the question is how many people are really being served? It may be necessary to take as many as 500,000,000 off the total to eliminate double and triple counting in order to arrive at the number of real people.

---

[16] OECD (2006) Revised OECD telecommunication price comparison methodology. DSTI/ICCP/CISP(2006)1. Paris: Organisation for Economic Cooperation and Development.

http://LINK.wits.ac.za/