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# Taxation and the Growth of Mobile in East Africa

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## Contents

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We would like to thank the following who have assisted us with this draft report and with the original report 'The economic impact and taxation of Mobile Telecommunications in East Africa' (2007): MTN; Safaricom; Vodacom; Warid; Zain; Ericsson; Nokia; Nokia Siemens Networks; Kenyan Telecommunications Regulatory Authority; Tanzanian Telecommunications Regulatory Authority; and Ugandan Telecommunications Regulatory Authority.

**Introduction from the GSMA**

Mobile phones are revolutionising the lives of millions of people in East Africa and will continue to be the primary means for the great majority to access voice, data and internet services. But mobile consumers in East Africa are taxed at some of the highest levels world-wide. In addition to VAT, an excise duty, or luxury tax, is levied on mobile services.

Recognising that this tax hits the poor hardest, the GSM Association, the global trade association representing the interests of over 850 GSM mobile phone operators and over 180 manufacturers and suppliers worldwide, in collaboration with GSM Africa, commissioned Deloitte to analyse the effect that lowering excise duties would have on the industry and total government receipts.

The findings are very encouraging. By lowering the excise duty on mobile services, governments can expect higher level of tax and extend the essential mobile franchise to poorer sections of society.

Today mobile phones are a basic need and not a luxury. All stakeholders will benefit if mobile services are taxed accordingly.

As the governments in East Africa go into their budgeting rounds, we call for an urgent review of mobile taxation policies. Restructuring mobile taxes can be a win win win solution for government, business and consumers.

Gabriel Solomon
(Senior Vice President)

Vitalis Olunga
(Africa Senior Vice President)

# 1 Context

The GSMA commissioned Deloitte to update our previous study entitled 'The economic impact and taxation of Mobile Telecommunications in East Africa', henceforth Deloitte (2007). Under the scope of this report, as set out in the engagement letter dated 12th September 2007, Deloitte was asked to:

- estimate the positive contribution that mobile telephony makes to economic and social welfare in Kenya, Uganda, Rwanda and Tanzania and where feasible, to quantify that impact; and

- examine the potential impact of reducing sector specific taxes applied to mobile telephone usage for Kenya, Uganda, Rwanda and Tanzania.

This draft report provides a revision of the results/findings set out in Deloitte (2007). It is based on revised data covering the period 2003 to 2006, and new data from 2007 to 2008. Data for full year 2008 was unavailable at the time of writing this report. For 2008 we have estimated full year values using data available for 2008, operator forecasts and trends.

# 2 Executive Summary

*'Mobile communication is perhaps the single most transformative technology for rural African villages to improve access to health care and education, create new business opportunities and access to markets, and ultimately to help eradicate extreme poverty'*

Jeffery Sachs 7th May 2008[1]

The impact that mobile communications is having on economic and social development in East Africa is akin to that of other major enabling infrastructure like roads, ports and railways. All stimulate trade, create jobs, generate wealth and enhance social welfare. Mobile communications, in particular, is making a profound impact by:

- delivering universal access, mobile networks cover the vast majority of East African citizens, and operators are investing substantial amounts in further network roll out;
- delivering universal services, mobile phones account for around 95% of all telecoms connections in East Africa; and
- boosting GDP, recent analysis by Deloitte shows that a 10% increase in mobile penetration leads to a 1.2% increase in GDP in the long-run across developing countries[2].

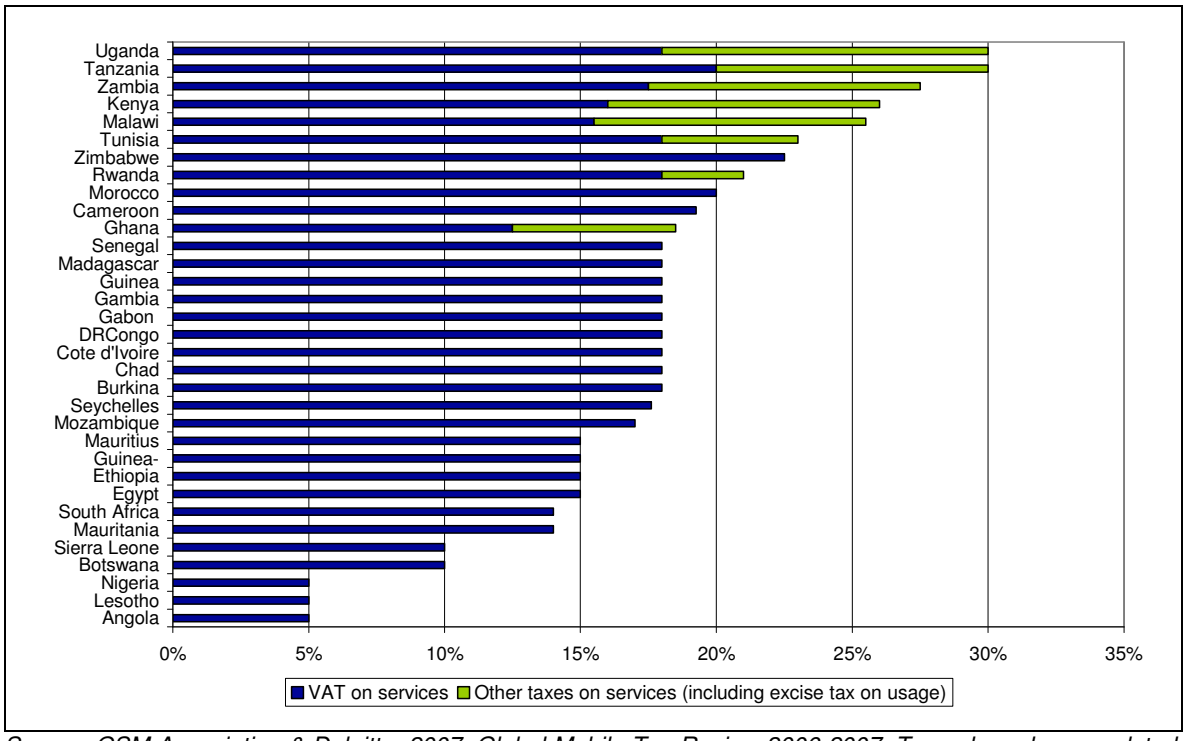
Despite the positive impact of mobile communications, East African community member states impose a sector specific tax on mobile usage impacts upon poorer consumers relatively harder. The excise duty also restricts the affordability of mobile services for many millions of East Africans. Globally only a small minority of countries, around 17 in total[3], impose mobile specific taxes. In Africa 8 countries do so and as the graph below shows. A substantial number of these are located in the East African community.

[1] Jeffery Sachs is Special Advisor to the United Nations Secretary-General and Director of Columbia University's Earth Institute.

[2] GSM Association & Deloitte. 2007. *Global Mobile Tax Review 2006-2007*.

[3] Findings from GSM Association & Deloitte. 2007. *Global Mobile Tax Review 2006-2007*. Results are updated for tax changes in Malawi, Ghana, Rwanda and Tanzania.

**Figure 1: Breakdown of taxes on mobile services**




*Source: GSM Association & Deloitte. 2007. Global Mobile Tax Review 2006-2007. Taxes have been updated to reflect changes in Malawi, Ghana, Rwanda and Tanzania.*

This report updates the quantification of the economic impact that the mobile industry has in each of the East Africa Community member states: Kenya; Rwanda; Tanzania and Uganda. It also assesses the taxation structure on the respective mobile industry and analyses the effects that lowering excise duties can have on the mobile industry and also government tax receipts.

## 2.1 Harmonizing taxation across East Africa

Currently, excise taxes are levied at 10% and 12% in Kenya and Uganda respectively. Since Deloitte (2007) Tanzania has increased taxation from 7% to 10%, whilst Rwanda initially introduced a 10% rate in January 2007 which was then reduced to 3% in July 2008.

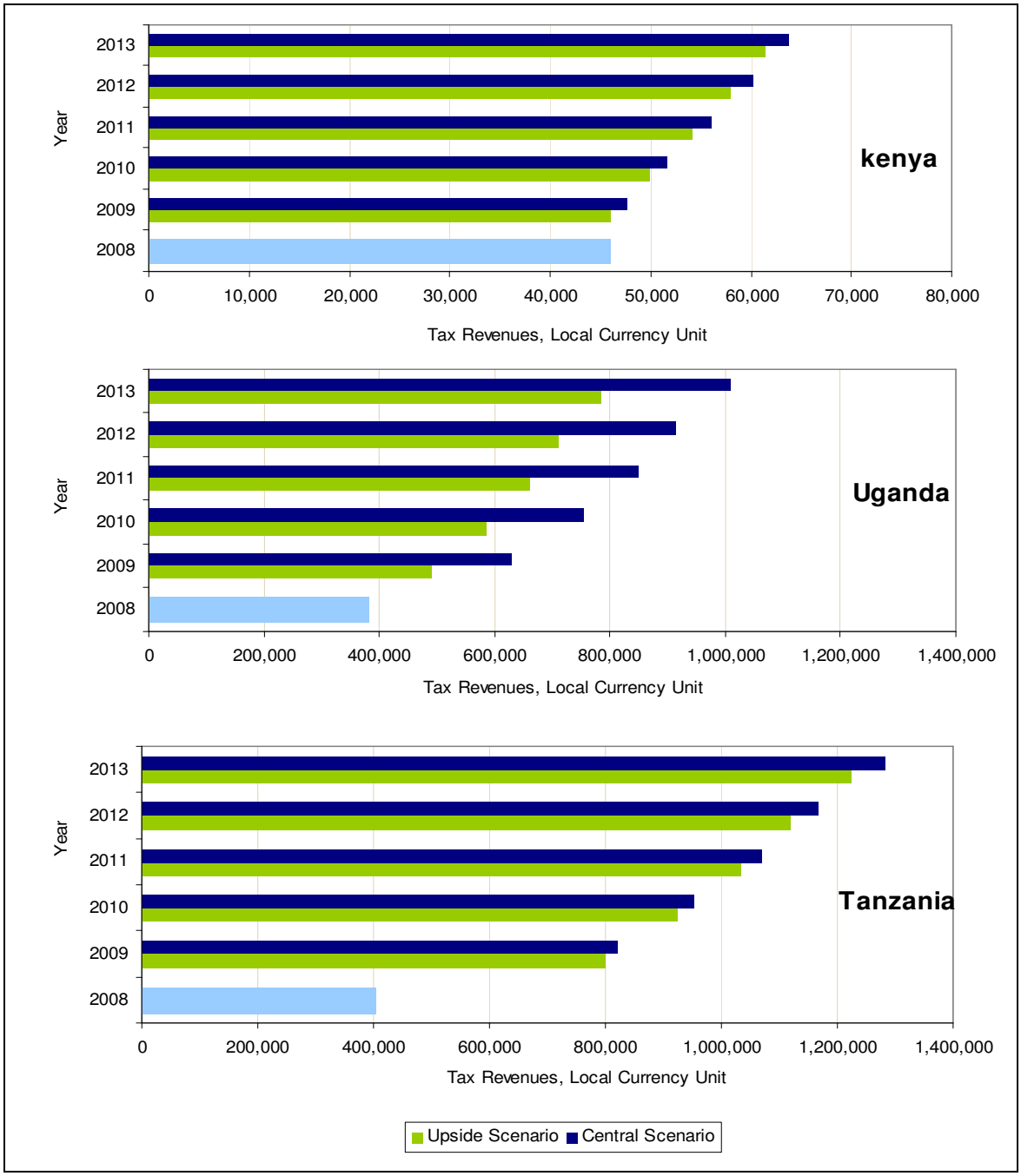
This report estimates the effect of harmonizing taxes to 3% across all countries. We estimate the impact by assessing likely tax revenue impacts over a ten year period from 2009 to 2019 against a base case of no intervention. We have estimated impacts over and above the base case using for a central and upside scenarios. These differ across parameters used to estimate the tax effect, such as the elasticity of mobile usage in respect to price. From our analysis there are several results.

- Reducing the excise tax is revenue positive across a range of scenarios. Over ten years we find tax revenues against our base of no intervention are between 4.6% and 10.8% higher across Uganda, Kenya and Tanzania. This rises to between 13.1% and 20.1% in our upside scenario.

- Revenue neutrality is achieved between five and six years in our central scenario depending on the country being considered.

- Government revenues are estimated to grow year-on-year despite a reduction in usage tax to 3%, as illustrated in Figure 2.

**Figure 2: Impact of reducing mobile usage tax to 3% on Government tax revenue (local currency units)**




*Source: Tax revenues derived from mobile telephony in 2008 are estimated on the basis of operator data. From 2009 revenues are estimated by Deloitte given the reduction in taxation is implemented. The large increase in tax revenue in Tanzania, from 2008 to 2009, is the result of large penetration increases forecast by market intelligence providers.*

## 2.2 The economic impact of mobile telephony

We estimated the economic impact of mobile telephony in each of the countries by quantifying both the supply and demand side impacts.

- Supply side impact: we analysed the flow of funds across the mobile supply chain to estimate the value-add created by the mobile network operators and other participants in the mobile supply chain. An economic multiplier was added to this to capture the 'knock-on' impact to the wider economy.

- Demand side impact: we estimated the increase in productivity that occurred through the use of mobile telephony for business purposes. An additional estimate was also made of the intangible and social benefits. This reflects the potential consumer value of the service above the price they pay.

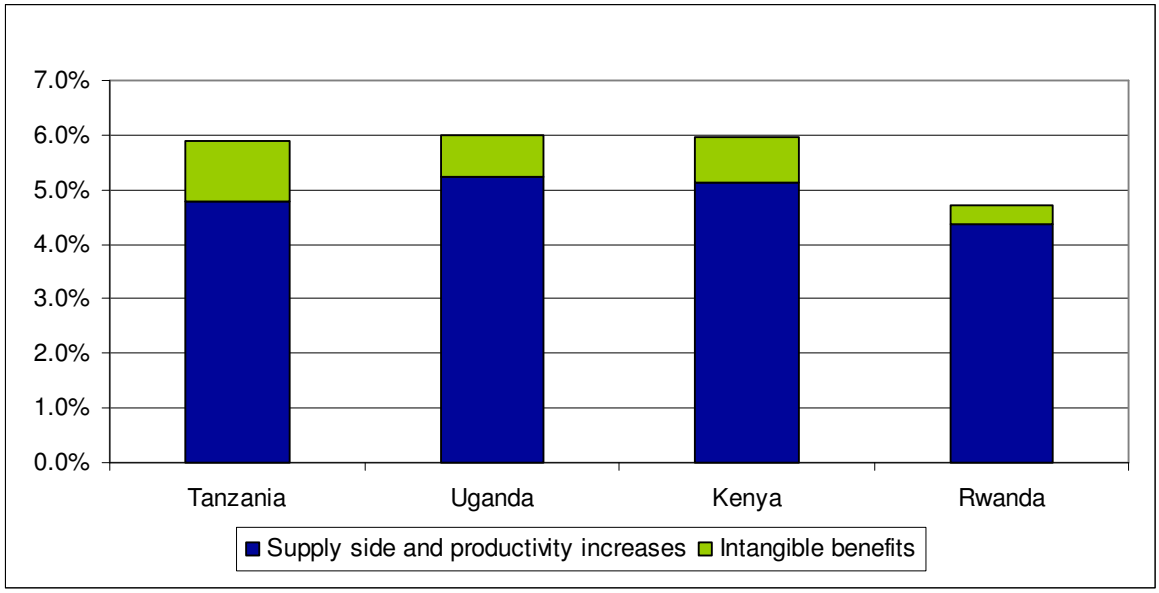
Our analysis was undertaken using publicly available statistics, company accounts and interviews with stakeholders in the mobile industry. By combining our supply-side and demand-side analysis, we were able to estimate the GDP contribution, employment created and taxation paid in each of the countries over the period 2004 to 2008.

### 2.2.1 Impact on GDP

In all four countries, mobile telephony has had a substantial positive impact to economic welfare, increasing GDP and generating employment opportunities both in the mobile communications sector and the wider economy.

We estimate that the mobile industry contributed between 5.1% and 4.4% of GDP in 2008 across the four East African countries analysed. If we further include the intangible benefits gleaned by consumers this impact rises to between 6.0% and 4.7% of GDP in 2008.

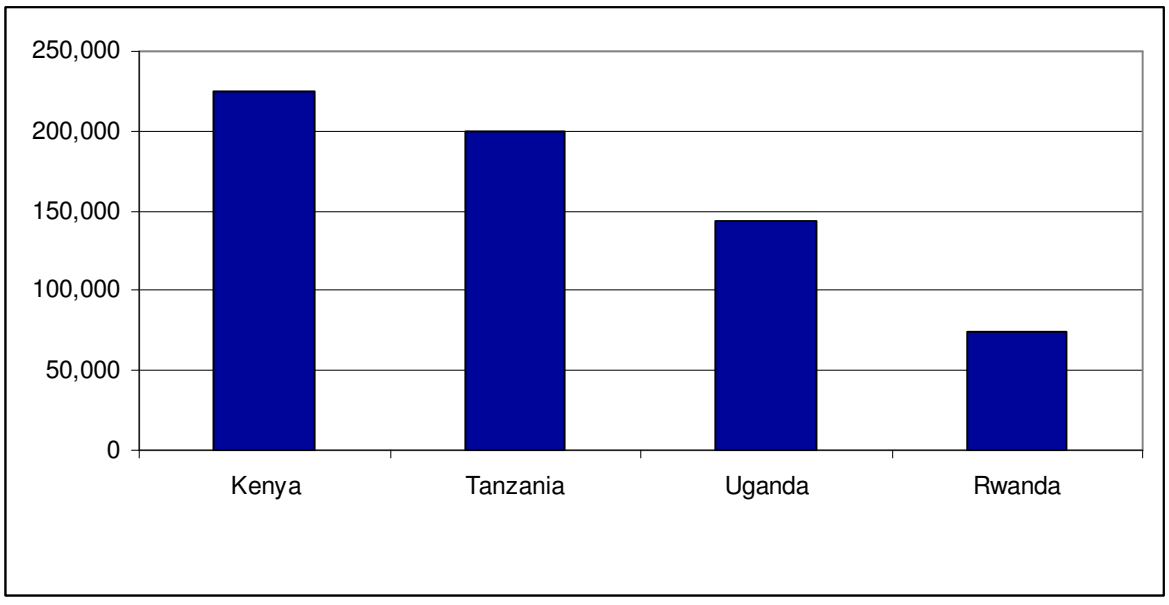
**Figure 3: Economic impact of the mobile communications industry in 2008 as a percentage of total GDP**




*Source: Deloitte analysis*

Mobile communications are also generating substantial employment both directly, from the operators, and more widely through related activities such as the selling of airtime. Employment generated in 2008 was found to range from 74,000 to 225,000 full time equivalents. Since Deloitte (2007) we have found some evidence of an increasing domestic focus in employment as local firms begin to offer services previously bought in.

**Figure 4: Employment generated from mobile communications and related industries**




*Source: Deloitte analysis*

The positive economic impact may continue to rise as new operators rollout and existing operators focus on additional value-add services facilitated through an increasing focus on 3G.

# 3 Introduction to the East African Mobile Communications Market

The mobile communications sector is considered a success story in East Africa – increasing the ease of communication between individuals and businesses. There have been significant increases in coverage and penetration over recent years and mobile has, for the vast majority of consumers, become the preferred method of communication. Investment in mobile communications by all operators has been substantial and is continuing. However, there are concerns that the tax structure, and in particular the excise taxes on mobile usage, threatens the continued prosperity of both the mobile sector and the wider economy.

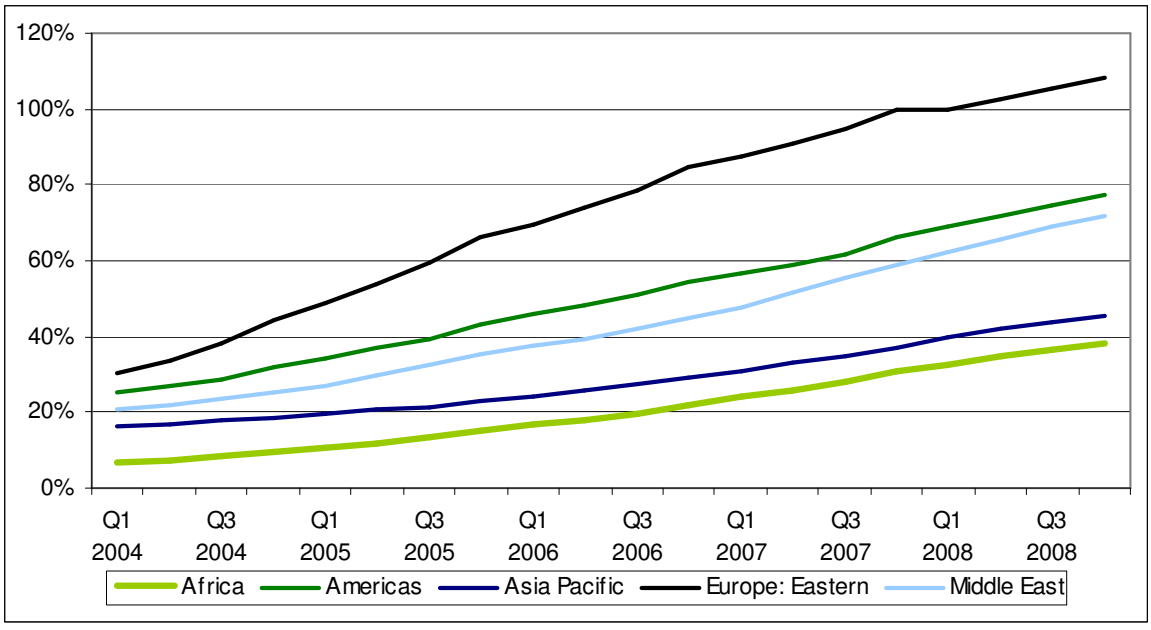
## 3.1 Rapid growth in market penetration and usage

Rapid developments in both penetration and usage have occurred in African countries since the liberalisation of the telecommunications markets in the mid 1990s. Prices have fallen considerably over the period as technological developments have led to reduced costs, whilst international ownership of mobile companies has led to greater innovation and a higher quality of service.

Mobile penetration has 'leap-frogged' fixed line in Africa with Mobile to fixed line connections reaching beyond 30:1 across several African countries. Pre-pay mobile phones have become the instrument of universal service across Africa.

However, despite the recent growth, population penetration in Africa remains low compared to other regions.

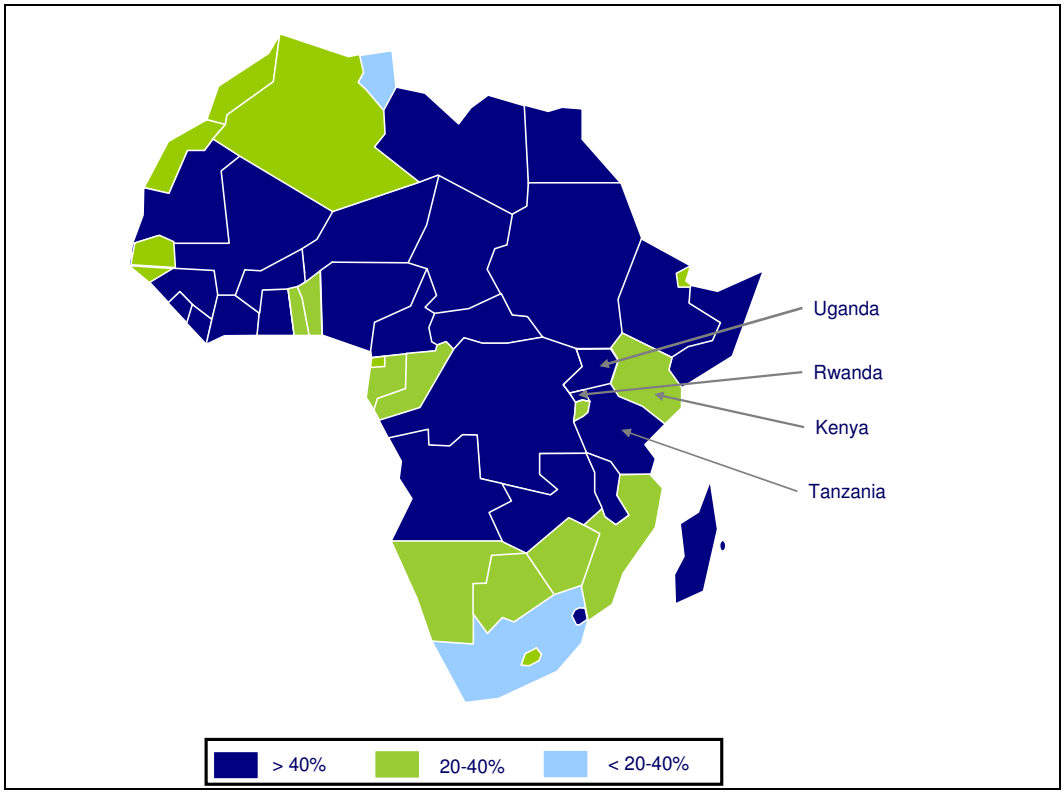
**Figure 5: Mobile Penetration Rates across regions**




*Source: Wireless Intelligence. Penetration calculated as total mobile connections divided by the total population.*

East African countries have all experienced this rapid expansion in their mobile industries, both in terms of coverage and penetration.

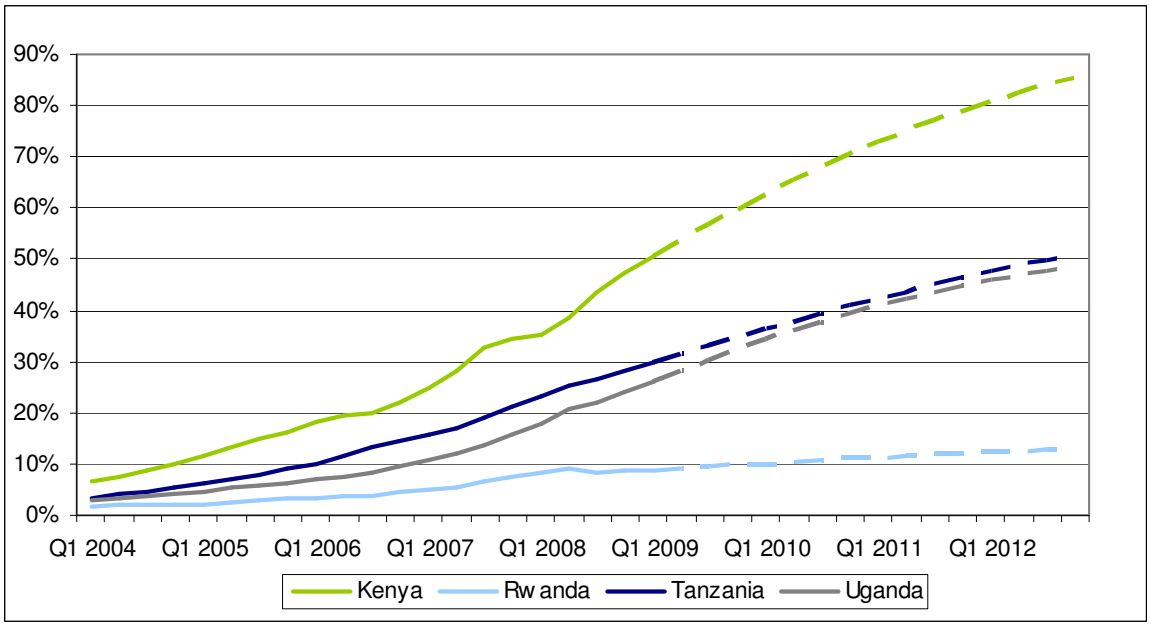
**Figure 6: Percentage growth of mobile connections across Africa**




*Source: Based on Wireless Intelligence data 2008*

Whilst penetration rates are lower in Rwanda, Tanzania and Uganda than in some of the more developed sub-Saharan countries, penetration rates are forecast to continue to grow in all of the East African countries. Moreover, across the four countries focussed on in this report three are currently growing at rate above 40%.

**Figure 7: Historical and forecast mobile penetration in East Africa**




*Source: Historic data and forecasts from Wireless Intelligence 2008. Forecasts denoted by dashed line.*

## 3.2 Successful licensing process with strong market competition

All four East African countries have been liberalised with new entrants successfully gaining market share. This has resulted in price competition which has contributed to the affordable nature of mobile services in each of the countries. For example, in Kenya a mobile operator in 2008 reduced average tariff prices by 40% yielding a large response in average minutes of use per subscriber.

**Figure 8: Mobile operators and market shares**

| Mobile operator | Licensed | Market share (year end 2008) |
|---|---|---|
| ***Kenya*** | | |
| Zain Kenya Limited. (Zain Kenya) | Aug 2000 | 14% |
| Safaricom Limited | July 1999 | 86% |
| ECONET Wireless Kenya Ltd. (ECONET) | December 2004 | 2% |
| Telkom Kenya (Orange) | December 2007 | 2% |
| ***Rwanda*** | | |
| MTN Rwandacell SARL | Dec 1998 | 100% |
| Rwandatel (Terracom) | Oct 2005 | n/a[4] |
| ***Tanzania*** | | |
| Zain Tanzania Limited (Zain Tanzania.) | Nov 2001 | 28% |
| Millicom International Cellular (tigo) | Sep 2000 | 17% |
| Vodacom Tanzania Ltd | Aug 2000 | 44% |
| Excellentcom Tanzania Ltd (Hits Tanzania) | Aug 1999 | n/a[5] |
| Zanzibar Telecom Ltd (Zantel) | Aug 1999 | 12% |
| ***Uganda*** | | |
| Zain Uganda | Dec 1994 | 25% |
| MTN Uganda Ltd | Oct 1998 | 38% |
| UTL Telecel | Jan 2001 | 19% |
| Warid Uganda | November 2006 | 14% |
| House of Integrated Technology and Systems Uganda Limited (Orange Uganda Limited)[6] | 2007 | 4% |

*Source: Various market intelligence reports, operator data and Wireless Intelligence*

[4] Rwandatel is in the process of rolling out and improving its' GSM network. It currently has only a limited number of GSM subscribers.

[5] Planned launch year end 2008.

[6] France Telecom acquired a majority stake of 53% stake in Hits Telecom October 2008.

## 3.3 Retail prices are low in East Africa compared to other countries

Mobile retail prices are relatively low in all four East African countries and have fallen from 2006 to 2008 by an average of 25% since our initial study.

**Figure 9: Average retail price per minute**[7]

| Country | Average retail price, USD |
|---|---|
| Kenya | 0.19 |
| Rwanda | 0.17 |
| Tanzania | 0.23 |
| Uganda | 0.17 |

*Source: Deloitte analysis based on mobile network operators data 2008*

This reduction in price has occurred despite the operators being faced with increased operating costs, particularly in terms of higher costs of fuel and power[8]. However, operators have indicated that prices are unlikely to fall much further unless there is a reduction in the overall cost base. There is reason to believe that the imposition of the tax may be distorting the competitive process. In Tanzania for example, operators are commonly choosing to market their tariff plans with the usage tax excluded. This is potentially misleading for consumers and may generate inefficient consumer switching.

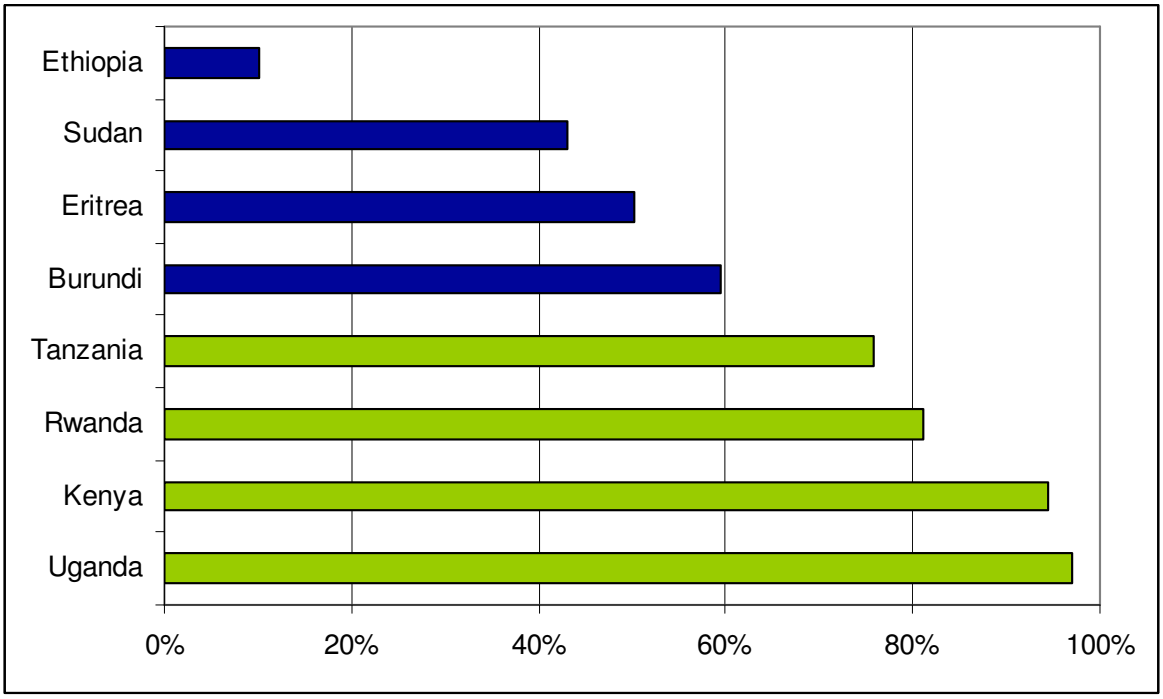
## 3.4 Extensive coverage and the ability to provide universal service

Mobile communications have been more successful than fixed lines in providing universal access; with both number of subscribers and population coverage far exceeding the fixed line operator's.

[7] Prices calculated as the weighted average of price of call per minute to on-net, off-net, fixed and international, weighted by estimates of destination.

[8] Additionally, faced with frequent power outages in urban areas and lack of power-line roll out in rural areas, operators are investing heavily in diesel generators which are also expensive to run. In Kenya the mobile operators are building out power infrastructure which is then transferred to the power companies on a BTO scheme. This is also increasing the operators' costs and preventing further falls in the retail price.

**Figure 10: Population coverage across East Africa countries**




*Source: GSMA 2008*

The mobile operators have invested heavily in the roll out of payphones[9]. These increase service availability, particularly amongst the poor who are unable to afford even the lowest value pre-paid cards or mobile handset. MTN Uganda, for example, estimates that every shared phone serves 500 unconnected people and MTN group estimate that shared traffic accounts for 30% of the total. Furthermore, the provision of payphones provides a valuable source of employment and wages in rural areas.

**Figure 11: Estimated number of payphones**

| | Estimated number of payphones, 2008 |
|---|---|
| Kenya | 34,100 |
| Rwanda | 9,465 |
| Tanzania | 33,575 |
| Uganda | 32,100 |

*Source: Calculation by Deloitte based on interviews with operators. Where operator unavailable, estimates have been made on publicly available information.*

Despite operators' investment commitments, telecommunication development funds have recently been established by governments in all four East African countries.

[9] Mobile payphones range from a single street vendor on the street offering the use of a phone for a charge to dedicated booths.

**Figure 12: Universal service funds**

| | Purpose of fund and distribution | Contribution basis |
|---|---|---|
| Kenya | Distribution of fund is unclear | Anticipated 1% of revenue. Unclear when commencing. |
| Rwanda | Connecting rural areas | 2% of revenue |
| Tanzania | Rural development – specific goals and distribution of fund is undecided | 1.5% of revenue. Unclear when commencing |
| Uganda | Rural communications and development | 1% of revenue |

*Source: Interviews and publicly available information*

Mobile operators have already made significant inroads into rural areas. Population coverage rates have increased in recent years, and are continuing to rise. All the operators that we have interviewed have demonstrated their intention to continue to invest in cell sites in rural areas. These levels of investment demonstrate that even in the absence of a fund, rural expansion will occur. Where funds continue to exist, mobile operators are requesting; access; and equal influence, as enjoyed by the fixed operators, on allocation decisions.

## 3.5 Reliance on handset and airtime dealers – creating economic value

A large number of handsets are imported from Dubai. Our interviews have suggested that tax is paid on only a proportion of these, with the remainder being imported illegally. The price of these handsets is low and it is therefore uneconomic for operators to compete extensively in this market. Some operators however are focussing on lower end handsets produced by firms such as ZTE.

Handsets are sold by official dealers and street-side vendors. Airtime is mainly sold by street-side and official vendors, with sellers receiving about 10% commission on airtime revenue sold. This method of selling airtime creates high levels of employment.

**Figure 13: Airtime employment and commission[10]**

| | Estimated employment from airtime sales (2008 estimates) | Commission paid to airtime sellers (2008 estimates) |
|---|---|---|
| Kenya | 141,530 | Ksh 12,050m |
| Rwanda | 48,840 | RWF 4,050m |
| Tanzania | 136,270 | Tsh 96,450m |
| Uganda | 98,610 | USh 90,960m |

*Source: Interviews with operators and handset dealers, 2008*

[10] Includes SIM and Payphone related employment and commission.

## 3.6 Taxation rates

A variety of taxes are applied to mobile handsets and services; including VAT or similar taxes, customs and excise duties, and lump sum taxes. The current taxes on mobiles in African countries are summarised in the following figure.

**Figure 14: Taxes on mobile services in African countries**

| | Taxes on handsets | | | Taxes on services | |
|---|---|---|---|---|---|
| | VAT or similar | Customs Duty | Other | VAT or similar | Other |
| Angola | 10.0% | 5.0% | | 5.0% | |
| Botswana | 10.0% | | 7.0% | 10.0% | |
| Rwanda | 19.3% | 31.5% | | 19.3% | |
| Chad | 18.0% | 30.0% | | 18.0% | |
| Cote d'Ivoire | 18.0% | 5.0% | 2.5% | 18.0% | |
| DRCongo | 13.0% | 20.0% | | 18.0% | |
| Egypt | 10.0% | | | 15.0% | |
| Ethiopia | 15.0% | 10.0% | | 15.0% | |
| Gabon | 18.0% | 10.0% | | 18.0% | |
| Gambia | 15.0% | 20.0% | | 18.0% | |
| Ghana | 0.0% | 0.0% | 5.5% | 12.5% | 6.0% |
| Guinea | 18.0% | 12.5% | | 18.0% | |
| Guinea-Bissau | 15.0% | | | 15.0% | |
| **Kenya** | **16.0%** | | | **16.0%** | **10.0%** |
| Lesotho | 14.0% | | 7.0% | 5.0% | |
| Madagascar | 18.0% | | | 18.0% | |
| Malawi | 15.5% | | | 15.5% | 10.0% |
| Mauritania | 14.0% | | | 14.0% | |
| Mauritius | 15.0% | | | 15.0% | |
| Morocco | 20.0% | 2.5% | | 20.0% | |
| Mozambique | 17.0% | 25.0% | 1.0% | 17.0% | |
| Nigeria | 5.0% | 10.0% | | 5.0% | |
| **Rwanda** | **18.0%** | * | | **18.0%** | **3.0%** |
| Senegal | 18.0% | 10-20% | 1.5% | 18.0% | |
| Seychelles | | 12.0% | | 17.6% | |
| Sierra Leone | 10.0% | | | 10.0% | |
| South Africa | 14.0% | 8.1% | | 14.0% | |
| Swaziland | | 14.0% | | | |
| **Tanzania** | **20.0%** | | | **20.0%** | **10.0%** |
| Tunisia | 10.0% | | 8.0% | 18.0% | 5.0% |
| **Uganda** | **18.0%** | | | **18.0%** | **12.0%** |
| Zambia | 17.5% | 5.0% | | 17.5% | 10.0% |
| Zimbabwe | 15.0% | | | 22.5% | |

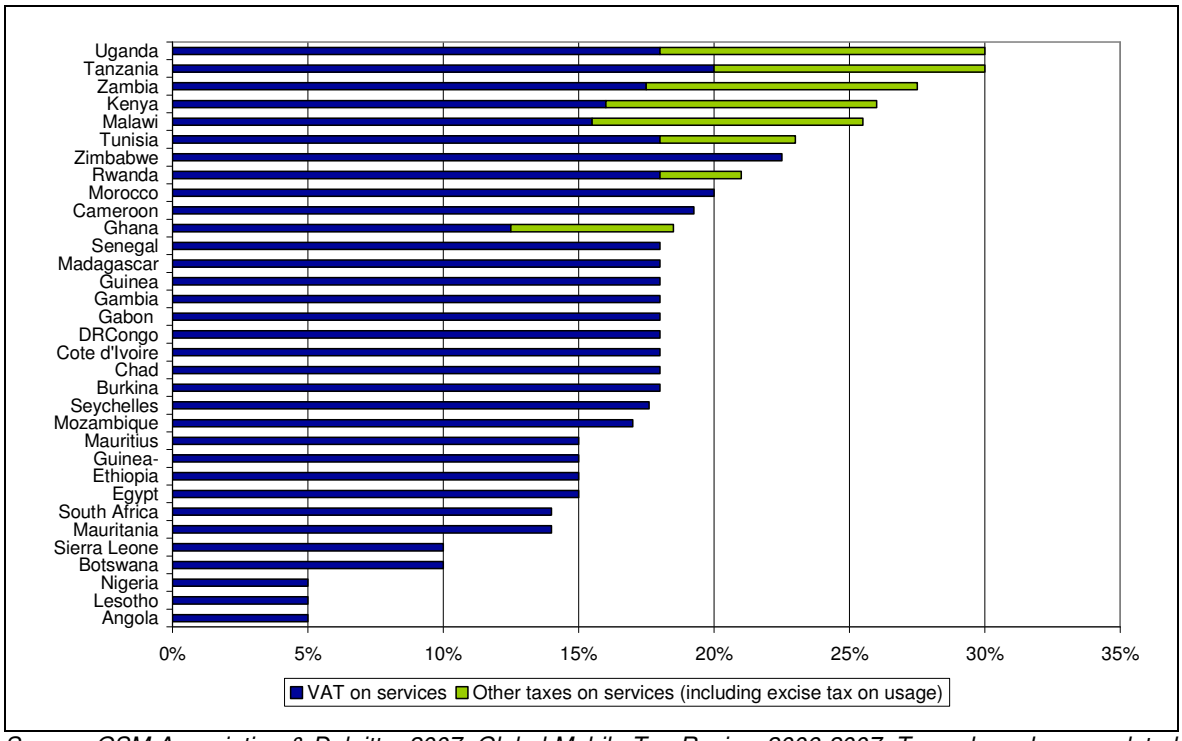
*Import duties of 30% were removed in 2006, though this is still to be signed and gazetted

*Source: Deloitte (2007). Taxes have been updated to reflect changes in Malawi, Ghana, Rwanda and Tanzania.*

We have previously conducted a study into taxes applied to mobile operators across 101 countries. Across this sample only 17 apply mobile specific taxes[11]. This makes the prevalence of sector specific taxes in East Africa unusual compared to our global sample. Drawing on this study the tax burden on mobile services is particularly high in East Africa, as illustrated in the figure below. However, the reduction of the excise duty in Rwanda has reduced Rwanda in the ranking from being second highest to the seventh. Tax burden is measured as the aggregate of VAT and other service related taxes. Any fixed taxes have been excluded.

[11] Findings from GSM Association & Deloitte. 2007. *Global Mobile Tax Review 2006-2007*. Results are updated for tax changes in Malawi, Ghana, Rwanda and Tanzania.

**Figure 15: Breakdown of taxes on mobile services**

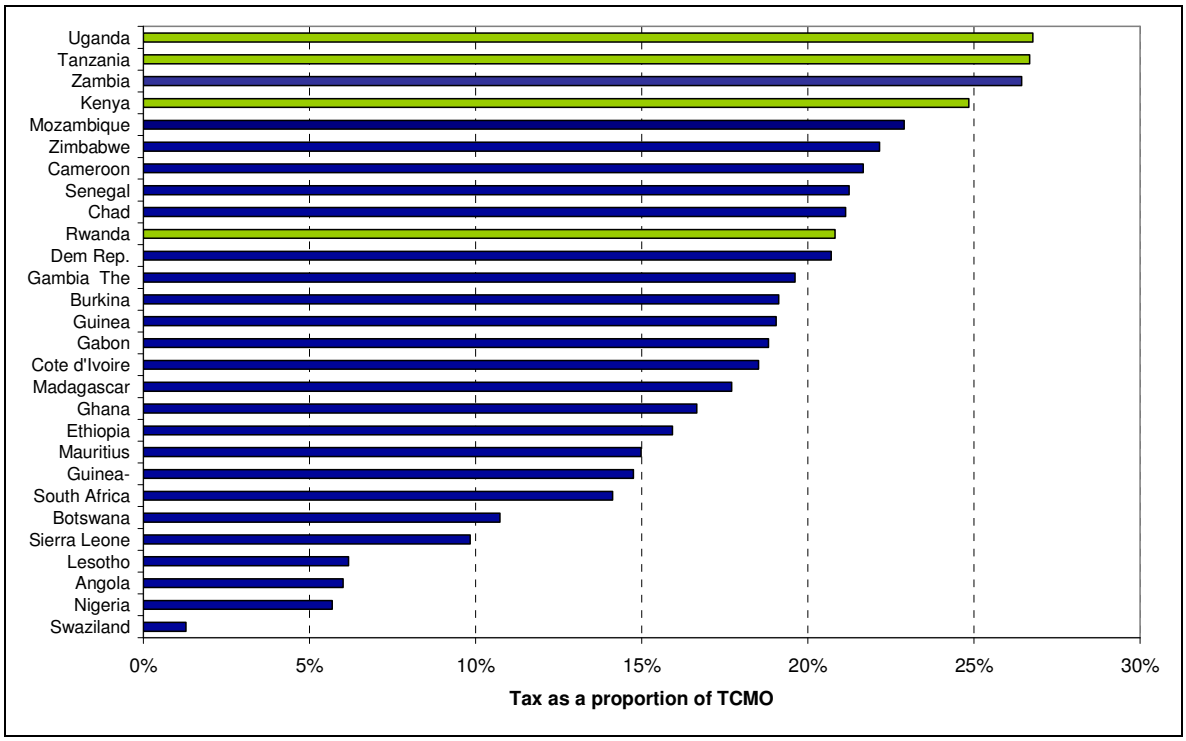



*Source: GSM Association & Deloitte. 2007. Global Mobile Tax Review 2006-2007. Taxes have been updated to reflect changes in Malawi, Ghana, Rwanda and Tanzania.*

Another way to consider the additional burden caused by the excise duty on usage is by calculating tax as a proportion of the cost of mobile ownership represented by taxation[12].

[12] Total cost of mobile ownership (TCMO) represents the average annual spend on mobile services by a user. This has been calculated as cost of handset/3 + connection fee/3 + total annual cost of usage. It is assumed for comparison across Africa, that handsets and subscriptions have a lifetime of 3 years (consistent with other studies, including Tax and the Digital Divide for the GSMA), though increasingly this may be shorter.

**Figure 16: Tax as percentage of total cost of mobile ownership across Africa**




*Source: Deloitte analysis*

Kenya, Tanzania and Uganda are among the African countries with the highest proportion of tax in the Total Cost of Mobile Ownership (TCMO). Uganda has the highest average tax burden reaching 27% of the TCMO, and Tanzania and Kenya follow closely with almost 27% and 25%.

The TCMO in Rwanda is calculated using the reduced excise duty of 3%. We note that the reduction from 10% has reduced tax as a proportion of the TCMO from 26% to 21%. Conversely, the increase in Tanzania has raised the TCMO by around 1%.

Tax is also high in an international context as measured as a proportion TCMO. Moreover Uganda ranks 4$^{th}$, Tanzania 5$^{th}$, Kenya 11$^{th}$ and Rwanda 26$^{th}$ out of 101 countries.

# 4 Approach to calculating the economic impact of mobile services

This section outlines the approach we have taken in estimating both the static and dynamic impacts of the economic contribution of the mobile industry in each of the countries.

## 4.1 Static Analysis, including intangible benefits

Static analysis refers to the impact of mobile services for a particular period of time and does not seek to estimate the longer term impacts of economic welfare. However, static analysis is extremely useful due to the greater availability of disaggregated data relative to dynamic analysis where a greater number of assumptions are typically required.

We utilise publicly available and operator data together with interviews and assumptions based on economic literature to estimate the value of the mobile communications to the economy in terms of employment and GDP, both direct and indirect, for each East African country. We have defined the total economic impact as consisting of the following elements[13]:

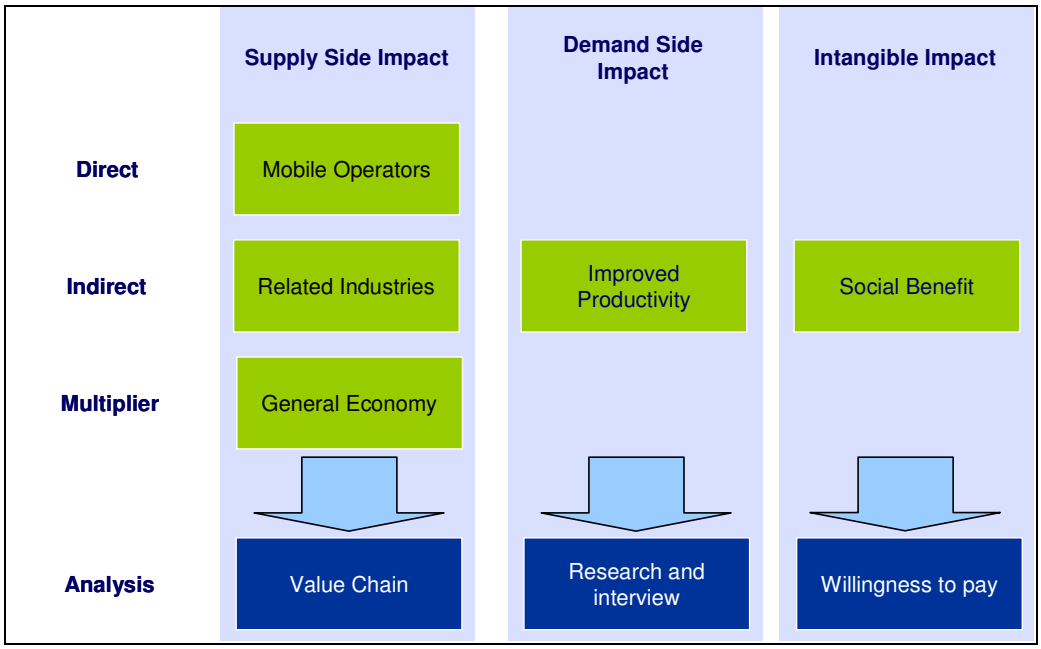
- the direct impact from the mobile operators;
- the indirect impact from other industries related to mobile services;
- the indirect impact due to the surplus enjoyed by end users in terms of productivity improvements; and
- the indirect impact due to more qualitative social benefits enjoyed by the population, defined as 'intangible benefits'.

We have structured our static analysis as illustrated by the following figure. The different impacts are summed together to give the total economic impact[14].

[13] Consistent with: Mckinsey & Co. Wireless Unbound. September 2006. *The surprising economic value and untapped potential of the mobile phone*.

[14] To obtain the total economic impact, it is necessary to sum together the supply side, demand side and intangible impacts. Whilst these are intended to capture different impacts of mobile telephony, there is a potential for limited double counting.

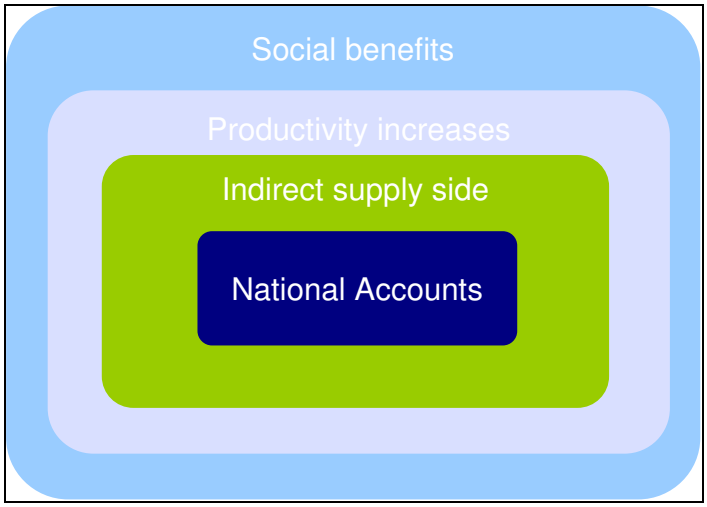
**Figure 17: Structure of our analysis of economic impact on GDP and employment**




*Source: Deloitte*

The methodology estimates the contribution of the sector on the basis of a wider definition than that commonly cited in national accounts. Our definition captures the 'economic footprint' of the mobile sector.

**Figure 18: Our methodology and national accounts**

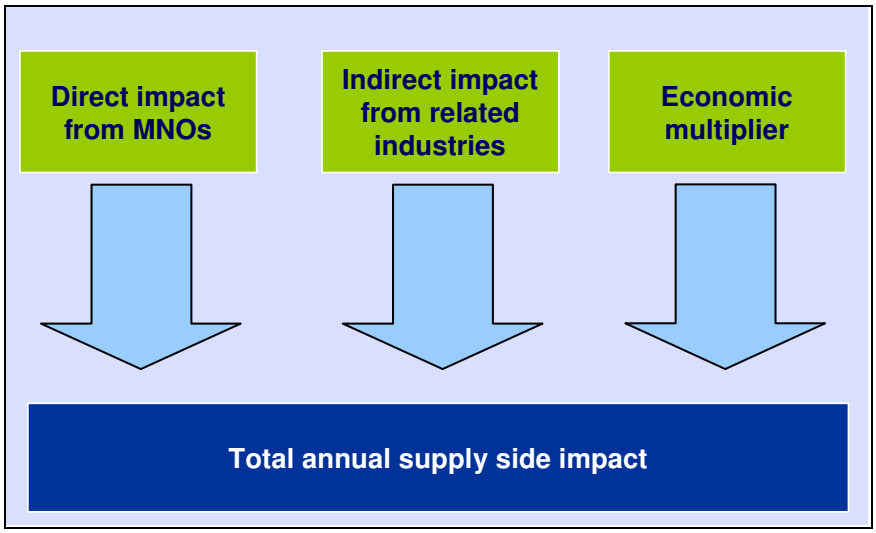



*Source: Deloitte*

### 4.1.1 Supply-side impact

We quantify the contribution of the mobile industry to the economy, covering the industry and its adjacent sectors. This is calculated by aggregating the direct, indirect and economy wide (multiplier) effects that have occurred in each year.

**Figure 19: Structure of our supply side analysis**

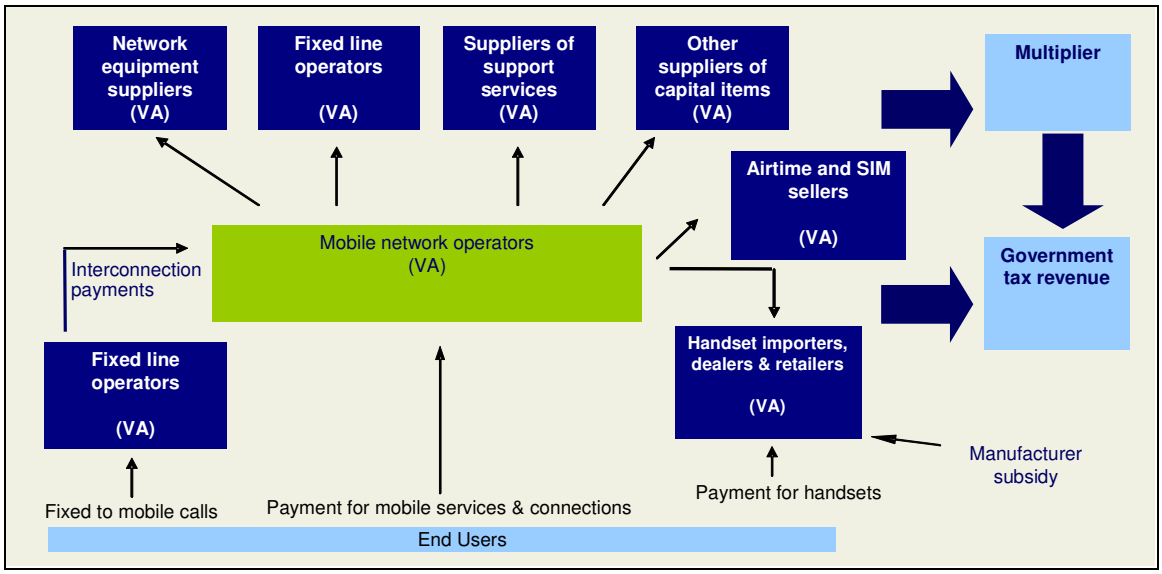



*Source: Deloitte*

This gives a snapshot view but does not take into account the future benefits to the economy resulting from growth. A customer's spend on mobile services flows along the value chain to the players within the industry: operators, suppliers, distributors and others. Money flows between these economic agents and the amounts retained are used to pay wages, taxes, buy inputs and other costs. Finally, the Government collects tax revenues from all operators within its jurisdiction. In our assessment, we limit our focus to the economy of the country in question and ignore international impacts.

We have identified each of the main stakeholders in the industry and assigned flows of value between them. These flows are shown in the diagram below.

**Figure 20: Mobile value chain**




*Source: Deloitte*

Our estimates of the flows are based on:

- discussions with mobile operators;
- interviews with handset dealers and equipment suppliers;
- discussions with other stakeholders (suppliers, chamber of commerce, etc);
- analysis of Government taxation statistics; and
- analysis of accounts and billing information.

Following the identification of the revenue flows, we estimate the proportion of these flows that remain within the domestic economy and are translated into a positive economic benefit, referred to in this report as value add.

#### 4.1.1.1 Direct value add from mobile network operators

We have determined five categories of economic value which are directly created by the mobile network operators:

- wages and employee benefits;
- contractor costs;
- taxes and regulatory fees;
- corporate social responsibility; and

- dividends.

For each of these categories we identify the proportion of value add which relates to the domestic economy. This analysis is based upon operator management accounts interviewing which identify the final destination of monetary flows.

#### 4.1.1.2 Indirect value add

We have identified the revenues that flow directly from the mobile network operators to other domestic industry players. We then estimate the proportion of revenues that are value add, using the five categories of value add used in the mobile network operator analysis above. These proportions for each country are outlined in Appendix A.

#### 4.1.1.3 The multiplier

The value add created by the mobile communications industry will have a subsequent positive impact on the economy. These effects are generated by further rounds of expenditure. For example, the indirect domestic industry players will additionally incur operating expenses paid to additional players. These players will then create value as they pay wages and taxes etc. The economic literature quantifies these effects by applying an 'economic multiplier' to the initial rounds of value generated. The table below shows the values of multipliers that have been calculated in other studies.

**Figure 21: Multiplier benchmarks**

| Title of study | Multiplier |
|---|---|
| The contribution of mobile phones to the UK economy, 02 for ONS | 1.13 |
| Ovum studies on economic impact of mobile telephony in Bangladesh and USA based on review of various other studies* | 1.6 |
| Association Française des Opérateurs Mobiles * | 1.7 |
| Economic impact of spectrum use in the UK, Europe economics, based on ONS | 1.1 |
| Sicrana, R., and de Bonis, R. 'The Multiplier Effects of Telecommunications Investments on Economic Growth and Restructuring'.'** | 1.5 |
| Radio authority UK. 1995. 'Economic impact of radio'. | 1.4 |
| Deloitte for Telenor. 2008. 'Economic Impact of mobile telephony in Serbia, Ukraine, Malaysia, Thailand, Ukraine and Pakistan'. | 1.2 - 1.4 |

*Source: Deloitte*

Based on a review of the above studies, we have assumed a multiplier value of 1.2 for both the economic impact and tax study. This is at the lower end of the estimates provided in the table above since it is likely that there are greater leakages in the East African economies relative to the French, UK and US economies on which the benchmark multipliers are based.

#### 4.1.1.4 Calculating tax revenues

Tax revenues to the Government are raised through taxes specific to mobile services, corporation tax, income tax and regulatory fees. Tax revenues are collected from the Government from all components in the value chain. However, based on interviews with parties within each country we assume a degree of leakage from the informal sector.[15]

We have collected information on revenues for various taxes.

- Economy wide taxes: value added (sales) taxes, corporate taxes and income tax paid by employees; and
- Mobile taxes: licence and spectrum fees, import duties, and other mobile specific taxes.

We calculate the tax revenues directly from the mobile operators and also from other entities in the value chain.

### 4.1.2 Calculating the impact on employment

Mobile services contribute to employment via several avenues:

- Direct employment of the industry and related industries;
- Support employment created by outsourced work and taxes that the government subsequently spends on employment generating activities; and
- Induced employment resulting from the above employees and beneficiaries spending their earnings, and creating more employment.

The first impact is estimated directly by collecting data from the mobile network operators and, for the related industries, dividing the proportion of revenue spent on wages by the average wage rate in each sector. Typically, support and induced employment is estimated using a multiplier and other studies have used a ratio of 1.1 to 1.7 for induced employment. The use of such multipliers can often be criticised for the lack of consideration to the economic basis of the industry and country under consideration. We have conducted extensive discussions with stakeholders on this issue and have chosen to apply a multiplier of 1.2 on all value add including employment due to the high leakages from the East African economies.

[15] We make assumptions on the percentage of money flows that are subject to the national tax regime. For example, we assume legitimate registered businesses pay sales, import, employee and corporate taxes whilst we assume only a small proportion of streetside airtime sellers and handset dealers pay taxes. Therefore we do not assume that all flows are subject to taxation.

### 4.1.3 Increases in productivity

There are numerous ways in which mobile services can improve productivity, particularly in developing countries where mobile services have 'leap-frogged' fixed line services and are the provider of universal service. Several important effects have been identified in the research[16].

- Improving information flows: mobile services allow certain occupations (such as commodities and agriculture, both prominent in developing countries) to cut out the middle-man as traders can obtain information on prices, quality, quantities directly. This improves the incomes of producers, and helps reduce wastage.

- Reducing travel time and costs: similarly, mobile services allow workers to trade and share information without travelling. The Vodafone paper on Africa (2006) contains analysis on Tanzania and South Africa that found 67% of users found mobiles greatly reduce travel time in Tanzania[17].

- Improving efficiency of mobile workers: mobile services improve the efficiency of all workers in the economy: This effect will particularly be felt by workers with unpredictable schedules, for example those involved in repair and maintenance, or collection and delivery. Mobiles will give them greater accessibility and better knowledge of demand.

- Improving job search: mobile services improve the chances of the unemployed finding employment through enabling people to call for opportunities rather than relying on word of mouth. Further to this, owning a mobile phone makes workers more employable as they are contactable while absent from their place of work.

No established economic methodology exists to estimate the GDP and employment effects of such productivity improvements across the economy. As such, we have considered available evidence from the literature in the area and conducted interviews with stakeholders (including business and government representatives) in order to provide an indication of the demand side impact of mobile communications in each of the countries. Of particular relevance to the East African context, Zain recently commissioned in 2008 a survey in Sudan trying to identify how average business revenue have increased with mobile usage[18]. Across the 800 people interviewed, average business revenue increases were found to be just below 11%. The survey also asked the degree to which people agreed with the following statement:

*'Mobile phone is a business enabler. It allows business to be more efficient and build, keep and maintain customer relations.'*

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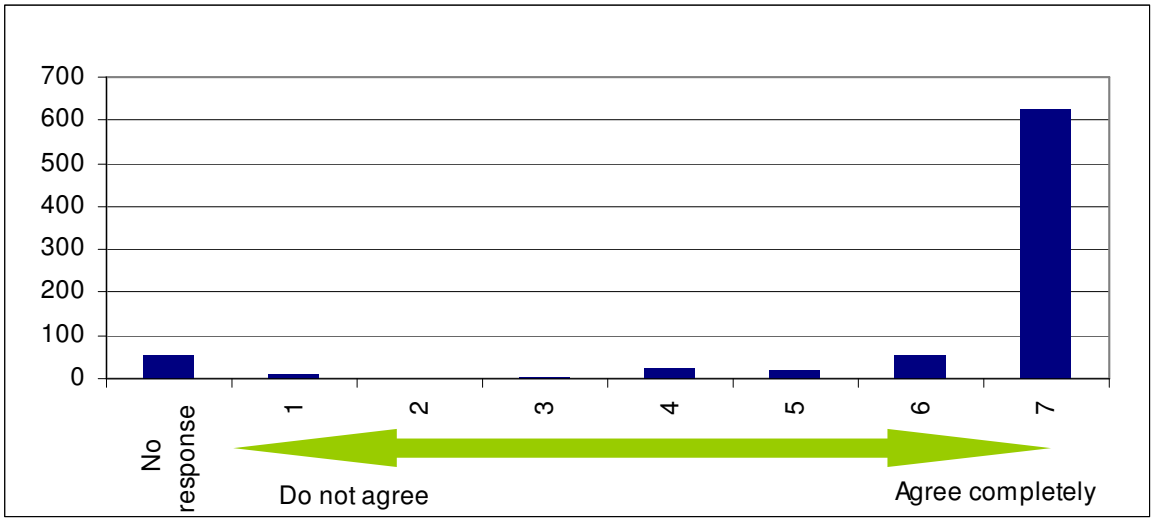
[16] See, for example: Vodaphone. March 2005. *Africa: The Impact of Mobile Phones*. Vodafone Policy Paper Series, No.3.

[17] Vodaphone. March 2005. *Africa: The Impact of Mobile Phones*. Vodafone Policy Paper Series, No.3.

[18] Referenced in: Deloitte. 2008. *Economic Impact of Mobile Communications in Sudan*.

Of the 744 respondents, 84% stated that they 'completely agreed' with the statement[19].

**Figure 22: Are mobile phones business enablers? (Number of people)**




*Source: Zain survey data*

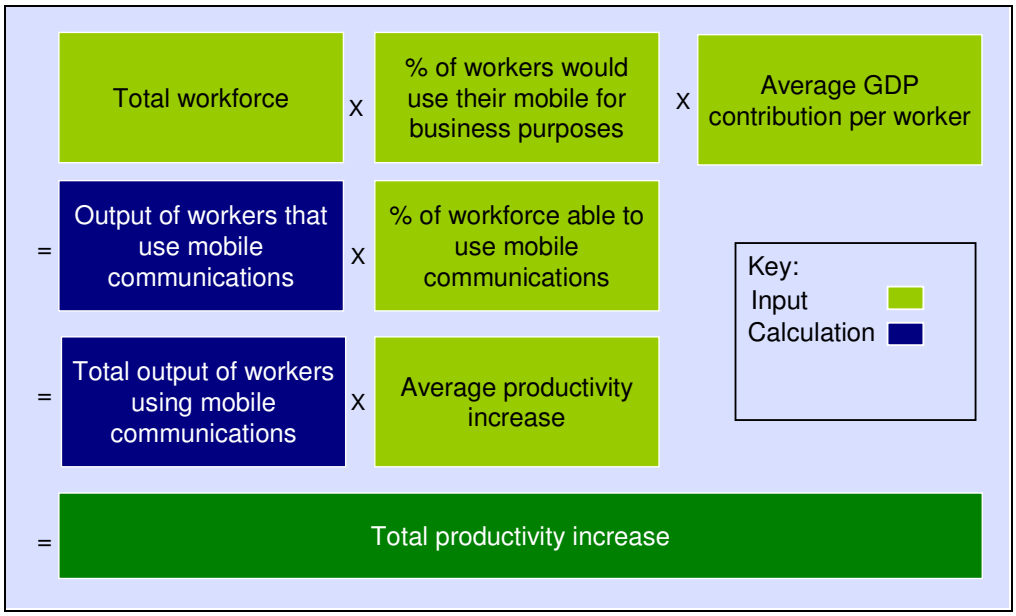
We estimate the impact on the productivity improvements on the overall economy by assuming that the productivity improvement will be experienced by high mobility employees within the economy. In line with similar studies[20], we define high mobility workers as those workers who undertake a moderate to high degree of travel in the course of their employment e.g. taxi drivers, agricultural workers selling produce in town, salesmen and transport workers. We calculate the proportion of high mobility workers by reference to data from the national bureau of statistics and international labour databases. We have estimated the productivity gain of high mobility workers with access to a mobile phone by undertaking interviews to identify the impacts seen in each country and by reference to previous studies.

The process for calculating the impact of the productivity improvements on the economy is set out in the figure below.

[19] Based on a sample of 800 people across a broad section of Sudan geographically and socially. Survey results at the time of writing this report were unpublished.

[20] Aside from Zain's survey other examples include: Mckinsey & Co. Wireless Unbound. September 2006. *The surprising economic value and untapped potential of the mobile phone*.

**Figure 23: Calculation of economic impact of productivity improvements**




*Source: Deloitte methodology*

### 4.1.4 Intangible impacts

Finally, we seek to identify the intangible impact of the mobile industry in EA. We utilise information provided to us during interviews with operators, governments and regulators in each of the three countries and additionally draw upon and extend findings from the Vodafone report (March 2005)[21] relating to Tanzania. This study found that mobile services promoted several intangible benefits.

- Promote social cohesion: through enabling contact when family members or friends who have moved away, and building trust through sharing of handsets (which has been found to be common in African countries). In addition, the study found a statistically robust relationship between mobile ownership and willingness to help others in the community.

- Extension of communications: especially to users with low education and literacy, particularly through the use of texts.

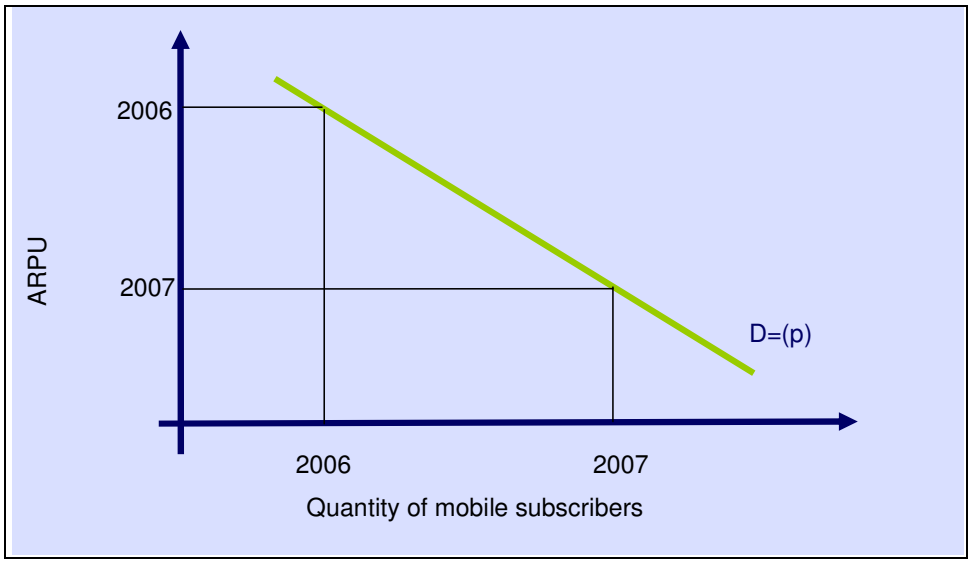
- Stimulating local content: this can be particularly useful for allowing users to learn about local services such as healthcare or education.

- Assisting in disaster relief: mobile services allow families and friends to stay in touch in the event of a natural disaster, which can also ensure that they obtain more rapid relief.

[21] The specific article referenced is Goodman. 2005. *Linking mobile phone ownership and use to social capital in rural South Africa and Tanzania*.

Whilst it is difficult to assign a specific value to these benefits in terms of contribution to GDP or employment, it is clear that many of these social and educational benefits could make people happier, healthier and more motivated; and hence more employable and able to contribute to GDP. One method for estimating a value using actual data is the willingness to pay concept[22]. This seeks to calculate the increase in consumer surplus that has resulted from a change in the price of a good.

**Figure 24: Increase in consumer surplus following a reduction in price**




*Source: Deloitte*

We use the willingness to pay concept to calculate the value of the intangible benefits of mobile phones in East Africa[23]. Historical average revenue per user (ARPU) shows us how much customers are willing to pay for mobile services. If it is assumed that these intangible benefits of owning a mobile are unchanged over time, then the value for this from of consumer surplus can be considered to be the difference between ARPU at the time of subscription, less ARPU today (which is likely to be less due to increased competition and other factors). Total consumer surplus is then the difference in ARPU multiplied by the total mobile subscribers.

## 4.2 Dynamic Impact: estimating the relationship between mobile communications and GDP

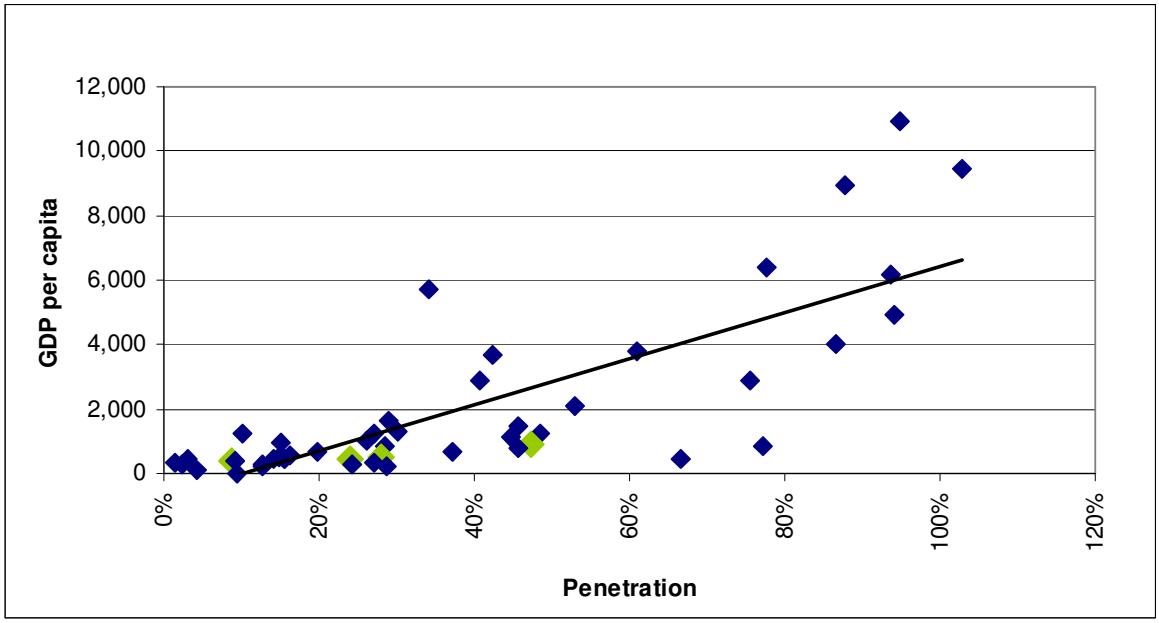
We have sought to estimate the dynamic relationship between mobile communications and GDP. That is, the longer term impact that investment in mobile communications may have on general economic welfare and GDP growth rates in particular.

[22] See: Mckinsey & Co. Wireless Unbound. September 2006. *The surprising economic value and untapped potential of the mobile phone.*

[23] There is a potential for double counting between the productivity improvement and the intangible impact.

A wide range of academic studies have demonstrated that a relationship exists between telecommunications penetration (originally fixed line, and more recently mobile) and economic growth[24]. The following simple scatter plot demonstrates the basis of this relationship, showing a positive correlation between penetration rates and GDP per capita for a selection of developing countries.

**Figure 25: Income and mobile penetration in developing countries**




*Source: Penetration data from Wireless Intelligence 2008. GDP per capita data from IMF World Economic Outlook database October 2008. Points in green represent countries focussed on in this study*

In estimating a relationship between mobile penetration and economic growth it is crucial to recognise that there exists a two-way causality: the impact of increased mobile penetration and investment in mobile infrastructure on economic growth, and the impact of rising GDP on the demand for telecommunications services. A recent study by Waverman, Meschi and Fuss (2005) showed that 10% higher penetration can translate into a 0.59% increase in GDP, all other factors remaining constant based on a sample of developed countries.

We undertook a regression based on cross-sectional data for developing countries[25]. Similarly to Waverman, Meschi and Fuss (2005)[26], we estimated a model in averages over 24 years, with

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[24] Studies include those by: United Nations Economic Commission for Europe. 1987. *The Telecommunications Industry*; ITU. 1980 *Growth and Structural Change*; World Bank. 1983. *Information, Telecommunications and Development*. More recently, Waverman, Meschi and Fuss (2005) and Sridhar and Sridhar (2004) have looked specifically at the mobile industry.

[25] We attempted to use time series data for each country to estimate the country specific impact of mobile penetration on GDP growth. However, GDP data is only available on an annual basis and the relative immaturity of the mobile market implied insufficient data points to undertake this analysis.

[26] Waverman L., Meschi M., Fuss M. 2005. *The Impact of Telecoms on Economic Growth in Developing Countries*. The Vodafone Policy Paper Series, Number 2

average GDP growth as dependent variable. Our explanatory variables include the average mobile penetration rate, GDP at the beginning of the averaging period and other country-specific variables such as the average level of investment and literacy of workforce. The regression is estimated for almost 60 developing countries in the African continent, the Asia Pacific region and Latin America.

For this sample, we estimate that a 10% increase in penetration could increase the GDP growth rate by 1.2%[27] in the long-run.

**Figure 26: Relationship between GDP growth and mobile penetration**

| | Dependent variable: average GDP growth | |
|---|---|---|
| **Explanatory variables** | **Coefficient** | **t-statistic** |
| Average mobile penetration per 100 people | 0.0012 | 2.42 |
| Average investment as a percentage of GDP | 0.00208 | 5.78 |
| Literacy rate at the beginning of the period | -0.00011 | -0.96 |
| GDP per capita at the beginning of the period | -0.0036 | -2.15 |

*Source: Deloitte*

As expected, the coefficient on average mobile penetration is approximately twice as large as that found by Waverman, Meschi and Fuss (2005). This is due to our sample including only countries from the poorest regions in the world, where the effect of mobile penetration will be the strongest. In African countries in particular, fixed phones have never reached a sufficiently high penetration to generate a significant network effect. The use of mobile phones, on the other hand, is continuously expanding and can therefore be expected to play the same crucial role for the economic development that fixed phones had for developed countries.

[27] The regression passes all standard econometric diagnostic tests. For ease of presentation, a significant constant term is omitted.

# 5 Approach to calculating the impact of changes in taxation policy

We have developed an economic model to quantify the impact of a change in taxation policy in each of the three countries. Specifically, we focus on the impact of the removal or reduction of the excise duties. Our model is constructed to carry out three distinct steps of analysis which we aggregate to provide the total impact.

1. First we model the direct impact of a reduction in excise taxes on mobile penetration, usage and handset sales for each country individually. In order to calculate this, we estimate elasticities of demand for mobile services for each country. We consider the direct impact on excise tax revenues which is the sum of:

    - the decline in revenue due to the reduction in the tax rate; and
    - the increase in revenue due to the greater number of mobile users and usage.

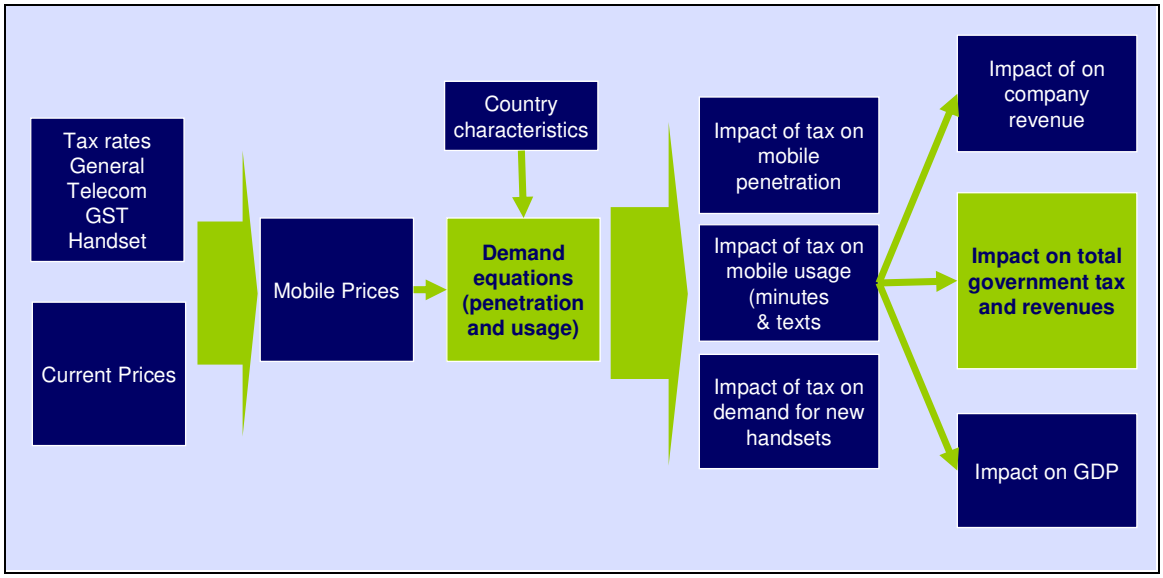
2. Second, we add the positive impact on corporate tax, licence fee receipts and other regulatory payments that results from higher revenues being generated by the larger mobile user / usage base.

3. Finally, we add the induced effects on wider economic growth that result from increasing mobile and penetration rates, and the increased tax revenues that will result from this effect. We consider the extent to which a reduction in mobile taxation may be revenue neutral when the beneficial impact on economic growth is accounted for. In order to quantify the impact of the tax change on the wider economy we rely on our estimates of the economic impact of the mobile industry which we discuss in more detail in the following chapter.

## 5.1 Calculating the impact of tax changes

The basis for the analysis is a model that calculates the impact of reducing or removing the excise tax on mobile usage, on penetration, usage and handset sales. From these, we have estimated the impact on total Government revenues, including taxes on mobile services, corporation tax and regulatory fees.

**Figure 27: Structure of the economic model**




*Source: Deloitte analysis*

In order to compare the impact of various taxes several steps were taken.

- A base case scenario was created which projects market development and tax revenue collection for the 10 years to 2019, assuming the application of the current taxation structure. External market projections from third parties are used as a basis to forecast number of subscribers, usage levels, and handset sales.

- All changes in penetration, handset sales, usage and Government tax revenue collection were compared to the base case scenario and estimated for each period.

The impact of changes in excise taxation relative to the base case scenario is based upon two key relationships:

- mobile penetration to the cost of airtime; and

- mobile usage to the cost of airtime.

The modelling of these relationships is discussed below.

A number of key assumptions were required to model the 'direct' impact upon penetration, usage and government tax revenues from these consumer taxes.

- Any reduction in the tax rate is fully reflected in prices faced by consumers, see Section 5.2.

- The reaction of the penetration and usage levels to a change in price is determined by the value of the elasticity of demands for usage and penetration, see Section 5.3.

- Handset sales are driven by penetration levels. It is assumed that additional subscribers will purchase a handset in the year of subscription, and replace this every two years[28]. This same lifetime is assumed for connections due to churn.

- Total mobile usage is assumed to increase by the number of new subscribers multiplied by the average number of minutes per subscriber. In particular, we have assumed that average minutes of use will remain constant over the next 5 years in the base case assumption[29].

- The change in penetration and usage levels drive the direct change in government revenue that results from a reduction in excise taxes. Though the excise taxes collected by the government will be at a lower rate, this is partially offset by the fact that penetration and usage will have increased leading to higher volumes upon which the new excise taxes and other taxes on mobiles (such as VAT) will be applied.

We then modelled the 'indirect impact' of the tax change, which represents the increase in corporation tax and regulatory fee revenues that result from the higher penetration and usage. Modelling this indirect impact required the following additional key assumptions:

- a calculated profit before tax margin on new revenue was multiplied by the country specific corporate tax rate to provide the increase in corporate tax[30]; and

- multiplying the additional revenue by the assumed regulatory fee percentage provided the increase in the regulatory fees[31].

Finally, we included a consideration of the relationship between mobile penetration, economic activity and hence GDP. We econometrically estimated this dynamic growth impact before inputting it into the model. This is discussed further below. Further to this impact, we also included a multiplier effect which aims to capture the additional tax revenues resulting from the value add from the mobile operators. This calculation is consistent with the economic impact analysis.

One final simplifying assumption was required to allow the comparison of different scenarios, is that the impacts of all tax change measures would be felt in full by the end of 2009. In reality, there could be a lag in this effect given budgets may be set in mid 2009 following the review in February.

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[28] We consider this to be a conservative assumption. More frequent replacements increase the impact of the tax changes modelled.

[29] This reflects two contrasting trends. Firstly, new subscribers are more likely to be prepaid, and relatively poorer than current users, and will therefore drive usage down. At the same time, as competition in the industry increases and prices are expected to fall, minutes of use are likely to begin to. Data from the operators supports a trend towards constant minutes of use, as do Pyramid forecasts for sub-Saharan Africa.

[30] Assumed profit margins used were the weighted average of the profit before tax margins of the operators in the jurisdiction, from the published financial accounts, weighted by number of subscribers of each operator.

[31] License fees and USO fees are set at a percentage of revenues. A simplifying assumption was required to model spectrum fees, which are set according to the amount of spectrum required by an operator. The spectrum fees paid were divided by consumer revenues of each operator, and a weighted average was taken. It was then assumed that increased penetration would lead to a requirement for more spectrum, therefore we have modelled spectrum fees as a percentage of revenue.

## 5.2 The impact of reducing taxes on retail prices

We have assumed that a reduction in tax will be fully passed through to customers, thus increasing consumer surplus, rather than resulting in an increase in corporate profit margins. This assumption requires consideration.

Where markets are fully competitive then economic theory suggests that prices should be reflective of costs, including a normal return on capital employed. Thus, where markets are deemed to be competitive then a fall in the tax rate should result in an equivalent, of nearly equivalent, fall in retail prices[32].

There are three licensed operators in Kenya with a fourth soon to be licensed, although only two operators are currently providing service. The cut in excise duty would be unlikely to occur before the new operators were operational. International experience suggests that two operators may not result in extensive price competition, however in markets with three or four operators then it is typical to see price falling rapidly. This was the experience in the UK where prices fell significantly following the licensing of the third and fourth operators (Orange and One-2-One).

Our interviews with the mobile operators suggest that they are presenting a degree of constraint on each other and are actively engaging in price cutting in order to increase subscribers – for example, Safaricom regularly launches handset subsidy promotions.

Based on the above analysis, and the approach that has been taken in similar studies[33], we assume that 100% of any change in tax is reflected in the consumer price.

## 5.3 Elasticity of demand for mobile services

We received data on prices, penetration and tariffs from a number of operators, and aggregated this data to create a single market-level dataset for each country. Where possible, we have derived own price elasticity for a number of variables.

- Market penetration: the relationship between the number of subscribers and the cost of usage.
- Voice usage: the relationship between monthly average voice usage per subscriber and call rates (estimated as a weighted average of the cost of the different types of calls).
- Text usage: the relationship between SMS monthly usage and SMS prices. This investigation may potentially be hampered by a lack of data and if this is the case we would use a SMS elasticity based on that of voice (taking into account the relationship between voice and SMS elasticities for other countries).

[32] The exact proportion of the tax decrease that is reflected in consumer prices depends upon the relationship between consumer and producer surplus. In a perfectly competitive market, price is equal to cost and 100% of the reduction in tax is assumed to be passed through to the consumer. As competition reduces from this level then the percentage passed through to the consumer is also reduced.

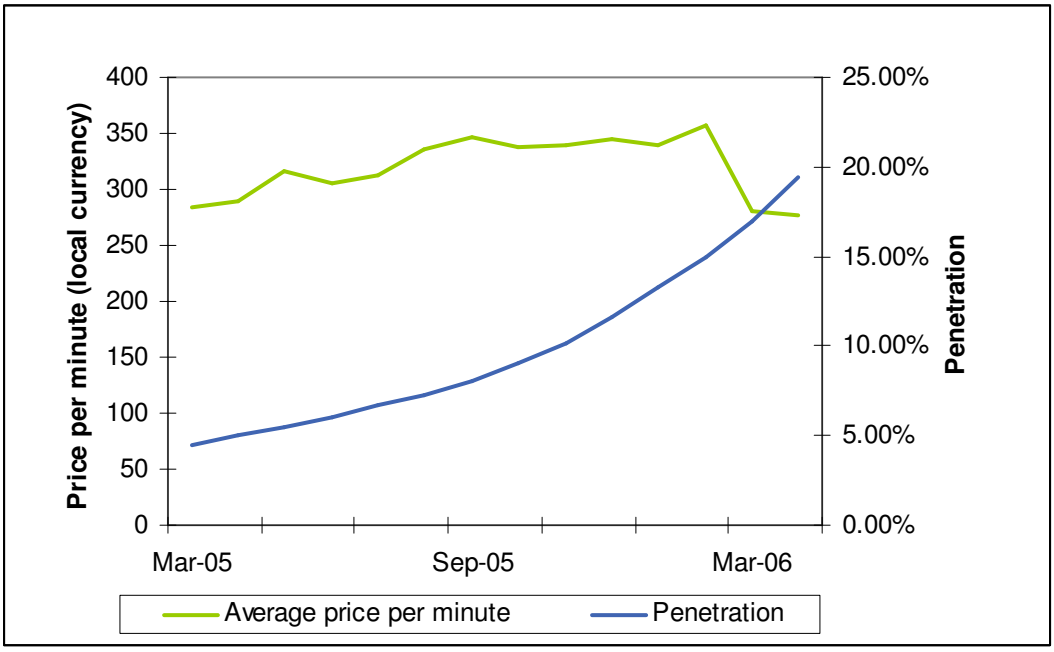
[33] For example, see: Frontier Economics. 2006. *Impact of mobile taxation in Bangladesh*.

We have estimated a single joint elasticity for post-pay and pre-pay markets since the number of post-pay subscribers is less than 2% in each of the countries. Additionally, data was not available from a sufficient number of operators to support separate regressions for pre-pay and post-pay.

### 5.3.1 Penetration Elasticity

Across the countries considered we found that penetration has grown at a steady rate throughout the period for which data is available, with little change in the rate of growth in response to changes to price per minute[34]. This is illustrated for Uganda in Figure 28.

**Figure 28: penetration and average price per minute - Uganda**




*Source: Operator data*

There have however been large increases in population coverage of the mobile industry over the last five years, implying penetration changes are principally supply rather than demand led. We can expect that a relationship between penetration and price per minute will develop as growth in coverage falls.

A method by which we could estimate the elasticity is to use penetration and price per minute data for those urban areas where penetration has already reached significant levels, so that one could expect further changes in penetration to be demand driven. However, we have not been able to obtain this data in the time available and have therefore based our penetration elasticity estimates on a review of elasticity benchmarks.

[34] This is exemplified by the lack of statistical significance on price in a simple regression of penetration on price and a time trend.

The following table presents some potential benchmarks reported in studies conducted in several countries around the world.

**Figure 29: Elasticity of penetration with respect to price per minute**

| Details | Elasticity of penetration with respect to price of calls per minute |
|---|---|
| Vodafone, UK. | **-0.480**[1] |
| O2, UK. Elasticity statistically insignificant. | **-0.260**[2] |
| T-Mobile, UK. | **-0.130**[3] |
| CRA, Australia. Based on other elasticities. | **-0.290**[4] |
| Competition Commission, UK. | **-0.198**[5] |
| Howe Institute, Canada. | **-0.706**[6] |
| Frontier, Bangladesh. Elasticity statistically insignificant. | **-0.180**[7] |

1, 2 & 3 Competition Commission. 2003. *Vodafone, O2, Orange and T-Mobile: Reports on references under section 13 of the Telecommunications Act 1984 on the charges made by Vodafone, O2, Orange and T-Mobile for terminating calls from fixed and mobile networks.*

4 CRA. 2004. *Pricing Mobile Termination in Australia.*

5 Quoted in: Frontier. 2004. *The importance of price elasticities in the regulation of mobile call termination.*

6 C.D. Howe Institute. 2005. *Going mobile slowly.*

7 Frontier Economics. 2006. *Taxation and the Development of the Mobile Market in Bangladesh.*

The elasticity estimates range from -0.706 to -0.130. It may be argued that the elasticity across East Africa could be higher than these benchmarks which were mainly estimated in more developed regions where mobile costs make up a smaller proportion of disposable income. As such, we have assumed for each country an elasticity of -0.4 in the central scenario and -0.6 upside.

## 5.3.2 Kenyan elasticities

### Penetration

The elasticity of penetration in respect to price per minute is assumed to be -0.4 in the central scenario and -0.6 upside as discussed above.

### Usage

The usage elasticities are obtained from the estimation of the relationship between average minutes of use per user and price per minute, defined as total airtime revenue divided by total minutes observed. The general form of the estimated relationship is outlined below. Notably we consider prices in previous periods as consumers might demonstrate some stickiness when reacting to price changes.

$$M_t = \alpha + \beta_1 P^m_{t-n} + \beta_2 S_t + \Psi X_t + \varepsilon_t$$

where:

$M_t$ is the average minute of use per user;

$P^m_{t-n}$ is the average price per minute;

$t$ is the time period under consideration;

$S_t$ is the total number of subscribers; and

$X_t$ is a matrix of other relevant variables including time trends.

To estimate the above model, we started by using a sample of observations taken from one mobile network operators over the period 2004 to 2008. Estimation then proceeded from a general specification, incorporating all potential explanatory variables, before paring this down using several 'information criterion'[35]. Correction was made for serial correlation by accounting for an Autoregressive component in the error. We also tested between linear and non-linear specifications finding a logarithmic transformation more accurately fit the data[36].

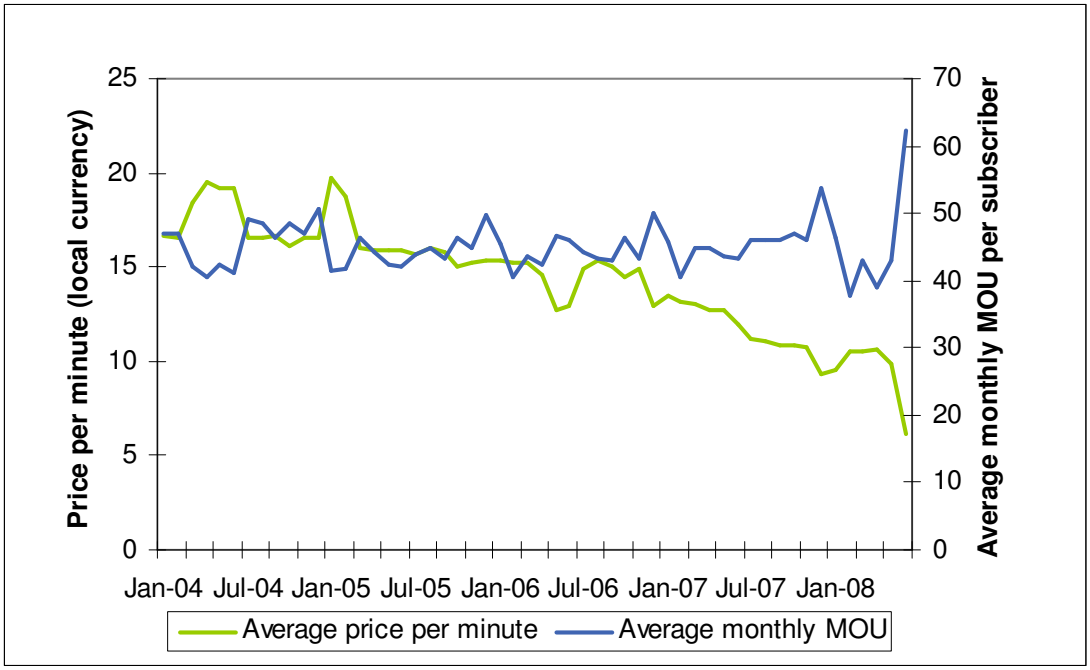
Our preferred specification included a total subscribers and own usage prices. Interestingly, only contemporaneous prices were found to be statistically significant suggestive of a lack of stickiness in consumer reactions to price. However, this result may further be related to the presence of multicolinearity[37]. The relationship between prices and minutes of use is illustrated Figure 30.

[35] Specifically we looked at the Akaike and Bayesian criterions.

[36] Using standard unit root tests there was also some evidence of nonstationarity. Loosely, nonstationarity is a phenomena whereby a variable does not present a constant mean over time. If nonstationary variables are included in a regression they can create the 'spurious regression' problem. However, in this instance the property of cointegration was supported by the Engle Granger test. The prevalence of this property suggests are estimation results are unlikely to be spurious.

[37] Multicolinearity is the correlation of explanatory variables in the regression. In its' presence regression analysis finds it difficult to differentiate between differing variables relation to the dependent variable. Correlation between prices this month was found to be over 90%.

**Figure 30: Price per minute and MOU**




*Deloitte analysis*

Estimates of the own price elasticity are presented below. The model fits the data well with statistical tests of lack of explanatory being rejected at the 1% significance level. We find an elasticity of -0.77 in our preferred specification.

**Figure 31: Own price elasticity for minutes of use[38]**

| Dependent variable: minutes of use per user per month | Elasticity | T-Value[39] | P-Value[40] |
|---|---|---|---|
| Log price per minute | -0.7739 | -6.53 | 0.00 |
| Log total subscribers | -5.33e-08 | -6.88 | 0.00 |

*Source: Deloitte analysis*

An alternative method to estimating the elasticity is to use a substantial one off pricing event. This approach reduces uncontrollable noise influencing parameter estimates but is more susceptible to switching as opposed to a pure price effects. In this sample, average prices per minute fell by

[38] For ease of presentation, statistically significant intercept is not here reported.

[39] The T-value is the estimated coefficient divided by the standard error estimated for this coefficient. For a coefficient to be statistically significant the T-value must exceed or be equal to 1.96 in absolute terms.

[40] The P-Value is the probability of rejecting the hypothesis that the variable is insignificant when the variable is significant. This is referred to as committing a type one error. In this report a variable is considered significant if the probability of committing a type one error is less than or equal to 0.05.

nearly 40% in mid 2008. This price event was met with a 45% increase in average minutes of use implying an elasticity of -1.22. This elasticity is larger than the econometric estimate potentially as a result of consumers switching mobile network operators.

Previous estimates of the own price elasticity, Deloitte (2007), found an elasticity of -0.96. This elasticity is around the mid-point between out preferred estimates.

### 5.3.3 Tanzanian elasticities

**Penetration**

The elasticity of penetration in respect to price per minute is assumed to be -0.4 in the central scenario and -0.6 upside as discussed above.

**Usage**

The usage elasticities are obtained from the estimation of the relationship between average minutes of use per user and average cost of call per minute, defined as the weighted average of tariffs of calls to fixed, on-net, off-net and international destinations per minute. The general form of the estimated relationship is outlined below.

$$M_t = \alpha + \beta_1 P^m_{t-n} + \beta_2 S_t + \Psi X_t + \varepsilon_t$$

where:

$M_t$ is the average minute of use per user;

$P^m_{t-n}$ is the average price per minute;

$t$ is the time period under consideration;

$S_t$ is the total number of subscribers; and

$X_t$ is a matrix of other relevant variables including time trends.

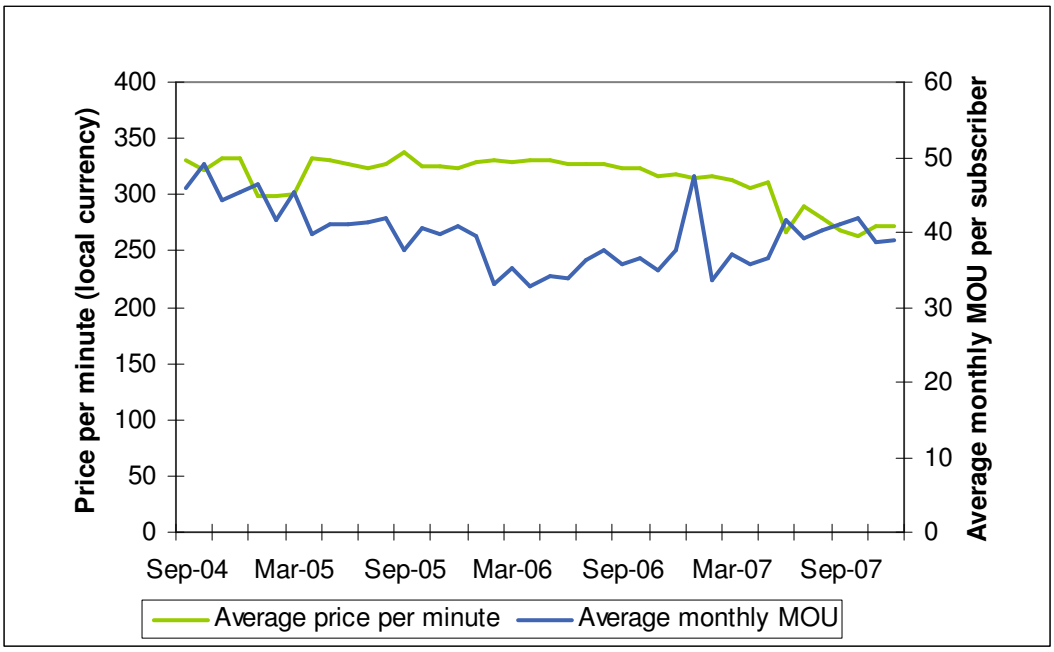
To estimate the above model, we started by using a sample of observations taken from one mobile network operators over the period mid 2004 to year end 2007. Estimation then proceeded from a general specification, incorporating all potential explanatory variables, before paring this down using several 'information criterion'[41]. Correction was made for serial correlation by accounting for an Autoregressive component in the error. We also tested between linear and non-linear specifications finding a logarithmic transformation more accurately fit the data[42].

[41] Specifically we looked at the Akaike and Bayesian criterions.

[42] Using standard unit root tests there was also some evidence of nonstationarity. Loosely, nonstationarity is a phenomena whereby a variable does not present a constant mean over time. If nonstationary variables are included in a regression they can create the 'spurious regression' problem. However, in this instance the

Our preferred specification included a linear time trend, own usage prices and total operator consumers. Interestingly, only contemporaneous prices were found to be releveant for inclusion suggestive of a lack of stickiness in consumer reactions to price. However, this result may further be related to the presence of multicolinearity[43]. The relationship between prices and MOU is illustrated in Figure 32[44].

**Figure 32: Price per minute and MOU**




*Deloitte analysis*

property of cointegration was supported by the Engle Granger test. The prevalence of this property suggests are estimation results are unlikely to be spurious.

[43] Multicolinearity is the correlation of explanatory variables in the regression. In its' presence regression analysis finds it difficult to differentiate between differing variables relation to the dependent variable.

[44] Average minutes of use have fallen for this operator systematically over time. Total minutes of use however have not fallen but increased suggesting new subscribers consumer fewer minutes that incumbent subscribers.

Estimates of the own price elasticity are presented below. The model fits the data well with statistical tests of lack of explanatory being rejected at the 1% significance level. We find an own price elasticity of -1.12 is estimated in our preferred specification.

**Figure 33: Own price elasticity for minutes of use[45]**

| Dependent variable: minutes of use per user per month | Elasticity | T-Value | P-Value |
|---|---|---|---|
| Log price per minute | -1.12 | -3.67 | 0.00 |
| Time trend | 0.20 | 2.11 | 0.03 |
| Log total subscribers | -5.56e-07 | -5.52 | 0.00 |

*Source: Deloitte analysis*

Our estimated price elasticity is quite high, consistent to our point estimate in Kenya but higher than -0.87 in Deloitte (2007). This discrepancy may result from the differing samples[46] and approaches to dealing with serial correlation. We have used the elasticity of -0.87 in our central and -1.12 in the upside scenario.

### 5.3.4 Uganda elasticities

**Penetration**

The elasticity of penetration in respect to price per minute is assumed to be -0.4 in the central scenario and -0.6 upside as discussed above.

**Usage**

The usage elasticities are obtained from the estimation of the relationship between average minutes of use per user and price per minute, defined as total airtime revenue divided by total minutes observed. The general form of the estimated relationship is outlined below. Notably we consider prices in previous periods as explanatory variable as consumers might demonstrate some stickiness when reacting to price changes.

$$M_t = \alpha + \beta_1 P^m_{t-n} + \beta_2 S_t + \Psi X_t + \varepsilon_t$$

where:

$M_t$ is the average minute of use per user;

$P^m_{t-n}$ is the average price per minute;

[45] For ease of presentation, statistically significant intercept is not here reported.

[46] We did truncate the sample to make it cover a period more similar to that used in Deloitte 2007. This led to a lower elasticity estimate consistent with a sampling period explanation.

$t$ is the time period under consideration;

$S_t$ is the total number of subscribers; and

$X_t$ is a matrix of other relevant variables including time trends.

To estimate the above model, we started by using a sample of observations taken from one mobile network operators over the period 2004 to 2008. Estimation then proceeded from a general specification, incorporating all potential explanatory variables, before paring this down using several 'information criterion'[47]. Correction was made for serial correlation using the Prais-Winsten transformation. We also tested between linear and non-linear specifications finding the linear-specification performed adequately[48].

Our preferred specification included a linear time trend and own usage prices. Interestingly, only contemporaneous prices were found to be statistically significant suggestive of a lack of stickiness in consumer reactions to price. However, this result may further be related to the presence of multicolinearity[49]. The relationship between prices and MOU is illustrated in Figure 34[50].

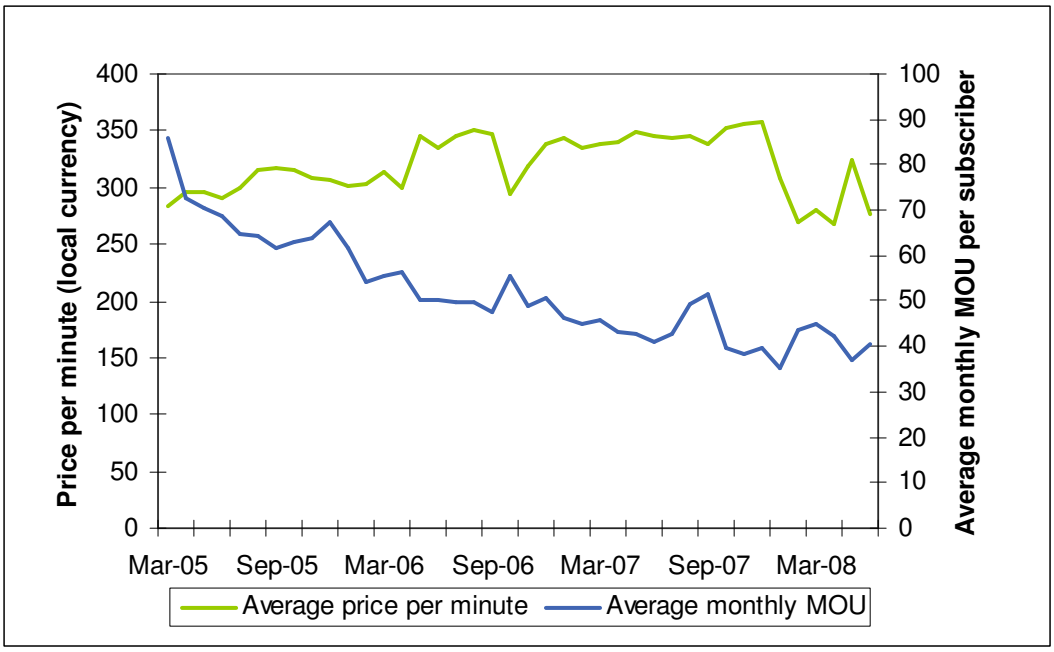
[47] Specifically we looked at the Akaike and Bayesian criterions.

[48] As in Kenya there was some evidence of nonstationarity using standard unit root tests. Again however cointegration was supported using the Engle Granger test.

[49] Multicolinearity is the correlation of explanatory variables in the regression. In its' presence regression analysis finds it difficult to differentiate between differing variables relation to the dependent variable.

[50] Average minutes of use have fallen for this operator systematically over time. Total minutes of use however have not fallen but increased suggesting new subscribers consumer fewer minutes that incumbent subscribers.

**Figure 34: Price per minute and MOU**




*Deloitte analysis*

Estimates of own price elasticity are below. The model fit the data well with the R-squared statistic implying over 80% of the movements in MOU being explained by the model.

**Figure 35: Own price elasticity for minutes of use[51]**

| Dependent variable: minutes of use per user per month | Elasticity | T-Value | P-Value |
|---|---|---|---|
| Price per minute | -0.6420 | -4.03 | 0.00 |
| Time trend | -0.5636 | -8.48 | 0.00 |

*Source: Deloitte analysis*

The estimates of the own price elasticity are lower than found previously in Uganda, see Deloitte (2007). Specifically using two mobile network operators' data over the period 2003 to 2006 the previous weighted elasticity was found to be -1.04[52]. The divergence in estimates is potential due to:

- more mobile network operators considered previously;

[51] For ease of presentation, statistically significant intercept is not reported here. Estimation has been undertaken using Prais-Winsten and standard errors robust to heteroscedasticity. Elasticities calculate at the mean value of the variables.

[52] The previously elasticity however is at the top end of the 95% confidence interval of the estimate here.

- differing time periods; or
- more robust data provided by the mobile network operators this time.

## 5.4 Kenya specific model inputs and assumptions

The following inputs and assumptions specific to Kenya were made within our mode[53].

- Country characteristics: most recent data on Kenya's Population, GDP and tax as a percentage of GDP were obtained from the IMF, World Bank and CIA.
- Mobile industry data: details on the prices, subscribers and usage were obtained from the operators and aggregated to the market level. It was assumed that all subscribers are on prepaid plans given that this is the case for over 99% of users, and this is expected to continue as future subscriptions growth may be from lower income and rural segments of the population.
- Handset sales: it was assumed that handsets are replaced every two years, and that the proportion of handsets sold through legitimate channels is 70% (following discussion with operators and vendors).
- Penetration forecasts: penetration is forecast to grow based on Wireless Intelligence subscriber forecasts, IMF population forecasts and industry reports. In the scenario, we have assumed that the greater penetration rates will create network effect which implies a shift in the S-curve, thus increasing forecast penetration rates by an extra 0.3% per year in the central scenario and 0.35% in the upside scenario.
- Usage forecasts: usage is forecast to fall by 5% a year in the base case scenario, based on lower consumption preferences of marginal consumers. In the scenario, we have assumed that the greater usage will create network effect will create a shift in the S-curve, thus increasing forecast usage rates by 0.3% per year in the central scenario and 0.35% in the upside scenario.
- Current tax structure: the relevant current tax rates being applied in Kenya are VAT of 16%, the excise tax on usage of 10%, and Corporation tax at 30%.
- Regulatory fees: our assumption on total regulatory fees was derived of the known licence fees (at 0.5% of revenues) a USO fee to be implemented from 2007 (at 1% of revenues) and 3.1% Spectrum fees (estimated by taking the amounts paid by the operators as percentages of consumer revenues, and weighted by the subscribers of each operator. The assumption is that as subscribers increase, operators will need more spectrum).
- The profit margin before tax was estimated as an average of an operator over several years.

[53] For more detail, see Appendix 2.

- Based on our econometric estimates we applied an elasticity of –0.77 in the central scenario and -1.22 in the upside.

- We assume that a 10% increase in penetration leads to a 1.2% increase in the GDP growth rate in the long-run.

- The following assumptions were included in the tax model flowing from our economic impact analysis: The percentage of value add was assumed to be 41%; and the multiplier applied to tax 1.2 in the central scenario and 1.3 in the upside.

## 5.5 Tanzania specific mobile inputs and assumptions

The following inputs and assumptions specific to Tanzania were made within our model[54]:

- Country characteristics: most recent data on Tanzania's Population, GDP and tax as a percentage of GDP were obtained from the IMF and EIU. GDP and population in the base case is forecast to grow at the average of IMF and Economic Intelligence Unit forecasts.

- Mobile industry data: details on the prices, subscribers and usage were obtained from the operators and aggregated to the market level. It was assumed that all subscribers are on prepaid plans given that this is the case for over 99% of users, and this is expected to continue as future subscriptions growth may be from lower income and rural segments of the population.

- Handset sales: it was assumed that handsets are replaced every two years, and that the proportion of handsets sold through legitimate channels is 50% (following discussion with operators and vendors).

- Penetration forecasts: penetration is forecast to grow based on Wireless Intelligence subscriber forecasts and IMF population forecasts. In the scenario, we have assumed that the greater penetration rates will create network effect which implies a shift in the S-curve, thus increasing forecast penetration rates by an extra 0.3% per year in the central scenario and 0.35% in the upside scenario.

- Usage forecasts: usage is forecast to fall by 5% a year in the base case scenario, based on lower consumption preferences of marginal consumers. In the scenario, we have assumed that the greater usage will create network effect will create a shift in the S-curve, thus increasing forecast usage rates by 0.3% per year in the central scenario and 0.35% in the upside scenario.

- Current tax structure: the relevant current tax rates being applied in Tanzania are VAT of 20%, the excise tax on usage of 10%, and Corporation tax at 30%.

[54] For more detail, see Appendix 2.

- Regulatory fees: 1.6% consists of a licence and spectrum fees. The latter two are estimated by using total industry paid regulatory fees divided by total industry generated revenues.

- The Profit margin before tax was calculated as an average of an operator over several years.

- We used -0.4 as the central case penetration elasticity and -0.6 as an upside.

- Based on our econometric estimates we applied an elasticity of -0.87 in the central scenario and -1.12 in the upside.

- We assume that a 10% increase in penetration leads to a 1.2% increase in the GDP growth rate in the long-run.

- The following assumptions were included in the tax model flowing from our economic impact analysis: the percentage of value add was assumed to be 32%; and the multiplier applied to tax 1.2 in the central scenario and 1.3 in the upside.

## 5.6 Uganda specific mobile inputs and assumptions

The following inputs and assumptions specific to Uganda were made within our model[55].

- Country characteristics: most recent data on Uganda's Population and GDP were obtained from the IMF and EIU.

- Mobile industry data: details on the prices, subscribers and usage were obtained from the operators and aggregated to the market level. It was assumed that all subscribers are on prepaid plans given that this is the case for over 99% of users, and this is expected to continue as future subscriptions growth may be from lower income and rural segments of the population.

- Handset sales: it was assumed that handsets are replaced every two years, and that the proportion of handsets sold through legitimate channels is 67% (following discussion with operators and vendors).

- Penetration forecasts: penetration is forecast to grow based on Wireless Intelligence subscriber forecasts, IMF population forecasts and industry reports. In the scenario, we have assumed that the greater penetration rates will create network effect which implies a shift in the S-curve, thus increasing forecast penetration rates by an extra 0.3% per year in the central scenario and 0.35% in the upside scenario.

- Usage forecasts: usage is forecast to fall by 5% a year in the base case scenario, based on lower consumption preferences of marginal consumers. In the scenario, we have assumed that the greater usage will create network effect will create a shift in the S-curve,

[55] For more detail, see Appendix 2.

thus increasing forecast usage rates by 0.3% per year in the central scenario and 0.35% in the upside scenario.

- Current tax structure: the relevant current tax rates being applied in Uganda are VAT of 18%, the excise tax on usage of 12%, and Corporation tax at 30%.

- Regulatory fees: 1.4% consists of a licence fee which is known to be 1% of revenues, and 0.4% spectrum fee which is calculated as operator payments divided by revenues.

- Profit before tax margins were calculated as a weighted average (based on subscribers) of the margins of each operator, sourced from the financial statements or management accounts.

- Based on our econometric estimates we applied an elasticity of -0.56 in the central scenario and -1.04 in the upside.

- We assume that a 10% increase in penetration leads to a 1.2% increase in the GDP growth rate in the long-run.

The following assumptions were included in the tax model flowing from our economic impact analysis: The percentage of value add was assumed to be 40%; and the multiplier applied to tax 1.2 in the central scenario and 1.3 in the upside.

## 5.7 Difference between Deloitte (2007) and this report

The impact of a reduction in excise tax in this update is broadly consistent to those found in Deloitte (2007). However, total tax revenue over and above the base case over the 10 year period has been greater and neutrality achieved more quickly. A primary driver of this discrepancy is the general reduction in price per minute of making a call and decrease in minutes of use for an average subscriber. These two effects mean that the overall tax revenues estimated in the base by the government are not as large as previously derived relative to the indirect effects which have grown more proportionately with the subscriber base.

# 6 Kenya: Executive Summary

The mobile communications sector has brought significant social and economic benefits to Kenya. Zain and Safaricom have invested heavily, increasing population coverage to 94% in 2008, equating to penetration rate of over 43%. The number of mobile phone connections now represents 95% of all telephone lines in Kenya[56]. Mobile networks reach many rural areas, revolutionising the way in which business is conducted and allowing social contact to be maintained much more easily amongst family and friends. The cost of owning and using a mobile phone continues to fall. Safaricom's average tariff per minute has fallen by 40% this year and Zain's One Network allows local call charging across East Africa[57].

Despite several setbacks two new GSM operators, Orange and Econet, are beginning to rollout and develop their networks. Investment in 2008 is estimated to be over Ksh 30,000m and this will further support the impact of mobile telephony.

The mobile communications industry contributed a total of Ksh 182,832m to the economy in 2008 with consumers enjoying additional intangible benefits equivalent to a further 29,284m. Relative to GDP this represents 5.1% and 0.8% from intangibles. Some 225,563 Kenyans are employed by the mobile and related industries.

Despite this contribution, mobile consumers are subject to a sector specific tax of 10% on mobile usage[58]. Our analysis shows that a reduction in usage tax from 10% to 3% could be tax positive and lead to incremental increases in mobile penetration rates of 4% by 2019. Our estimates suggest that tax revenue neutrality could occur in around five years after such a policy is implemented. Using upside assumptions, neutrality is estimated to occur more quickly, after two years.

The 'tiger' economies in Asia have placed telecommunications at the core of their economic development strategies. If Kenya is to follow a similar path the developing mobile communications sector needs to be encouraged to continue operating as an engine of growth. In particular, it may be counterproductive for government policy to limit this development through policies which may restrain consumer demand for mobile services. Furthermore, the 10% excise duty on mobile services is regressive, hitting poorer consumers the hardest as their spending on mobile services is likely to represent a higher proportion of their income.

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[56] Budde. March 2008. *Kenya - Mobile Market - Overview and Statistics*.

[57] 'One Network' was launched September 2006 and allows customers to use their local SIM out of their indigenous country but pay a local tariff.

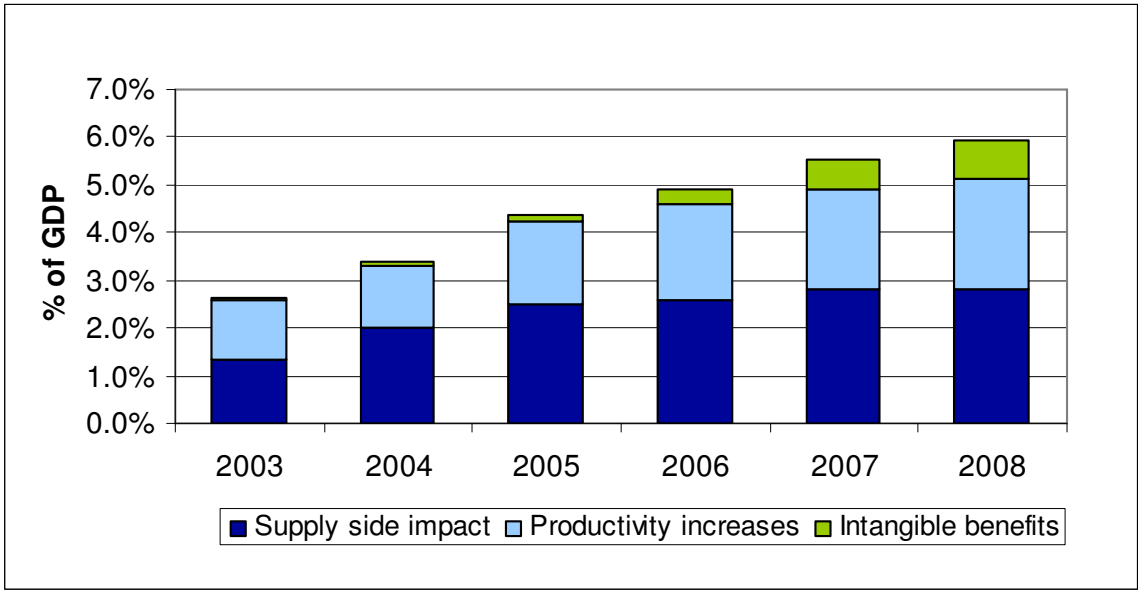
[58] This increased from 5% to 10% in July 2003,

## 6.1 Establishing the economic benefit of mobile communications in Kenya

The economic impact of mobile communications has been increasing over time from Ksh 41,948m in 2003 to Ksh 182,832m in 2008. In addition, consumers have gained from falling prices unlocking intangibles which have risen from Ksh 508m to Ksh 29,284m during the same period.

The economic impact of mobile communications is, for 2008, estimated to be above 5.1% of GDP, with additional 0.8% in intangible benefits. This impact could potentially rise with further mobile penetration. Our analysis also suggests that a 10% increase in mobile penetration can increase Kenya's GDP growth rate by 1.2% over the long-run.

**Figure 36: Economic impact of mobile communications industry as a percentage of GDP**



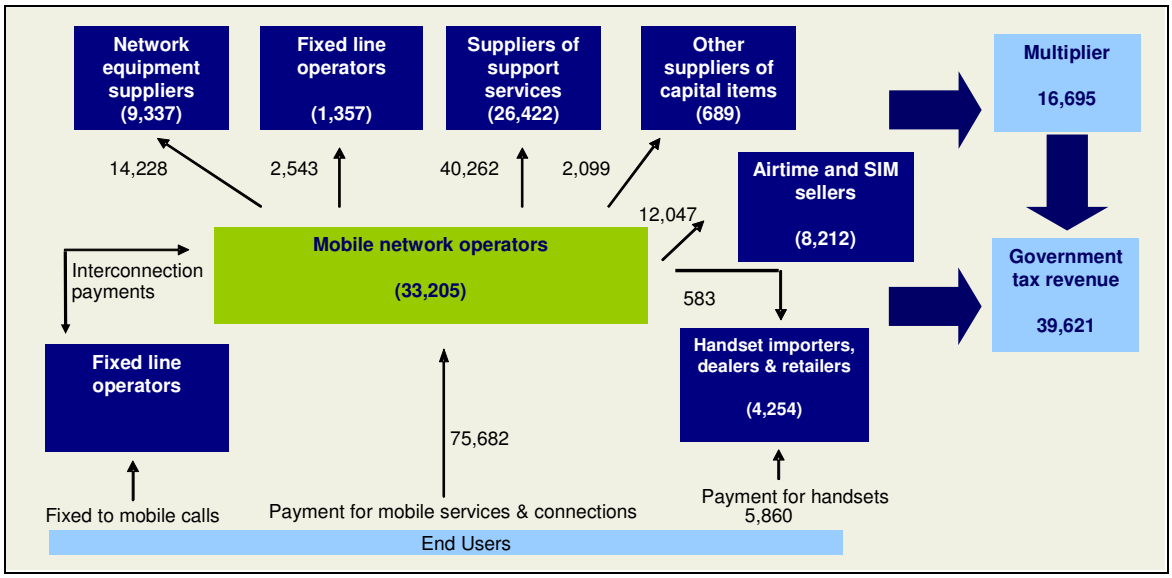

*Source: Deloitte Analysis*

### 6.1.1 Supply side impact of mobile communications

The supply side impact of mobile communications is derived from direct, indirect and multiplier[59] impacts. The revenue flows and value add for 2008 are presented below.

[59] Representing the positive impact on the economy from the value add created by the mobile industry.

**Figure 37: Mobile value chain in Kenya in 2008, Ksh millions**




*Source: Deloitte analysis based on information provided by Zain and Safaricom, interviews with Ericsson and Nokia Siemens and analysis of company accounts and industry reports*

## 6.1.2 Increases in productivity

The following productivity impacts of mobile communications were identified during interviews.

- Substantial reductions in travel times and costs: particularly in rural areas where previously traders would have needed to travel to the urban areas to check for demand and agree prices. In urban areas services such as SMS services notifying of exam results are also, reducing travel times.

- Creation of market efficiency: in the agriculture sector, for example, workers are notified about changes in demand / prices from multiple markets so that they can achieve the best price for their goods. They are able to use SMS to receive market prices for each area, so they can decide whether to travel to sell produce and where to travel to;

- Encouraging entrepreneurialism: mobile has encouraged the growth of small business and has increased its efficiency, for example in small, owner operator businesses like taxi driving, painting or plumbing.

- Mobile banking: Safaricom has launched Mpesa, a mobile banking and micro finance service that reduces the need to 'meet in person' to conduct business and extends the reach of financial services to rural areas and many Kenyans who previously fell outside the formal banking system. This service is soon to be extended to include the purchase of goods and services.

- SMS job search: employment opportunities are advertised via SMS text messages that are sent to registered users who have indicated they are seeking employment in that area.

Taken together we estimate that workers using mobile phones experienced productivity increases equivalent to Ksh 82,662m in 2008.

### 6.1.3 Intangible benefits

During interviews, we identified several intangible benefits of mobile communications in Kenya:

- promotion of social cohesion, through the creation of 'chat groups' and SMS;
- extension of communications to users with low education and literacy and on low incomes;
- transferring wealth to poorer regions, through schemes such as mobile based money transfer;
- stimulating local content, this has increased substantially since Deloitte (2007) due to the increased number of local content providers;
- assisting in disaster relief;
- fostering the democratic process, for example SMS is used in the voter registration process and to encourage voter turn-out; and
- increased electricity rollout; and
- employment creation, for example through SMS job search applications.

Using a 'willingness-to-pay' methodology to proxy for these, we estimate consumers enjoyed the equivalent of Ksh 29,284m in intangible benefits in 2008.

### 6.1.4 Impact on employment

Mobile services contribute to employment via several avenues:

- direct employment of the industry and related industries;
- support employment created by outsourced work and taxes that the government subsequently spends on employment generating activities; and
- induced employment resulting from the above employees and beneficiaries spending their earnings, and creating more employment.

The first effect is obtained directly from mobile operators. The support and induced employment is estimated using a multiplier of 1.2. Combing these employment generated in relation to mobile communications in 2008 is estimated to be over 250,000 full time equivalents.

**Figure 38: Contribution to employment from the mobile value chain**

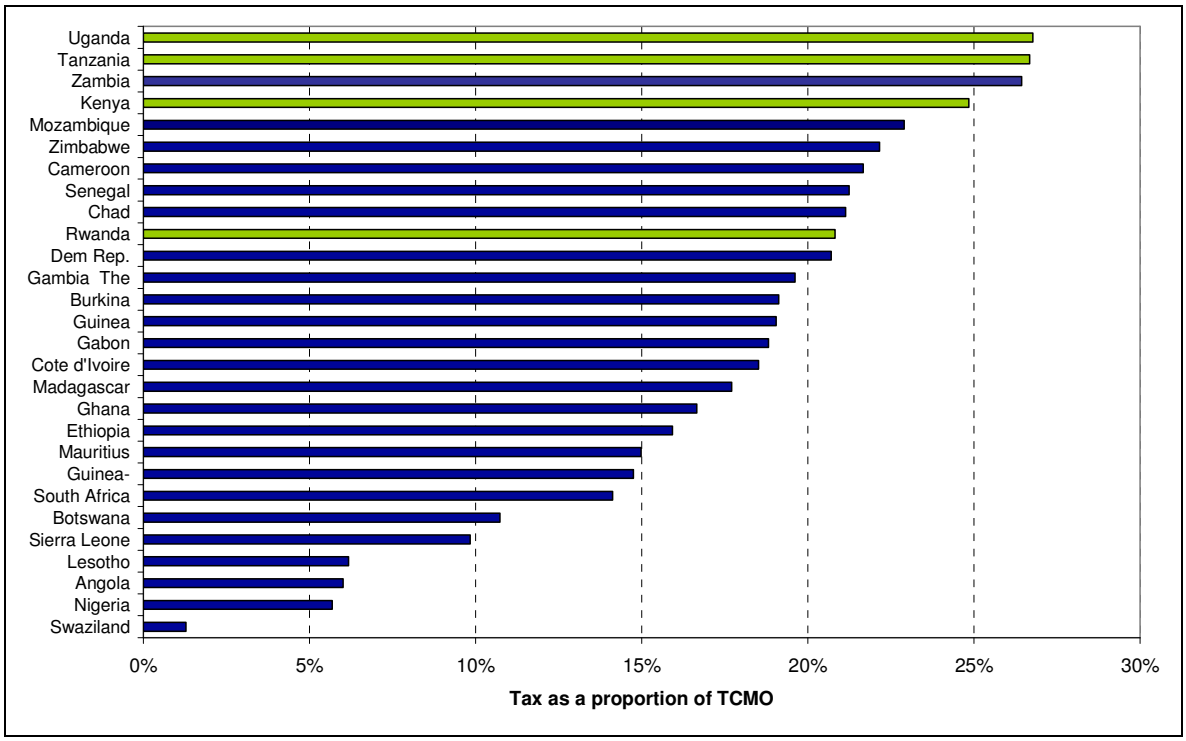
| Employment Impact | Number of employees | Number of employees including multiplier |
|---|---|---|
| Mobile network operators | 2,861 | 2,861 |
| Fixed telecommunications operators | 488 | 586 |
| Network equipment suppliers | 2,444 | 2,933 |
| Handset designers and dealers | 2,348 | 2,818 |
| Other suppliers of capital items | 240 | 287 |
| Suppliers of support services | 38,286 | 45,943 |
| Airtime commission, payphone commission | 141,530 | 169,835 |
| **Total** | **188,196** | **225,263** |

*Source: Operator data, interviews and Deloitte analysis on average wage rates. Note this is employment directly created by revenue flows from the mobile network operators and does not represent total employment in the sector.*

## 6.2 Impact of reducing the excise taxes on usage

Despite the positive economic impact that mobile communications creates for the Kenyan economy, mobile consumers are subject to some of the highest taxes in Africa. The following figure illustrates the tax burden on mobile services as a percentage of the total cost of mobile ownership ('TCMO').

**Figure 39: Tax as percentage of total cost of mobile ownership across Africa**

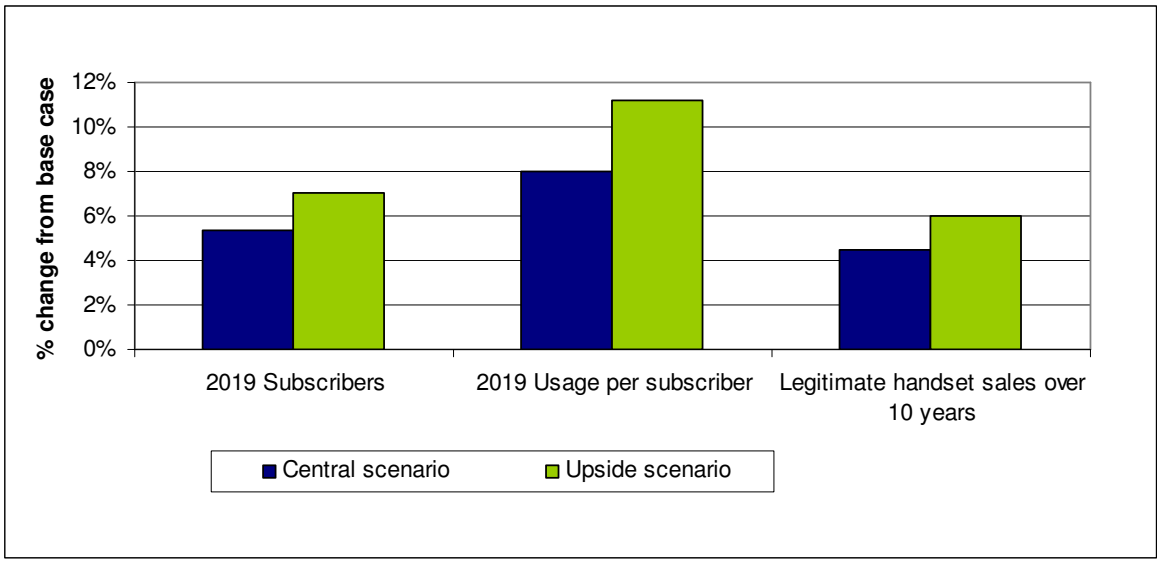



*Source: Deloitte analysis*

In Kenya tax on mobile telephony makes up almost 25% of TCMO, which is high by African standards. Taxation is high in Kenya because taxation includes both taxes on the same basis as other goods but also specific excise duty applied to mobile usage at a rate of 10%.

In considering the impact of reducing the excise duty in Kenya we modelled a cut in the duty to 3%, the rate currently applied in Rwanda. We then compare the changes that result against our base case forecast which projects the development of the mobile industry to 2019 without any changes to the tax structure. The following figure illustrates the impact on mobile penetration, usage and handset sales over the 10 year period from 2009.

**Figure 40: Impact of reduction in excise tax from 10% to 3% on usage on the mobile industry**




*Source: Deloitte analysis*

Our central scenario shows that total subscribers may be 5.4% higher in 2019 than the base case, representing mobile penetration of over 70%[60]. In our upside scenario, mobile penetration is estimated to be 5.9% higher in 2019. Penetration rises due to the lower overall cost of mobile ownership falling. The impact on usage per subscriber is also significant at almost 8.0% in the central scenarios and 11.2% in the upside scenario. The increase observed in the upside scenario is the result of a higher elasticity of usage with respect to price of -1.22.

### 6.2.1 Impact on Government tax revenues

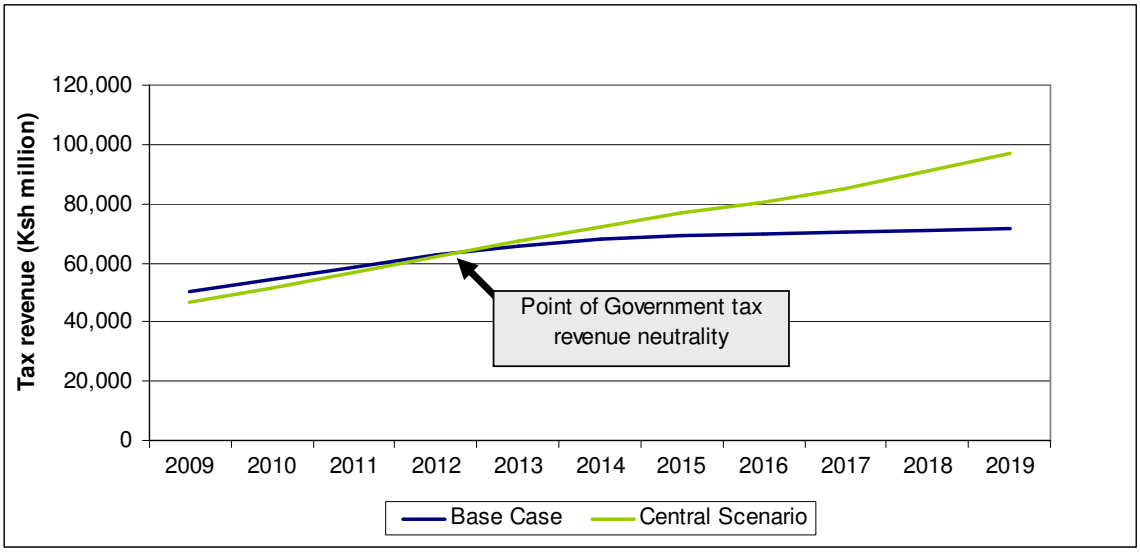
The impact on government tax revenue is split into:

- the initial fall in taxes on mobile services;
- the uplift from the indirect effect (increased corporate tax and regulatory fees);
- the uplift once the growth and national economic multiplier impacts are accounted for; and
- the net impact.

Our quantification of these impacts is based on a reduction of excise taxes to 3% which is compared to the tax revenues obtained in the base scenario with constant tax rates.

[60] Population penetration will be lower as more people possess more than one SIM card. We correct for this throughout the model where subscriber is the relevant unit. However, for handsets replacement we remain with connections given as the market develops the handset replacement period will fall counteracting the increased double SIMs.

**Figure 41: Impact of reduction in excise tax on usage from 10% to 3% on Government tax revenues, 2009-2019**

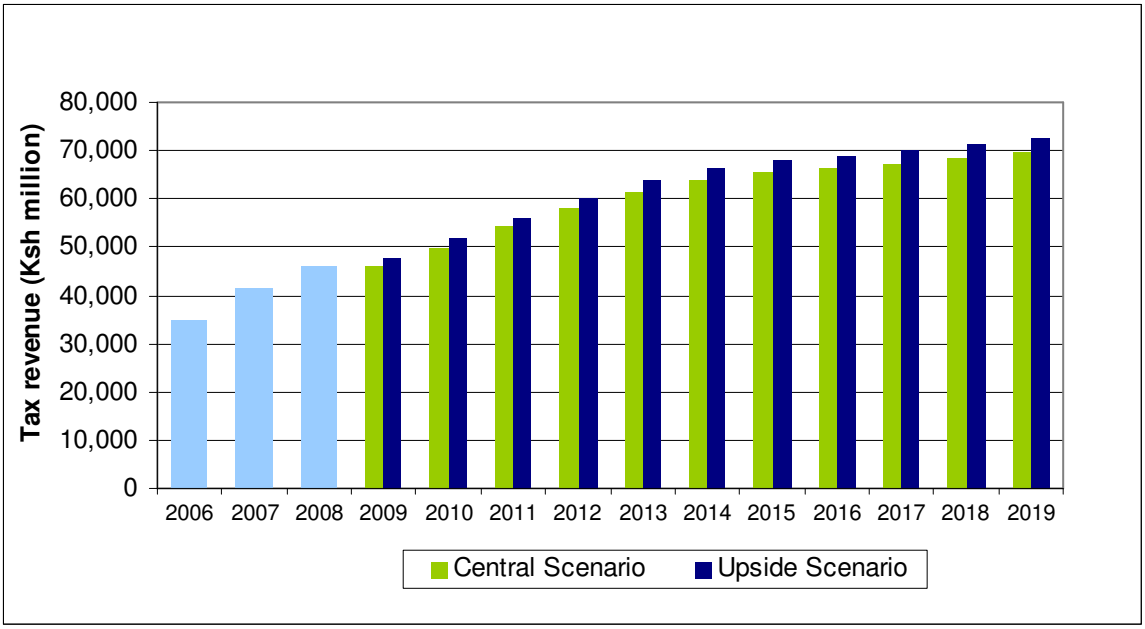



*Source: Deloitte analysis*

Our analysis suggests that these tax changes may be tax positive with neutrality being achieved five years after the tax reduction. Moreover, total Government tax revenue is projected to rise by 10.8% over the ten year time frame. This positive impact is enhanced further in our upside scenario with neutrality achieved after two years and tax revenues projected to rise by 20.1%.

Interestingly if we compare tax revenues derived once the reduction is implemented to those that have historically been collected by the Kenyan taxation authorities it can be seen that the reduction in excise duty on mobile usage is estimated not to decrease government tax revenues in either scenario. This is illustrated in Figure 59.

**Figure 42: Impact of reduction of excise tax on usage to 3% on Government tax revenue**




*Source: Deloitte analysis. Historic data corresponds to actual taxes reported to paid by mobile network operators and wider taxes resulting as captured by a multiplier. Post 2008 taxes as estimated by our model but exclusive of GDP growth effect for comparability to historic data.*

# 7 Kenya: Economic impact of mobile industry

The mobile communications industry contributed a total of Ksh 182,832m in 2008 with a further Ksh 29,284m relating to intangible consumer benefits, such as social cohesion. Relative to GDP this represents 5.1% and 0.8% from intangibles.

Academic research suggests that over the longer term mobile communications have a significant impact on economic growth. It has been suggested that this effect is particularly strong in developing countries. Our research is consistent to this and we estimate that mobile communications has raised GDP growth rates in Kenya by 12% in the long-run for each 10% increase in penetration. As such, the 15% increase in penetration rates between 2007 and 2008 may have contributed 1.8% to the Kenyan GDP growth rate.

## 7.1 Overview of mobile communications in Kenya

Mobile communications has a visible impact on the social and economic structures in Kenya. Zain and Safaricom have undertaken significant investment in a network which now covers an estimated 95% of the population[61], with mobile phone representing 95% of all telephone lines[62]. Recently the sector has experience substantial growth with penetration increasing from 28% in 2007 to 43% in 2008; corresponding to over 14 million mobile subscribers. Much investment has been undertaken in rural areas, allowing people to better stay in contact with their families and revolutionising the way in which business is conducted. Investment has also undertaken in value-add applications some of which have a social value, e.g. music and SMS chat applications but many of which are have a positive knock-on effect on business conditions in Kenya, for example Mpesa mobile banking and food exchange pricing.

Investment in 2008 has increased substantially as new mobile network operators, Orange[63] and Econet, rollout their networks. Additionally Safaricom, after being licensed in late 2007, has begun it's 3G roll-out and plans further investment in 2009.

The regulator has undertaken a number of new initiatives since Deloitte (2007) such as a movement to a technology neutral Unified Licensing Framework. Moreover, the operators have been working closely with the Telecommunications Regulatory Authority to ensure that the regulatory framework is one which continues to foster rising penetration rates and low prices. However, despite many positive interactions with the regulatory authority, the mobile operators noted that there remains significant uncertainty around regulatory direction on interconnection rates and the process by which the regulator intervenes in retail tariff setting[64]. The operators also noted

[61] Data supplied by GSMA.

[62] Budde. March 2008. *Kenya - Mobile Market - Overview and Statistics.*

[63] France Telecom acquired a 51% stake in Telkom Kenya in December 2007. Telkom Kenya also runs a CDMA network which is not consider as part of this study.

[64] Ex-ante Intervention in mobile retail setting is rare and, for example, not recommended by the European Commission. Any intervention usually only occurs: (i) following a market review process; and (ii) due to a breach in competition law.

that they are engaging in infrastructure sharing on a commercially negotiated basis and therefore were unclear as to the rationale for the regulator intervening in this process. Clarification from the regulator alongside a consistent approach a stable set of licence obligations would be welcomed by the operators. This increased certainty would facilitate their investment appraisal process and potentially result in further roll-out and investment in new applications.

## 7.2 Operator participation in the economic impact study

Safaricom and Zain provided us with data for this study, we also interviewed Orange. We were unable to obtain data for other operators but have conducted further interview with Ericsson and Nokia Siemens. Using data on subscriber numbers for each operator, we gross up cost, revenue and employment data received from Safaricom and Zain to provide indicative values for Orange and Econet. Where public data was available for these operators we have used this in preference. The values presented in the remainder of this chapter are intended to represent the total aggregate impact of the mobile communications sector in Kenya. For 2008 we have estimated full year values using half year results, operator forecasts and trends.

A number of our results have been updated since our Deloitte 2007. This is due to revised operator data or the availability of better public or interview evidence. The impact of these changes is marginal.

## 7.3 Static Supply side impact of mobile communications

We have estimated the value add created by the mobile communications industry. We have also estimated the 'leakages' from the system, i.e. what percentage of any shilling spent will remain within the national economy to be spent in the next round and use this to isolate the impact on the Kenyan economy from the total international impact of the mobile communications industry.

### 7.3.1 Value chain impact

The value add of the mobile network operators in Kenya is estimated to provide a direct contribution of Ksh 33,205m in 2008 to the Kenyan economy. The breakdown by category is provided in the figure below.

**Figure 43: Value add of mobile network operators (excluding multiplier effect), Ksh millions**

| Value add | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|---|
| Employee wages and benefits | 1,448 | 1,731 | 2,135 | 2,630 | 3,798 | 5,934 |
| Contractors | 1 | - | 37 | 34 | 81 | 34 |
| Taxes and regulatory fees | 5,986 | 10,319 | 14,425 | 18,875 | 23,662 | 24,539 |
| CSR | 68 | 68 | 68 | 449 | 310 | 297 |
| Dividends | - | - | - | 1,795 | 2,400 | 2,400 |
| **Total** | **7,503** | **12,118** | **16,664** | **23,783** | **30,251** | **33,205** |

*Source: Deloitte analysis based on information provided by Zain and Safaricom, interviews and analysis of company accounts and industry reports*

Taxes and regulatory fees (including spectrum fees) make up the largest proportion in the above table, accounting for over 74% of the total in 2008. The next largest contributor is employee wages and benefits.

Corporate social responsibility (CSR) programmes received over Ksh 297m in 2008, including Ksh 35m from Zain's Build Our Nation' program. This program provides text books, revision texts, reference books and other teaching aides. Other initiatives include Safaricom's work in the areas of community, environment, education, health and sports.

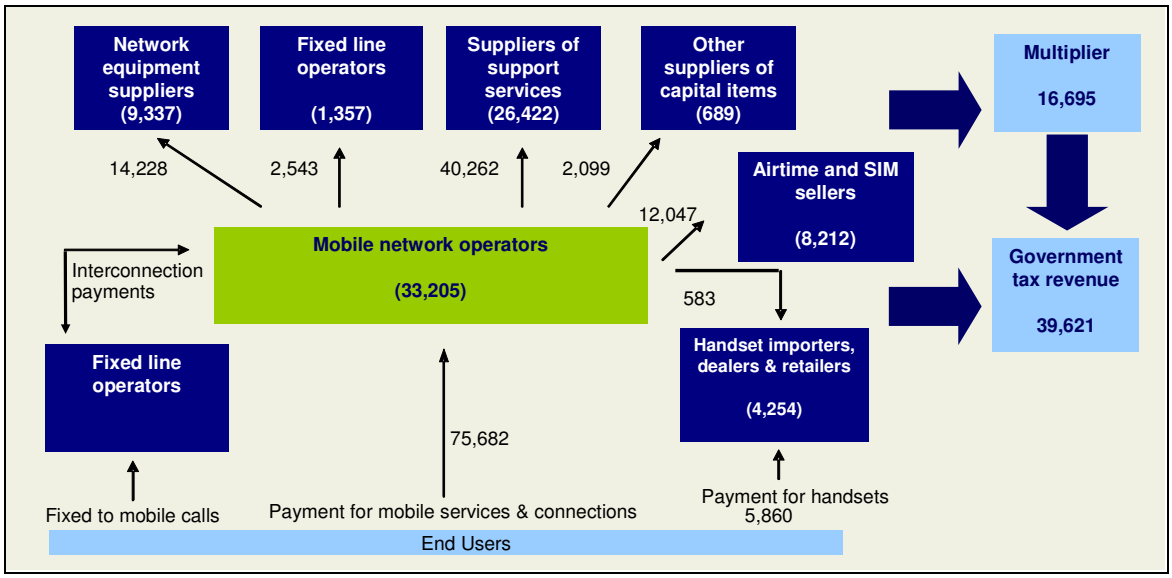
Dividends were not paid by either company in the period 2003-2005 as any profit was reinvested in the network.

We then analysed the revenue flows from Safaricom and Zain to others in the industry, and estimated the quantity translated into further value add[65]. The estimates of value add include the multiplier effect on the wider-economy which is assumed to be 20% of value-add[66].

[65] Details on value add margins, percentage of revenue translated into value add, are contained in the assumptions appendix.

[66] Figure 21 summarizes the rationale behind this assumption.

**Figure 44: Mobile value chain in Kenya in 2008, Ksh millions**




*Source: Deloitte analysis based on information provided by Zain and Safaricom, interviews and analysis of company accounts and industry reports*

The figures next to the arrows represent the flow of money from one group to another. The figures inside the boxes represent the value retained by each group. The figures shown relate solely to domestic flows and domestic value add. The following table shows the calculation of value add.

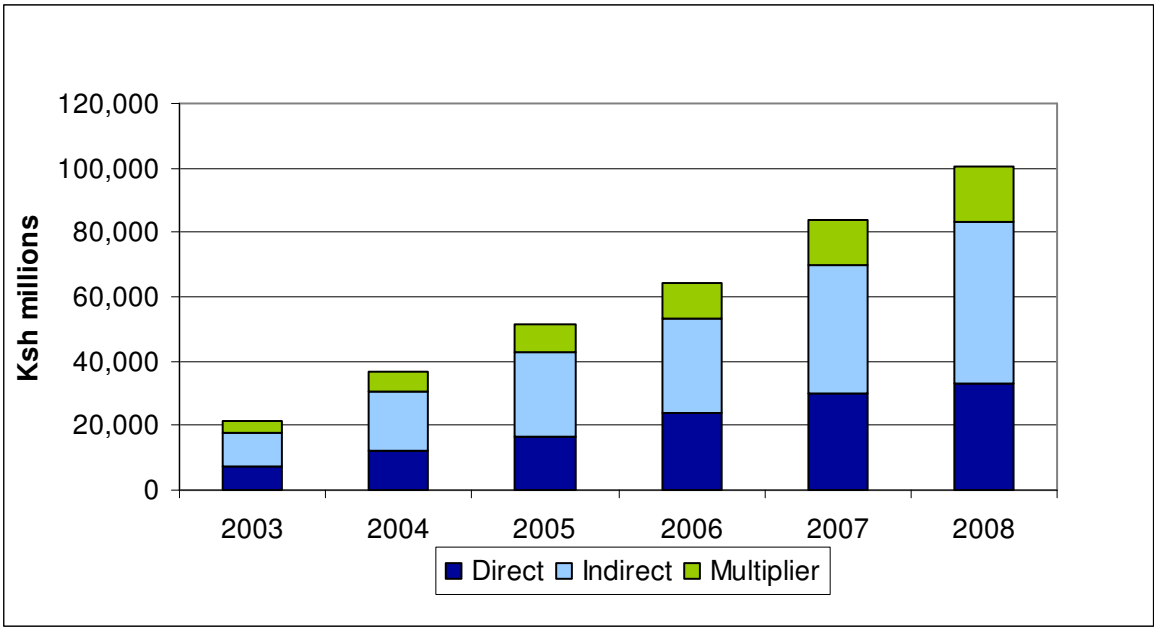
**Figure 45: Calculation of value add from mobile communications in Kenya in 2008, Ksh millions**

| Domestic value add in 2008 | Total revenue | Domestic revenue | Domestic cost | Domestic value add | Value add with multiplier |
|---|---|---|---|---|---|
| Mobile network operators | 75,682 | 75,682 | 42,477 | 33,205 | 39,846 |
| Fixed telecom operators | 2,543 | 2,543 | 1,185 | 1,357 | 1,629 |
| Network equipment suppliers | 56,911 | 14,228 | 4,891 | 9,337 | 11,204 |
| Handset designers and dealers | 16,227 | 6,443 | 2,190 | 4,254 | 5,104 |
| Other suppliers of capital items | 2,887 | 2,099 | 1,410 | 689 | 826 |
| Suppliers of support services | 44,118 | 40,262 | 13,840 | 26,422 | 31,706 |
| Airtime & payphone commission | 12,047 | 12,047 | 3,835 | 8,212 | 9,854 |
| **Total** | **210,415** | **153,303** | **69,829** | **83,475** | **100,170** |

*Source: Deloitte analysis based on information provided by Zain and Safaricom, interviews and analysis of company accounts and industry reports*

73% of the revenue flows from the mobile network operators are estimated to remain in Kenya. Of this a large portion relates to network and non-network support services. More of these services are locally provisioned than in other East African countries given the more developed nature of Kenya's economy. It is estimated that only 25% of network capital expenditure is domestic, this comprises primarily of lower value capitalised labour.

**Figure 46: Supply side value add from mobile communications 2003 to 2008**




*Source: Deloitte analysis*

## 7.3.2 Contribution to Government revenue

Tax revenues to the Government are raised through taxes specific to mobile services, corporation tax, income tax, regulatory fees and spectrum fees. There has additionally been a proposal to mandate a 1.5% charge on revenues into a universal service fund which maybe payable in the future[67].

[67] In Deloitte (2007), this proposed levy was included in tax revenues. However, given it is still yet to be enforced we have excluded from this version of the report.

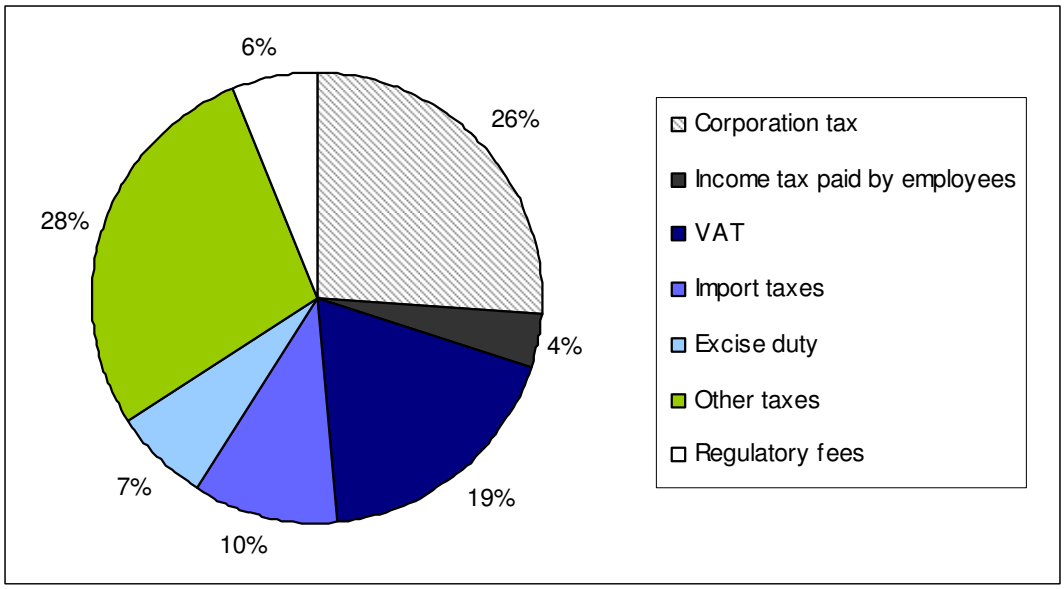
**Figure 47: Tax and regulatory payments in Kenya from mobile operators, Ksh millions**

| Taxes from mobile network operators | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|---|
| Corporation tax | 1,153 | 2,262 | 2,500 | 2,800 | 6,070 | 6,406 |
| Income tax paid by employees | 259 | 291 | 431 | 479 | 760 | 940 |
| Sales and mobile specific taxes | 4,177 | 7,260 | 10,760 | 14,542 | 15,402 | 15,717 |
| Regulatory fees | 397 | 506 | 733 | 1,054 | 1,430 | 1,477 |
| **Total taxes and fees** | **5,986** | **10,319** | **14,425** | **18,875** | **23,662** | **24,539** |

*Source: Deloitte analysis based on operator data*

The largest proportion of tax revenue is raised through mobile specific and sales taxes which accounted for 64% of tax paid in 2008, of these the excise tax on usage makes up around 30% of total tax paid. The breakdown for 2008 is illustrated in the figure below:

**Figure 48: Breakdown of 2008 tax revenues from mobile operators by source**




*Source: Deloitte analysis based on operator data*

Tax as a proportion of company revenues averaged 32% in 2008.

In addition to the direct tax revenue received from mobile operators, it is necessary to consider the tax revenue received from others in the value chain. We have considered import, sales, corporation and employee income taxes in our calculations below.

**Figure 49: Total tax revenues from the mobile value chain in 2008, Ksh millions**

| Tax Revenue | Tax revenue | Tax revenue with multiplier |
|---|---|---|
| Mobile network operators | 24,539 | 29,447 |
| Fixed telecommunications operators | 570 | 684 |
| Network equipment suppliers | 2,937 | 3,524 |
| Handset designers and dealers | 1,612 | 1,935 |
| Other suppliers of capital items | 217 | 260 |
| Suppliers of support services | 8,310 | 9,972 |
| Airtime commission, payphone commission | 1,436 | 1,724 |
| **Total** | **39,621** | **47,546** |

*Source: Deloitte analysis based on Deloitte tax data, analysis of company accounts and interviews. Note this represents tax revenues directly created by revenue flows from the mobile network operators and not total tax revenues from the sector.*

The largest payers of tax, aside from the mobile network operators, are the suppliers of support services. Although airtime sellers and payphone operators receive large revenues from the mobile network operators, they are assumed to mainly operate in the informal economy and thus are assumed not to pay tax. Our calculations assume only the largest airtime sellers that work through official dealerships pay tax and that, by and large, street-side airtime sellers do not. Interviews with operators, handset manufacturers and dealers revealed that many handsets are imported illegally from Dubai or are reconditioned / stolen[68]. Therefore we assume that only 70% of handsets sold are subject to sales tax.

### 7.3.3 Impact on employment

Mobile services contribute to employment via several avenues:

- direct employment of the industry and related industries;
- support employment created by outsourced work and taxes that the government subsequently spends on employment generating activities; and
- induced employment resulting from the above employees and beneficiaries spending their earnings, and creating more employment.

[68] Mobile network operators have implemented a phone blocking system 'Equipment Identification Register' (EIR) to try and reduce the prevalence of stolen phones. However, it is reported that this technology can be circumvented.

The first effect is obtained directly from mobile operators. The support and induced employment is estimated using a multiplier of 1.2. For operators no multiplier was applied as the majority of induced employment will be captured by the first round flows.

**Figure 50: Contribution to employment from the mobile value chain 2008**

| Employment Impact | Number of employees | Number of employees including multiplier |
|---|---|---|
| Mobile network operators | 2,861 | 2,861 |
| Fixed telecommunications operators | 488 | 586 |
| Network equipment suppliers | 2,444 | 2,933 |
| Handset designers and dealers | 2,348 | 2,818 |
| Other suppliers of capital items | 240 | 287 |
| Suppliers of support services | 38,286 | 45,943 |
| Airtime commission, payphone commission | 141,530 | 169,835 |
| Total | **188,196** | **225,263** |

*Source: Operator data, interviews and Deloitte analysis on average wage rates. Note this is employment directly created by revenue flows from the mobile network operators and does not represent total employment in the sector.*

The largest category of employment is airtime sellers and payphone operators. From interviews with mobile network operators there are estimated to be around 80,000 points of sale including; street hawkers, pharmacies, hotels, street sellers etc. We estimate these points of sale employ on average 1.2 FTEs[69].

Network equipment providers have employed an increasing number of people. This is largely a function of the rollout of Econet and Orange but is also related to Kenya being a regional hub for some of the international providers[70].

The number of employees in other sectors is estimated as revenue received from the mobile network operators divided by the average wage in the particular sector. Average wages are estimated based on data from the Kenya Bureau of Statistics and a review of company accounts.

[69] This is lower than in Deloitte (2007) given better information regarding the airtime supply chain was available.

[70] For example Ericsson Kenya provides back office functionality for Rwanda, Uganda, Tanzania, Burundi, and some of the Indian Ocean Islands.

### 7.3.4 Increases in productivity

There are numerous ways in which mobile services can improve productivity, particularly in developing countries where mobile services have 'leap-frogged' fixed line services and are the provider of universal service. During our interviews with government, regulator and operators, a number of specific areas where mobile productivity has been improved were noted, these are consistent with effects that have been identified in other research papers into this subject[71].

- Improving information flows and creating market efficiency: mobile services allow certain occupations (such as commodities and agriculture, both prominent in developing countries) to cut out the middle-man as traders can obtain information on prices, quality, quantities directly. This improves the incomes of producers, and helps reduce wastage. One specific example is the mobile food exchange, which provides information on price and demand in each region of Kenya for a variety of primary agricultural products.

- Reducing travel time and costs: similarly, mobile services allow workers to trade and share information without travelling. This is particularly true in rural areas where previously traders would have needed to travel to the urban areas to check for demand and agree prices, this business is now conducted on the telephone. Traders are able to ensure demand exists for their products before setting out on a journey.

- Improving efficiency of mobile workers: mobile services improve the efficiency of all workers in the economy. This effect will particularly be felt by workers with unpredictable schedules, for example those involved in repair and maintenance, or collection and delivery. Mobiles will give them greater accessibility and better knowledge of demand.

- Improving job search: mobile services improve the chances of the unemployed finding employment through enabling people to call for opportunities rather than relying on word of mouth. This includes by using the SMS job search facility that has been created in Kenya.

- Encouraging entrepreneurialism: mobile has encouraged the growth of small business and has increased its efficiency. For example, there are few taxi firms in Kenya and instead taxi drivers print business cards with their mobile number. Several drivers are able to share a taxi, using mobile phones to agree arrangements.

- Mobile banking: Safaricom has recently launched Mpesa, a mobile banking service that allows money to be transferred over a mobile phone. This reduces the need to meet in person to conduct business and has also extended banking facilities into rural and low-income groups who were previously outside of the formal banking system. Furthermore, telephone banking is reducing the need for people to queue in banks to check their balances. The benefits from this service are expected to grow further as the technology is evolved to allow customers to use Mpesa to buy products and services.

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[71] See for example: Vodaphone. 2005. *Africa: The Impact of Mobile Phones*. Vodafone Policy Paper Series, No.3.

No established economic methodology exists to estimate the GDP and employment effects of such productivity improvements across the economy. We have not been able to obtain any reports or studies that particularly focus on Kenya and, in the time available to us, we have not been able to quantify the impact of these gains[72]. However, all those we questioned in government and at the regulator agreed that mobile communications had transformed the way in which business was conducted, with one individual stating that mobile has revolutionised the way people do business and that it must be cutting down costs.

Other surveys have typically quantified productivity improvements to be between 6% and 11%. For example, Mckinsey[73] quantified the impact to be 6% in China, whilst the impact in the UK has been estimated to be between 1% and 11%[74]. Of particular relevance to the Kenyan context, Zain recently commissioned a survey in Sudan trying to identify how average business revenue have increased with mobile usage[75]. Across the 800 people interviewed, average business revenue increases were found to be just below 11%.

Based on our interviews within East Africa, it may be assumed that the productivity increase in Kenya would be around this level give:

- there is limited fixed line roll out in Kenya implying that the impact of mobile should be compared to a base-line of limited connectivity rather than higher fixed line penetration rates of developed countries; and

- higher levels of informal activity imply greater need for co-ordination between individuals since there is less formal communication at the company level.

We therefore assume a productivity gain of 10% has been experienced by high mobility workers who own a mobile phone. Using the economic value concept that we set-out in Figure 51, we estimate the incremental impact on the economy was Ksh 82,662m 2008. This calculation is set out below, where we have not considered any impact on low mobility workers.

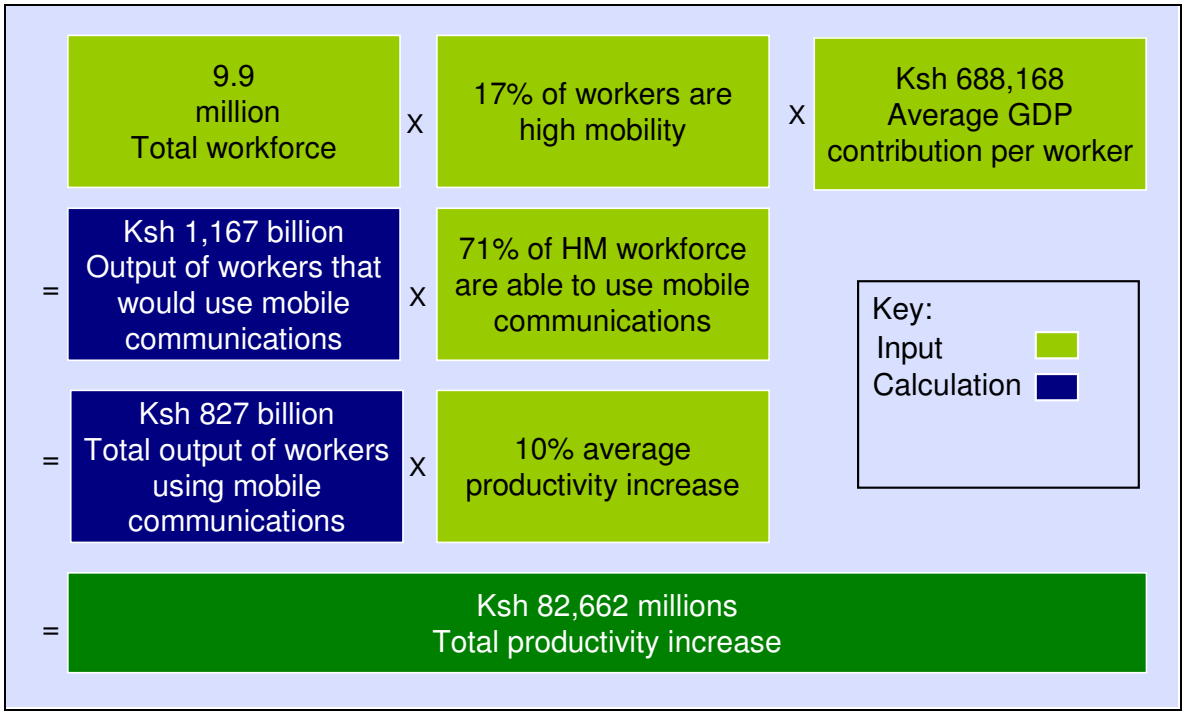
[72] Quantification would require consumer and business surveys to be undertaken

[73] Mckinsey & Co. Wireless Unbound. September 2006. *The surprising economic value and untapped potential of the mobile phone*.

[74] See for example: $O_2$. 2004. *The Changing Economic Impact of Mobile Telephones.*

[75] Referenced in: Deloitte. 2008. *Economic Impact of Mobile Communications in Sudan*.

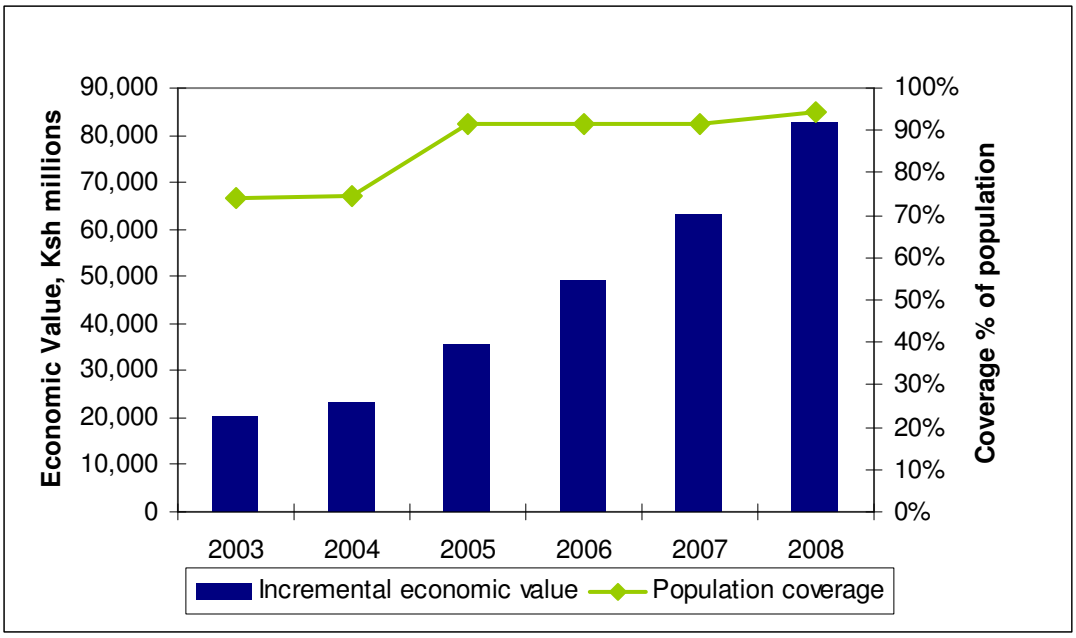
**Figure 51: Economic impact in 2008 of increased productivity amongst high mobility workers**




*Source: Deloitte analysis based on Deloitte assumptions, interviews and Kenya Bureau of Statistics*

Our calculations show large increases in productivity between 2003 and 2008. These are driven by both by: the increase in population coverage which has allowed a greater proportion of high mobility workers to access mobile technology; and the increasing number of high mobility workers using mobile telephony.

**Figure 52: Economic value from increases in productivity, 2003 to 2008**




*Source: Deloitte analysis. Population coverage calculated by GSMA*

## 7.3.5 Intangible impacts

During our interviews, we asked individuals for their views on the intangible benefits of mobile communications in Kenya. The views expressed were consistent with those voiced in the Vodafone report (March 2005)[76] relating to Tanzania.

- Promotion of social cohesion: through enabling contact when family members or friends who have moved away, and building trust through sharing of handsets (which has been found to be common in African countries). This effect is supported by the Vodafone Tanzania study which found a statistically robust relationship between mobile ownership and willingness to help others. Mobile chat groups have grown in popularity since our initial report and are particularly popular amongst the youth.

- Extension of communications: particularly to users with low education and literacy, particularly through the use of texts.

- Extension of communications to those on low incomes: whilst individuals with low income levels are often unable to afford a handset or even the lowest value prepaid cards, through the use of formal and informal payphones they are able to enjoy the benefits of mobile communications.

[76] The specific article referenced is: Goodman. 2005. *Linking mobile phone ownership and use to social capital in rural South Africa and Tanzania*.

- Transferring wealth to poorer regions: family members in urban areas use SIM cards to transfer money and phone credit to relatives in rural areas. 'Beeping' or 'flashing' by friends or relatives is also used to ask one mobile user to contact another.

- Stimulating local content: this can be particularly useful for allowing users to learn about local services such as healthcare or education. The number of local content providers has grown significantly since our first study.

- Assisting in disaster relief: mobile services allow families and friends to stay in touch in the event of a natural disaster, which can also ensure that they obtain more rapid relief.

- Fostering the democratic process: for example SMS is used in the voter registration process and to encourage voter turn-out.

- Employment creation: SMS is used to send through information on job vacancies to those who have registered for the service. Information is categorised by employment type and region.

- Increased electricity rollout: Mobile operators are investing in power infrastructure which is then transferred to the power companies on a Build Transfer Operator (BTO) basis, allowing electricity coverage to be extended into rural areas.

We have estimated value using the willingness to pay concept[77]. Historical average revenue per user (ARPU) shows us how much customers are willing to pay for mobile services. It is then assumed that the intangible benefits of owning a mobile are unchanged over time, and as such the value for this form of consumer surplus is defined as the difference between ARPU at the time of subscription, less ARPU today (which is likely to be less due to increased competition and other factors). However, as in Uganda and Tanzania there has been a reductions in the average minutes of use of mobile subscribers, biasing this calculation. To correct for this impact we have chosen to calculate the change in ARPU by holding the number of minutes that a subscriber uses at the average level of usage on the date the subscriber joined the network. As such, the following equation provides the calculation methodology for the 2003 consumer surplus[78].

*2003 Consumer surplus = (2002 new minutes of use x 2002 average price per minute) – (2002 new minutes of use x 2003 price per minute)*

Following the above, the calculation of the increase in consumer surplus in each year, for each set of new customers, is provided below[79]. We find that consumers benefit from intangibles equivalent to Ksh 29,284m

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[77] Mckinsey & Co. Wireless Unbound. September 2006. *The surprising economic value and untapped potential of the mobile phone*.

[78] This approach is valid with the usage patterns currently observed. In the future this approach however may fail to be less appropriate.

[79] In Deloitte (2007) the original methodology was deployed given decreases in minutes of use occurred subsequently. Given this, estimates for 2003 to 2006 here are close to those originally estimated.

**Figure 53: Calculation of intangible benefits using willingness to pay concept, Ksh million**

| | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|---|---|
| 2002 new Subscribers | - | 508 | 994 | 1,459 | 2,637 | 4,373 | 5,715 |
| 2003 new Subscribers | - | - | 388 | 758 | 1,698 | 3,083 | 4,154 |
| 2004 new Subscribers | - | - | - | 542 | 1,917 | 3,943 | 5,509 |
| 2005 new Subscribers | - | - | - | - | 1,801 | 4,454 | 6,504 |
| 2006 new Subscribers | - | - | - | - | - | 1,769 | 3,136 |
| 2007 new Subscribers | - | - | - | - | - | - | 4,266 |
| 2008 new Subscribers | - | - | - | - | - | - | - |
| **Total** | **0** | **508** | **1,382** | **2,759** | **8,053** | **17,621** | **29,284** |

*Source: Deloitte calculation based on operator information*

There are a number of reasons why these estimates are conservative and may underestimate the true value of intangible benefits.

- Due to data limitations, it assumes that all subscribers joined the network in 2003 and does not account for the increased willingness to pay that would have resulted from the higher ARPUs in early years.

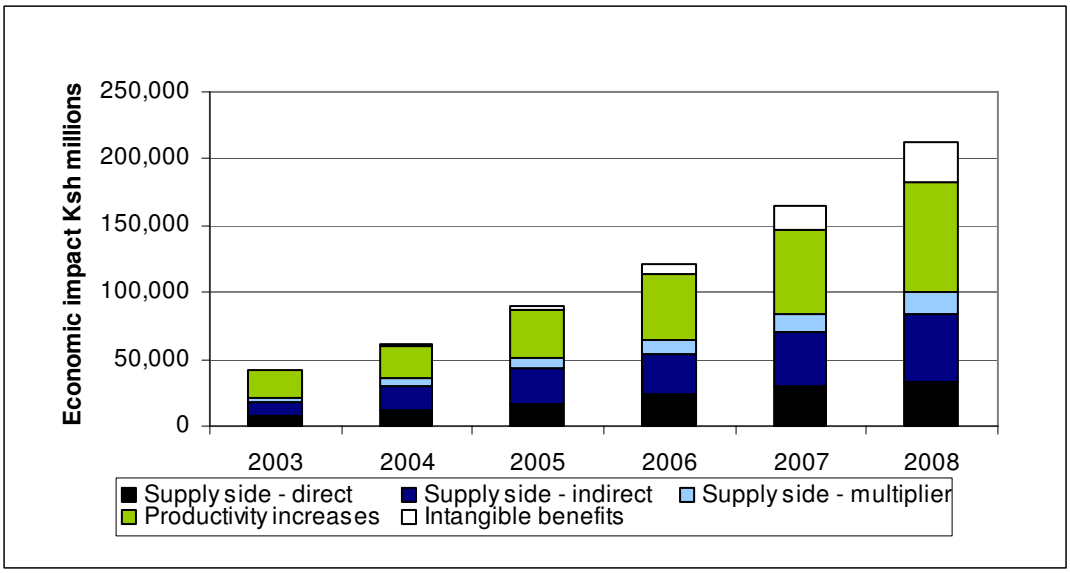
- The calculation assumes that the number of subscribers in each year is a function of price. However, subscriber levels during the period are highly influenced by the level of network coverage and therefore, had mobile coverage been greater, then it is likely more subscribers would have been signed up at higher ARPUs in the early years.

We have not been able to quantify the impact of these effects. However, we note that they imply our calculation may be an underestimation of the true value of mobile communications.

### 7.3.6 Total impact on economic welfare

The aggregation of the supply-side, demand side and intangible benefits provides an indication of the total economic impact of mobile communications in Kenya. This is estimated to be Ksh 182,832m in 2008 and Ksh 29,284m for intangibles. The biggest contributors are the indirect supply side impacts and demand side productivity increases. There has been a substantial increase in the economic impact in 2008 inline with increasing subscribers and new mobile network operators entering the market.

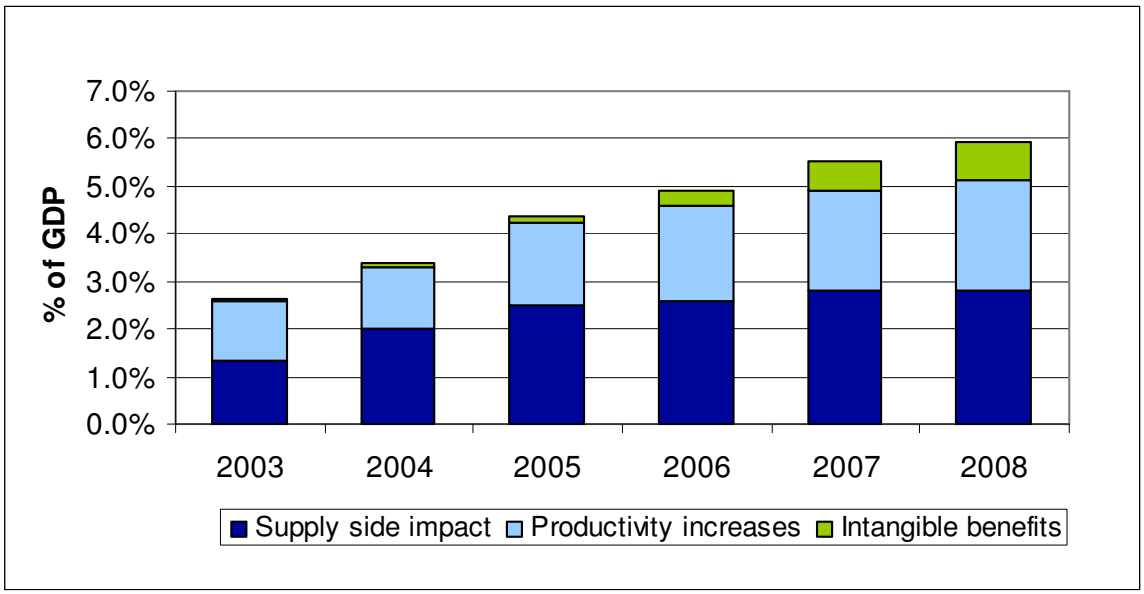
**Figure 54: Economic impact of mobile communications in Kenya**




*Source: Deloitte Analysis*

The impact of mobile communications on GDP has been substantial. We estimate that the total economic impact of mobile communications was 2.6% of GDP in 2003 with a further 0.03% related to intangible benefits. This has increased substantially to 5.1% of GDP in 2008, rising to 6% of GDP if intangible benefits are included.

**Figure 55: Economic impact as a percentage of GDP**




*Source: Deloitte analysis*

## 7.4 Dynamic relationship between mobile communications and growth

A wide range of academic studies have demonstrated that a relationship exists between telecommunications penetration (originally fixed line, and more recently mobile) and economic growth. We have sought to estimate the dynamic relationship between mobile communications and GDP[80]. That is, the longer term impact that investment in mobile communications may have on general economic welfare and GDP growth rates in particular.

We undertook a regression based on cross section data for developing countries[81] analogous to Waverman, Meschi and Fuss (2005)[82]. The regression was estimated for almost 60 developing countries in the African continent, the Asia Pacific region and Latin America.

For this sample, we found that a 10% increase in penetration could increase the GDP growth rate by 1.2% in the long-run[83]. This effect is larger than that found by Waverman, Meschi and Fuss (2005). This result may be a result of the sample including only countries from the poorest regions in the world, where the effect of mobile penetration will be the strongest[84].

This result suggests that the 15% increase in penetration rates between 2007 and 2008 may have contributed 1.8% to the Kenyan GDP growth rate.

## 7.5 Conclusion and policy implications

The Kenyan mobile sector creates a substantial and increasing proportion of the country's economic value. It is now responsible for approximately 5.1% of GDP, rising to 6% when intangible benefits are included. The research provided above has demonstrated the various routes through which the mobile sector influences consumers behaviour and other economic agents and hence the economy as a whole.

Internationally, the Asian Governments of Hong-Kong, Singapore and Korea have placed telecommunications development at the core of their development strategies. If Kenya is to follow a similar path the developing mobile communications sector needs to be encouraged to continue operating as an engine of growth. In particular, it may be counterproductive for government policy

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[80] Studies include those by: United Nations Economic Commission for Europe. 1987. *The Telecommunications Industry*; ITU. 1980 *Growth and Structural Change*; World Bank. 1983. *Information, Telecommunications and Development*. More recently, Waverman, Meschi and Fuss (2005) and Sridhar and Sridhar (2004) have looked specifically at the mobile industry.

[81] We attempted to use time series data for each country to estimate the country specific impact of mobile penetration on GDP growth. However, GDP data is only available on an annual basis and the relative immaturity of the mobile market implied insufficient data points to undertake this analysis.

[82] Waverman L., Meschi M., Fuss M. 2005. *The Impact of Telecoms on Economic Growth in Developing Countries*. The Vodafone Policy Paper Series, Number 2

[83] The regression passes all standard econometric diagnostic tests. For ease of presentation, a significant constant term is omitted.

[84] See the methodology section for estimated coefficients and a broader discussion.

to limit this development through policies which may restrain consumer demand for mobile services.

# 8 Kenya: Impact of reducing excise duties

In this section we present the results of our tax analysis for Kenya. We calculate the impact of the reduction of excise taxes on mobile usage on:

- the mobile industry in terms of demand for mobile services, usage and handset sales; and
- government tax revenues.

## 8.1 Reducing mobile taxes to 3%

Using the model and assumptions outlined in the methodology section, we have analysed the impact of different reductions of excise duty applied on mobile usage from 10% to 3%. This scenario draws on the recent reduction in the equivalent tax rate in Rwanda to 3%. We then compare the changes that result against our base case forecast of no taxation change.

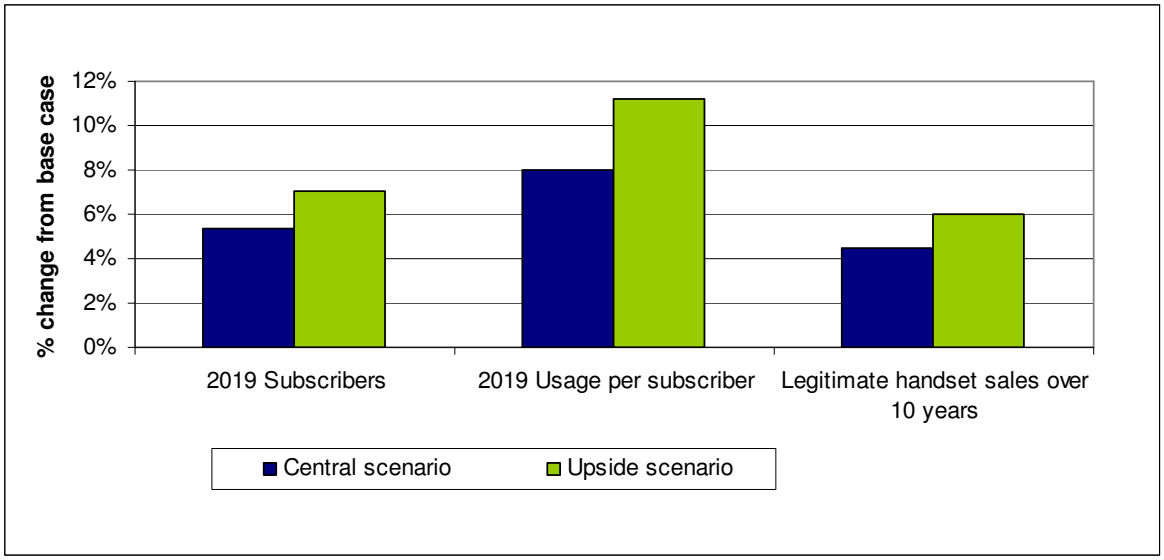
In order to look at this tax reduction, we have established a central and upside scenario. Our central scenario involved the elasticity of penetration of -0.4, of minutes of –0.77, a network effect of 0.3% and using a value-add multiplier of 1.2. Conversely, our upside scenario is based on a higher penetration elasticity at -0.6, usage elasticity of -1.22, network effect 0.35% and multiplier of 1.3[85].

### 8.1.1 Impact on demand for mobile services

The following graph illustrates the impact on mobile penetration, usage and handset sales over the 10 year period from 2009 with the tax reduction to 3%.

[85] Section 5.3.2 outlines the econometric approach deployed to estimate the elasticities used.

**Figure 56: Impact of a reduction in excise tax to 3% on usage on the mobile industry**




*Source: Deloitte analysis*

Our central scenario predicts that the number of subscribers would be nearly 6% higher than the base case in 2019 at 30.8 million[86]. In the upside this is increased to a subscriber impact of over around 8%. The increasing subscribers, and hence penetration, drives the increase in legitimate handset sales.

The impact on usage in the central scenario is 8%, representing nearly 2.5 extra minutes of use per user per month, or 1 extra text. The impact on usage in the upside scenario is 11.6%. The difference in usage increase between the central and upside scenario is due to the higher network effect assumed in the upside case.

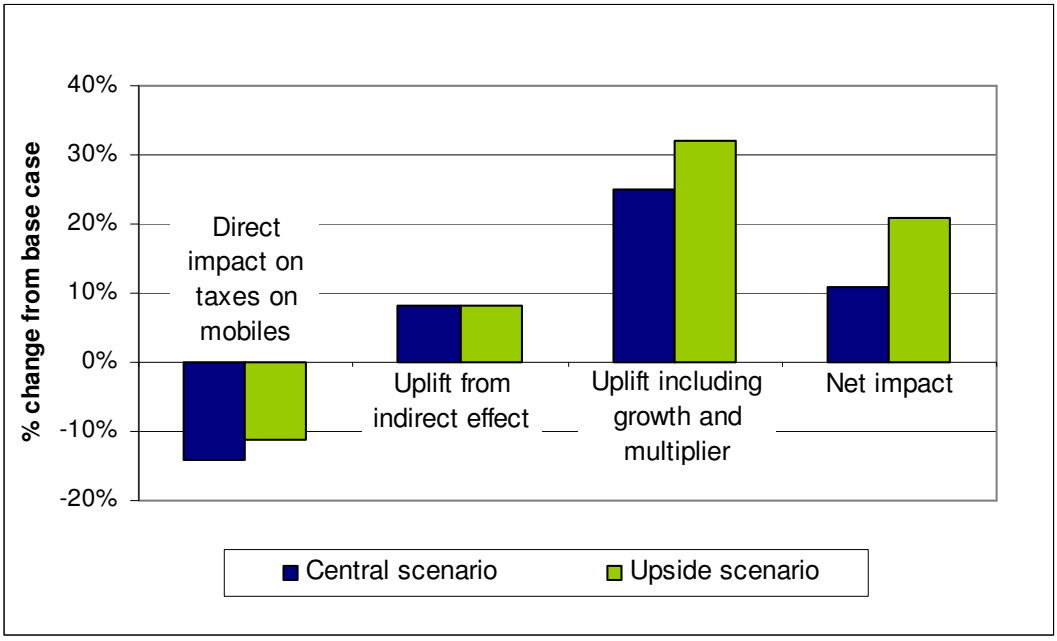
### 8.1.2 Impact on Government tax revenues

The following figure shows the impact, over the 10 years to 2019, on Government tax revenues split into:

- the initial fall in taxes on mobile services;
- the uplift from the indirect effect;
- the uplift once the growth and multiplier impacts are accounted for; and
- finally, a net impact is shown.

[86] This is the estimated number of connections. By 2019 we would expect a reasonable proportion of people to have a number of SIM cards.

**Figure 57: Impact on tax revenues of a reduction in excise tax to 3%**




*Source: Deloitte analysis*

The following discusses our results as compared to the base case forecasts.

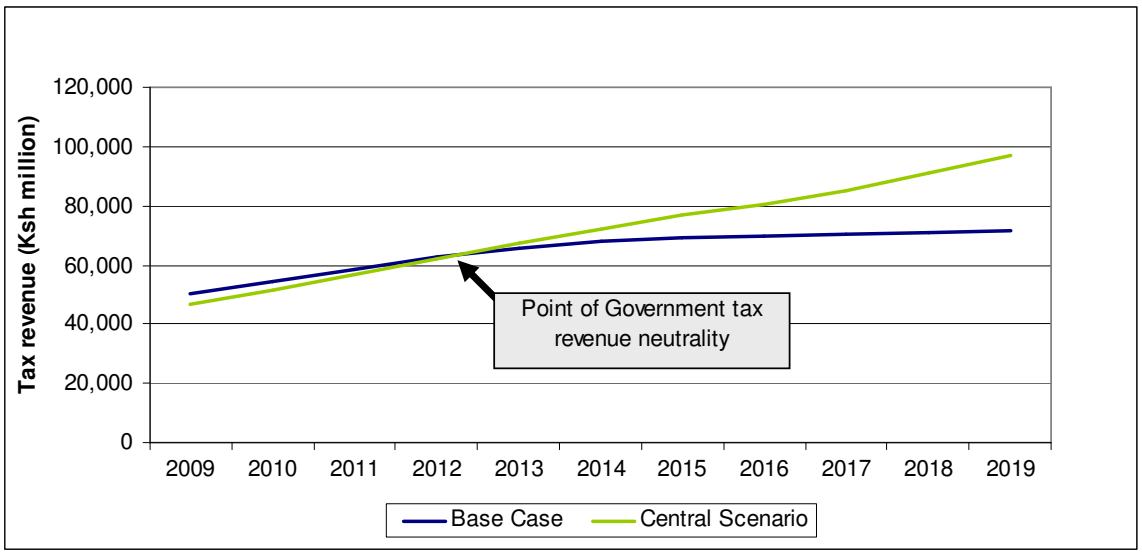
- Direct impact on taxes on mobiles: overall, direct taxes on mobile services are expected to fall by 14.26% in the central scenario and 11.30% in the upside. This impact consists of the impact revenues from the excise tax itself. The reduction in the excise tax leads to a loss in government revenues due to a lower rate of 3% being applied compared to the current 10% tax. This is mitigated somewhat by the increased subscriber base and usage which imply higher volumes on which to apply VAT and the new reduced excise tax. VAT revenues increase by 8.7% in the central scenario and 12.4% in the upside scenario over the period. Revenues from excise taxes fall by 66.8% in the central scenario and slightly less in the upside, showing that following the 70% tax cut, the increased volumes create a compensating effect over the ten years.

- Uplift from the indirect effect: this uplift is the result of the additional corporation tax and regulatory fee revenues paid by the mobile operators, due to the fact that their revenues and profits will increase following the tax reduction. Company revenues increase by 8.7% in the central case and by 12.4% in the upside case, driving the change in these additional tax revenues.

- Uplift including growth and multiplier impact: the dynamic impact on GDP resulting from our estimated relationship between mobile penetration and GDP growth. Combined with our estimate of the additional tax revenues from the multiplier effect; the total uplift in tax revenues is increased to over 16.9% in the central scenario and 23.7% in the upside. The higher impact in the upside scenario is a result of the use of a multiplier of 1.3 in this scenario.

- Net impact: combining the effects on tax revenues, the net result is positive in both scenarios at 10.76% in the central scenario, and 20.77% in the upside scenario. A neutral position is reached 5 years after the tax reduction in the central scenario. In the upside neutrality is reached more quickly, after 2 years. Figure 58 outlines the point in which neutrality is achieved i.e. where tax revenues in the central scenario are equal to those in the base case of no tax change.

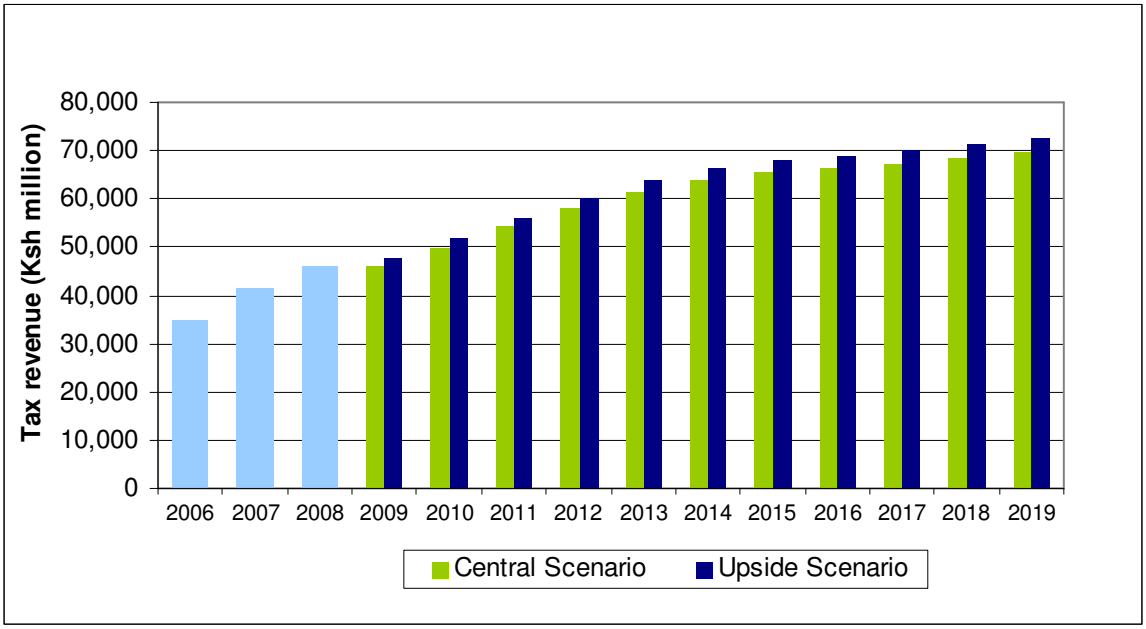
**Figure 58: Government revenue neutrality in the central scenario**




*Source: Deloitte analysis*

The time path of projected tax revenues given the reduction in usage tax is outlined in Figure 59. It is clear from our modelling that reducing the excise duty levied on mobile usage will not lead to a reduction in government tax revenues compared to those received by the government in 2008. Further despite the cut, government tax revenues from mobile telephony will continue to grow. We do however estimate that overtime tax revenues level off as subscriber saturation is reached.

**Figure 59: Impact of reduction of excise tax on usage to 3% on Government tax revenue**




*Source: Deloitte analysis. Historic data corresponds to actual taxes reported to paid by mobile network operators and wider taxes resulting as captured by a multiplier. Post 2008 taxes as estimated by our model but exclusive of GDP growth effect for comparability to historic data.*

### 8.1.3 Alternative tax changes

In addition to assuming a once and for all reduction in usage tax to 3% we have also considered three further scenarios for the time path of taxes. These scenarios range from full abolition to a gradual abatement of current rates. The time path of taxation rates over these scenarios is described in Figure 60.

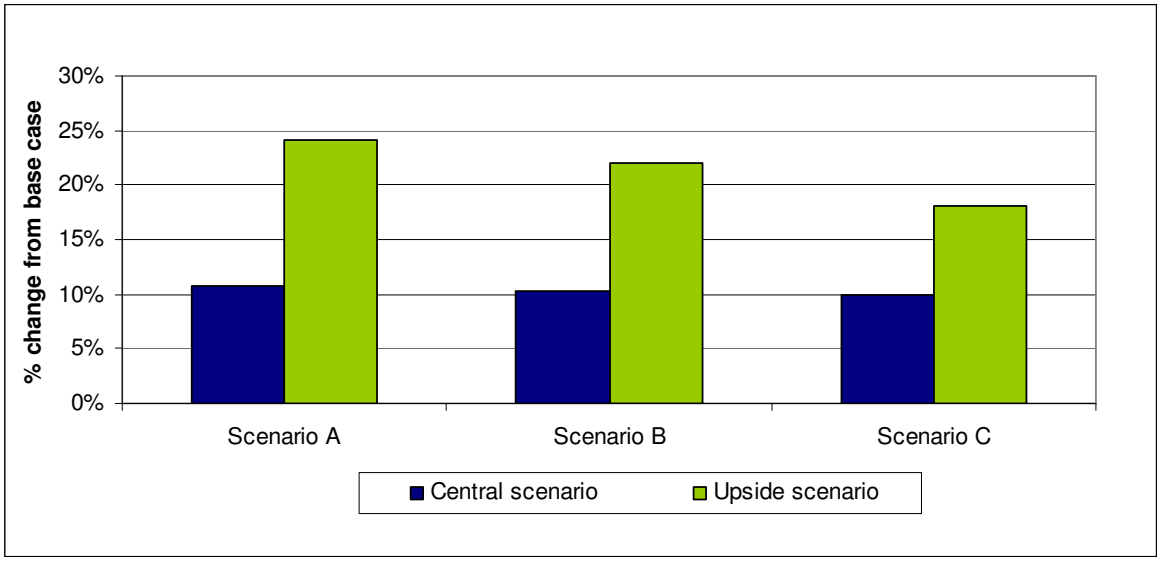
**Figure 60: Further tax rate scenarios (figures correspond to absolute size of excise duty)**

| Year | Scenario A | Scenario B | Scenario C |
|---|---|---|---|
| 2009 | 0% | 3% | 7% |
| 2010 | 0% | 3% | 7% |
| 2011 | 0% | 3% | 7% |
| 2012 | 0% | 3% | 7% |
| 2013 | 0% | 3% | 3% |
| 2014 | 0% | 0% | 3% |
| 2015 | 0% | 0% | 3% |
| 2016 | 0% | 0% | 3% |
| 2017 | 0% | 0% | 3% |
| 2018 | 0% | 0% | 3% |
| 2019 | 0% | 0% | 3% |

*Source: Deloitte*

Across these scenarios the net impact remains positive although the time frame for neutrality to be achieved does vary. Significantly revenue neutrality occurs in the same year for a full abolition of excise duty as the reduction to 3%. This result only requires our central inputs and assumptions.

**Figure 61: Net impact government revenues of reducing excise tax**




*Source: Deloitte analysis*

The net effect on government revenues in scenario A is 10.8% and 24.1% in the central and upside case respectively. The respective figures for scenario B are 10.3%, 22.1% and for scenario C 9.9%, 18.2%.

## 8.2 Conclusions

Kenya currently levies excise duty on mobile usage. However, our analysis has shown that reducing the excise tax is revenue positive across a range of scenarios and that government revenues will continue to grow year-on-year despite a tax cut. Though tax revenues are lost in the short term, these are compensated for by the increased tax revenues resulting from the growth in the industry, related industries and the economy as a whole. We believe that our central scenario has used cautious estimates of both the elasticities of demand and the economic multiplier effects, and hence there could be more of a positive net impact as identified in the upside scenario.

Of particular pertinence we found that if Kenyan tax authorities followed Rwanda, and reduced usage taxes to 3%, tax revenues could increase by 10.76% over ten years with revenue neutrality achieved in five. This was found to be prevalent even given conditions prevailing in our central scenario, with revenues in the upside projected to rise by 20.77%.

The results in this updated report present a more positive impact on tax revenues from tax cuts than found previously in Deloitte (2007). Part of the reason why prevailing conditions are more

conducive to tax cuts is the further growth of the industry and reduction in prices which have occurred[87].

[87] This is explained in more detail in section 5.7.

# 9 Rwanda: Executive Summary

The mobile communications sector has brought significant social and economic benefits to Rwanda. MTN Rwandacell has invested heavily bringing the percentage of the population covered by mobile to over 80%, with mobile connections outnumbering fixed lines by around 30 to 1[88]. There are currently 790,000 mobile subscribers, equating to a penetration rate of 8.5%, which is significantly below Rwanda's longer term potential.

The mobile communications industry contributed a total of RWF 89,435m to the economy in 2008 with a further RWF 7,484m relating to intangible benefits. Relative to GDP this represents 4.4% and 0.4% from intangibles. Some 60,000 Rwandans are employed by the mobile and related industries.

The sector will continue to be of importance to Rwanda as Rwandatel and a further operator to be licensed this year rollout their networks. Moreover, as mobile network operators rollout 3G networks they will additionally provide vital access to internet and data services.

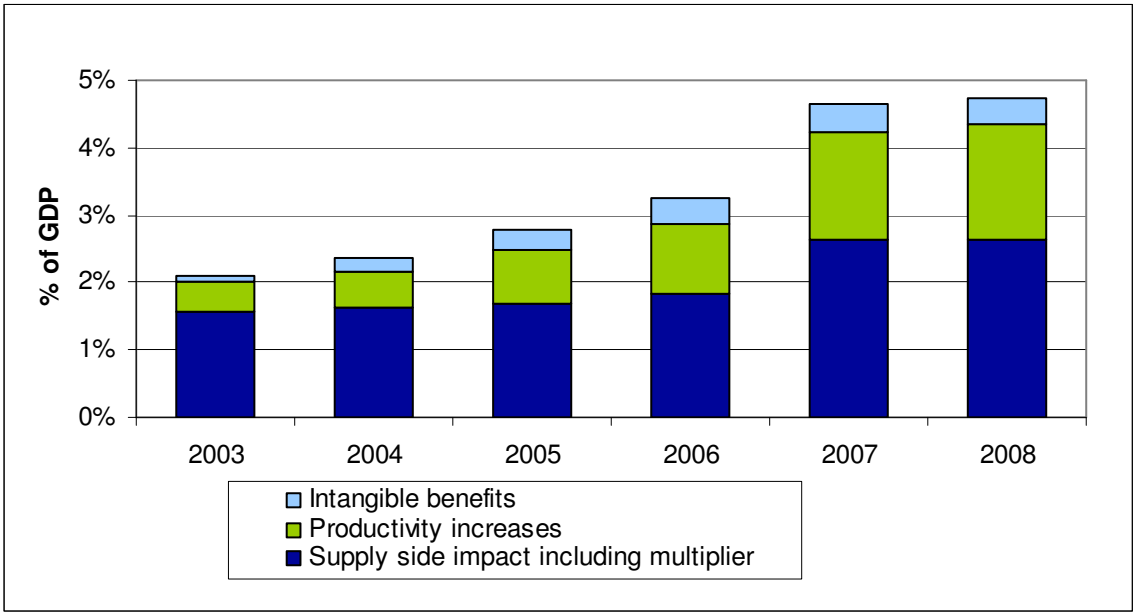
The government is playing an active roll in developing a fertile environment for future growth of the sector with taxes on mobile usage reduced from 10%, levied in January 2007, to 3% in July 2007. Prices have fallen substantially by over 35% over the period subsequent to the tax reduction.

## 9.1 Establishing the economic benefit of mobile communications in Rwanda

The mobile communications industry's economic contribution has increased significantly since 2003. Moreover, value generated from the supply side and productivity impact has risen from RWF 18,662m in 2003 to RWF 89,435m, a 300% increase. The economic impact can be expected to rise steadily with mobile penetration. Consumers have also been benefiting from mobile telephony gleaning intangible benefits equivalent to 0.4% GDP. Our analysis suggests that a 10% increase in mobile penetration can increase can increase the growth rate of Rwanda's GDP by 1.2% in the long-run. Increasing mobile penetration should therefore be a cornerstone of the government's economic and fiscal policy.

[88] Based on fixed line data from the ITU and mobile connections for Wireless Intelligence.

**Figure 62: Economic impact of mobile communications industry as a percentage of GDP**



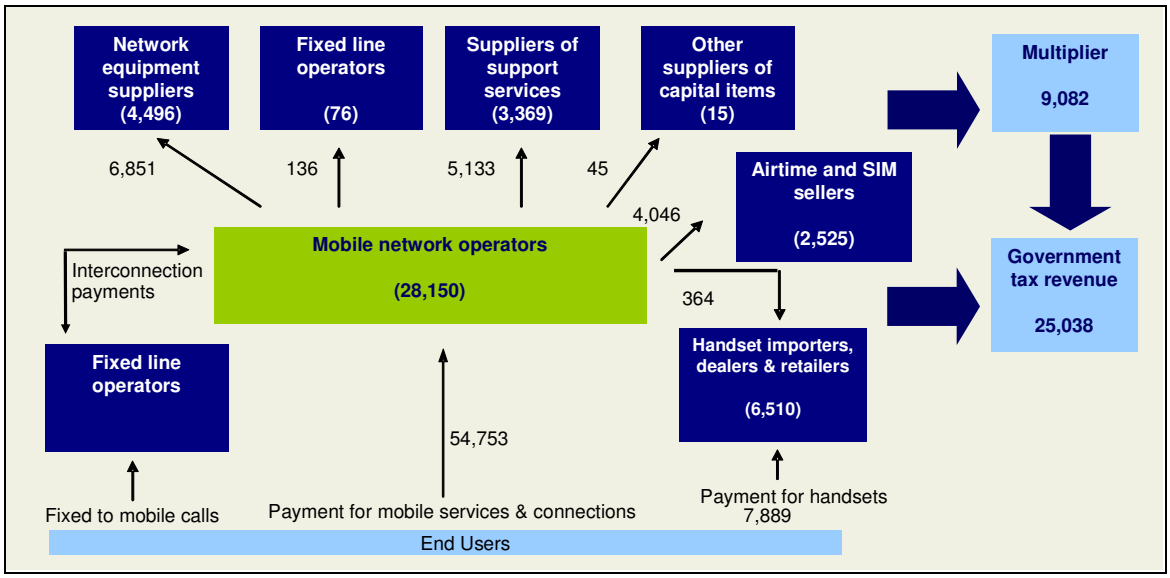

*Source: Deloitte Analysis*

### 9.1.1 Supply side impact of mobile communications

The supply side impact of mobile communications is derived from direct, indirect and multiplier[89] impacts. The revenue flows and value add for 2008 are presented in Figure 63.

[89] Representing the positive impact on the economy from the value add created by the mobile industry.

**Figure 63: Mobile value chain in Rwanda in 2008, RWF millions**




*Source: Deloitte analysis based on information provided by MTN Rwanda, interviews and analysis of company accounts and industry reports*

## 9.1.2 Increases in productivity

Our scope of work did not include interviews in Rwanda; however the following productivity impacts of mobile communications were identified during interviews in other East African countries.

- Substantially reducing travel times and costs: particularly in rural areas where previously traders would have needed to travel to the urban areas to check for demand and agree prices.

- Creating market efficiency: particularly in the agriculture sector, workers are now quickly notified about changes in demand / prices so that they can amend their growing / harvest plans accordingly. Previously workers travelled to the nearest major city or replied upon slower postal communications.

- Encouraging entrepreneurialism: mobile has encouraged the growth of small business and has increased its efficiency. For example, there are few formally established taxi firms in Rwanda and instead taxi drivers print business cards with their mobile number. Several drivers are able to share a taxi, using mobile phones to agree arrangements.

- Mobile banking: customers receive a text message once their salaries have been received by the bank, this has noticeably reduces queues in bank branches.

- Innovation and learning: the launch of GPRS has enabled workers, and in particular farmers, to use the internet to learn about new production techniques.

Taken together we estimate that workers using mobile phones experienced productivity increases equivalent to RWF 35.3bn in 2008.

### 9.1.3 Intangible benefits

We identified several intangible benefits of mobile communications in Rwanda:

- promotion of social cohesion;
- extension of communications to users with low education and literacy and on low incomes;
- transferring wealth to poorer regions;
- assisting in disaster relief; and
- increased electricity rollout.

Using a 'willingness-to-pay' methodology to proxy for these, we estimate consumers enjoyed the equivalent of RWF 7,484m in intangible benefits in 2008.

### 9.1.4 Impact on employment

Mobile services contribute to employment via several avenues:

- direct employment of the industry and related industries;
- support employment created by outsourced work and taxes that the government subsequently spends on employment generating activities; and
- induced employment resulting from the above employees and beneficiaries spending their earnings, and creating more employment.

The first effect is obtained directly from mobile operators. The support and induced employment is estimated using a multiplier of 1.2. Combing these employment generated in relation to mobile communications in 2008 is estimated to be over 73,000 full time equivalents.

## 9.2 Excise taxes in Rwanda

Excise taxes were introduced by the Rwandan government in January 2007 levied at a rate of 10% on mobile usage. However, the rate was reduced by 70% soon after in July 2007 to 3%. Although little data is available yet to assess the impact of the tax reduction average prices per minute have fallen by around 35% from July 2007 to June 2008. Given the responsiveness found across Kenya, Uganda and Tanzania in this study to price it is therefore reasonable to expect the reduction in taxes to lead to greater usage and penetration. This would drive up the economic and social benefits we have found to date in Rwanda.

# 10 Rwanda: Economic impact of mobile industry

We estimate that the mobile communications industry contributed a total of RWF 89,435m to the economy in 2008 and a further RWF 89,435m were enjoyed in intangible benefits. This represents approximately 4.4% of total GDP and further 0.4% from intangibles. At 8.5% of population, mobile penetration rates in Rwanda are significantly below their longer term potential and the government's target of 5million GSM subscribers by 2012. The economic impact can be expected to grow as increased network investment by the operators provides increased population coverage.

Academic research suggests that over the longer term mobile communications have a significant impact on economic growth. It has been suggested that this effect is particularly strong in developing countries. Our research is consistent to this and we estimate that mobile communications has raised GDP growth rates in Rwanda by 12% in the long-run for each 10% increase in penetration. As such, the 7% increase in penetration rates between 2003 and 2008 may have contributed 0.84% to the Rwandan GDP growth rate.

## 10.1 Overview of mobile communications in Rwanda

Mobile communications has a visible impact on the social and economic structures in Rwanda. MTN has undertaken significant investment in a network that now covers over 80% of the population, with mobile connections outnumbering fixed lines by around 30 to 1[90]. There are over 790,000 mobile subscribers and a penetration rate of 8.5%. Historically, investment has focussed on major urban towns and cities. However, increasingly investment is being focussed towards raising coverage in rural areas, allowing people to better stay in contact with their families and revolutionising the way in which business is conducted. The operators are committed to continuing to invest for both coverage and usage. MTN Rwandacell is planning to have built over 250 sites by the end of 2008.

## 10.2 Operator participation in the economic impact study

MTN Rwandacell and Rwandatel are currently the sole mobile network operators licensed in Rwanda. However, this year it has been announced a third license will be issued. MTN Rwandacell has provided us with data for this study.

A number of our results have been updated since Deloitte (2007). This is due to revised operator data or the availability of better public or interview evidence. The impact of these changes is marginal.

Our estimates should be seen as conservative given insufficient data was available for Rwandatel, and hence its impact has not been quantified. However, given Rwandatel currently accounts for a very low number of subscribers we expect its' impact to be currently insignificant.

[90] Based on fixed line data from the ITU and mobile connections for Wireless Intelligence.

## 10.3 Static Supply side impact of mobile communications

We have estimated the value add created by the mobile communications industry in Rwanda. We have also estimated the leakages from the system, i.e. what percentage of any Rwandan Franc spent will remain within the national economy to be spent in the next round and use this to isolate the impact on the Rwandan economy from the total international impact of the mobile communications industry.

### 10.3.1 Value chain impact

Firstly, we analysed the domestic value add of the mobile network operators in Rwanda. We find that they directly contribute RWF 28,150m in 2008. The breakdown by category is provided in the following figure.

**Figure 64: Value add of mobile network operators (excluding multiplier effect), RWF millions**

| Value add | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|---|
| Employee wages and benefits (including contractors) | 1,594 | 1,445 | 1,890 | 2,619 | 2,964 | 3,483 |
| Taxes and regulatory fees | 4,112 | 7,185 | 7,944 | 9,834 | 16,846 | 20,745 |
| CSR | 8 | 2 | 5 | 115 | 353 | 233 |
| Dividends | 2,687 | 1,710 | 1,710 | 1,710 | 4,918 | 3,688 |
| **Total** | **8,401** | **10,343** | **11,548** | **14,278** | **25,081** | **28,150** |

*Source: Deloitte analysis based on information provided by MTN Rwanda, and analysis of company accounts and industry reports*

Taxes and regulatory fees (including spectrum fees) make up the largest proportion in the above table, accounting for over 73% of the total in 2008.

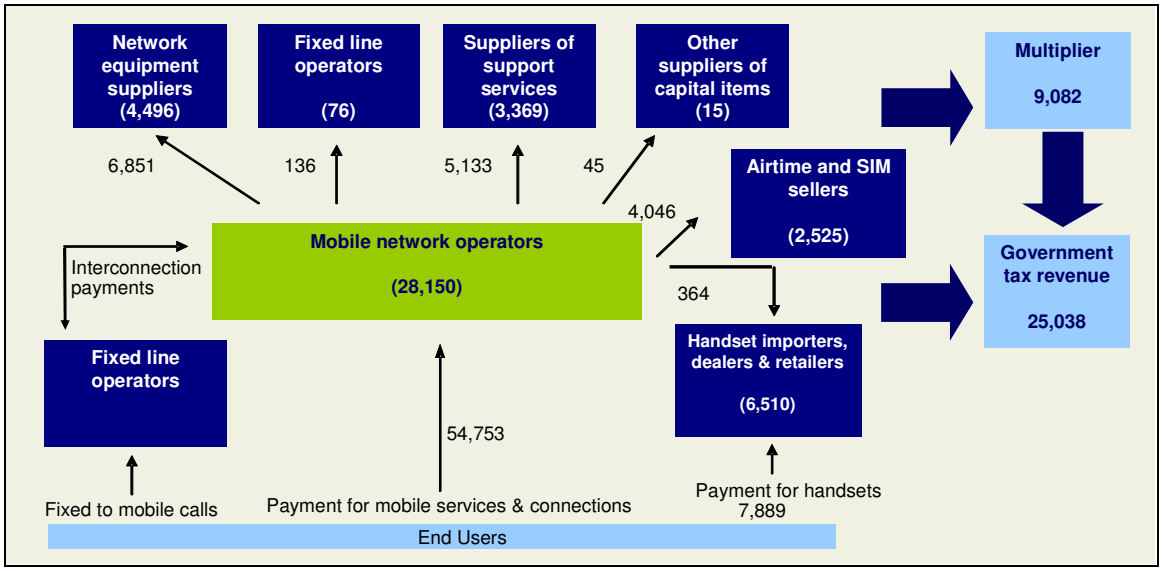
Corporate social responsibility (CSR) programmes received over RWF 233m in 2086, including sponsorship of events.

45% of MTN Rwandacell is locally owned and the dividends paid to this group of owners are assumed to remain in Rwanda. These have represented an increasing proportion of total value add with13% of value from mobile network operators in 2008 originating from dividends[91].

[91] MTN Rwandacell increased ownership in late 2007 from 40% to 55% for USD 40.5m.

We then analysed the revenue flows from MTN to others in the industry and estimated the quantity translated into further value add[92]. The estimates of value add include the multiplier effect on the wider-economy which is assumed to be 20% of value-add[93].

**Figure 65: Mobile value chain in Rwanda in 2008, RWF millions**




*Source: Deloitte analysis based on information provided by MTN Rwanda, and analysis of company accounts and industry reports*

The figures next to the arrows represent the flow of money from one group to another. The figures inside the boxes represent the value retained by each group. The figures shown relate solely to domestic flows and domestic value add. The figure below shows the calculation of value add.

[92] Details on value add margins, percentage of revenue translated into value add, are contained in the assumptions appendix.

[93] Figure 21 summarizes the rationale behind this assumption.

**Figure 66: Calculation of value add from mobile communications in Rwanda in 2008, RWF millions**

| Domestic value add | Total revenue | Domestic revenue | Domestic cost | Domestic value add | Value add with multiplier |
|---|---|---|---|---|---|
| Mobile network operators | 54,753 | 54,753 | 26,603 | 28,150 | 33,780 |
| Fixed telecommunications operators | 136 | 136 | 60 | 76 | 91 |
| Network equipment suppliers | 27,405 | 6,851 | 2,355 | 4,496 | 5,395 |
| Handset designers and dealers | 8,666 | 8,263 | 1,753 | 6,510 | 7,812 |
| Other suppliers of capital items | 1,152 | 46 | 31 | 15 | 18 |
| Suppliers of support services | 12,652 | 5,133 | 1,765 | 3,369 | 4,042 |
| Airtime commission, payphone commission | 4,046 | 4,046 | 1,521 | 2,525 | 3,030 |
| **Total** | **108,810** | **79,229** | **34,088** | **45,141** | **54,169** |

*Source: Deloitte analysis based on information provided by MTN Rwanda, interviews and analysis of company accounts and industry reports*

45% of the revenue flows from the mobile network operators are estimated to remain in Rwanda. This figure is dominated by handset designers and dealers[94], and network equipment suppliers[95]. Network equipment is imported from overseas. However, employment and value is generated locally as the international equipment providers hire Rwandan citizens directly and work with local subcontractors.

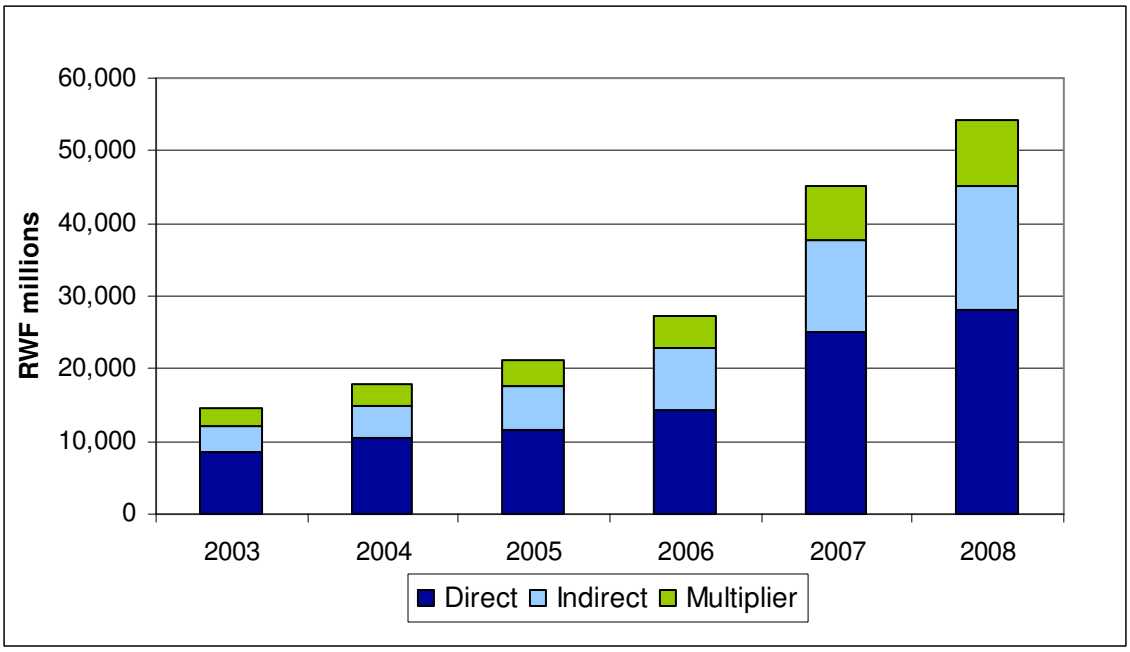
Only 50% of support services are purchased from within Rwanda, consisting of legal services, marketing and advertising and outsourced network maintenance. The other 50% are purchased overseas and relate to Service Level Agreements with Ericsson, Converse and other companies.

Using the same process as above, we estimated the value-add on an annual basis from 2003.

[94] The relatively high value of handset sales is due to the fact that only 3% of handsets are sold by operators, with 37% being sold by third party dealers (the remainder are sold in the illegitimate market).

[95] The relatively high value of network capital is due to the large investment occur in Rwanda at present.

**Figure 67: Supply side value add from mobile communications 2003 to 2008**




*Source: Deloitte analysis*

Value add has increased by over 250% during the six year period, with significant growth in the direct impact, particularly with respect to taxes paid by the mobile operator as subscribers have increased.

## 10.3.2 Contribution to Government revenue

Tax revenues to the Government are raised through taxes specific to mobile services, corporation tax, income tax, regulatory fees, universal service contributions and spectrum fees.

**Figure 68: Tax revenues in Rwanda from mobile operators, RWF millions**

| Taxes from mobile network operators | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|---|
| Corporation tax | 2,224 | 3,410 | 3,260 | 3,674 | 6,026 | 8,070 |
| Income tax paid by employees | 435 | 394 | 353 | 522 | 603 | 677 |
| Sales taxes (VAT) and mobile specific tax | 1,077 | 2,708 | 3,587 | 4,713 | 9,013 | 10,313 |
| Regulatory fees | 376 | 673 | 743 | 924 | 1,204 | 1,686 |
| **Total taxes and fees** | **4,112** | **7,185** | **7,944** | **9,834** | **16,846** | **20,745** |

*Source: Deloitte analysis based on operator data*

The largest proportion of tax revenue is raised through VAT and mobile specific taxes, followed by corporation tax. Tax as a proportion of revenues has averaged 33% since 2003[96] but increased significantly with the introduction of the excise tax on mobile usage in January 2007. However, since its reduction to 3% this burden has receded in 2008.

In addition to the direct tax revenue received from mobile operators, it is necessary to consider the tax revenue received from others in the value chain. The following figure considers import, sales, corporation and employee income taxes.

**Figure 69: Total tax revenues from the mobile value chain in 2008[97], RWF millions**

| Tax Revenue | Tax revenue | Tax revenue with multiplier |
|---|---|---|
| Mobile network operators | 20,745 | 24,894 |
| Fixed telecommunications operators | 34 | 41 |
| Network equipment suppliers | 1,342 | 1,611 |
| Handset designers and dealers | 1,738 | 2,085 |
| Other suppliers of capital items | 5 | 5 |
| Suppliers of support services | 1,006 | 1,207 |
| Airtime commission, payphone commission | 169 | 202 |
| **Total** | **25,038** | **30,045** |

Source: Deloitte analysis based on Deloitte tax data, analysis of company accounts and interviews. Note this represents tax revenues directly created by revenue flows from the mobile network operators and not total tax revenues from the sector.

After the mobile network operators, the largest payers of tax are the handset designers and dealers who operate in the legitimate market. Substantial tax revenues are also received from suppliers of support services, and network equipment suppliers. Our calculations assume only the largest airtime sellers that work through official dealerships pay tax and that street-side airtime sellers do not. Interviews with operators, handset manufacturers and dealers revealed that many handsets are imported illegally from Dubai or are reconditioned / stolen. As such, we assume that only around 40% of handsets are sold legally paying all mandated taxes.

## 10.3.3 Impact on employment numbers

Mobile services contribute to employment via several avenues:

[96] Revenue is defined to include revenue received from the provision of interconnection and termination services

[97] This represents tax revenues directly created by revenue flows from the mobile network operators and not total tax revenues from the sector.

- direct employment of the industry and related industries;
- support employment created by outsourced work and taxes that the government subsequently spends on employment generating activities; and
- induced employment resulting from the above employees and beneficiaries spending their earnings, and creating more employment.

The first effect is obtained directly from mobile operators. The support and induced employment is estimated using a multiplier of 1.2. For operators no multiplier was applied given the majority of induced employment will be captured by the first round flows. The figure below shows the contribution to employment in Rwanda from the mobile value chain.

**Figure 70: Contribution to employment from the mobile value chain[98]**

| Employment Impact | Number of employees | Number of employees with multiplier |
|---|---|---|
| Mobile network operators | 297 | 297 |
| Fixed telecommunications operators | 5 | 6 |
| Network equipment suppliers | 303 | 364 |
| Handset designers and dealers | 2,158 | 2,590 |
| Other suppliers of capital items | 1 | 2 |
| Suppliers of support services | 9,990 | 11,988 |
| Airtime commission, payphone commission | 48,835 | 58,602 |
| **Total** | **61,589** | **73,848** |

*Source: Operator data, interviews and Deloitte analysis on average wage rates. Note this is employment directly created by revenue flows from the mobile network operators and does not represent total employment in the sector.*

The largest category of employment is airtime sellers and payphone operators. It is assumed that there are on average 1.5 employees for each of the estimated 25,000 airtime outlets and 9,500 payphones[99]. The 25,000 outlets comprise of mobile network operator owned shops, distributor owned shops, supermarkets, kiosks, taxis and other retailers.

Traditionally a large proportion of capital items have been imported by MTN Rwandacell and as such the impact on domestic employment is negligible. However, there is increasing employment

[98] This is employment directly created by revenue flows from the mobile network operators and does not represent total employment in the sector

[99] This is an estimate of both official and unofficial payphones from MTN Rwanda.

of Rwandan nationals with the constructions of sites and as the Rwandan economy grows it is likely that non-network capex, e.g. office furniture, will be purchased in Rwanda. This will, in turn, lead to an increase in the level of employment.

The number of employees in other sectors is estimated as revenue received from the mobile network operators divided by the average wage in the particular sector. Average wages are estimated based on data from various sources and a review of company accounts.

### 10.3.4 Increases in productivity

There are numerous ways in which mobile services can improve productivity, particularly in developing countries where mobile services have leap-frogged fixed line services and are the provider of universal service. The following important effects have been identified in the research[100].

- Improving information flows: mobile services allow certain occupations (such as commodities and agriculture, both prominent in developing countries) to cut out the middle-man as traders can obtain information on prices, quality, quantities directly. This improves the incomes of producers, and helps reduce wastage.

- Reducing travel time and costs: similarly, mobile services allow workers to trade and share information without travelling. The Vodafone paper on Africa (2006) contains analysis on Tanzania and South Africa found that 67% of users in Tanzania said that mobiles greatly reduce travel time[101].

- Improving efficiency of mobile workers: mobile services improve the efficiency of all workers in the economy. This effect will particularly be felt by workers with unpredictable schedules, for example those involved in repair and maintenance, or collection and delivery. Mobiles will give them greater accessibility and better knowledge of demand.

- Improving job search: mobile services improve the chances of the unemployed finding employment through enabling people to call for opportunities rather than relying on word of mouth. Further to this, owning a mobile phone makes workers more employable as they are contactable while away.

During our interviews with government, regulator and operators, a number of specific areas where mobile communications have improved productivity were noted.

- Substantially reducing travel times and costs: particularly in rural areas where previously traders would have needed to travel to the urban areas to check for demand and agree prices, this business is now conducted on the telephone. Traders are able to ensure demand exists for their products before setting out on a journey.

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[100] See, for example: Vodaphone. March 2005. *Africa: The Impact of Mobile Phones*. Vodafone Policy Paper Series, No.3.

[101] Africa: The Impact of Mobile Phones, Vodafone Policy Paper Series, No.3, March 2005.

- Creating market efficiency: particularly in the agriculture sector, workers are now quickly notified about changes in demand or prices so that they can amend their growing and harvest plans accordingly. Previously workers travelled to the nearest major city or replied upon slower postal communications.

- Encouraging entrepreneurialism: mobile has encouraged the growth of small business and has increased its efficiency. For example, there are few formally established taxi firms in Rwanda and instead taxi drivers print business cards with their mobile number. Several drivers are able to share a taxi, using mobile phones to agree arrangements.

- Mobile banking: customers receive a text message once their salaries have been received by the bank, this has noticeably reduces queues in bank branches.

- Innovation and learning: the launch of GPRS has enabled workers, and in particular farmers, to use the internet to learn about new production techniques.

No established economic methodology exists to estimate the GDP and employment effects of such productivity improvements across the economy. We have not been able to obtain any reports or studies that particularly focus on Rwanda and, in the time available to us, we have not been able to quantify the impact of these gains[102]. However, all those we questioned in government and at the regulator agreed that mobile communications had transformed the way in which business was conducted, with one individual stating that mobile has revolutionised the way people do business and that it must be cutting down costs.

Other surveys have typically quantified productivity improvements to be between 6% and 11%. For example, Mckinsey[103] quantified the impact to be 6% in China, whilst the impact in the UK has been estimated to be between 1% and 11%[104]. Of particular relevance to the Rwanda context, Zain recently commissioned a survey in Sudan trying to identify how average business revenue have increased with mobile usage[105]. Across the 800 people interviewed, average business revenue increases were found to be just below 11%.

Based on our interviews within East Africa, it may be assumed that the productivity increase in Rwanda would around this level given:

- there is limited fixed line roll out implying that the impact of mobile should be compared to a base-line of limited connectivity rather than higher fixed line penetration rates of developed countries; and

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[102] Quantification would require consumer and business surveys to be undertaken.

[103] Mckinsey & Co. Wireless Unbound. September 2006. *The surprising economic value and untapped potential of the mobile phone*.

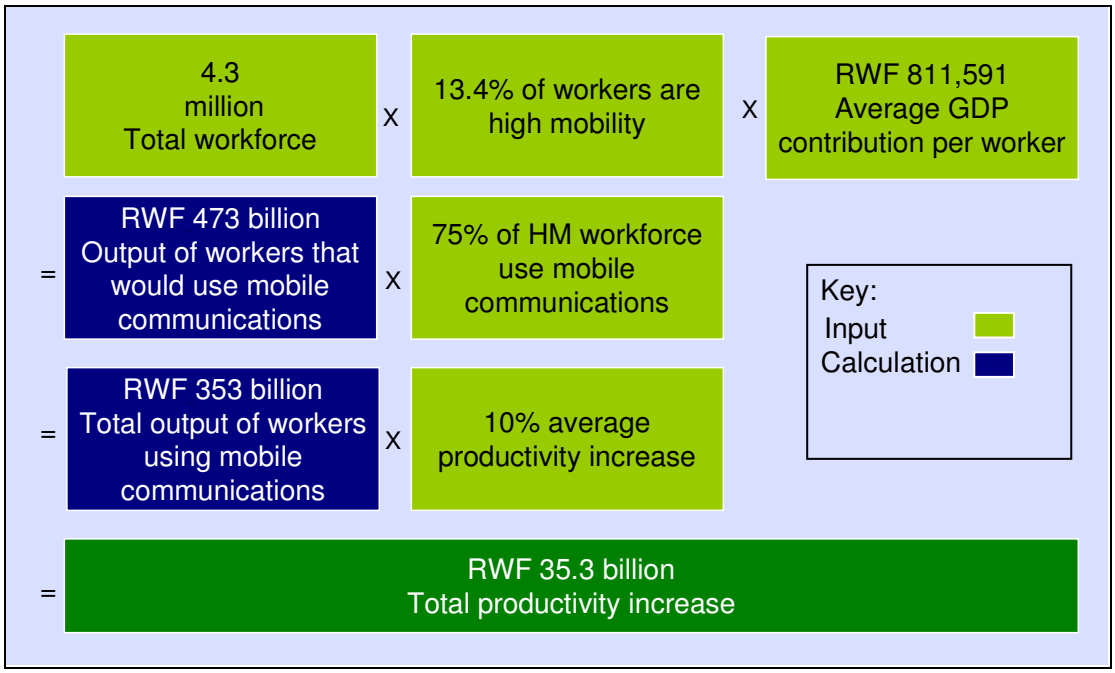
[104] $O_2$. 2004. *The Changing Economic Impact of Mobile Telephones*.

[105] Referenced in: Deloitte. 2008. *Economic Impact of Mobile Communications in Sudan*.

- higher levels of informal activity imply greater need for co-ordination between individuals since there is less formal communication at the company level.

We therefore assume a central productivity gain of 10% has been experienced by high mobility workers who own a mobile phone. Using the economic value concept that we set-out in the methodology section, we estimate the incremental impact on the economy was RWF 35,265m 2008. This calculation is set out below, where we have not considered any impact on low mobility workers.

**Figure 71: Economic impact in 2008 of increased productivity amongst high mobility workers**




*Source: Deloitte analysis based on Deloitte assumptions, interviews and Statistics Department of Rwanda*

Our calculations show large increases in productivity between 2003 and 2008. These are driven by the increase in population coverage which allows a greater proportion of high mobility workers to access mobile technology.

This report has revised the manner in which the percentage of high mobility workers that use mobile communications is estimated. In Deloitte (2007), it was estimated primarily in reference to population coverage. In this study we have further referenced the percentage to the total number of subscribers. This extended approach better accounts for the low penetration observed in Rwanda.

## 10.3.5 Intangible impacts

During our interviews, we asked individuals for their views on the intangible benefits of mobile communications in Rwanda. The views expressed were consistent with those voiced in the

Vodafone report (March 2005)[106] relating to Tanzania and those expressed in other interviews we conducted in East Africa. Benefits identified, which are applicable in Rwanda are outlined as follows.

- Promotion of social cohesion: through enabling contact when family members or friends who have moved away, and building trust through sharing of handsets (which has been found to be common in African countries). This effect is supported by the Vodafone Tanzania study which found a statistical robust relationship between mobile ownership and willingness to help others. This impact is particularly important in a country where the road network is limited.

- Transferring wealth to poorer regions: family members in urban areas use SIM cards to transfer money and phone credit to relatives in rural areas. Beeping or flashing by friends / relatives is also used to ask one mobile user to contact another.

- Extension of communications to users with low education and literacy, particularly through the use of texts.

- Extension of communications to those on low incomes: whilst individuals with low income levels are often unable to afford a handset or even the lowest value prepaid cards, through the use of formal and informal payphones they are able to enjoy the benefits of mobile communications.

- Stimulating local content: this can be particularly useful for allowing users to learn about local services such as healthcare or education.

- Assisting in disaster relief: mobile services allow families and friends to stay in touch in the even of a natural disaster, which can also ensure that they obtain more rapid relief.

We have estimated value using the willingness to pay concept[107]. Historical average revenue per user (ARPU) shows us how much customers are willing to pay for mobile services. If it is assumed that these intangible benefits of owning a mobile are unchanged over time, then the value for this form of consumer surplus can be considered to be the difference between ARPU at the time of subscription, less ARPU today (which is likely to be less due to increased competition and other factors)[108]. ARPU has remained relatively constant in 2005 and 2006 and therefore most of the consumer surplus is generated from reductions in the price of calls during 2003 and 2004. The

[106] The specific article referenced is Goodman. 2005. *Linking mobile phone ownership and use to social capital in rural South Africa and Tanzania*.

[107] Used by McKinsey in: Mckinsey & Co. Wireless Unbound. September 2006. *The surprising economic value and untapped potential of the mobile phone*.

[108] This approach is valid with the usage patterns currently observed. In the future this approach however may fail to be less appropriate.

total increase in consumer surplus has been estimated as RWF 1,657m, as shown in the table below[109].

**Figure 72: Calculation of intangible benefits using willingness to pay concept**

| | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|---|
| Average annual ARPU minus current ARPU | 25,973 | 31,022 | 15,593 | 15,247 | 7,623 | N/A |
| New Subscribers | 36,500 | 41,000 | 100,000 | 109,000 | 268,000 | 138,035 |
| Value add RWF millions | 948 | 1,272 | 1,559 | 1,662 | 2,0431 | N/A |
| **Cumulative value add (RWF millions)** | 948 | 2,220 | 3,779 | 5,441 | 7,484 | 7,484 |

*Source: Deloitte calculation based on operator information*

There are several reasons why these estimates are conservative and may underestimate the true value of intangible benefits.

- Due to data limitations, it assumes that all subscribers joined the network in 2003 and does not account for the increased willingness to pay that would have resulted from the higher ARPUs in early years. This bias may however be low given the small number of subscribers pre-2003.

- The calculation assumes that the number of subscribers in each year is a function of price. However, subscriber levels during the period are highly influenced by the level of network coverage and therefore, had mobile coverage been greater, then it is likely more subscribers would have been signed up at higher ARPUs in the early years.

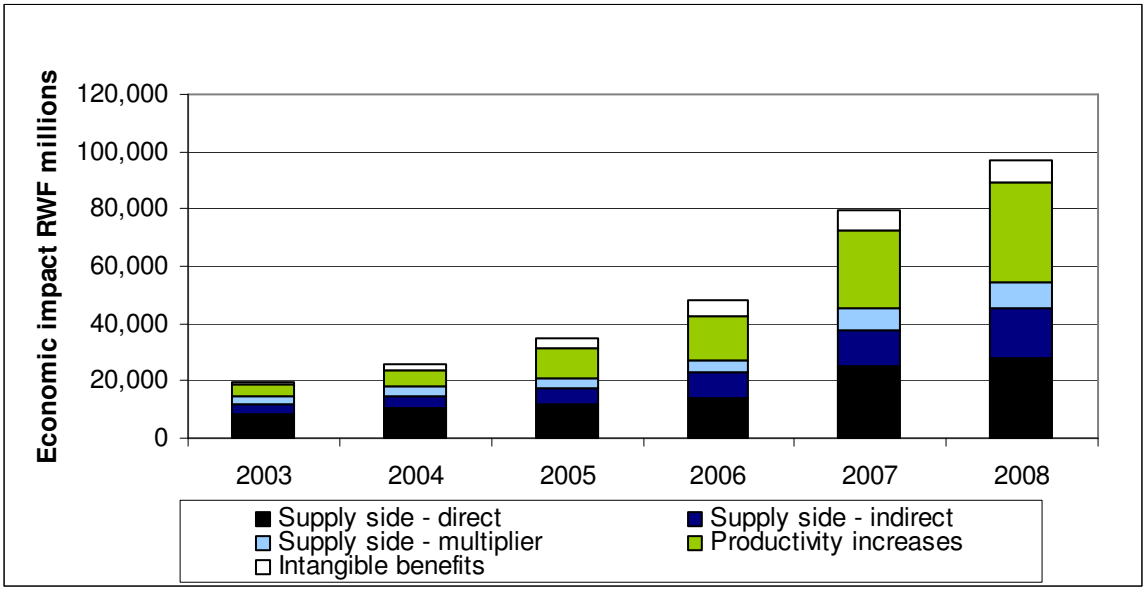
We have not been able to quantify the impact of these effects. However, we note that they imply our calculation may be an underestimation of the true value of mobile communications. The value of intangible benefits will increase as the number of mobile subscribers continues to grow.

## 10.4 Total impact on economic welfare

The aggregation of the supply-side, demand side and intangible benefits provides an indication of the total economic impact of mobile communications in Rwanda. This is estimated to be RWF 89,435m in 2008 and RWF 7,484m for intangibles. The biggest contributors are the direct supply side impact and the demand side productivity increase. Economic impact has been increasing as a fairly steady rate since 2003, following the steady increase in network coverage and penetration levels.

[109] In the context of willingness to pay analysis, ARPU is calculated as total revenues received by consumers during the year divided by the average number of customers in the year. Thus, ARPU includes revenue from usage, roaming, SIMs and accessories but does not include interconnect receipts.

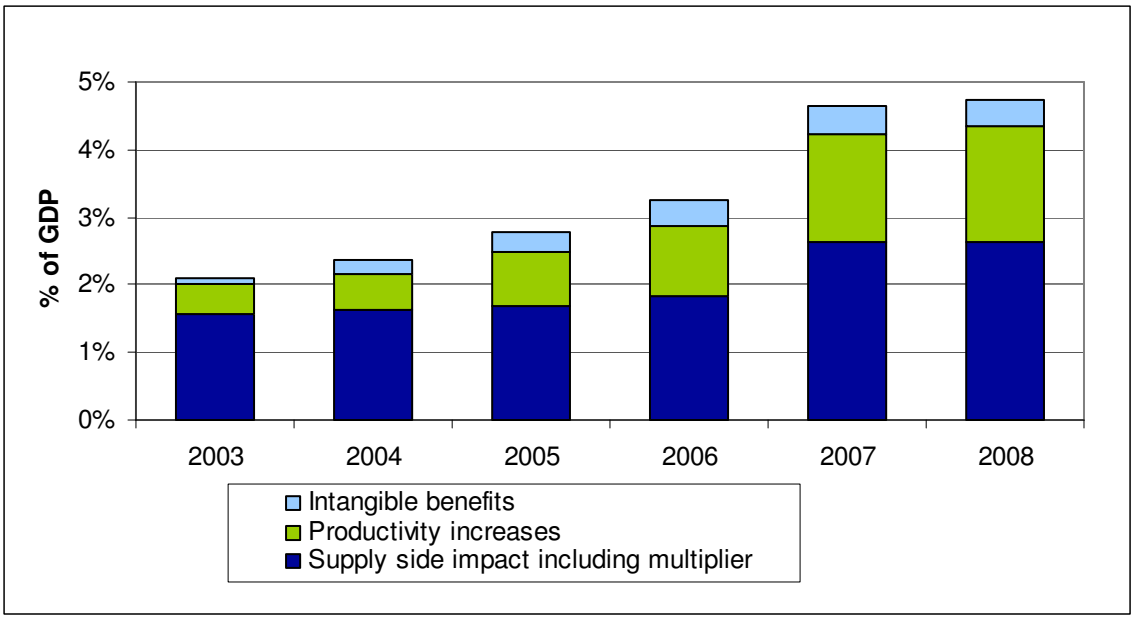
**Figure 73: Economic impact of mobile communications in Rwanda**




*Source: Deloitte analysis*

The impact of mobile communications on GDP has been substantial. We estimate that the total economic impact of mobile communications was 2.0% of GDP in 2003 with a further 0.1% related to intangible benefits. This has increased substantially to 4.4% of GDP in 2008 and 0.4% in intangibles. As a percentage of GDP the sectors impact rose substantially from 2007 to 2008. This rise is attributable to the large tax revenues collected from the imposition of the excise tax on mobile usage. Although in absolute levels the economic impact has risen from 2007 to 2008, this rise has not increased by much over the general rise in GDP of the country. However, looking forward with the rollout of 3G services and license and rollout of a third mobile network operator the economic benefits may rise in the future.

**Figure 74: Economic impact as a percentage of GDP**




*Source: Deloitte analysis*

## 10.5 Dynamic relationship between mobile communications and growth

A wide range of academic studies have demonstrated that a relationship exists between telecommunications penetration (originally fixed line, and more recently mobile) and economic growth. We have sought to estimate the dynamic relationship between mobile communications and GDP[110]. That is, the longer term impact that investment in mobile communications may have on general economic welfare and GDP growth rates in particular.

We undertook a regression based on cross section data for developing countries[111] analogous to Waverman, Meschi and Fuss (2005) [112]. The regression was estimated for almost 60 developing countries in the African continent, the Asia Pacific region and Latin America.

For this sample, we found that a 10% increase in penetration could increase the GDP growth rate by 1.2% in the long-run[113]. This effect is larger than that found by Waverman, Meschi and Fuss

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[110] Studies include those by: United Nations Economic Commission for Europe. 1987. *The Telecommunications Industry*; ITU. 1980 *Growth and Structural Change*; World Bank. 1983. *Information, Telecommunications and Development*. More recently, Waverman, Meschi and Fuss (2005) and Sridhar and Sridhar (2004) have looked specifically at the mobile industry.

[111] We attempted to use time series data for each country to estimate the country specific impact of mobile penetration on GDP growth. However, GDP data is only available on an annual basis and the relative immaturity of the mobile market implied insufficient data points to undertake this analysis.

[112] Waverman L., Meschi M., Fuss M. 2005. *The Impact of Telecoms on Economic Growth in Developing Countries*. The Vodafone Policy Paper Series, Number 2

(2005). This result may be due to the sample including only countries from the poorest regions in the world, where the effect of mobile penetration will be the strongest[114].

This result suggests that the 7% increase in penetration rates between 2003 and 2008 may have contributed 0.84% to the Rwandan GDP growth rate.

## 10.6 Excise taxes in Rwanda

Excise taxes were introduced by the Rwandan government in January 2007 levied at a rate of 10% on mobile usage. However, the rate was reduced by 70% soon after in July 2007 to 3%. Although little data is available yet to assess the impact of the tax reduction average prices per minute have fallen by around 35% from July 2007 to June 2008. Given the responsiveness found across Kenya, Uganda and Tanzania in this study to price we would therefore expect the reduction in taxes to lead to greater usage and penetration. This will increase the economic and social benefits we have found to date in Rwanda.

## 10.7 Conclusion and policy implications

The Rwandan mobile sector creates a substantial and increasing proportion of the country's economic value. It is now responsible for approximately 4.4% of GDP and providing intangible benefits equivalent to 0.4%. The research provided above has clearly demonstrated the various routes through which the mobile sector influences consumers behaviour and other economic agents and hence the economy as a whole.

We expect the positive impact of the sector to grow with MTN and Rwandatel's future investment, the licensing of a third operator and the recent reductions in price. Testament to this Rwandatel has publicly committed to investing USD 317m over the next 15 years.

Internationally, the tiger development economies in Hong-Kong, Singapore and Korea have placed telecommunications development at the core of their development strategies. If Rwanda is to follow a similar path the developing mobile communications sector needs to be encouraged to continue operating as an engine of growth. In particular, it may be counterproductive for government policy to limit this development through policies which may restrain consumer demand for mobile services.

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[113] The regression passes all standard econometric diagnostic tests. For ease of presentation, a significant constant term is omitted.

[114] See the methodology section for estimated coefficients and a broader discussion.

# 11 Tanzania: Executive Summary

The mobile communications sector has brought significant social and economic benefits to Tanzania. The four mobile operators have invested heavily increasing population coverage to 76%; this is expected to rise further as operators build-out planned base stations. Currently there are over 11 million mobile subscribers equating to population penetration of 28%. The number of mobile connections outnumbers fixed lines by over 50 to 1[115]. Mobile networks are increasingly connecting rural areas, revolutionising the way in which business is conducted and allowing social contact to be maintained much more easily. The cost of owning and using a mobile phone continues to fall. Average tariffs for Vodacom are falling, whilst Zain's One Network is delivering value to its customers through the removal roaming charges within East Africa.

The mobile communications industry contributed a total of Tsh 765,988m to the economy in 2008 with a further Tsh 177,017m relating to intangible benefits. Relative to GDP this represents 4.8% and 1.1% from intangibles. Some 189,044 Tanzanians and employed by the mobile and related industries.

Despite this contribution, mobile consumers are subject to a sector specific tax of 10% on mobile usage. Our analysis shows that a reduction in usage tax from 10% to 3% could be tax positive and lead to incremental increases in mobile penetration rates of 5.2% by 2019. Our estimates suggest that tax revenue neutrality could occur in around six years after such a policy is implemented. Using upside assumptions, neutrality is estimated to occur more quickly, after five years.

The tiger economies in Asia have placed telecommunications at the core of their economic development strategies. If Tanzania is to follow a similar path the developing mobile communications sector needs to be encouraged to continue operating as an engine of growth. In particular, it may be counterproductive for government policy to limit this development through policies which may restrain consumer demand for mobile services. Furthermore, the 10% excise duty on mobile services is regressive, hitting poorer consumers the hardest as their spending on mobile services is likely to represent a higher proportion of their income.

## 11.1 Establishing the economic benefit of mobile communications in Tanzania

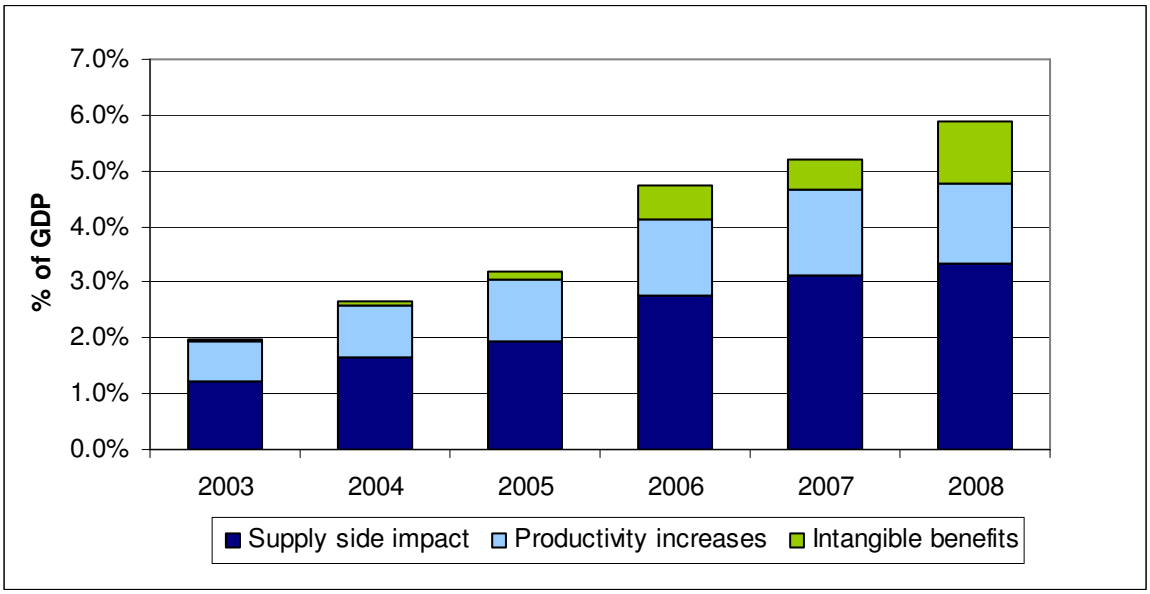
The economic impact of mobile communications has increased by over 300% from Tsh 232,703m in 2003 to Tsh 943,005m in 2008 including intangible benefits. Of this, 34% went to the government in tax revenues.

The economic impact of mobile communications is, for 2008, estimated to be above 4.8% of GDP, with additional 1.1% in intangible benefits. This impact could potentially rise with further mobile penetration as coverage rise. Our analysis also suggests that a 10% increase in mobile penetration can increase Tanzania's GDP growth rate by 1.2% over the long-run.

[115] Based on fixed line data from the ITU and mobile connections for Wireless Intelligence.

Our analysis suggests that a 10% increase in mobile penetration can increase the growth rate of Tanzania's GDP by 1.2% in the long-run. Increasing mobile penetration should therefore be a cornerstone of the government's economic and fiscal policy.

**Figure 75: Economic impact of mobile communications industry as a percentage of GDP**



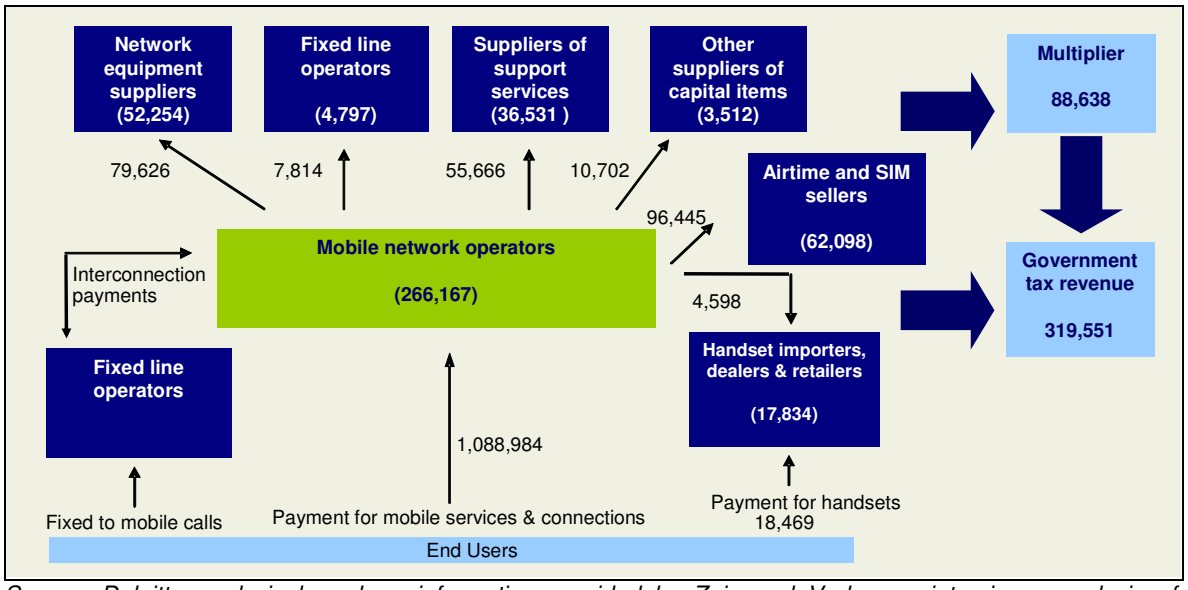

*Source: Deloitte Analysis*

## 11.1.1 Supply side impact of mobile communications

The supply side impact of mobile communications are derived from direct, indirect and multiplier [116] impacts. The revenue flows and value add for 2008 are presented below.

[116] Representing the positive impact on the economy from the value add created by the mobile industry.

**Figure 76: Mobile value chain in Tanzania in 2008, Tsh millions**




*Source: Deloitte analysis based on information provided by Zain and Vodacom, interviews, analysis of company accounts and industry reports. Figures grossed up to capture estimated impact of Tigo and Zantel*

## 11.1.2 Increases in productivity

The following productivity impacts of mobile communications were identified during interviews.

- Substantially reducing travel times and costs: particularly in rural areas where previously traders would have needed to travel to the urban areas to check for demand and agree prices.

- Creating market efficiency: particularly in the agriculture and fishing sector, workers are now quickly notified about changes in demand / prices so that they can amend their growing / harvest plans accordingly. Previously workers travelled to the nearest major city or relied upon slower postal communications.

- Encouraging entrepreneurialism: mobile has encouraged the growth of small business and has increased its efficiency. For example, there are few formally established taxi firms in Tanzania and instead taxi drivers print business cards with their mobile number. Several drivers are able to share a taxi, using mobile phones to agree arrangements.

- Mobile banking: customers receive a text message once their salaries have been received by the bank, this has noticeably reduces queues in bank branches. The unbanked are being drawn into the banking system which is reducing the time and effort to pay staff. This service is soon to be expanded so that consumers will be able to pay bills, including DSTV, via their mobile phone.

- Money transfers: approximately $US 5m per day is transferred and this figure is growing. Money is typically transferred from urban to rural regions and from the young to old, reducing income distribution. Mobile based money transfers are cheaper than traditional

money orders, approximately $3 to transfer $500 and also leading to job creation as money transfer kiosks are being set-up in towns.

- Innovation and learning: the launch of GPRS has enabled workers, and in particular farmers, to use the internet to learn about new production techniques.

Taken together we estimate that workers using mobile phones experienced productivity increases equivalent to Tsh 234,157 in 2008.

### 11.1.3 Intangible benefits

During interviews, we identified several intangible benefits of mobile communications in Tanzania

- promotion of social cohesion, through the creation of chat groups and SMS;
- extension of communications to users with low education and literacy and on low incomes;
- transferring wealth to poorer regions, through schemes such as mobile based money transfer;
- assisting in disaster relief;
- promotion of the democratic process; and
- increased electricity rollout.

Using a 'willingness-to-pay' methodology to proxy for these, we estimate consumers enjoyed the equivalent of Tsh 177,017m in intangible benefits in 2008.

### 11.1.4 Impact on employment

Mobile services contribute to employment via several avenues:

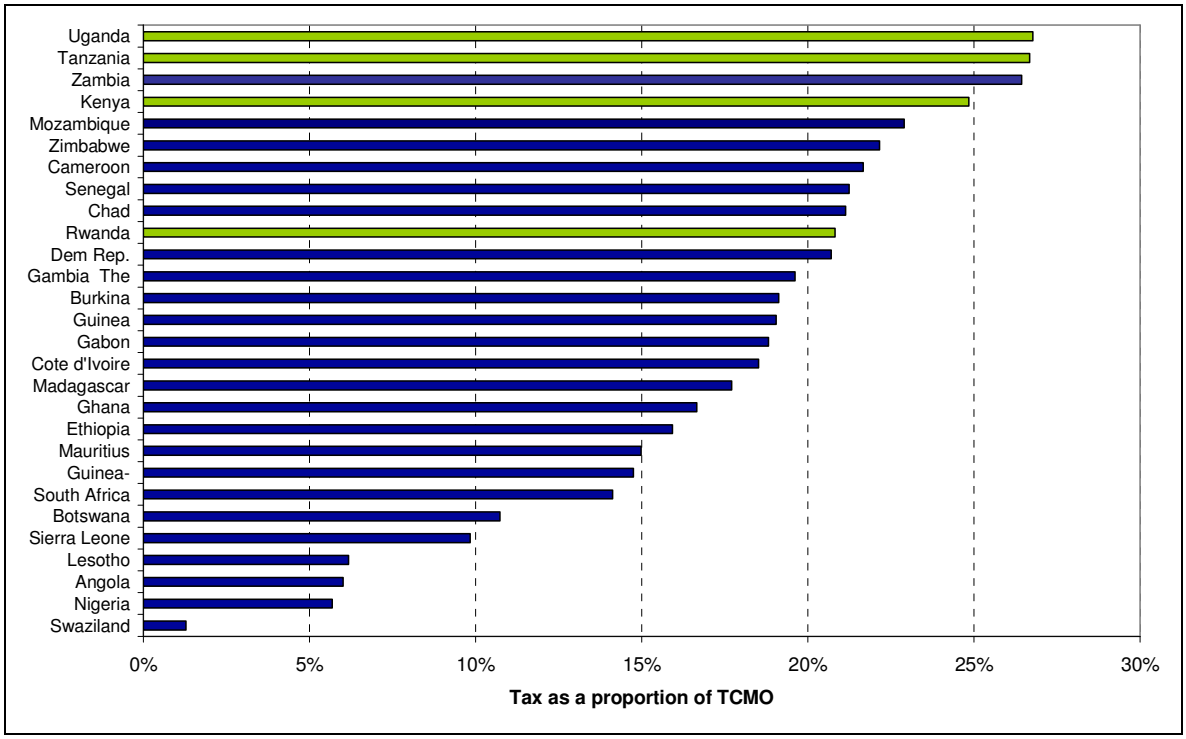
- direct employment of the industry and related industries;
- support employment created by outsourced work and taxes that the government subsequently spends on employment generating activities; and
- induced employment resulting from the above employees and beneficiaries spending their earnings, and creating more employment.

The first effect is obtained directly from mobile operators. The support and induced employment is estimated using a multiplier of 1.2. Combing these suggests that the employment generated in relation to mobile communications in 2008 is over 189,000 full time equivalents.

## 11.2 Impact of reducing the excise taxes on usage

Despite the positive economic impact that mobile communications creates for the Tanzanian economy, mobile consumers are subject to some of the highest taxes in Africa. The following figure illustrates the tax burden on mobile services as a percentage of the total cost of mobile ownership (TCMO).

**Figure 77: Tax as percentage of total cost of mobile ownership across Africa**

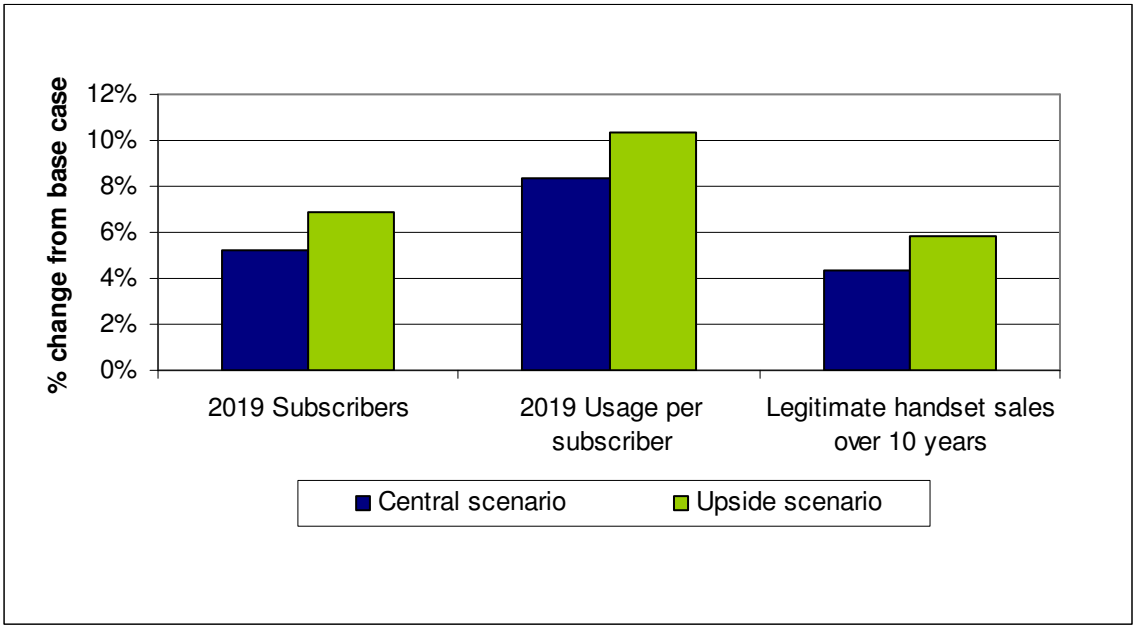



*Source: Deloitte analysis*

In Tanzania tax on mobile telephony makes up almost 27% of TCMO, which is high by African standards. Taxation is high in Tanzania because taxation includes both taxes on the same basis as other goods but also specific excise duty applied to mobile usage at a rate of 10%.

In considering the impact of reducing the excise duty in Tanzania we modelled a cut in the duty to 3%, the rate currently applied in Rwanda. We then compare the changes that result against our base case forecast which projects the development of the mobile industry to 2019 without any changes to the tax structure. The following figure illustrates the impact on mobile penetration, usage and handset sales over the 10 year period from 2009.

**Figure 78: Impact of reduction in excise tax on usage on the mobile industry**




*Source: Deloitte analysis*

Our central scenario shows that penetration may be 5.2% higher in 2019 than the base case, representing mobile penetration of over 70%[117]. In our upside scenario, mobile penetration is estimated to be 6.9% higher in 2019. Penetration rises due to the lower overall cost of mobile ownership falling. The impact on usage per subscriber is also significant at almost 8.36% in the central scenarios and 10.4% in the upside scenario. The increase observed in the upside scenario is the result of a higher elasticity of usage with respect to price of -1.22.

## 11.2.1 Impact on Government tax revenues

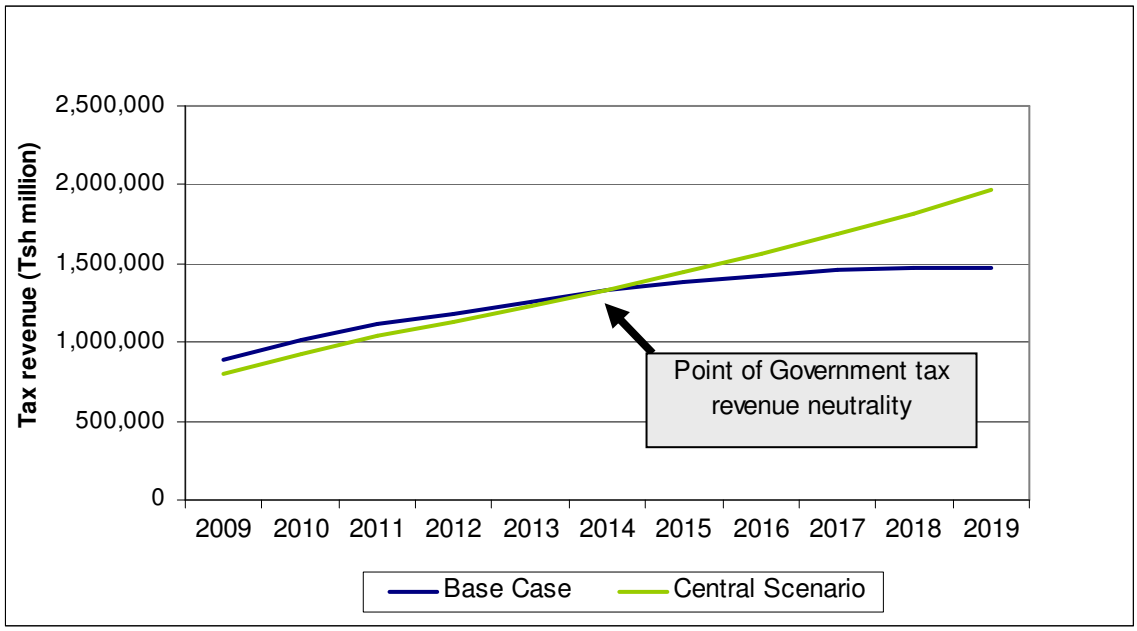
The impact on government tax revenue is split into:

- the initial fall in taxes on mobile services;
- the uplift from the indirect effect (increased corporate tax and regulatory fees);
- the uplift once the growth and national economic multiplier impacts are accounted for; and
- the net impact.

Our quantification of these impacts is based on a reduction of excise taxes to 3% which is compared to the tax revenues obtained in the base scenario with constant tax rates.

[117] Population penetration will be lower as more people possess more than one SIM card. We correct for this throughout the model where subscriber is the relevant unit. However, for handsets replacement we remain with connections given as the market develops the handset replacement period will fall counteracting the increased double SIMs.

**Figure 79: Impact of reduction in excise tax on usage on Government tax revenues, 2009-2019**

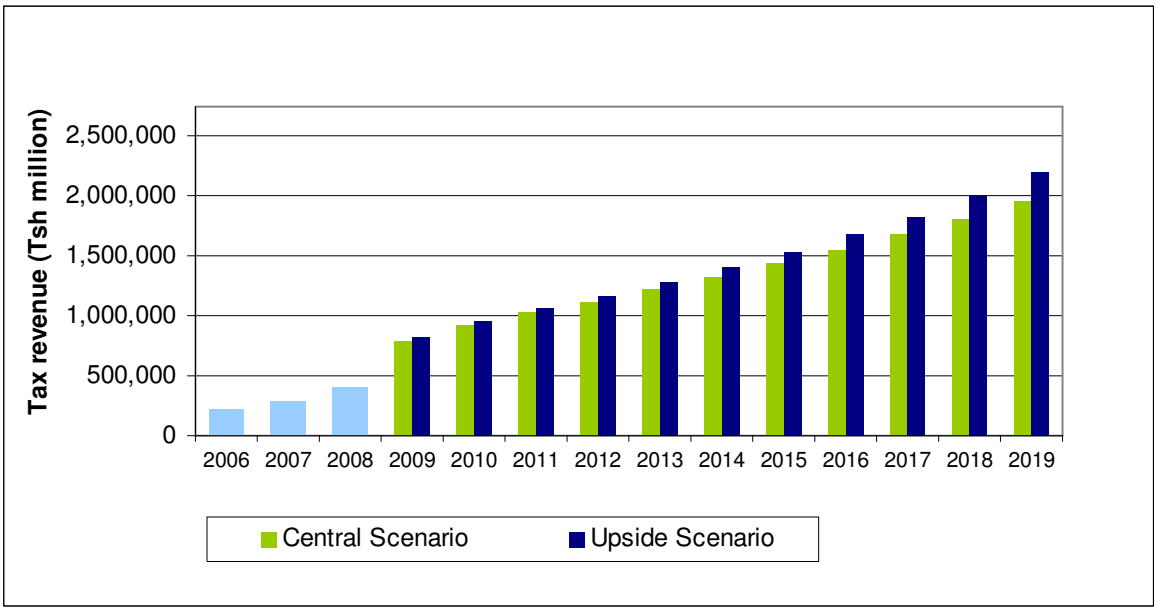



*Source: Deloitte analysis*

Our analysis suggests that these tax changes may be tax positive with neutrality being achieved six years after the tax reduction. Total Government tax is projected to rise by 6.6% over the ten year time frame. This positive impact is enhanced further in our upside scenario with neutrality achieved after five years and tax revenues projected to rise by 15.0%.

Interestingly if we look at tax revenues derived once the reduction is implemented and compare these in a historically context, the reduction in SIM activation tax does not lead to a decrease in government tax revenues. This is illustrated in Figure 59. There is a substantial increase in revenues from 2008 to 2009 due to the large increase in subscribers projected by Wireless Intelligence.

**Figure 80: Impact of reduction of excise tax on usage to 3% on Government tax revenue**




*Source: Deloitte analysis. Historic data corresponds to actual taxes reported to paid by mobile network operators and wider taxes resulting as captured by a multiplier. Post 2008 taxes as estimated by our model but exclusive of GDP growth effect for comparability to historic data.*

# 12 Tanzania: Economic impact of the mobile industry

The mobile communications industry contributed a total of Tsh 765,988m to the economy in 2008 with a further Tsh 177,017m relating to intangible benefits. This represents 4.8% of GDP rising to 5.9% when intangibles are included.

At 29%, penetration has doubled since 2006 driving the increasing positive impact of the sector. Penetration however still lags behind markets such as Kenya suggesting longer term potential for further benefits to be derived.

Academic research suggests that over the longer term mobile communications have a significant impact on economic growth. It has been suggested that this effect is particularly strong in developing countries. Our research is consistent to this and we estimate that mobile communications has raised GDP growth rates in Tanzania by 1.2% in the long-run for each 10% increase in penetration. As such, the 7.1% increase in penetration rates between 2007 and 2008 may have contributed 0.9% to the Tanzanian GDP growth rate.

## 12.1 Overview of mobile communications in Tanzania

Mobile communications has a visible impact on the social and economic structures in Tanzania[118]. Zain[119], Vodacom, Tigo and Zantel have undertaken significant investment in a network which now covers an estimated 76% of the population[120], with mobile connections outnumbering fixed lines by over 50 to 1[121]. There are over 11 million mobile subscribers and a penetration rate of 29%. Historically, investment has focussed on major urban towns and cities. However, increasingly investment is being focussed towards increasing coverage in rural areas, allowing people to better stay in contact with their families and revolutionising the way in which business is conducted. The operators are committed to continuing to invest for both coverage and usage.

During interviews, the mobile operators noted that they have regular contact with the regulatory authority and Government agencies and the positive progress that has been made on a number of issues. However, several areas are still restricting network growth.

- A shortage of skilled workers which is exacerbated by the current limit on work permits.
- Lack of clarity around the objectives of the USO fund and the way in which money will be targeted. TTCL is represented at the USO fund and the mobile operators also wish to have representation.

[118] Tanzania is defined to include Zanzibar in this report

[119] Previously branded Celtel.

[120] Data supplied by GSMA

[121] Based on fixed line data from the ITU and mobile connections for Wireless Intelligence.

- Uncertainty over tax reforms and the impact on the industry. Other major industries, including utility companies and the tobacco industry, are represented at the task force on tax reforms and as one of the largest tax payers the mobile operators should also have representation.

Clarification on these issues would impact the operators investment appraisal calculations and could foster further roll-out and development of applications.

## 12.2 Operator participation in the economic impact study

Vodacom and Zain provided us with data for this study. We were unable to obtain data from Tigo, Zantel and Hits. Using data on subscriber numbers for each operator, we gross up cost, revenue and employment data received from Vodacom and Zain to provide indicative values for Tigo and Zantel. Given this, the values presented in the remainder of this chapter are intended to represent the total aggregate impact of the mobile communications sector in Tanzania. For 2008 we have estimated full year values using half year results, operator forecasts and trends.

Our estimates may be conservative given Hits has not been included in the study given the lack of data available on its' current network investment. In addition the Tanzania Telecommunications Company's CDMA network has also not been considered as part of this study.

A number of our results have been updated since Deloitte (2007). This is due to revised operator data or the availability of better public or interview evidence. The impact of these changes is marginal.

## 12.3 Static Supply side impact of mobile communications

We have estimated the value add created by the mobile communications industry in Tanzania. We have also estimated the leakages from the system, i.e. the percentage of any Tanzanian shilling spent that will remain within the national economy to be spent in the next round and use this to isolate the impact on the Tanzanian economy from the total international impact of the mobile communications industry.

### 12.3.1 Value chain impact

We initially analysed the domestic value add of the mobile network operators in Tanzania. We find that they directly contributed Tsh 345,134m to the Tanzanian economy in 2008. The breakdown by category is provided in the figure below.

**Figure 81: Value add of mobile network operators (excluding multiplier effect), Tsh millions**

| Value add | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|---|
| Employee wages and benefits | 12,386 | 16,864 | 22,107 | 32,964 | 34,104 | 47,167 |
| Contractors | 1 | 4 | 9 | 12 | 12 | 13 |
| Taxes and regulatory fees | 36,767 | 62,221 | 82,928 | 127,953 | 199,185 | 218,170 |
| CSR | 569 | 573 | 559 | 697 | 818 | 817 |
| Dividends | 0 | 0 | 0 | 0 | 0 | 0 |
| **Total** | **49,723** | **79,661** | **105,602** | **161,626** | **234,120** | **266,167** |

*Source: Deloitte analysis based on information provided by Zain and Vodacom, interviews, analysis of company accounts and industry reports. Figures grossed up to capture estimated impact of Tigo and Zantel*

Taxes and regulatory fees (including spectrum fees) make up the largest proportion in the above table, accounting for over 82% of the total in 2008. The next largest contributor is employee wages and benefits.

Corporate social responsibility (CSR) programmes received over Tsh 817m in 2008[122], including sponsorship of events. This includes projects from Vodacom focusing on education, health and poverty alleviation to align with the Government's millennium goals. Specific CSR projects have including providing free airtime to the police services, supporting a toll-free youth aids awareness campaign, developing micro-finance based community projects aimed particularly at empowering women and delivering books and IT equipment to schools.

Despite making an average profit before tax of around 20%, neither of the operators' interviewed opted to pay dividends. Instead both chose to reinvest profits in network expansion. As such, this economic impact is captured elsewhere rather than as a direct impact of the operators.

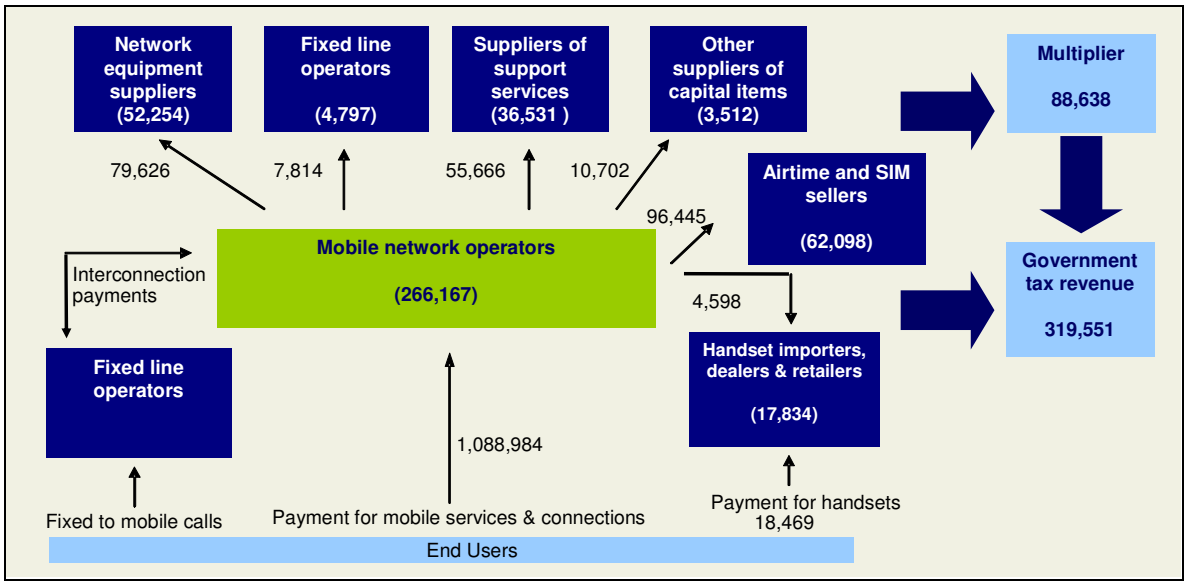
We then analysed the revenue flows from Vodacom and Zain to others in the industry, and estimated the quantity translated into further value add[123]. The estimates of value add include the multiplier effect on the wider-economy which is assumed to be 20% of value-add[124].

[122] CSR figures are slightly lower than in Deloitte (2007) given operators have provided more accurate data.

[123] Details on value add margins, percentage of revenue translated into value add, are contained in the assumptions appendix.

[124] Figure 21 summarises the rationale behind this assumption.

**Figure 82: Mobile value chain in Tanzania in 2008, Tsh millions**




*Source: Deloitte analysis based on information provided by Zain and Vodacom, interviews, analysis of company accounts and industry reports. Figures grossed up to capture estimated impact of Tigo and Zantel*

The figures next to the arrows represent the flow of money from one group to another. The figures inside the boxes represent the value retained by each group. The figures shown relate solely to domestic flows and domestic value add. The table below shows the calculation of value add.

**Figure 83: Calculation of value add from mobile communications in Tanzania in 2008, Tsh millions**

| Domestic value add | Total revenue | Domestic revenue | Domestic cost | Domestic value add | Value add with multiplier |
|---|---|---|---|---|---|
| Mobile network operators | 1,088,984 | 1,088,984 | 822,817 | 266,167 | 319,401 |
| Fixed telecommunications operators | 7,814 | 7,814 | 3,017 | 4,797 | 5,757 |
| Network equipment suppliers | 318,504 | 79,626 | 27,372 | 52,254 | 62,705 |
| Handset designers and dealers | 70,974 | 23,067 | 5,233 | 17,834 | 21,400 |
| Other suppliers of capital items | 24,431 | 10,702 | 7,191 | 3,512 | 4,214 |
| Suppliers of support services | 68,720 | 55,666 | 19,135 | 36,531 | 43,837 |
| Airtime commission, payphone commission | 96,445 | 96,445 | 34,347 | 62,098 | 74,517 |
| **Total** | 1,675,872 | 1,362,304 | 919,112 | 443,192 | 531,831 |

*Source: Deloitte analysis based on information provided by Zain and Vodacom, interviews, analysis of company accounts and industry reports. Figures grossed up to capture estimated impact of Tigo and Zantel*

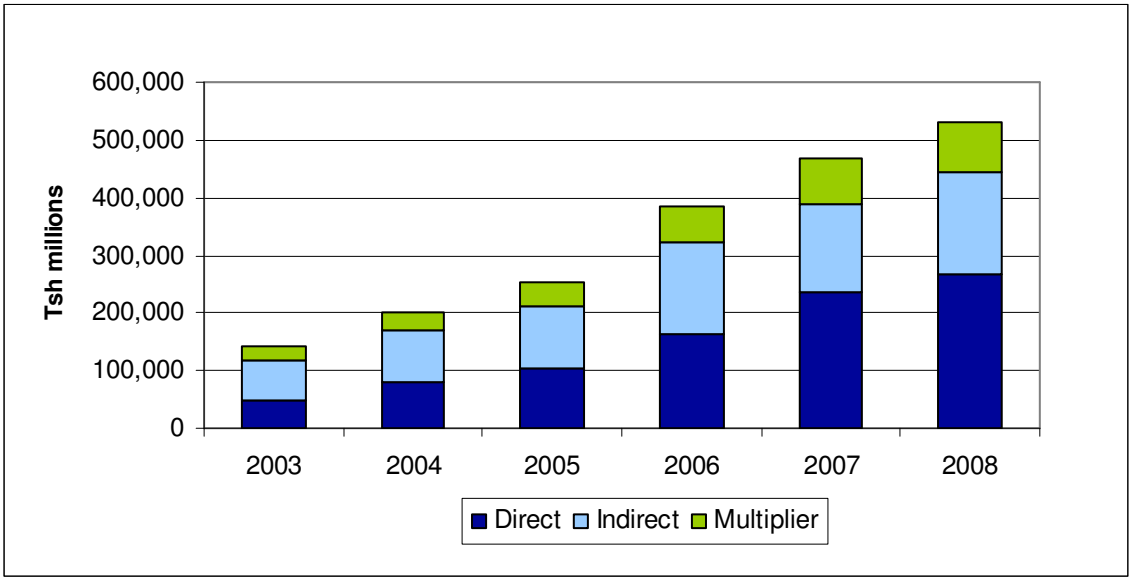
47% of the revenue flows from the mobile network operators are estimated to remain in Tanzania. This figure is dominated by interconnection payments and airtime and payphone commissions. Over 80% of support services are purchased from within Tanzania, including legal services, marketing, advertising, outsourced network maintenance and other administrative expenses.

It is estimated that 25% of capital expenditure is domestic, primarily low-value non network equipment[125]. Capital expenditure has been increasing in Tanzania and made a large jump with Vodacom rolling out 3G in 2006 and 2007. Zain has announced that next year it plans to invest USD 180 million in 2009 including rolling out 3G.

Using the same process as above, we estimated the value-add on an annual basis from 2003.

[125] This is slightly increased from Deloitte 2007 given more is now available locally.

**Figure 84: Supply side value add from mobile communications 2003 to 2008**




*Source: Deloitte analysis*

Value add has increased substantially by over 350% during the six year period.

## 12.3.2 Contribution to Government revenue

Tax revenues to the Government are raised through taxes specific to mobile services, corporation tax, income tax, regulatory fees, universal service contributions and spectrum fees.

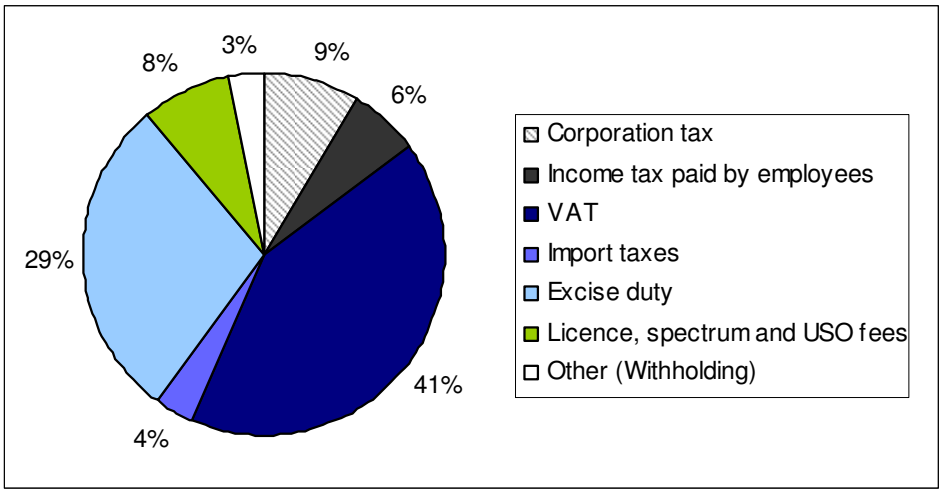
**Figure 85: Tax revenues in Tanzania from mobile operators, Tsh millions**

| Taxes from mobile network operators | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|---|
| Corporation tax | - | - | - | 5,641 | 19,830 | 18,811 |
| Income tax paid by employees | 1,911 | 2,879 | 6,269 | 9,261 | 8,694 | 13,548 |
| Sales taxes (VAT) and mobile specific tax | 31,308 | 54,240 | 69,491 | 103,101 | 157,287 | 168,382 |
| Regulatory fees | 3,548 | 5,103 | 7,168 | 9,950 | 13,374 | 17,429 |
| **Total taxes and fees** | 36,767 | 62,221 | 82,928 | 127,953 | 199,185 | 218,170 |

*Source: Deloitte analysis based on operator data*

The largest proportion of tax revenue is raised through mobile specific and sales taxes which, together, accounted for over 70% of tax paid in 2008. The breakdown for 2008 is shown in the figure below:

**Figure 86: Breakdown of 2008 tax revenues from mobile operators by source**




*Source: Deloitte analysis based on operator data*

Tax as a proportion of revenues has averaged 20% since 2003[126].

In addition to the direct tax revenue received from mobile operators, it is necessary to consider the tax revenue received from others in the value chain. We have considered import, sales, corporation and employee income taxes in our calculations below.

[126] Revenue is defined to include revenue received from the provision of interconnection and termination services

**Figure 87: Total tax revenues from the mobile value chain in 2008[127], Tsh millions**

| Tax Revenue | Tax revenue | Tax revenue with multiplier |
|---|---|---|
| Mobile network operators | 218,170 | 261,804 |
| Fixed telecommunications operators | 2,378 | 2,854 |
| Network equipment suppliers | 16,434 | 19,721 |
| Handset designers and dealers | 7,003 | 8,404 |
| Other suppliers of capital items | 1,104 | 1,325 |
| Suppliers of support services | 11,489 | 13,787 |
| Airtime commission, payphone commission | 9,713 | 11,655 |
| **Total** | **266,292** | **319,551** |

*Source: Deloitte analysis based on Deloitte tax data, analysis of company accounts and interviews. Note this represents tax revenues directly created by revenue flows from the mobile network operators and not total tax revenues from the sector.*

After the mobile network operators, the largest payers of tax are the suppliers of network equipment. Substantial tax revenues are also received from suppliers of support services and handset dealers who operate in the formal market place. Although airtime sellers and payphone operators receive Tsh 96,445m from the mobile network operators, a large proportion operate in the informal economy and thus we estimate that as a group they only pay Tsh 9,713m in taxes. Our calculations assume only the largest airtime sellers that work through official dealerships pay tax and that, by and large, street-side airtime sellers do not. Interviews with operators, handset manufacturers and dealers revealed that many handsets are imported illegally from Dubai or are reconditioned / stolen. On this basis we assume that only 50% of handsets sold are subject to sales tax.

## 12.3.3 Impact on employment

Mobile services contribute to employment via several avenues:

- direct employment of the industry and related industries;
- support employment created by outsourced work and taxes that the government subsequently spends on employment generating activities; and
- induced employment resulting from the above employees and beneficiaries spending their earnings, and creating more employment.

[127] This represents tax revenues directly created by revenue flows from the mobile network operators and not total tax revenues from the sector.

The first effect is obtained directly from mobile operators. The support and induced employment is estimated using a multiplier of 1.2. For operators no multiplier was applied given the majority of induced employment will be captured by the first round flows.

**Figure 88: Contribution to employment from the mobile value chain 2008[128]**

| Employment Impact | Number of employees | Number of employees with multiplier |
|---|---|---|
| Mobile network operators | 1,960 | 1,960 |
| Fixed telecommunications operators | 121 | 145 |
| Network equipment suppliers | 390 | 468 |
| Handset designers and dealers | 958 | 1,150 |
| Other suppliers of capital items | 110 | 132 |
| Suppliers of support services | 18,059 | 21,671 |
| Airtime commission, payphone commission | 136,265 | 163,518 |
| **Total** | **157,863** | **189,044** |

*Source: Operator data, interviews and Deloitte analysis on average wage rates. Note this is employment directly created by revenue flows from the mobile network operators and does not represent total employment in the sector.*

The largest category of employment is airtime sellers and payphone operators. This category is made up of kiosks, supermarkets, banks, payphone operators, street sellers etc. We estimate these points of sale provide employ on average around 1.2 FTEs[129]

The number of employees in other sectors is estimated as revenue received from the mobile network operators divided by the average wage in the particular sector. Average wages are estimated based on data from the Tanzanian Bureau of Statistics and a review of company accounts.

## 12.3.4 Increases in productivity

There are numerous ways in which mobile services can improve productivity, particularly in developing countries where mobile services have leap-frogged fixed line services and are the provider of universal service. During our interviews with government, regulator and operators, a

[128] This is employment directly created by revenue flows from the mobile network operators and does not represent total employment in the sector

[129] This is lower than in Deloitte 2007 given better information regarding the airtime supply chain was available.

number of specific areas where mobile communications have improved productivity were noted. These are also consistent with those identified in the research[130].

- Improving information flows: mobile services allow certain occupations (such as commodities and agriculture, both prominent in developing countries) to cut out the middle-man as traders can obtain information on prices, quality, quantities directly. This improves the incomes of producers, and helps reduce wastage.

- Substantially reducing travel times and costs: particularly in rural areas where previously traders would have needed to travel to the urban areas to check for demand and agree prices, this business is now conducted on the telephone. Traders are able to ensure demand exists for their products before setting out on a journey. The Vodafone paper on Africa (2006) contains analysis on Tanzania and South Africa found that 67% of users in Tanzania said that mobiles greatly reduce travel time[131].

- Creating market efficiency: particularly in the agriculture sector, workers are now quickly notified about changes in demand / prices so that they can amend their growing / harvest plans accordingly. Previously workers travelled to the nearest major city or replied upon slower postal communications.

- Improving efficiency of mobile workers: mobile services improve the efficiency of all workers in the economy: This effect will particularly be felt by workers with unpredictable schedules, for example those involved in repair and maintenance, or collection and delivery. Mobiles will give them greater accessibility and better knowledge of demand.

- Improving job search: mobile services improve the chances of the unemployed finding employment through enabling people to call for opportunities rather than relying on word of mouth. SMS based job search applications have also been developed. Further to this, owning a mobile phone makes workers more employable as they are contactable while away.

- Encouraging entrepreneurialism: mobile has encouraged the growth of small business and has increased its efficiency. For example, there are few formally established taxi firms in Tanzania and instead taxi drivers print business cards with their mobile number. Several drivers are able to share a taxi, using mobile phones to agree arrangements.

- Mobile banking: customers receive a text message once their salaries have been received by the bank, this has noticeably reduces queues in bank branches. It has also led to an increase in the number of Tanzanians who are part of the formal banking sector. There are plans to expand this service so that customers can use their mobile phones to pay their bills.

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[130] See, for example: Vodaphone. March 2005. *Africa: The Impact of Mobile Phones*. Vodafone Policy Paper Series, No.3.

[131] Vodaphone. March 2005. *Africa: The Impact of Mobile Phones*. Vodafone Policy Paper Series, No.3.

- Innovation and learning: the launch of GPRS has enabled workers, and in particular farmers, to use the internet to learn about new production techniques.

No established economic methodology exists to estimate the GDP and employment effects of such productivity improvements across the economy. We have not been able to obtain any reports or studies that particularly focus on Tanzania and, in the time available to us, we have not been able to quantify the impact of these gains[132]. However, all those we questioned in government and at the regulator agreed that mobile communications had transformed the way in which business was conducted, with one individual stating that mobile has revolutionised the way people do business and that it must be cutting down costs.

Other surveys have typically quantified productivity improvements to be between 6% and 11%. For example, Mckinsey[133] quantified the impact to be 6% in China, whilst the impact in the UK has been estimated to be between 1% and 11%[134]. Of particular relevance to the Tanzanian context, Zain recently commissioned a survey in Sudan trying to identify how average business revenue have increased with mobile usage[135]. Across the 800 people interviewed, average business revenue increases were found to be just below 11%.

Based on our interviews within East Africa, it may be assumed that the productivity increase in Tanzania would around this level since:

- there is limited fixed line roll out in Tanzania implying that the impact of mobile should be compared to a base-line of limited connectivity rather than higher fixed line penetration rates of developed countries; and

- higher levels of informal activity imply greater need for co-ordination between individuals since there is less formal communication at the company level.

We therefore assume a productivity gain of 10% has been experience by high mobility workers who own a mobile phone. Using the economic value concept that we set-out in the methodology section, we estimate the incremental impact on the economy was Tsh 234,157m 2008. This calculation is set out below, where we have not considered any impact on low mobility workers.

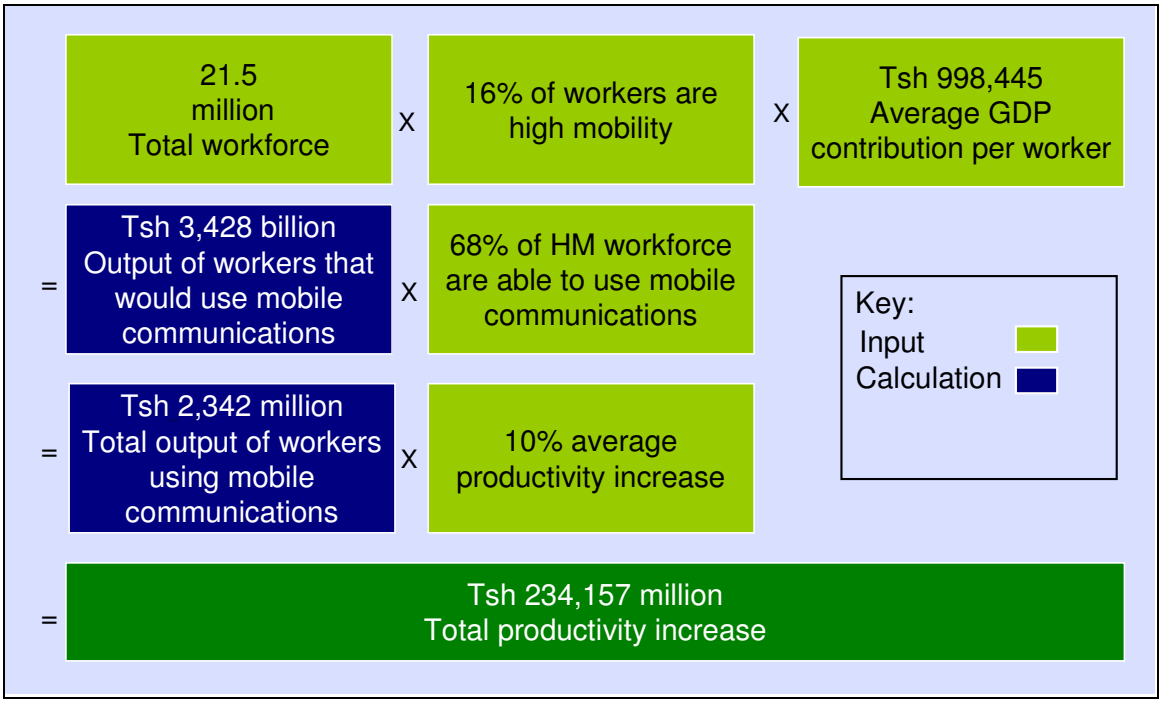
[132] Quantification would require consumer and business surveys to be undertaken

[133] Mckinsey & Co. Wireless Unbound. September 2006. *The surprising economic value and untapped potential of the mobile phone*.

[134] $O_2$. 2004. The *Changing Economic Impact of Mobile Telephones*.

[135] Referenced in: Deloitte. 2008. *Economic Impact of Mobile Communications in Sudan*.

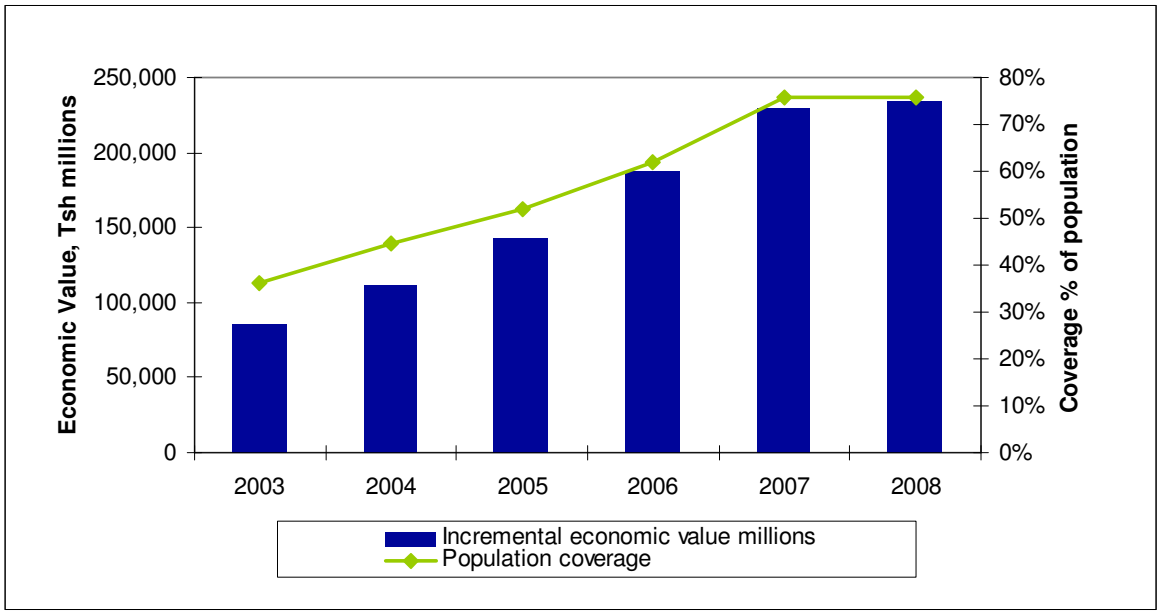
**Figure 89: Economic impact in 2008 of increased productivity amongst high mobility workers**




*Source: Deloitte analysis based on Deloitte assumptions, interviews and Tanzania Bureau of Statistics*

Our calculations show large increases in productivity between 2003 and 2007 before a slight levelling off. The initial increases were driven by the increase in population coverage which allowed a greater proportion of high mobility workers to access mobile technology. By 2008 the majority of high mobility workers are using mobile telephony.

**Figure 90: Economic value from increases in productivity, 2003 to 2008**




*Source: Deloitte analysis. Population coverage calculated by GSMA*

## 12.3.5 Intangible impacts

During our interviews, we asked individuals for their views on the intangible benefits of mobile communications in Tanzania. The views expressed were consistent with those voiced in the Vodafone report (March 2005)[136] relating to Tanzania and those expressed in other interviews we conducted in East Africa. Benefits identified in Tanzania are as follows.

- Promotion of social cohesion: through enabling contact when family members or friends who have moved away, and building trust through sharing of handsets (which has been found to be common in African countries). This effect is supported by the Vodafone Tanzania study which found a statistical robust relationship between mobile ownership and willingness to help others. This impact is particularly important in a country where the road network is limited.

- Transferring wealth to poorer regions: family members in urban areas use SIM cards to transfer money and phone credit to relatives in rural areas. Money is also being transferred from the young to the old. Beeping or flashing by friends or relatives is also used to ask one mobile user to contact another.

- Extension of communications to users with low education and literacy, particularly through the use of texts.

[136] The specific article referenced is Goodman. 2005. *Linking mobile phone ownership and use to social capital in rural South Africa and Tanzania*.

- Extension of communications to those on low incomes: whilst individuals with low income levels are often unable to afford a handset or even the lowest value prepaid cards, through the use of formal and informal payphones they are able to enjoy the benefits of mobile communications.

- Support of the democratic process: the operators are investigating the possibility of using mobile phones to support the democratic process in term of encouraging voter turnout and registering voters.

- Educational support: exam results are now distributed via SMS, meaning that students are notified of their results sooner.

- Stimulating local content: this can be particularly useful for allowing users to learn about local services such as healthcare or education. Local content is also of a social nature, for example the lottery results are distributed via SMS. The amount of local content has increased substantially since our first study.

- Assisting in disaster relief: mobile services allow families and friends to stay in touch in the even of a natural disaster, which can also ensure that they obtain more rapid relief.

We have estimated value using the willingness to pay concept[137]. Historical average revenue per user (ARPU) shows us how much customers are willing to pay for mobile services. It is then assumed that the intangible benefits of owning a mobile are unchanged over time, and as such the value for this form of consumer surplus is defined as the difference between ARPU at the time of subscription, less ARPU today (which is likely to be less due to increased competition and other factors). However, as in Uganda and Kenya, there have been reductions in the average minutes of use of mobile subscribers, biasing this calculation. To correct for this impact we have chosen to calculate the change in ARPU by holding the number of minutes that a subscriber uses at the average level of usage on the date the subscriber joined the network. As such, the following equation provides the calculation methodology for the 2003 consumer surplus[138]:

*2003 Consumer surplus = (2002 new minutes of use * 2002 average price per minute) – (2002 new minutes of use * 2003 price per minute)*

Following the above, the calculation of the increase in consumer surplus in each year, for each set of new customers, is provided below[139]. We find that consumers benefit from intangibles equivalent to Tsh 177,017m

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[137] Used by McKinsey in: Mckinsey & Co. Wireless Unbound. September 2006. *The surprising economic value and untapped potential of the mobile phone*.

[138] This approach is valid with the usage patterns currently observed. In the future this approach however may fail to be less appropriate.

[139] In Deloitte (2007) the original methodology was deployed. Revised data however, shows minutes of use have fallen implying a reappraisal of the methodology is necessary.

**Figure 91: Calculation of intangible benefits using willingness to pay concept, Tsh million**

| | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|---|---|
| 2002 new Subscribers | - | 4,841 | 8,805 | 12,365 | 32,729 | 29,842 | 44,381 |
| 2003 new Subscribers | - | - | 1,696 | 3,220 | 11,936 | 10,700 | 16,923 |
| 2004 new Subscribers | - | - | - | 2,553 | 17,157 | 15,086 | 25,513 |
| 2005 new Subscribers | - | - | - | - | 24,454 | 20,987 | 38,446 |
| 2006 new Subscribers | - | - | - | - | - | - | 13,979 |
| 2007 new Subscribers | - | - | - | - | - | - | 37,775 |
| 2008 new Subscribers | - | - | - | - | - | - | - |
| **Total** | **-** | **4,841** | **10,501** | **18,139** | **86,275** | **76,615** | **177,017** |

*Source: Deloitte calculation based on operator information*

There are several reasons why these estimates are conservative and may underestimate the true value of intangible benefits.

- Due to data limitations, it assumes that all subscribers joined the network in 2002 and does not account for the increased willingness to pay that would have resulted from the higher ARPUs in early years.

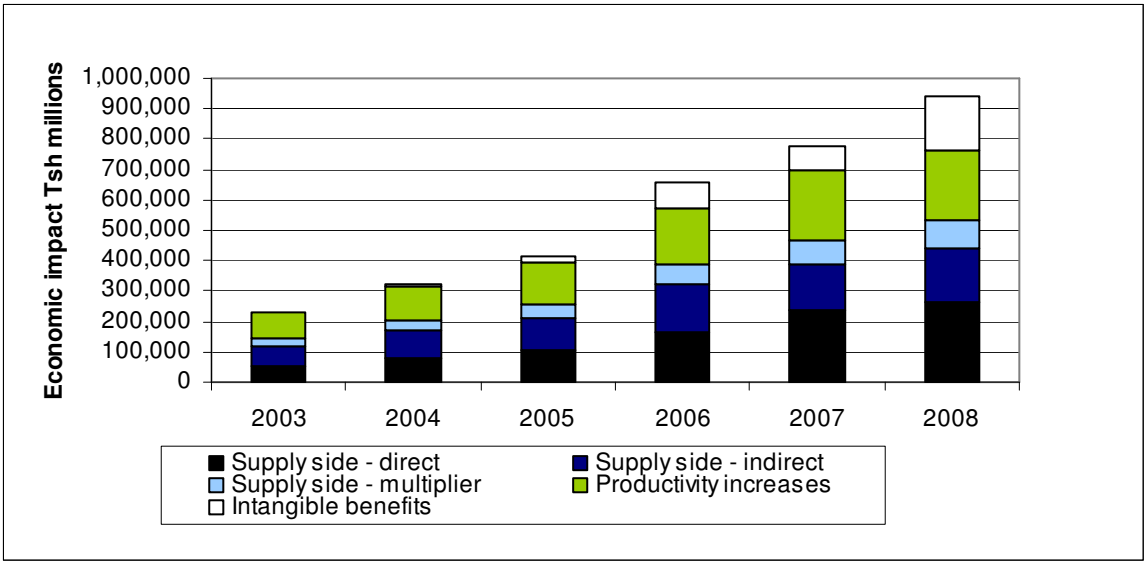
- The calculation assumes that the number of subscribers in each year is a function of price. However, subscriber levels during the period are highly influenced by the level of network coverage and therefore, had mobile coverage been greater, then it is likely more subscribers would have been signed up at higher ARPUs in the early years.

We have not been able to quantify the impact of these effects. However, we note that they imply our calculation may be an underestimation of the true value of mobile communications.

## 12.3.6 Total impact on economic welfare

The aggregation of the supply-side, demand side and intangible benefits provides an indication of the total economic impact of mobile communications in Tanzania. This is estimated to be Tsh 765,988m and Tsh 177,017m for intangibles in 2008. The biggest contributors are the direct supply side impacts and demand side productivity increases. There has been a substantial increase in the economic impact in 2008 inline with the increasing size of the market.

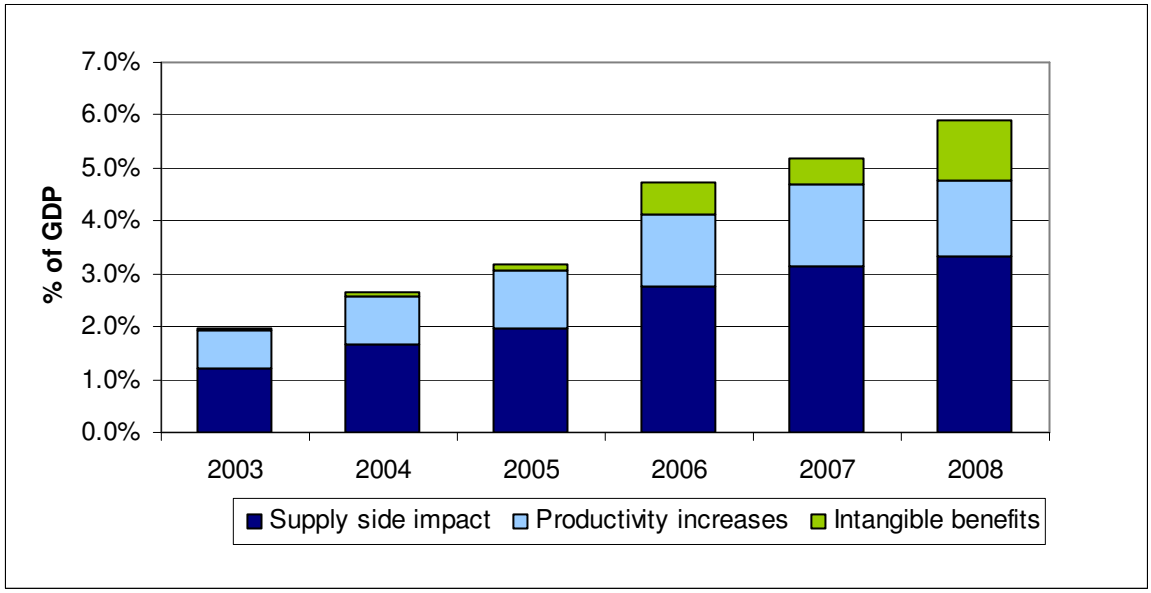
**Figure 92: Economic impact of mobile communications in Tanzania, Tsh millions**




*Source: Deloitte analysis*

The impact of mobile communications on GDP has been substantial. We estimate that the total economic impact of mobile communications was 2% of GDP in 2003 increasing to 4.8% of GDP in 2008. Accounting for intangible benefits enjoyed by consumers the impact rises to 5.9% in 2008. Further increases in mobile coverage can be expected to result in the contribution of the mobile sector continuing to grow further.

**Figure 93: Economic impact as a percentage of GDP**




*Source: Deloitte analysis*

## 12.4 Dynamic relationship between mobile communications and growth

As discussed in the methodology section, we have estimated econometrically the relationship between mobile communications and growth. We estimate that for each 10% increase in mobile penetration there is a 1.2% increase, in the long-run, of the economic growth rate. The

A wide range of academic studies have demonstrated that a relationship exists between telecommunications penetration (originally fixed line, and more recently mobile) and economic growth. We have sought to estimate the dynamic relationship between mobile communications and GDP[140]. That is, the longer term impact that investment in mobile communications may have on general economic welfare and GDP growth rates in particular.

We undertook a regression based on cross section data for developing countries[141] analogous to Waverman, Meschi and Fuss (2005) [142]. The regression was estimated for almost 60 developing countries in the African continent, the Asia Pacific region and Latin America.

For this sample, we found that a 10% increase in penetration could increase the GDP growth rate by 1.2% in the long-run[143]. This effect is larger than that found by Waverman, Meschi and Fuss (2005). This result may be the result of the sample including only countries from the poorest regions in the world, where the effect of mobile penetration will be the strongest[144].

Overall our results suggest that the 7.1% increase in penetration rates between 2007 and 2008 may have contributed 0.9% to the Tanzanian GDP growth rate.

## 12.5 Conclusion and policy implications

The Tanzanian mobile sector creates a substantial and increasing proportion of the country's economic value. It is now responsible for approximately 4.8% of GDP and providing intangible benefits equivalent to 1.1%. The research provided above has demonstrated the various routes

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[140] Studies include those by: United Nations Economic Commission for Europe. 1987. *The Telecommunications Industry*; ITU. 1980 *Growth and Structural Change*; World Bank. 1983. *Information, Telecommunications and Development*. More recently, Waverman, Meschi and Fuss (2005) and Sridhar and Sridhar (2004) have looked specifically at the mobile industry.

[141] We attempted to use time series data for each country to estimate the country specific impact of mobile penetration on GDP growth. However, GDP data is only available on an annual basis and the relative immaturity of the mobile market implied insufficient data points to undertake this analysis.

[142] Waverman L., Meschi M., Fuss M. 2005. *The Impact of Telecoms on Economic Growth in Developing Countries*. The Vodafone Policy Paper Series, Number 2

[143] The regression passes all standard econometric diagnostic tests. For ease of presentation, a significant constant term is omitted.

[144] See the methodology section for estimated coefficients and a broader discussion.

through which the mobile sector influences consumers behaviour and other economic agents and hence the economy as a whole.

Internationally, the Asian development economies in Hong-Kong, Singapore and Korea have placed telecommunications development at the core of their development strategies. If Tanzania is to follow a similar path the developing mobile communications sector needs to be encouraged to continue operating as an engine of growth. In particular, it may be counterproductive for government policy to limit this development through policies which may restrain consumer demand for mobile services.

# 13 Tanzania: Impact of reducing excise duties

In this section we present the results of our tax analysis for Tanzania. We calculate the impact of the reduction of excise taxes on mobile usage on:

- the mobile industry in terms of demand for mobile services, usage and handset sales; and
- government tax revenues.

## 13.1 Reducing mobile taxes to 3%

Using the model and assumptions outlined in the methodology section, we have analysed the impact of different reductions of excise duty applied on mobile usage from 10% to 3%. This scenario draws on the recent reduction in the equivalent tax rate in Rwanda to 3%. We then compare the changes that result against our base case forecast of no taxation change.

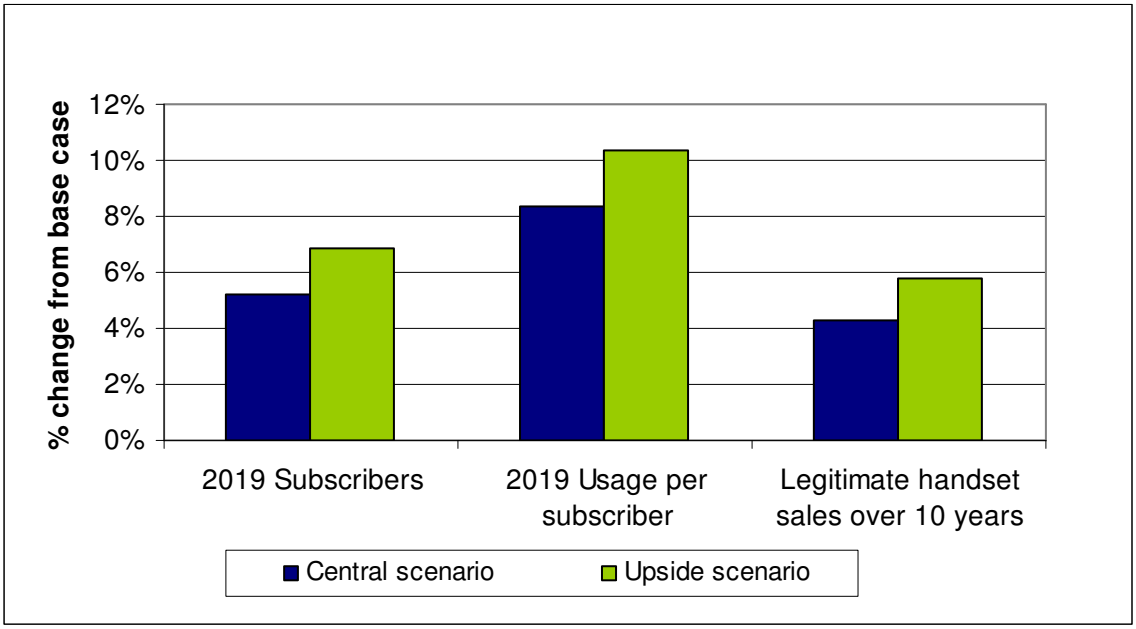
In order to look at this tax reduction, we have established a central and upside scenario. Our central scenario involved the elasticity of penetration of -0.4, of minutes of –0.87, a network effect of 0.3% and using a value-add multiplier of 1.2. Conversely, our upside scenario is based on a higher penetration elasticity at -0.6, usage elasticity of -1.12, network effect 0.35% and multiplier of 1.3[145].

### 13.1.1 Impact on demand for mobile services

The following graph illustrates the impact on mobile penetration, usage and handset sales over the 10 year period from 2009 with the tax reduction to 3%.

[145] Section 5.3.3 outlines the econometric approach deployed to estimate the elasticities used.

**Figure 94: Impact of a reduction in excise tax to 3% on usage on the mobile industry**




*Source: Deloitte analysis*

Our central scenario shows that penetration may be 5.2% higher in 2019 than the base case, representing mobile penetration of over 70%[146]. In our upside scenario, mobile penetration is estimated to be 6.9% higher in 2019. Penetration rises due to the lower overall cost of mobile ownership falling.

The impact on usage in the central scenario is 8.4%, representing nearly 26 extra minutes of use per user per year, or around 10 extra texts a year. The impact on usage in the upside scenario is 10.4%. The difference in usage increase between the central and upside scenario is due to the higher network effect assumed in the upside case.

## 13.1.2 Impact on Government tax revenues

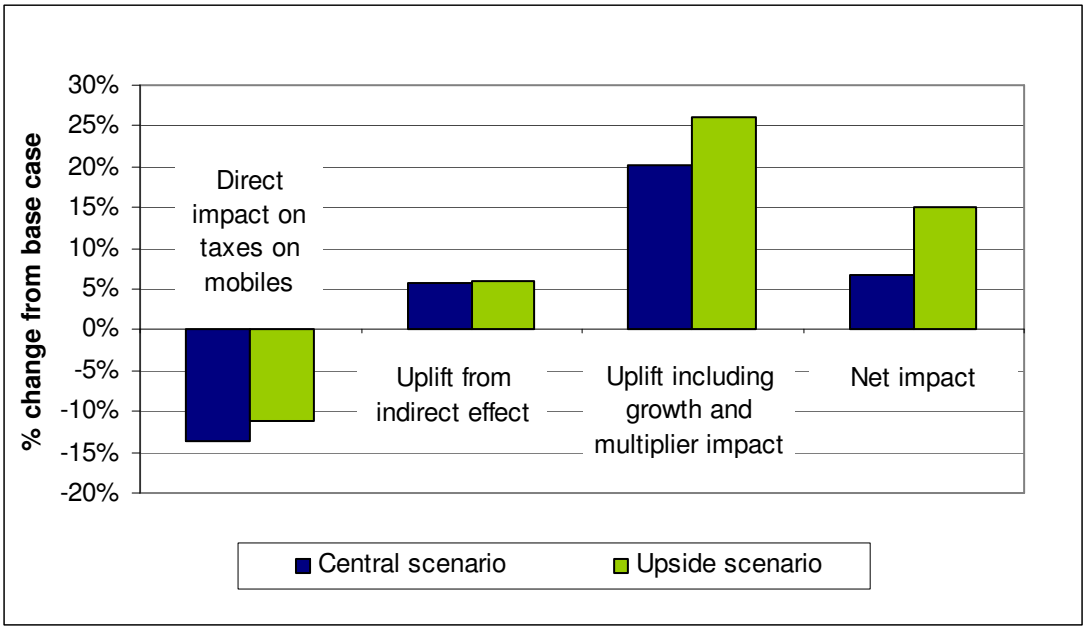
The following figure shows the impact, over the 10 years to 2019, on Government tax revenues split into:

- the initial fall in taxes on mobile services;
- the uplift from the indirect effect;
- the uplift once the growth and multiplier impacts are accounted for; and

[146] Population penetration will be lower as more people possess more than one SIM card. We correct for this throughout the model where subscriber is the relevant unit. However, for handsets replacement we remain with connections given as the market develops the handset replacement period will fall counteracting the increased double SIMs.

- finally, a net impact is shown.

**Figure 95: Impact on tax revenues of a reduction in excise tax to 3%**




*Source: Deloitte analysis*

The following discusses our results as compared to the base case forecasts.

- Direct impact on taxes on mobiles: overall, direct taxes on mobile services are expected to fall by 13.7% in the central scenario and 11.2% in the upside. This impact consists of the impact revenues from the excise tax itself. The reduction in the excise tax leads to a loss in government revenues due to a lower rate of 3% being applied compared to the current 10% tax. This is mitigated somewhat by the increased subscriber base and usage which imply higher volumes on which to apply VAT and the new reduced excise tax. VAT revenues increase by 10.4% in the central scenario and 13.5% in the upside scenario over the period. Revenues from excise taxes fall by 66.8% in the central scenario and slightly less in the upside, showing that following the 70% tax cut, the increased volumes create a compensating effect over the ten years.

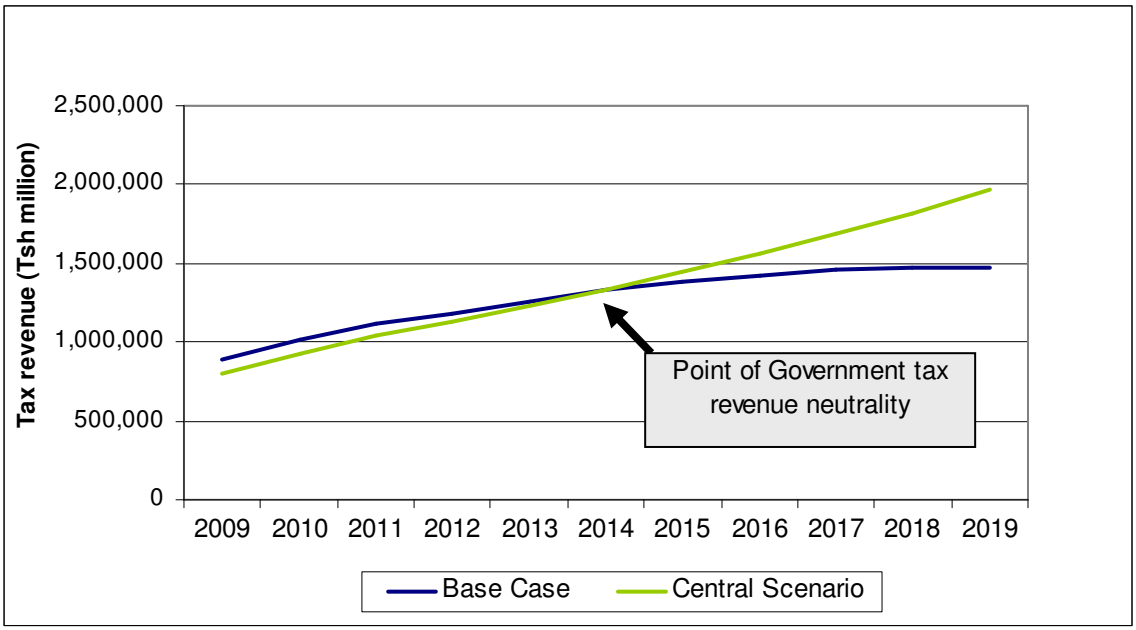
- Uplift from the indirect effect: this uplift is the result of the additional corporation tax and regulatory fee revenues paid by the mobile operators, due to the fact that their revenues and profits will increase following the tax reduction. Company revenues increase by 10.4% in the central case and by 13.5% in the upside case, driving the change in these additional tax revenues.

- Uplift including growth and multiplier impact: the dynamic impact on GDP resulting from our estimated relationship between mobile penetration and GDP growth. Combined with our estimate of the additional tax revenues from the multiplier effect; the total uplift in tax revenues is increased to over 20.3% in the central scenario and 26.2% in the upside. The

higher impact in the upside scenario is a result of the use of a multiplier of 1.3 in this scenario.

- Net impact: combining the effects on tax revenues, the net result is positive in both scenarios at 6.6% in the central scenario, and 15.0% in the upside scenario. A neutral position is reached six years after the tax reduction in the central scenario. In the upside neutrality is reached more quickly, after five years. Figure 96: Government revenue neutrality in the central scenario outlines the point in which neutrality is achieved i.e. where tax revenues in the central scenario are equal to those in the base case of no tax change.

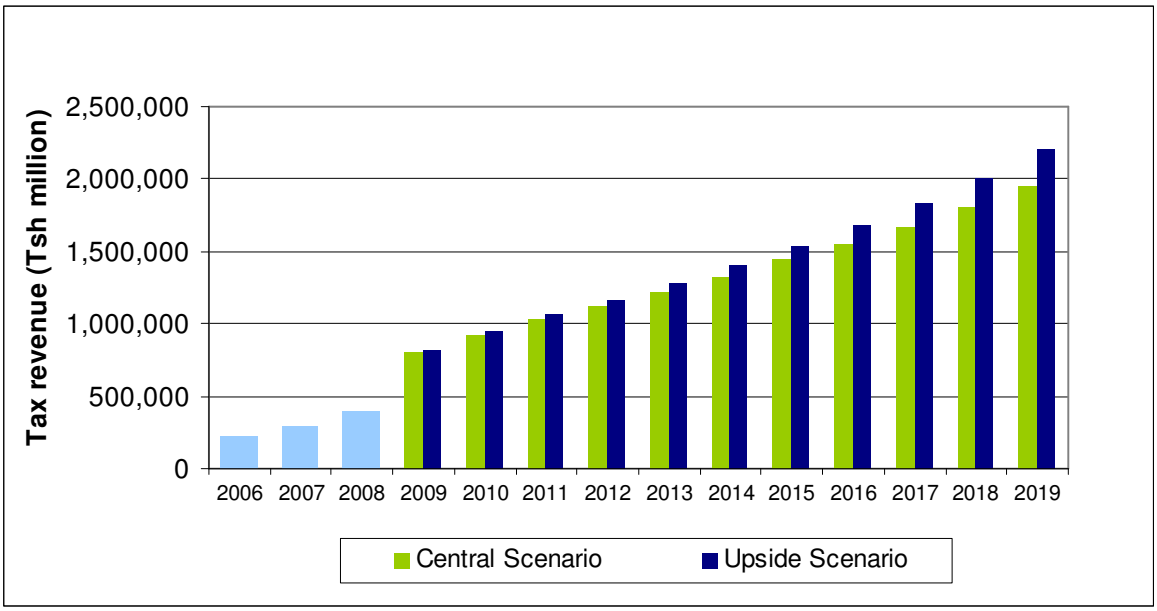
**Figure 96: Government revenue neutrality in the central scenario**




*Source: Deloitte analysis*

The time path of projected tax revenues given the reduction in usage tax is outlined in Figure 97. It is clear from our modelling that reducing the SIM activation tax will not lead to a decrease in government tax revenues compared to those received by the government in 2008. Further despite the cut government tax revenues from mobile telephony will continue to grow.

**Figure 97: Impact of reduction of excise tax on usage to 3% on Government tax revenue**




*Source: Deloitte analysis. Historic data corresponds to actual taxes reported to paid by mobile network operators and wider taxes resulting as captured by a multiplier. Post 2008 taxes as estimated by our model but exclusive of GDP growth effect for comparability to historic data.*

## 13.1.3 Alternative tax changes

In addition to assuming a once and for all reduction in usage tax to 3% we have also considered three further scenarios for the time path of taxes. These scenarios range from full abolition to a gradual abatement of current rates. The time path of taxation rates over these scenarios is described in Figure 124.

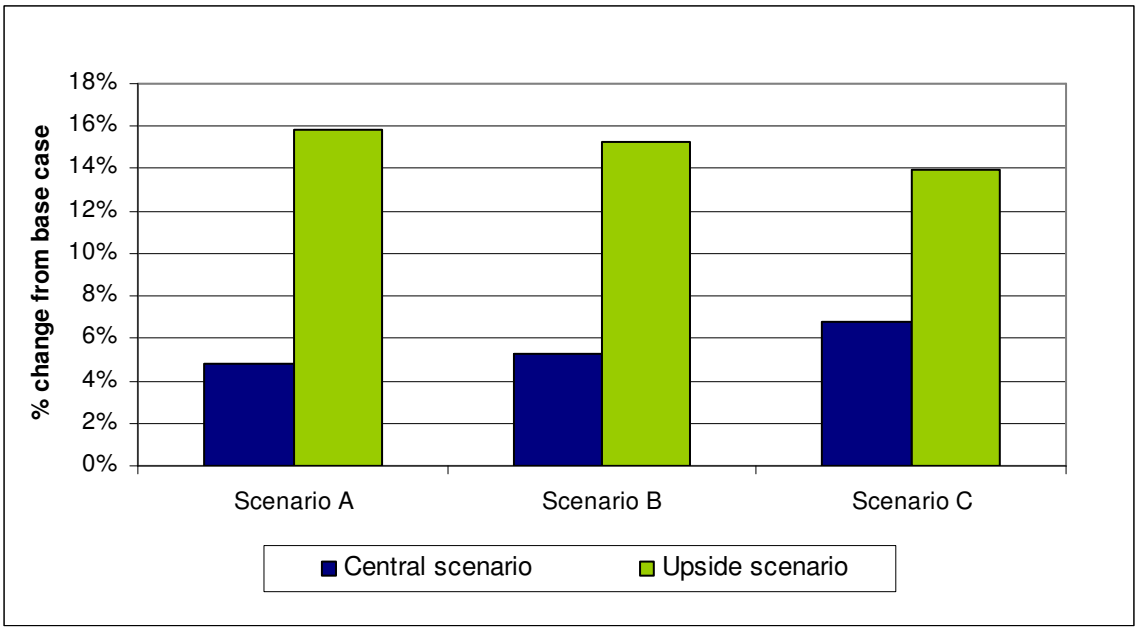
**Figure 98: Further tax rate scenarios (figures correspond to absolute size of excise duty)**

| Year | Scenario A | Scenario B | Scenario C |
|---|---|---|---|
| 2009 | 0% | 3% | 7% |
| 2010 | 0% | 3% | 7% |
| 2011 | 0% | 3% | 7% |
| 2012 | 0% | 3% | 7% |
| 2013 | 0% | 3% | 3% |
| 2014 | 0% | 0% | 3% |
| 2015 | 0% | 0% | 3% |
| 2016 | 0% | 0% | 3% |
| 2017 | 0% | 0% | 3% |
| 2018 | 0% | 0% | 3% |
| 2019 | 0% | 0% | 3% |

*Source: Deloitte*

Across these scenarios the net impact remains positive although the time frame for neutrality to be achieved does vary. Significantly revenue neutrality occurs in the same year for a full abolition of excise duty as the reduction to 3%. This result only requires our central inputs and assumptions.

**Figure 99: Net impact government revenues of reducing excise tax**




*Source: Deloitte analysis*

The net effect on government revenues in scenario A is 4.8% and 15.6% in the central and upside case respectively. The respective figures for scenario B are 5.3%, 15.3% and for scenario C 6.8%, 13.9%.

## 13.2 Conclusions

Tanzania currently levies excise duty on mobile usage at a rate of 10%. However, our analysis has shown that reducing the excise tax is revenue positive across a range of scenarios and that government revenues will continue to grow year-on-year despite a tax cut. Though tax revenues are lost in the short term, these are compensated for by the increased tax revenues resulting from the growth in the industry, related industries and the economy as a whole. We believe that our central scenario has used cautious estimates of both the elasticities of demand and the economic multiplier effects, and hence there could be more of a positive net impact as identified in the upside scenario.

Of particular pertinence we found that if Tanzanian tax authorities followed Rwanda, and reduced usage taxes to 3%, tax revenues could increase by 6.6% over ten years with revenue neutrality achieved in six. This was found to be prevalent even given conditions prevailing in our central by scenario, with revenues in the upside projected to rise 15.0%.

# 14 Uganda: Executive Summary

The mobile communications sector has brought significant social and economic benefits to Uganda. The five primary mobile operators have invested heavily, with population coverage at 97%[147]. It is estimated that by year end 2008 there will be over 8 million mobile subscribers, equating to a penetration rate of 24%[148]. The number of mobile connections outnumbers fixed lines by around 30 to 1[149]. Mobile networks are increasingly connecting rural areas, revolutionising the way in which business is conducted and allowing social contact to be maintained much more easily. The cost of owning and using a mobile phone continues to fall. MTN has reduced international rates and Zain's One Network is delivering value to its customers through its lack of roaming charges within East Africa.

The mobile communications industry contributed a total of USh 1,223bn to the economy in 2008, representing approximately 5.2% of total GDP. In addition consumers are benefiting from a range of service offerings gleaning intangible benefits equivalent to USh 175bn or 0.8% of GDP. Some 109,000 Ugandans are employed by the mobile and related industries. Despite this contribution, mobile consumers are subject to a sector specific tax of 12% on mobile usage. A reduction in this tax to 3%, in line with Rwanda, could be tax positive, leading to a cumulative incremental increase in tax revenues by 2019[150] of 4.6% (with revenue neutrality achieved after five years) along with an incremental increase in mobile subscribers of 6%.

The Asian economies have placed telecommunications at the core of their economic development strategies. If Uganda is to follow a similar path the developing mobile communications sector needs to be encouraged to continue operating as an engine of growth. In particular, it may be counterproductive for government policy to limit this development through policies which may restrain consumer demand for mobile services. The 12% excise duty (the highest of the East African excise taxes) is regressive, hitting poorer consumers the hardest as their spending on mobile services is likely to represent a higher proportion of their income.

## 14.1 Establishing the economic benefit of mobile communications in Uganda

The mobile communications industry's economic contribution has increased significantly since 2003. Moreover, value generated from the supply side and productivity impact has risen from USH 18,662m in 2003 to USh 89,435m, a 300% increase. This rise has been particularly marked in 2007 and 2008 with the rollout of network by both Warid and Hits. Our analysis suggests that a 10% increase in mobile penetration can increase the growth rate of Uganda's GDP by 1.2% in the long-run. Increasing mobile penetration should therefore be a cornerstone of the government's economic and fiscal policy.

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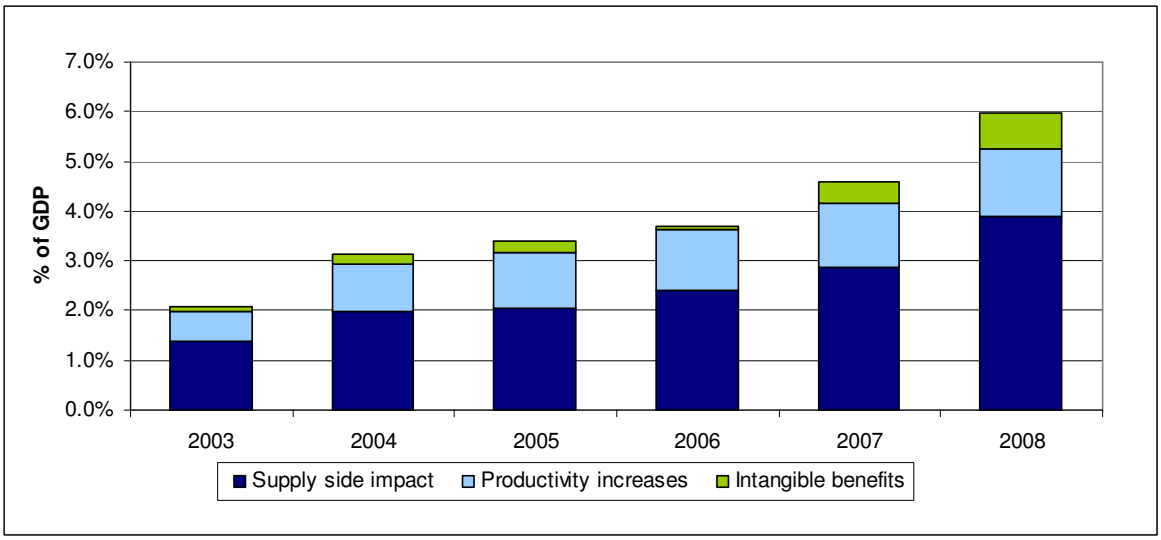
[147] Provided by GSMA 2008.

[148] This does not correct for the prevalence of multiple SIMs per subscriber.

[149] Based on fixed line data from the ITU and mobile connections for Wireless Intelligence.

[150] This is the central scenario. In the upside taxes are estimated to be 13% higher over ten years with tax revenue neutrality achieved after two years.

**Figure 100: Economic impact of mobile communications industry as a percentage of GDP**

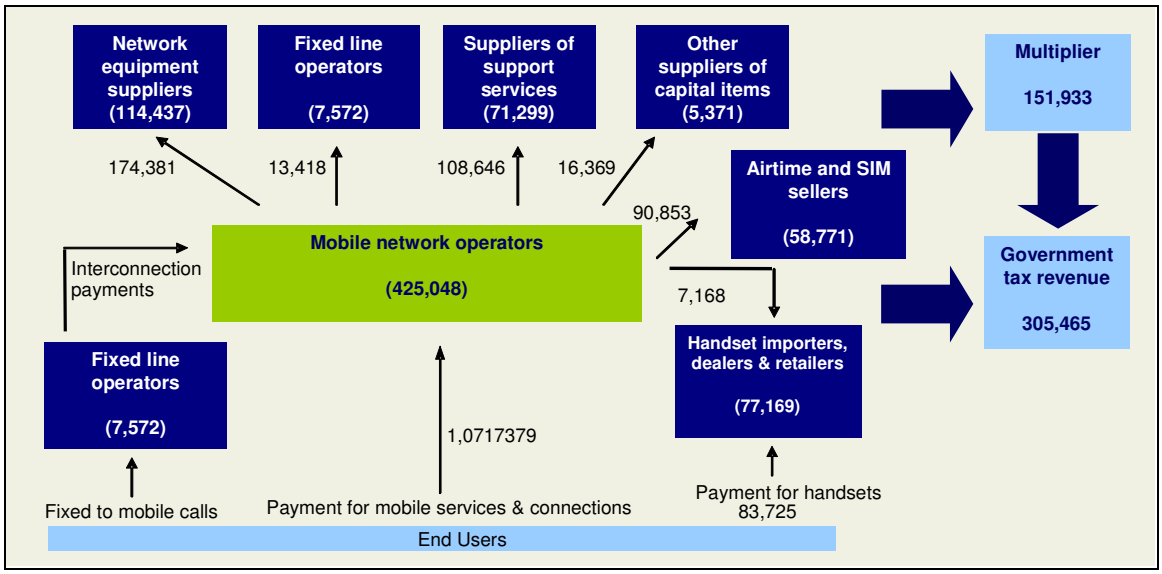



*Source: Deloitte Analysis*

## 14.1.1 Supply side impact of mobile communications

The supply side impact of mobile communications is derived from direct, indirect and multiplier [151] impacts. The revenue flows and value add for 2008 are presented below.

**Figure 101: Mobile value chain in Uganda in 2008, USh millions**




*Source: Deloitte analysis based on information provided by MTN, Zain, Warid, interviews, analysis of company accounts and industry reports. Figures grossed up to capture estimated impact of UTE and Hits.*

[151] Representing the positive impact on the economy from the value add created by the mobile industry.

### 14.1.2 Increases in productivity

The following productivity impacts of mobile communications were identified during interviews.

- Substantially reducing travel times and costs: particularly in rural areas where previously traders would have needed to travel to the urban areas to check for demand and agree prices.
- Creating market efficiency: particularly in the agriculture sector, workers are now quickly notified about changes in demand / prices so that they can amend their growing / harvest plans accordingly. Previously workers travelled to the nearest major city or relied upon slower postal communications.
- Encouraging entrepreneurialism: mobile has encouraged the growth of small business and has increased its efficiency. For example, there are few formally established taxi firms in Uganda and instead taxi drivers print business cards with their mobile number. Several drivers are able to share a taxi, using mobile phones to agree arrangements.
- Mobile banking: customers receive a text message once their salaries have been received by the bank, this has noticeably reduces queues in bank branches.
- Improving safety: mobile networks are being used to support the emergency services. For example the Lake Victoria project has enabled emergency communications on the lake.
- Innovation and learning: the launch of GPRS has enabled workers, and in particular farmers, to use the internet to learn about new production techniques.

Taken together we estimate that workers using mobile phones experienced productivity increases equivalent to Tsh 311bn in 2008.

### 14.1.3 Intangible benefits

During interviews, we identified several intangible benefits of mobile communications in Uganda:

- promotion of social cohesion;
- extension of communications to users with low education and literacy and on low incomes;
- transferring wealth to poorer regions;
- assisting in disaster relief; and
- increased electricity rollout.

Using a 'willingness-to-pay' methodology to proxy for these, we estimate consumers enjoyed the equivalent of Tsh 175,902m in intangible benefits in 2008.

### 14.1.4 Impact on employment

Mobile services contribute to employment via several avenues:

- direct employment of the industry and related industries;

- support employment created by outsourced work and taxes that the government subsequently spends on employment generating activities; and

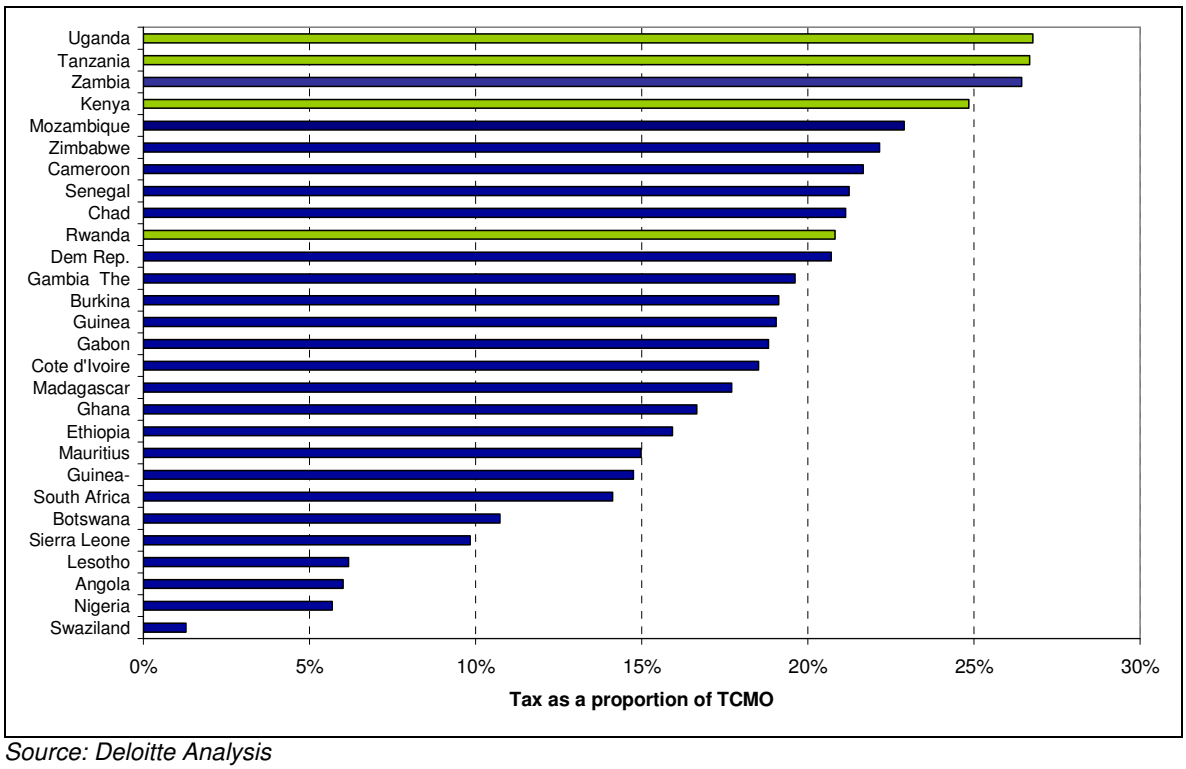
- induced employment resulting from the above employees and beneficiaries spending their earnings, and creating more employment.

The first effect is obtained directly from mobile operators. The support and induced employment is estimated using a multiplier of 1.2. Combing these employment generated in relation to mobile communications in 2008 is estimated to be over 144,000 full time equivalents.

## 14.2 Impact of reducing the excise taxes on usage

Despite the positive economic impact that mobile communications creates for the Ugandan economy, mobile consumers are subject to some of the highest taxes in Africa. The following figure illustrates the tax burden on mobile services in Uganda as a percentage of the total cost of mobile ownership (TCMO).

**Figure 102: Tax as percentage of total cost of mobile ownership across Africa**



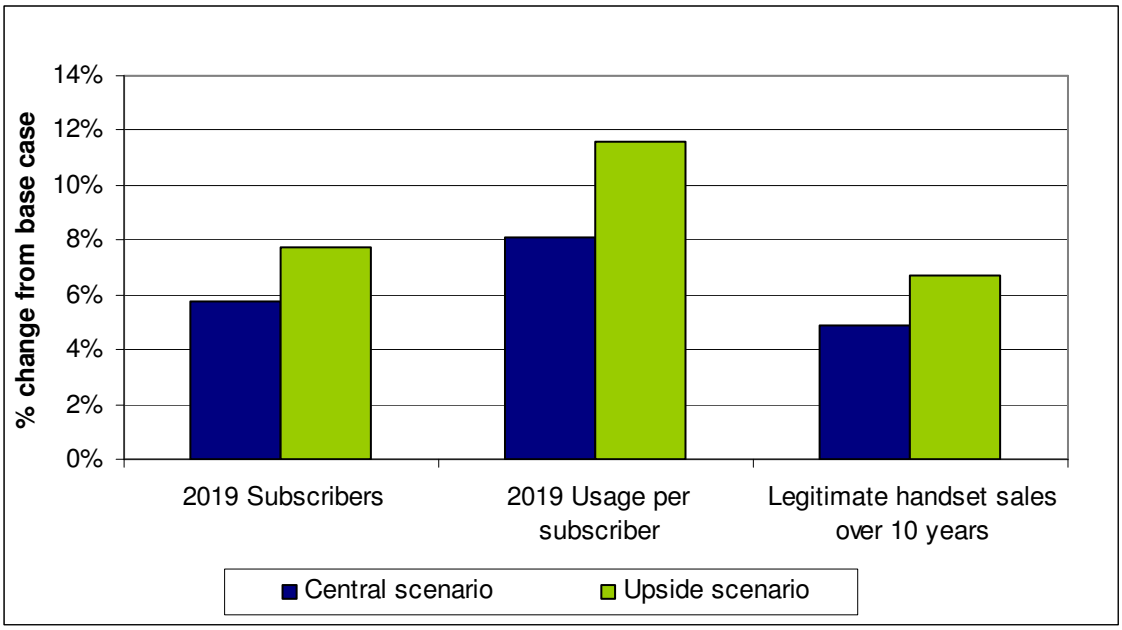

*Source: Deloitte Analysis*

From this analysis it is clear that taxes are the highest in Uganda compared to other Africa countries 2. Part of reason why taxes are so high is an excise duty levied on mobile usage at the rate of 12%.

In considering the impact of reducing the excise duty in Uganda we modelled a cut in the duty to 3%, the rate currently applied in Rwanda. We then compare the changes that result against our base case forecast which projects the development of the mobile industry to 2019 without any

changes to the tax structure. The following figure illustrates the impact on mobile penetration, usage and handset sales over the 10 year period from 2009.

**Figure 103: Impact of reduction in excise tax on usage on the mobile industry**




*Source: Deloitte analysis*

Our central scenario shows that total subscribers may be 5% higher in 2019 compared to the base case at 5.8 million, representing mobile penetration of 13.2%. In our upside scenario, total subscribers could be over 6% higher in 2019. The impact on usage is significant at 7.4% in the central scenario and 7.8% in the upside scenario given the elasticity of usage with respect to price of -1.05.

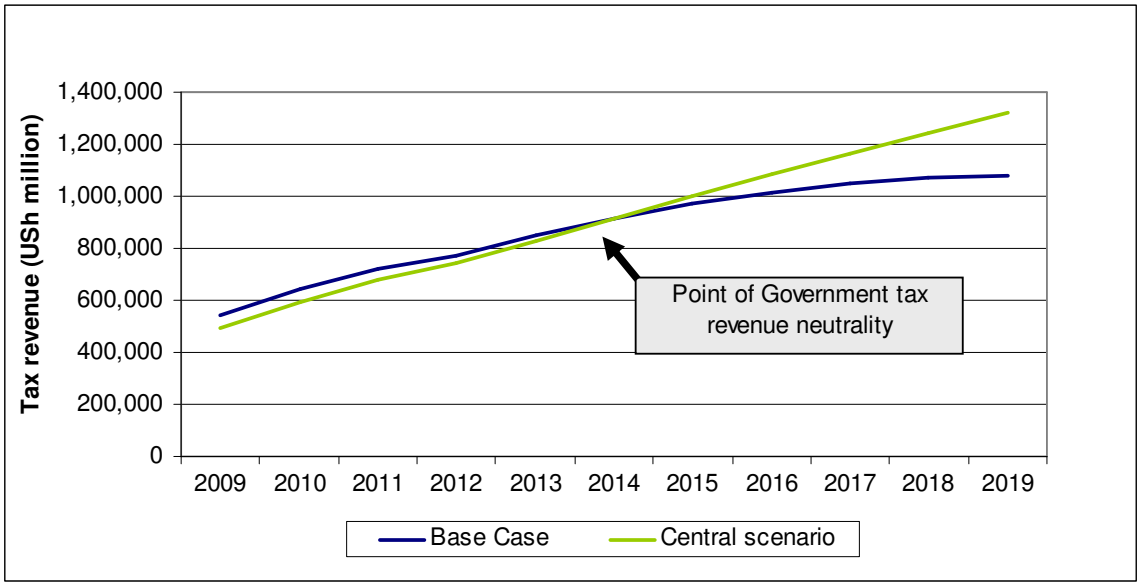
## 14.2.1 Impact on Government tax revenues

The impact on government tax revenue is split into:

- the initial fall in taxes on mobile services;
- the uplift from the indirect effect (increased corporate tax and regulatory fees);
- the uplift once the growth and national economic multiplier impacts are accounted for; and
- the net impact.

Our quantification of these impacts is based on a reduction of excise taxes to 3% which is compared to the tax revenues obtained in the base scenario with constant tax rates.

**Figure 104: Impact of reduction in excise tax on usage on Government tax revenues, 2009-2019**

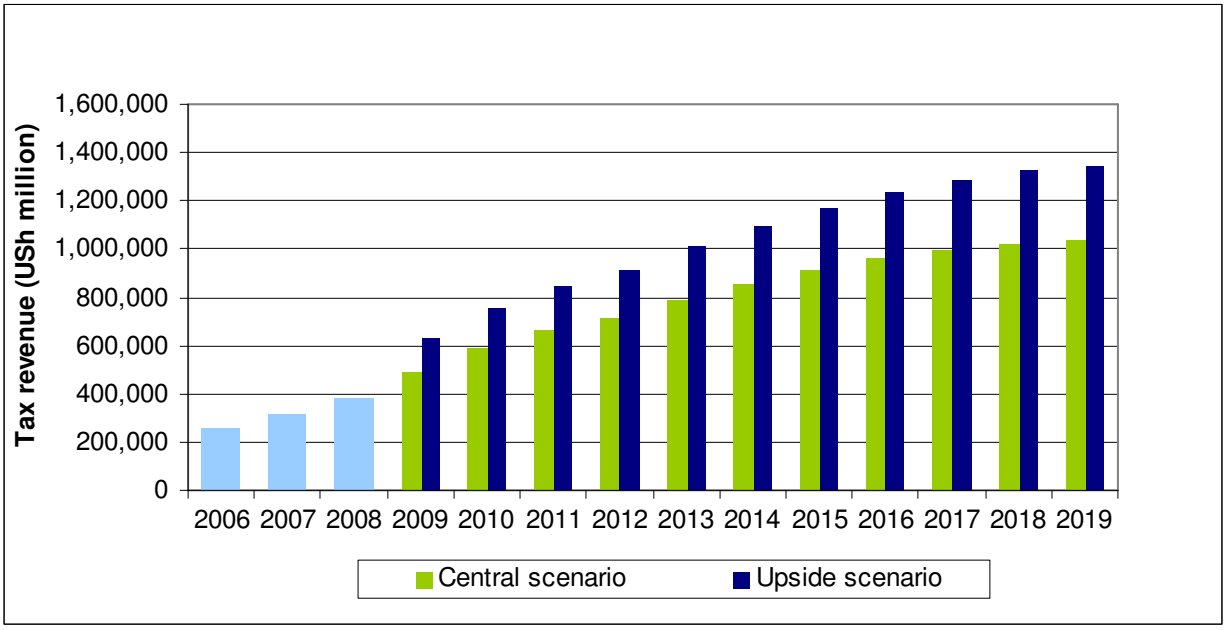



*Source: Deloitte analysis*

Our analysis suggests that these tax changes may be tax positive with neutrality being achieved five years after the tax reduction. Moreover tax is projected to rise by 4.6% over the ten year time frame. This positive impact is enhanced further in our upside scenario with neutrality achieved after two years and tax revenues projected to rise by 13.1%.

Interestingly if we look at tax revenues derived once the reduction is implemented and compare these in a historically context, the reduction in SIM activation tax does not lead to a decrease in government tax revenues. This is illustrated in Figure 105.

**Figure 105: Impact of reduction of excise tax on usage to 3% on Government tax revenue**




*Source: Deloitte analysis. Historic data corresponds to actual taxes reported to paid by mobile network operators and wider taxes resulting as captured by a multiplier. Post 2008 taxes as estimated by our model but exclusive of GDP growth effect for comparability to historic data.*

# 15 Uganda: Economic impact of the mobile industry

The mobile communications industry contributed a total of USh 1,223bn to the economy in 2008, representing approximately 5.2% of total GDP. In addition consumers are benefiting from a range of service offerings gleaning intangible benefits equivalent to USH 175bn or 0.8% of GDP. The economic and intangible benefits of mobile telephony have increased substantially. This is particularly marked given the rollout of two operators in 2008.

Academic research suggests that over the longer term mobile communications have a significant impact on economic growth. It has been suggested that this effect is particularly strong in developing countries. Our research is consistent to this and we estimate that mobile communications has raised GDP growth rates in Uganda by 12% in the long-run for each 10% increase in penetration. As such, the 8.4% increase in penetration rates between 2007 and 2008 may contribute around 1% to the Ugandan GDP growth rate.

## 15.1 Overview of mobile communications in Uganda

Mobile communications has a visible impact on the social and economic structures in Uganda. Historically MTN, Zain[152] and UTL have undertaken significant investment in a network which now covers an estimated 97% of the population[153], with mobile connections outnumbering fixed lines by around 30 to 1[154]. It is estimated that by year end 2008 there will be over 8 million mobile subscribers, equating to a penetration rate of 24%[155]. Much investment has been undertaken in rural areas, allowing people to better stay in contact with their families and revolutionising the way in which business is conducted. Investment in 2007 and 2008 has been focussed with entrants Hits and Warid rolling out their networks.

The regulator has undertaken a number of new initiatives since Deloitte (2007). Whilst many of these have been welcomed by the mobile operators, there are a number which have created concerns and which may have negatively impacted on network roll-out rates. For example, a new spectrum pricing approach was implemented. Whilst economic theory suggests that the price paid for spectrum should reflect its scarcity, the large price increases have negatively impacted operator plans. The regulatory authority is currently investigating cost based interconnection rates. Should a benchmarking approach be undertaken, the operators believe it is essential that Ugandan specific factors, for example the increased costs of being a land-locked country, are fully accounted for. It was also noted by the mobile operators that the regulator is currently trying to take-on the role as competition authority but, in their view, a separate competition authority should be established. This would lead to a faster investigation time which would create greater certainty and allow faster decisions to be taken on network investment.

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[152] MTC was rebranded Zain in 2008.

[153] Data supplied by GSMA.

[154] Based on fixed line data from the ITU and mobile connections for Wireless Intelligence.

[155] This does not correct for the prevalence of multiple SIMs per subscriber.

## 15.2 Operator participation in the economic impact study

MTN, Zain, UTL, Warid and Hits are the five principal mobile network operators operating in Uganda. Data has been drawn from data requests completed by MTN, Zain and Warid who represent around 75% of the subscriber market. In addition we have conducted interviews with Ericsson and Nokia Siemens. For 2008 we have estimated full year using half year results, operator forecasts and trends.

A number of our results have been updated since Deloitte (2007). This is due to revised operator data or the availability of better public or interview evidence. The impact of these changes is marginal.

## 15.3 Static Supply side impact of mobile communications

We have estimated the value add created by the mobile communications industry and leakages from the system, i.e. the percentage of any dollar spent will remain within the national economy to be spent in the next round and use this to isolate the impact on the Ugandan economy from the total international impact of the mobile communications industry.

### 15.3.1 Value chain impact

We initially analysed the value add of the mobile network operators in Uganda. We find that they directly contribute USh 226,721 in 2008. The breakdown by category is provided in the figure below.

**Figure 106: Value add of mobile network operators (excluding multiplier effect), USh millions**

| Value add | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|---|
| Employee wages and benefits | 18,228 | 23,240 | 27,781 | 35,139 | 65,056 | 116,203 |
| Taxes and regulatory fees | 70,243 | 112,888 | 151,748 | 196,951 | 234,419 | 305,465 |
| CSR | 462 | 492 | 278 | 319 | 801 | 3,374 |
| Dividends | 1 | 1 | 2 | 3 | 7 | 7 |
| **Total** | **107,161** | **159,861** | **207,591** | **267,551** | **365,338** | **541,252** |

*Source: Deloitte analysis based on information provided by MTN, Zain, Warid, interviews, analysis of company accounts and industry reports. Figures grossed up to capture estimated impact of UTE and Hits.*

Taxes and regulatory fees (including spectrum fees) make up the largest proportion in the above table, accounting for over 55% of the total in 2006. Increased tax revenues have been the direct result of an increasing subscriber base. The next largest contributor is employee wages and benefits.

Corporate social responsibility (CSR) programmes received over USh 3,374m in 2008, including sponsorship of events. One such CSR program is the Lake Victoria project described in Figure 107. Other initiatives are centred around health and education and include the donation of books and computers to schools, road safety campaigns and the development of sports centres.

Dividends were paid only by MTN during the four years considered, which is 97% foreign owned.

**Figure 107: Case study – The Lake Victoria Project**

Operators across East Africa are actively engaged in a number corporate and social responsibility programmes. One such project is the Lake Victoria project.

Lake Victoria is the second largest lake in the world and is shared by Kenya, Uganda and Tanzania. The lake is home to approximately 30 million people living on its' shores and provides employment, through fishing, for 3 to 4 million people.

Currently the lake is lacking communications and safety mechanisms which culminate in the annual loss of between 3,000 and 5,000 lives. The Lake Victoria Project aims to abate this by bringing mobile coverage and establishing a rescue coordination service to provide assistance to lake users. Given 50% of boat owners already possess mobile phones, the scheme may be effective in not only increasing safety but also further facilitating business whilst on the lake.

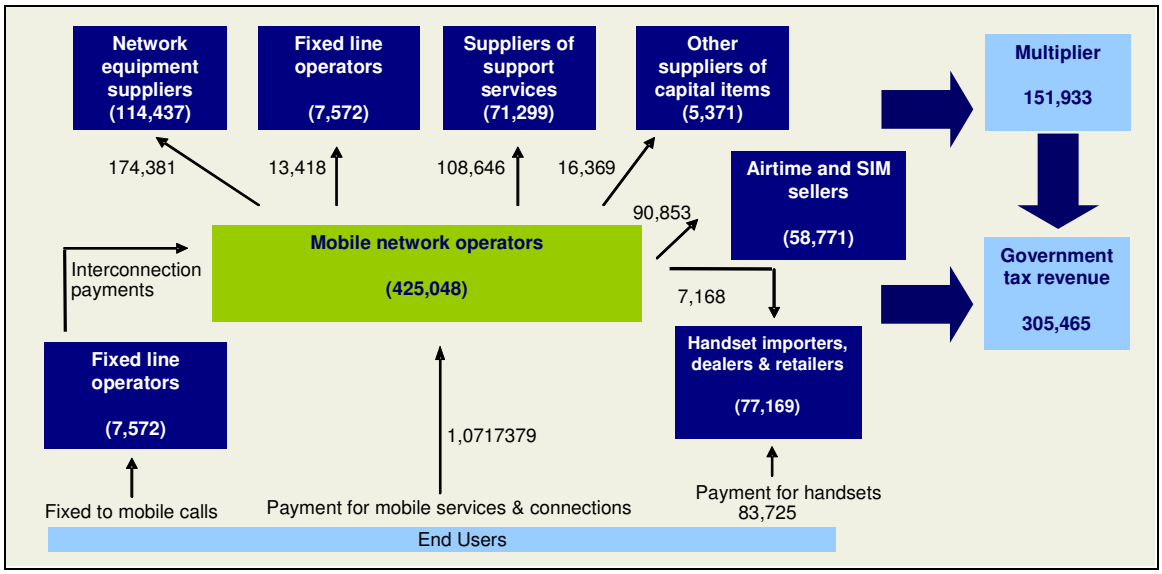
The program is being developed through a partnership between the GSMA Development Fund, Zain and Ericsson. It will require an addition 21 base stations to be built which will allow coverage to extend 20km into the lake. At this level over 90% of fishing activities will be covered.

We then analysed the revenue flows from the operators to others in the industry, and estimated the quantity translated into further value add[156]. The estimates of value add include the multiplier effect on the wider-economy which is assumed to be 20% of value-add[157].

[156] Details on value add margins, percentage of revenue translated into value add, are contained in the assumptions appendix.

[157] Figure 21 summarizes the rationale behind this assumption.

**Figure 108: Mobile value chain in Uganda in 2008, USh millions**




*Source: Deloitte analysis based on information provided by MTN, Zain, Warid, interviews, analysis of company accounts and industry reports. Figures grossed up to capture estimated impact of UTE and Hits.*

The figures next to the arrows represent the flow of money from one group to another. The figures inside the boxes represent the value retained by each group. The figures shown relate solely to domestic flows and domestic value add. The table below shows the calculation of value add.

**Figure 109: Calculation of value add from mobile communications in Uganda in 2008, USh millions**

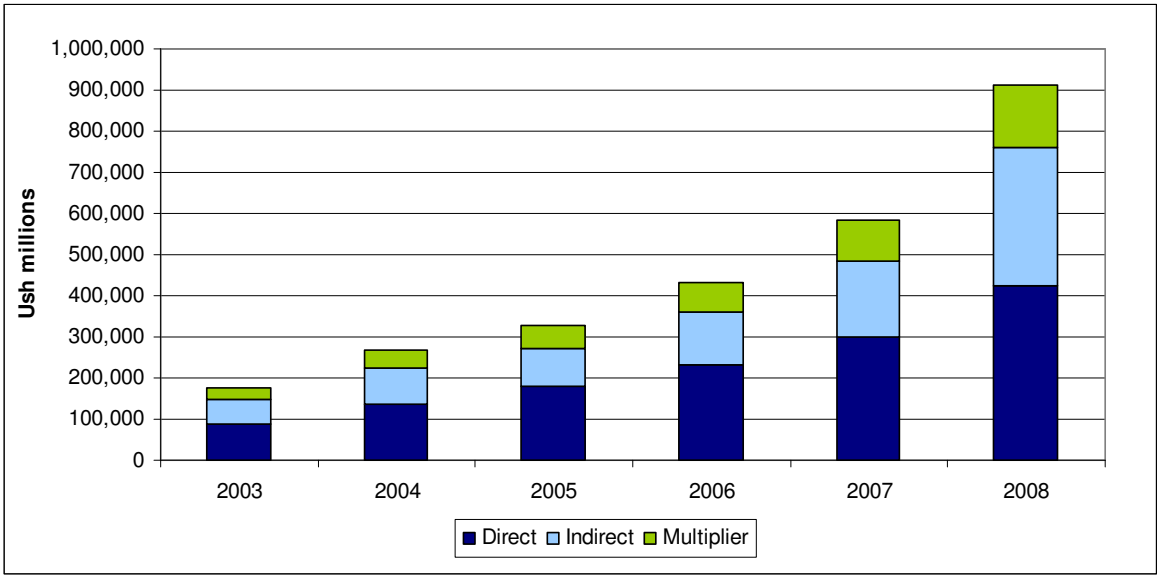
| Domestic value add | Total revenue | Domestic revenue | Domestic cost | Domestic value add | Value add with multiplier |
|---|---|---|---|---|---|
| Mobile network operators | 1,017,379 | 1,017,379 | 592,330 | 425,048 | 510,058 |
| Fixed telecommunications operators | 13,418 | 13,418 | 5,846 | 7,572 | 9,087 |
| Network equipment suppliers | 697,522 | 174,381 | 59,944 | 114,437 | 137,324 |
| Handset designers and dealers | 222,232 | 90,893 | 13,724 | 77,169 | 92,602 |
| Other suppliers of capital items | 40,922 | 16,369 | 10,998 | 5,371 | 6,445 |
| Suppliers of support services | 170,882 | 108,646 | 37,347 | 71,299 | 85,558 |
| Airtime commission, payphone commission | 90,853 | 90,853 | 32,081 | 58,771 | 70,526 |
| **Total** | **2,253,208** | **1,511,938** | **752,271** | **759,667** | **911,600** |

*Source: Deloitte analysis based on information provided by MTN, Zain, Warid, interviews, analysis of company accounts and industry reports. Figures grossed up to capture estimated impact of UTE and Hits.*

67% of the revenue flows from the mobile network operators are estimated to remain in Uganda. It is estimated that 25% of capital expenditure is domestic, this has increased from Deloitte (2007) as more sites are being erected utilising local subcontractors. Over 60% of support services are purchased from within Uganda, including legal services, marketing and advertising and outsourced network maintenance.

Using the same process as above, we estimated the value-add on an annual basis from 2003.

**Figure 110: Supply side value add from mobile communications 2003 to 2008**




*Source: Deloitte analysis*

Value add has increased by over 100% just from 2006 to 2008.

## 15.3.2 Contribution to Government revenue

Tax revenues to the Government are raised through taxes specific to mobile services, corporation tax, income tax, and regulatory fees (consisting of a USO fee of 1% of revenues and frequency fees).

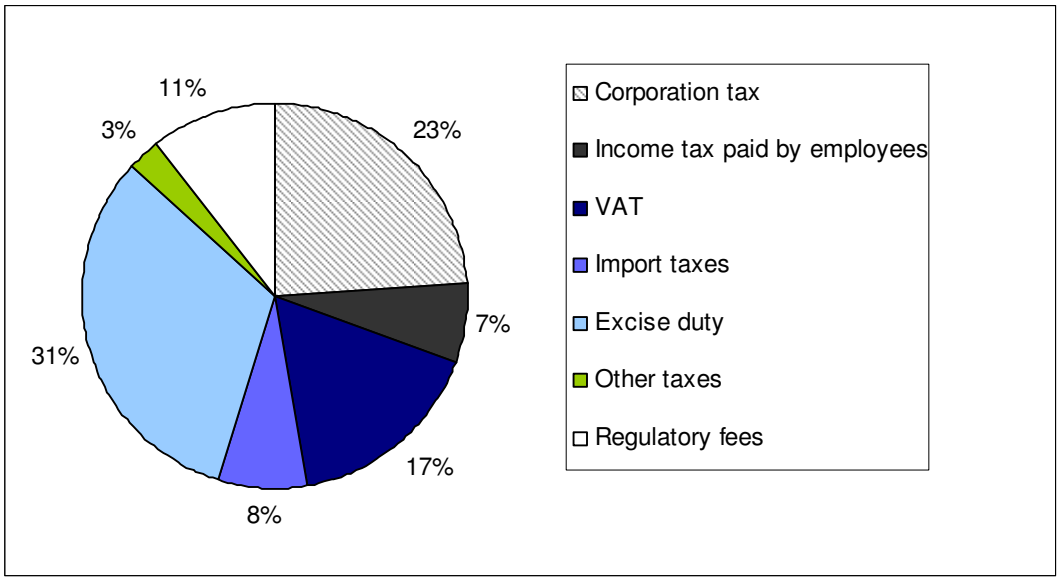
**Figure 111: Tax revenues in Uganda from mobile operators, USh millions**

| Taxes from mobile network operators | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|---|
| Corporation tax | 10,129 | 24,380 | 37,294 | 50,906 | 55,908 | 72,606 |
| Income tax paid by employees | 4,631 | 5,518 | 7,543 | 7,751 | 9,612 | 20,449 |
| Sales and mobile specific taxes | 50,965 | 77,884 | 99,187 | 130,290 | 154,670 | 179,788 |
| Licence, spectrum and USO fees | 4,519 | 5,107 | 7,724 | 8,004 | 14,229 | 32,622 |
| **Total taxes and fees** | **70,243** | **112,888** | **151,748** | **196,951** | **234,419** | **305,465** |

*Source: Deloitte analysis based on operator data*

The largest proportion of tax revenue is raised through mobile specific and sales taxes which accounted nearly 60% of tax paid in 2008. The breakdown for 2008 is illustrated in the following figure:

**Figure 112: Breakdown of 2008 tax revenues from mobile operators by source**




*Source: Deloitte analysis based on operator data*

Tax as a proportion of mobile network operator revenue averaged around 25% in 2008.

In addition to the direct tax revenue received from mobile operators, a plethora of taxes are received from other stakeholders in the value chain. We have considered import, sales, corporation and employee income taxes in our calculations below.

**Figure 113: Total tax revenues from the mobile value chain in 2008, USh millions**

| Tax Revenue | Tax revenue | Tax revenue with multiplier |
|---|---|---|
| Mobile network operators | 305,465 | 366,558 |
| Fixed telecommunications operators | 3,418 | 4,102 |
| Network equipment suppliers | 35,991 | 43,190 |
| Handset designers and dealers | 28,706 | 34,447 |
| Other suppliers of capital items | 1,689 | 2,027 |
| Suppliers of support services | 22,424 | 26,909 |
| Airtime commission, payphone commission | 10,491 | 12,590 |
| **Total** | **408,185** | **489,822** |

*Source: Deloitte analysis based on Deloitte tax data, analysis of company accounts and interviews. Note this represents tax revenues directly created by revenue flows from the mobile network operators and not total tax revenues from the sector.*

Other than the mobile network operators themselves, the largest payers of tax are the suppliers of support services. Although airtime sellers and payphone operators receive the largest revenues from the mobile network operators, they are assumed to mainly operate in the informal economy and thus are assumed not to pay tax. Our calculations assume only the largest airtime sellers that work through official dealerships pay tax and that, by and large, street-side airtime sellers do not. Interviews with operators, handset manufacturers and dealers revealed that many handsets are imported illegally from Dubai or are reconditioned / stolen. On this basis, we assume that just over 70% of handsets sold are subject to sales tax.

## 15.3.3 Impact on employment

Mobile services contribute to employment via several avenues:

- direct employment of the industry and related industries;
- support employment created by outsourced work and taxes that the government subsequently spends on employment generating activities; and
- induced employment resulting from the above employees and beneficiaries spending their earnings, and creating more employment.

The first effect is obtained directly from mobile operators. The support and induced employment is estimated using a multiplier of 1.2. For operators no multiplier was applied given that the majority of induced employment will be captured by the first round flows.

**Figure 114: Contribution to employment from the mobile value chain**

| Employment Impact | Number of employees | Number of employees including multiplier |
|---|---|---|
| Mobile network operators | 2,276 | 2,276 |
| Fixed telecommunications operators | 96 | 116 |
| Network equipment suppliers | 524 | 629 |
| Handset designers and dealers | 5,222 | 6,266 |
| Other suppliers of capital items | 121 | 145 |
| Suppliers of support services | 13,634 | 16,360 |
| Airtime commission, payphone commission | 98,614 | 118,337 |
| **Total** | **120,487** | **144,129** |

*Source: Operator data, interviews with suppliers and Deloitte analysis on average wage rates. Note this is employment directly created by revenue flows from the mobile network operators and does not represent total employment in the sector.*

The largest category of employment is airtime sellers and payphone operators. Based on interviews we have estimated employment in this area using operator estimates of the number of: dealers, stockists, pharmacies, supermarkets, kiosks, street sellers and payphones. We found substantial employment being generated by payphones and kiosks selling airtime.

Despite network equipment remaining a relatively small employer employment has increased over time inline with the recent rollout of network by Warid and Hits. Data for these estimates has been drawn from interviews with equipment suppliers.

The number of employees in other sectors is estimated as revenue received from the mobile network operators divided by the average wage in the particular sector. Average wages are estimated based on data from the Uganda bureau of statistics and a review of company accounts.

## 15.3.4 Increases in productivity

There are numerous ways in which mobile services can improve productivity, particularly in developing countries where mobile services have leap-frogged fixed line services and are the provider of universal service. The following important effects have been identified in the research[158].

- Improving information flows: mobile services allow certain occupations (such as commodities and agriculture, both prominent in developing countries) to cut out the middle-

[158] See, for example: Vodaphone. March 2005. *Africa: The Impact of Mobile Phones*. Vodafone Policy Paper Series, No.3.

man as traders can obtain information on prices, quality, quantities directly. This improves the incomes of producers, and helps reduce wastage.

- Reducing travel time and costs: similarly, mobile services allow workers to trade and share information without travelling. The Vodafone paper on Africa (2006) contains analysis on Tanzania and South Africa found that 67% of users in Tanzania said that mobiles greatly reduce travel time[159].
- Improving efficiency of mobile workers: mobile services improve the efficiency of all workers in the economy. This effect will particularly be felt by workers with unpredictable schedules, for example those involved in repair and maintenance, or collection and delivery. Mobiles will give them greater accessibility and better knowledge of demand.
- Improving job search: mobile services improve the chances of the unemployed finding employment through enabling people to call for opportunities rather than relying on word of mouth. Further to this, owning a mobile phone makes workers more employable as they are contactable while away.

During our interviews with government, regulator and operators, a number of specific areas where mobile productivity has been improved were noted.

- Substantially reducing travel times and costs: particularly in rural areas where previously traders would have needed to travel to the urban areas to check for demand and agree prices, this business is now conducted on the telephone. Traders are able to ensure demand exists for their products before setting out on a journey.
- Creating market efficiency: particularly in the agriculture sector, workers are now quickly notified about changes in demand or prices so that they can amend their growing and harvest plans accordingly.
- Encouraging entrepreneurialism: mobile has encouraged the growth of small business and has increased its efficiency. For example, there are few taxi firms in Uganda and instead taxi drivers print business cards with their mobile number. Several drivers are able to share a taxi, using mobile phones to agree arrangements.
- Mobile banking: Mobile banking services are being developed in Uganda whereby money (or airtime) can be transferred over a mobile phone. This reduces the need to meet in person to conduct business. Also, telephone banking is reducing the need for people to queue in banks to check their balances.

No established economic methodology exists to estimate the GDP and employment effects of such productivity improvements across the economy. We have not been able to obtain any reports or studies that particularly focus on Uganda and, in the time available to us, we have not been able to quantify the impact of these gains[160]. However, all those we questioned in government and at the regulator agreed that mobile communications had transformed the way in which business was conducted, with one individual stating that mobile has revolutionised the way people do business and that it must be cutting down costs.

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[159] Vodaphone. March 2005. *Africa: The Impact of Mobile Phones*. Vodafone Policy Paper Series, No.3.

[160] Quantification would require consumer and business surveys to be undertaken

Other surveys have typically quantified productivity improvements to be between 6% and 11%. For example, Mckinsey[161] quantified the impact to be 6% in China, whilst the impact in the UK has been estimated to be between 1% and 11%[162]. Of particular relevance to the Rwanda context, Zain recently commissioned a survey in Sudan trying to identify how average business revenue have increased with mobile usage[163]. Across the 800 people interviewed, average business revenue increases were found to be just below 11%.

Based on our interviews we have concluded that the productivity increase in Uganda would be at a similar level to those found in Sudan for a number of reasons.

- Interviewees have all reported on the dramatic impact that mobile telephony has had on the Ugandan economy. These reports have described changes that appear greater than those documented in other reports.
- The limited fixed line roll out implies the impact of mobile should be compared to a base-line of limited connectivity rather than higher fixed line penetration rates found in developed countries.
- Higher levels of informal activity imply greater need for co-ordination between individuals since there is less formal communication at the company level.

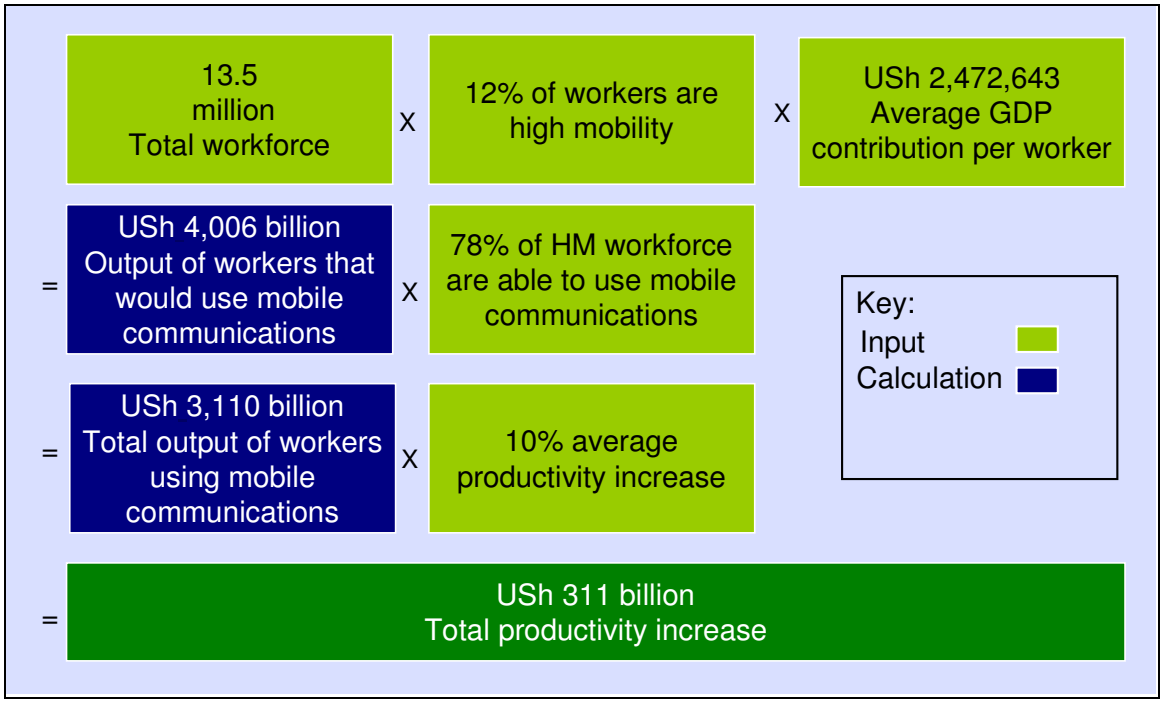
We therefore assume a productivity gain of 10% has been experienced by high mobility workers who own a mobile phone. Using the economic value concept that we set-out in the methodology section, we estimate the incremental impact on the economy in 2008 to be USh. This calculation is set out below, where we have not considered any impact on low mobility workers.

[161] Mckinsey & Co. Wireless Unbound. September 2006. *The surprising economic value and untapped potential of the mobile phone*.

[162] $O_2$. 2004. *The Changing Economic Impact of Mobile Telephones*.

[163] Referenced in: Deloitte. 2008. *Economic Impact of Mobile Communications in Sudan*.

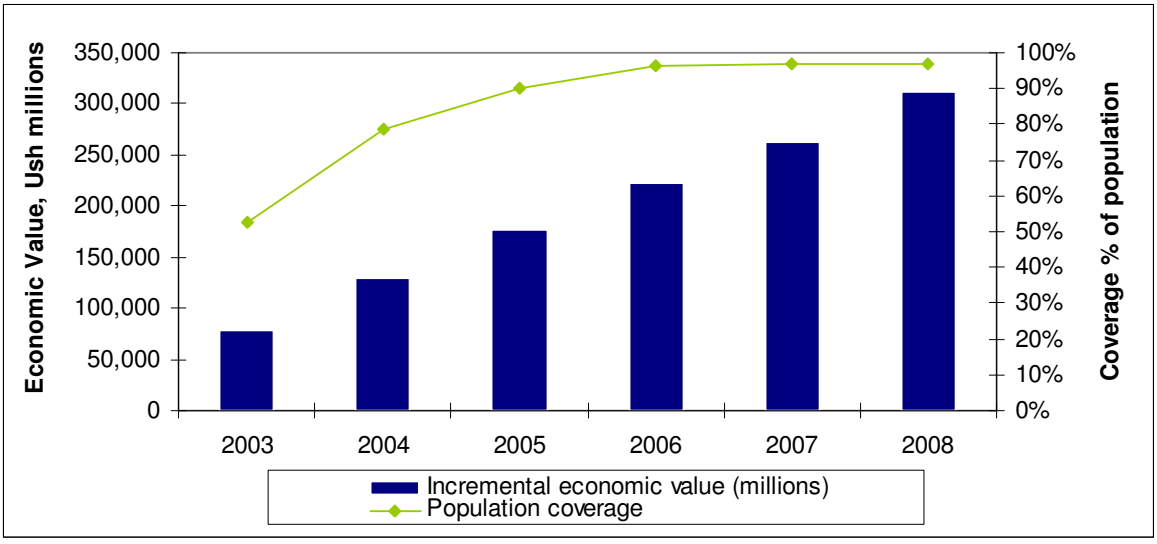
**Figure 115: Economic impact in 2008 of increased productivity amongst high mobility workers**




*Source: Deloitte analysis based on Deloitte assumptions, interviews and Uganda Bureau of Statistics*

Our calculations show large increases in productivity between 2003 and 2008. These are driven by the increase in population coverage which allows a greater proportion of high mobility workers to access mobile technology.

**Figure 116: Economic value from increases in productivity, 2003 to 2008**




*Source: Deloitte analysis. Population coverage calculated by GSMA*

### 15.3.5 Intangible impacts

During our interviews, we asked individuals for their views on the intangible benefits of mobile communications in Uganda. The views expressed were consistent with those voiced in the Vodafone report (March 2005) [164] relating to Tanzania. Benefits identified in Uganda are as follows.

- Promotion of social cohesion: through enabling contact when family members or friends who have moved away, and building trust through sharing of handsets (which has been found to be common in African countries). This effect is supported by the Vodafone Tanzania study which found a statistically robust relationship between mobile ownership and willingness to help others.
- Extension of communications to users with low education and literacy, particularly through the use of texts.
- Extension of communications to those on low incomes: whilst individuals with low income levels are often unable to afford a handset or even the lowest value prepaid cards, through the use of formal and informal payphones they are able to enjoy the benefits of mobile communications. Mobile networks are also being used to connect internet cafes in rural areas which is extending internet penetration.
- Transferring wealth to poorer regions: family members in urban areas use SIM cards to transfer money and phone credit to relatives in rural areas. Beeping or flashing by friends or relatives is also used to ask one mobile user to contact another.
- Stimulating local content: this can be particularly useful for allowing users to learn about local services such as healthcare or education. The number of users of local content has increased dramatically since our first report, driven by the growth in content providers as well as the higher number of mobile phone users and internet cafes.
- Assisting in disaster relief: mobile services allow families and friends to stay in touch in the event of a natural disaster, which can also ensure that they obtain more rapid relief.
- Increased electricity rollout: Mobile operators are investing in power infrastructure which is then transferred to the power companies on a Build Transfer Operator (BTO) basis, allowing electricity coverage to be extended into rural areas.

We have estimated value using the willingness to pay concept[165]. Historical average revenue per user (ARPU) shows us how much customers are willing to pay for mobile services. It is then assumed that the intangible benefits of owning a mobile are unchanged over time, and as such the value for this form of consumer surplus is defined as the difference between ARPU at the time of subscription, less ARPU today (which is likely to be less due to increased competition and other factors). However, in the case of Uganda, there has been a substantial drop in the average minutes of use of mobile subscribers, biasing this calculation. To correct for this impact we have chosen to calculate the change in ARPU by holding the number of minutes that a subscriber uses

[164] The specific article referenced is Goodman. 2005. *Linking mobile phone ownership and use to social capital in rural South Africa and Tanzania*.

[165] Used by McKinsey in: Mckinsey & Co. Wireless Unbound. September 2006. *The surprising economic value and untapped potential of the mobile phone*.

at the average level of usage on the date the subscriber joined the network. As such, the following equation provides the calculation methodology for the 2003 consumer surplus[166]:

2003 Consumer surplus = (2002 new minutes of use * 2002 average price per minute) – (2002 new minutes of use * 2003 price per minute)

Following the above, the calculation of the increase in consumer surplus in each year, for each set of new customers, is provided in the following figure.

**Figure 117: Calculation of consumer surplus, USh millions[167]**

| | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|---|---|
| 2002 new Subscribers | - | 11,458 | 25,919 | 28,591 | 12,206 | 54,104 | 77,678 |
| 2003 new Subscribers | - | - | 4,605 | 5,455 | 238 | 13,579 | 21,085 |
| 2004 new Subscribers | - | - | - | 640 | - | 6,755 | 12,405 |
| 2005 new Subscribers | - | - | - | - | - | 8,669 | 16,680 |
| 2006 new Subscribers | - | - | - | - | - | 6,931 | 10,830 |
| 2007 new Subscribers | - | - | - | - | - | - | 37,224 |
| 2008 new Subscribers | - | - | - | - | - | - | - |
| **Total** | **-** | **11,458** | **30,524** | **34,687** | **12,444** | **90,037** | **175,902** |

*Source: Deloitte calculation based on operator information*

The total increase in consumer surplus has been estimated as USh 175,902m in 2008. In 2006 consumer actually shrank due to an increase in the average price per minute above 2004 and 2005 prices.

For several reasons our calculation of consumer surplus is likely to be conservative.

- The calculation assumes that no subscribers joined the network before 2002 and does not account for the increased willingness to pay that would have resulted from the higher ARPUs in early years. The data available forces this assumption.
- The calculation assumes that the number of subscribers in each year is a function of price. However, subscriber levels during the period are highly influenced by the level of network

[166] This approach is valid with the usage patterns currently observed. In the future this approach however may fail to be less appropriate.

[167] The new subscribers figures do not reflect UTE subscribers. Therefore we uplift the calculated consumer surplus to reflect UTE subscriber numbers.

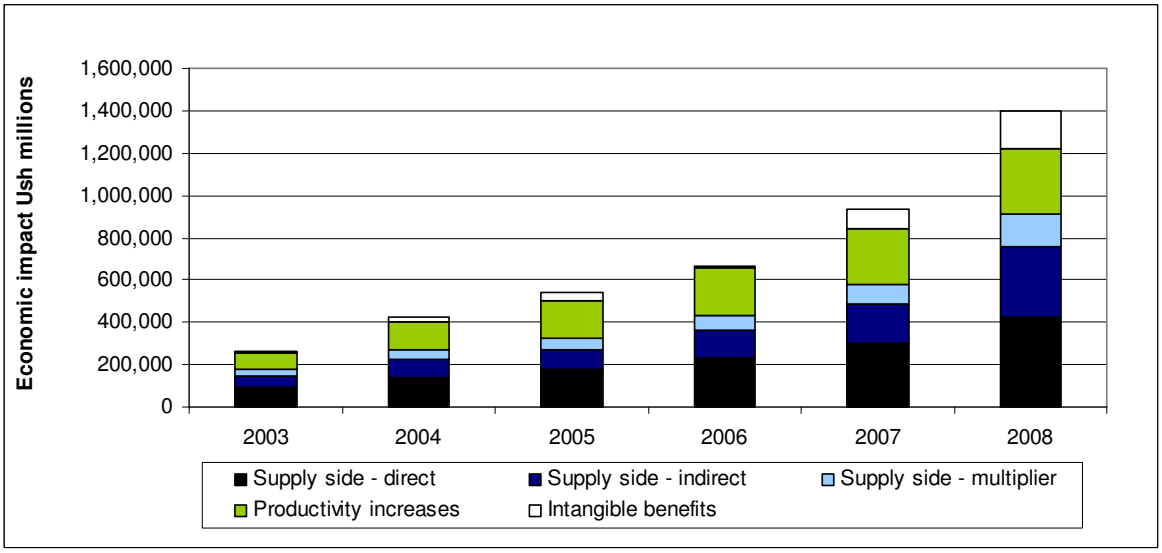
coverage and therefore, had mobile coverage been greater, then it is likely more subscribers would have been signed up at higher ARPUs in the early years.

We have not been able to quantify the impact of these effects. However, we note that they imply our calculation may be an underestimation of the true value of mobile communications.

## 15.3.6 Total impact on economic welfare

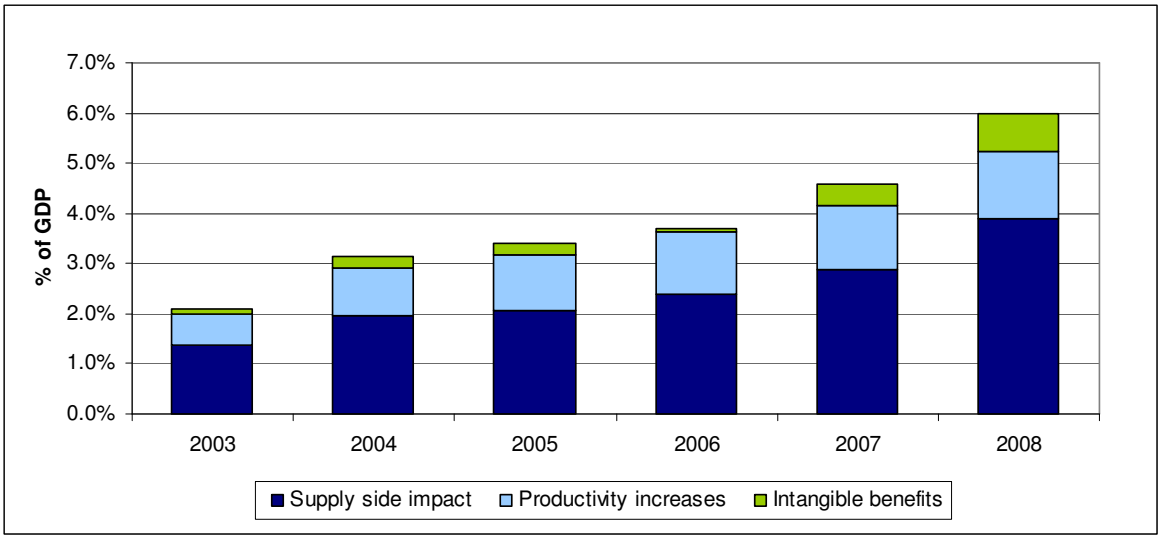
The demand and supply side together have contributed USh 1,223m in 2008 with a further USh 176m related to intangibles. The biggest contributors are the direct and indirect supply side value add estimated to be USh 760 in 2008.

**Figure 118: Economic impact of mobile communications in Uganda, USh millions**




The impact of mobile communications on GDP has been substantial. We estimate that the supply and demand side have risen from being 2.0% in 2003, to 5.2% of GDP in 2008. At the same time, consumers have derived increasing benefits from 0.1% in 2003 to 0.8% of GDP in 2008.

**Figure 119: Economic impact as a percentage of GDP**




*Source: Deloitte analysis*

## 15.4 Dynamic relationship between mobile communications and growth

A wide range of academic studies have demonstrated that a relationship exists between telecommunications penetration (originally fixed line, and more recently mobile) and economic growth. We have sought to estimate the dynamic relationship between mobile communications and GDP[168]. That is, the longer term impact that investment in mobile communications may have on general economic welfare and GDP growth rates in particular.

We undertook a regression based on cross section data for developing countries[169] analogous to Waverman, Meschi and Fuss (2005) [170]. The regression was estimated for almost 60 developing countries in the African continent, the Asia Pacific region and Latin America.

For this sample, we found that a 10% increase in penetration could increase the GDP growth rate by 1.2% in the long-run[171]. This effect is larger than that found by Waverman, Meschi and Fuss

[168] Studies include those by: United Nations Economic Commission for Europe. 1987. *The Telecommunications Industry*; ITU. 1980 *Growth and Structural Change*; World Bank. 1983. *Information, Telecommunications and Development*. More recently, Waverman, Meschi and Fuss (2005) and Sridhar and Sridhar (2004) have looked specifically at the mobile industry.

[169] We attempted to use time series data for each country to estimate the country specific impact of mobile penetration on GDP growth. However, GDP data is only available on an annual basis and the relative immaturity of the mobile market implied insufficient data points to undertake this analysis.

[170] Waverman L., Meschi M., Fuss M. 2005. *The Impact of Telecoms on Economic Growth in Developing Countries*. The Vodafone Policy Paper Series, Number 2

[171] The regression passes all standard econometric diagnostic tests. For ease of presentation, a significant constant term is omitted.

(2005). This result is likely the result of the sample including only countries from the poorest regions in the world, where the effect of mobile penetration will be the strongest[172].

Overall our results suggest that the 8.4% increase in penetration rates between 2007 and 2008 may have contributed around 1% to the Ugandan GDP growth rate.

## 15.5 Conclusion and policy implications

The Ugandan mobile sector creates a substantial and increasing proportion of the country's economic value. It is now corresponds to around 5.2% of GDP with consumers reaping intangibles benefits in monetary terms of around 0.8%. The research provided above has clearly demonstrated the various routes through which the mobile sector influences consumers behaviour and other economic agents and hence the economy as a whole.

Internationally, the tiger development economies in Hong-Kong, Singapore and Korea have placed telecommunications development at the core of their development strategies. If Uganda is to follow a similar path the developing mobile communications sector needs to be encouraged to continue operating as an engine of growth. In particular, it may be counterproductive for government policy to limit this development through policies which may restrain consumer demand for mobile services.

[172] See the methodology section for estimated coefficients and a broader discussion.

# 16 Uganda: Impact of reducing excise duties

In this section we present the results of our analysis for Uganda. We calculate the impact of the reduction of excise taxes on mobile usage on:

- the mobile industry in terms of demand for mobile services, usage and handset sales; and
- government tax revenues.

## 16.1 Reducing mobile taxes to 3%

Using the model and assumptions outlined in the methodology section, we have analysed the impact of different reductions of excise duty applied on mobile usage from 12% to 3%. We then compare the changes that result against our base case forecast of no taxation change. This scenario draws on the recent taxation changes which have been implemented in Rwanda and have seen the tax rate lowered to 3%.

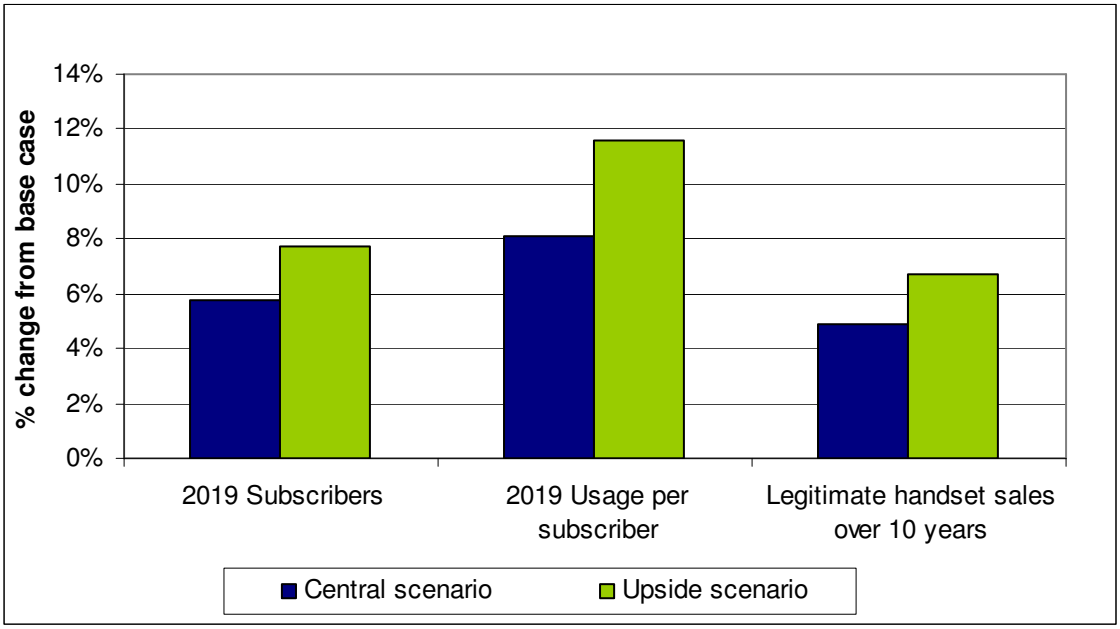
In order to look at these two possible tax reductions, we have established a central and upside scenario for each. Our central scenario involved the elasticity of penetration of -0.4, of minutes of -0.64, a network effect of 0.3% and using a value-add multiplier of 1.2. Conversely, our upside scenario is based on a higher penetration elasticity at -0.6, usage elasticity of -1.04, network effect 0.35% and multiplier of 1.3[173].

### 16.1.1 Impact on demand for mobile services

The following graph illustrates the impact on mobile penetration, usage and handset sales over the 10 year period from 2009 with the tax reduction to 3%.

[173] Section 5.3.4 outlines the econometric approach deployed to estimate the elasticities used.

**Figure 120: Impact of a reduction in excise tax to 3% on usage on the mobile industry**




*Source: Deloitte analysis*

Our central scenario predicts that the number of subscribers would be nearly 6% higher than the base case in 2019 at 30.8 million[174]. In the upside this is increased to a subscriber impact of over around 8%. The increasing subscribers, and hence penetration, drives the increase in legitimate handset sales.

The impact on usage in the central scenario is 8%, representing nearly 2.5 extra minutes of use per user per month, or 1 extra text. The impact on usage in the upside scenario is 11.6%. The difference in usage increase between the central and upside scenario is due to the higher network effect assumed in the upside case.

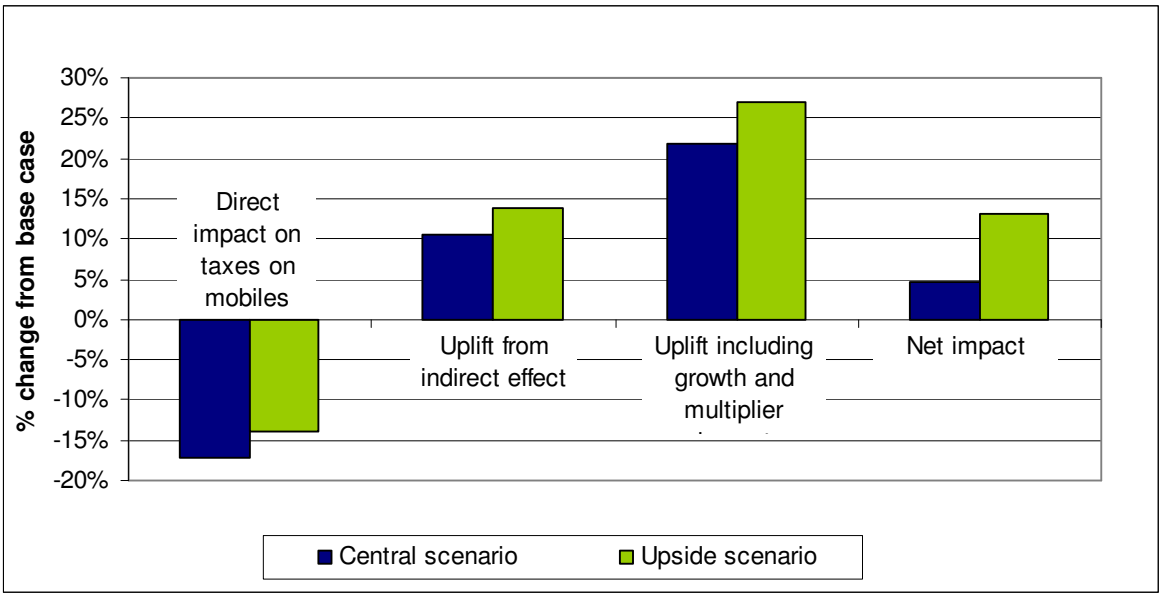
## 16.1.2 Impact on Government tax revenues

The following figure shows the impact, over the 10 years to 2019, on Government tax revenues split into:

- the initial fall in taxes on mobile services;
- the uplift from the indirect effect;
- the uplift once the growth and multiplier impacts are accounted for; and
- finally, a net impact is shown.

[174] This is the estimated number of connections. By 2019 we would expect a reasonable proportion of people to have a number of SIM cards.

**Figure 121: Impact on tax revenues of a reduction in excise tax to 3%**



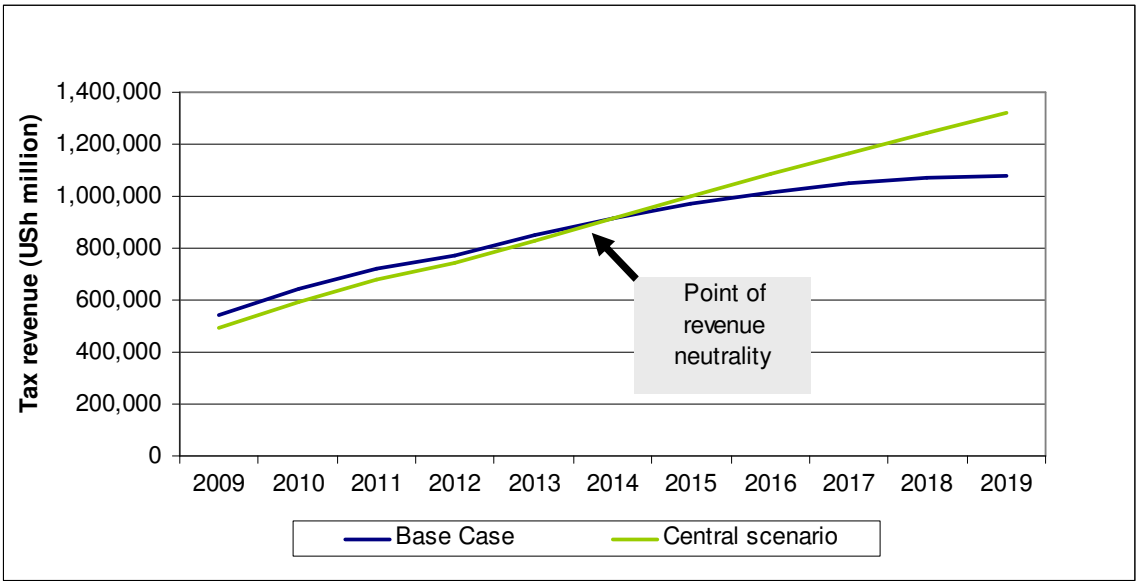

*Source: Deloitte analysis*

The following discusses our results as compared to the base case forecasts.

- Direct impact on taxes on mobiles: overall, direct taxes on mobile services are expected to fall by 17.3% in the central scenario and 13.9% in the upside. This impact consists of the impact of the reduction in excise tax itself. Though the reduction in the excise tax leads to a loss in government revenues due to a lower rate of 3% being applied compared to the current 12% tax, this is mitigated somewhat by the increased subscriber base and usage which imply higher volumes on which to apply VAT and the new reduced excise tax. VAT revenues increase by 12% in the central scenario and 14% in the upside scenario over the period. Revenues from excise taxes fall by 72% in the central scenario and slightly less in the upside, showing that following the 70% tax cut, the increased volumes create a compensating effect over the ten years.
- Uplift from the indirect effect: this uplift is the result of the additional corporation tax and regulatory fee revenues paid by the mobile operators, due to the fact that their revenues and profits will increase following the tax reduction. Company revenues increase by 9.7% in the central case and by 14.0% in the upside case, driving the change in these additional tax revenues.
- Uplift including growth and multiplier impact: the dynamic impact on GDP resulting from our estimated relationship between mobile penetration and GDP growth. Combined with our estimate of the additional tax revenues from the multiplier effect; the total uplift in tax revenues is increased to over 11.2% in the central scenario and 13.1% in the upside. The higher impact in the upside scenario is a result of the use of a multiplier of 1.3 in this scenario.
- Net impact: combining the effects on tax revenues, the net result is positive in both scenarios at 4.6% in the central scenario, and 13.1% in the upside scenario. A neutral

position is reached in 5 years following the tax reduction in the central scenario, whilst 2 years in the upside. Figure 122 outlines the point in which neutrality is achieved i.e. where tax revenues in the central scenario are equal to those in the base case of no tax change.

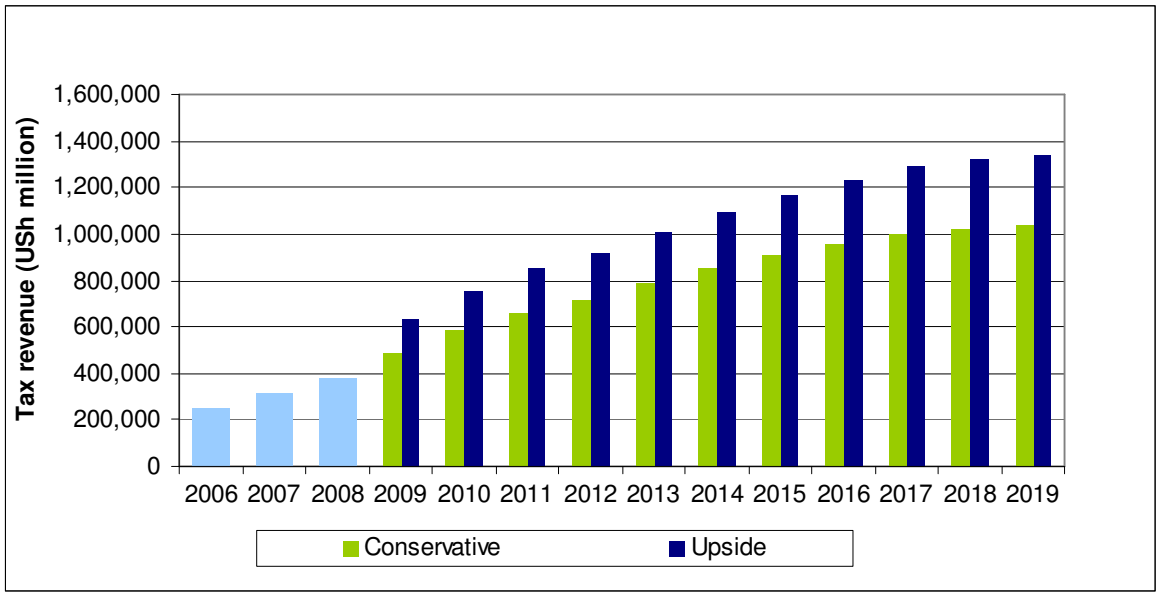
**Figure 122: Government revenue neutrality in the base case**




*Source: Deloitte analysis*

The time path of projected tax revenues given the reduction in usage tax is outlined in Figure 123. The revenues we have put in historic context with our estimates of revenues collected for 2006 through to 2008. This shows that although the reduction in excise tax may have an impact against the counterfactual, government revenues will continue to grow despite the reduction in excise duty on usage.

**Figure 123: Impact of reduction of excise tax on usage to 3% on Government tax revenue**




*Source: Deloitte analysis. Historic data corresponds to actual taxes reported to paid by mobile network operators and wider taxes resulting as captured by a multiplier. Post 2008 taxes as estimated by our model but exclusive of GDP growth effect for comparability to historic data.*

## 16.1.3 Alternative tax changes

In addition to assuming a once and for all reduction in usage tax to 3% we have also considered three further scenarios for the time path of taxes. These scenarios range from full abolition to a gradual abatement of current rates. The time path of taxation rates over these scenarios is described in Figure 124.

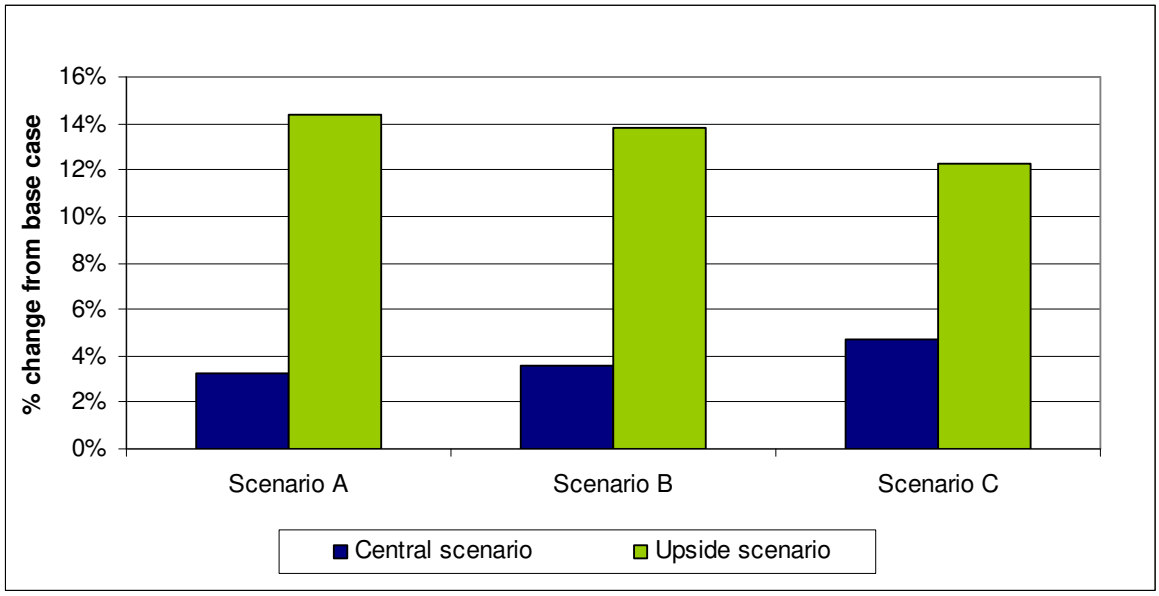
**Figure 124: Further tax rate scenarios (figures correspond to absolute size of excise duty)**

| Year | Scenario A | Scenario B | Scenario C |
|---|---|---|---|
| 2009 | 0% | 3% | 7% |
| 2010 | 0% | 3% | 7% |
| 2011 | 0% | 3% | 7% |
| 2012 | 0% | 3% | 7% |
| 2013 | 0% | 3% | 3% |
| 2014 | 0% | 0% | 3% |
| 2015 | 0% | 0% | 3% |
| 2016 | 0% | 0% | 3% |
| 2017 | 0% | 0% | 3% |
| 2018 | 0% | 0% | 3% |
| 2019 | 0% | 0% | 3% |

*Source: Deloitte*

Across these scenarios the net impact remains positive although the time frame for neutrality to be achieved does vary. The lowest net gain occurs when the usage tax is fully abolished and central assumptions are made over elasticities and other inputs.

**Figure 125: Net impact government revenues of reducing excise tax**




*Source: Deloitte analysis*

The net effect on government revenues in scenario A is 3.3% and 14.3% in the central and upside case respectively. The respective figures for scenario B are 3.6%, 13.8% and for scenario C 4.7%, 12.27%.

## 16.2 Conclusions

Uganda currently levies the largest excise duty on mobile usage in East Africa at 12%. However, our analysis has shown that reducing the excise tax is revenue positive across a range of scenarios and that government revenues will continue to grow year-on-year despite a tax cut. Though tax revenues are lost in the short term, these are compensated for by the increased tax revenues resulting from the growth in the industry, related industries and the economy as a whole. We believe that our central scenario has used cautious estimates of both the elasticities of demand and the economic multiplier effects, and hence there could be more of a positive net impact as identified in the upside scenario.

Of particular pertinence we found that if Kenyan tax authorities followed Rwanda, and reduced usage taxes to 3%, tax revenues could increase by 4.6% over ten years with revenue neutrality achieved in five. This was found to be prevalent even given conditions prevailing in our central scenario, with revenues in the upside projected to rise by 13.1%.

The results in this updated report present a more positive impact on tax revenues from tax cuts than found previously in Deloitte (2007). Part of the reason why prevailing conditions are more

conducive to tax cuts is the further growth of the industry and reduction in prices which have occurred[175].

[175] This is explained in more detail in Section 5.7

# Appendix A Data limitations and Detailed Assumptions

## A.1 Kenya specific assumptions

**Assumptions used in the economic impact assessment**

| Assumption | Value |
|---|---|
| Employment levels | Direct employment by mobile network operators<br><br>Data was obtained directly from operators and estimates for Orange and Econet based on interviews and publicly available information.<br><br>Indirect employment<br><br>Employment figures estimated for each segment of the value chain as revenue inflow multiplied by wages as percentage of revenue divided by average wage. Wages as percentage of revenue estimated based on accounts of similar companies in other geographies and best estimates. Average wage estimated using assumptions on operator wage and average wage in Kenya.<br><br>For airtime employment, interviews identified the number of points of sale and distributors by type. We then assumed an appropriate level of employment for each type. On average 1.2 FTEs were assumed for each point of sale. This is lower than in Deloitte (2007) given better information regarding the airtime supply chain was available.<br><br>Network equipment employment was estimated on the basis of information provided by Ericsson. This information was uplifted on the basis of market share to account for other equipment suppliers.<br><br>A multiplier of 1.2 was applied to indirect levels to gauge the total employment effect in the economy. In Deloitte (2007) a multiplier was also applied to direct employment, this has been excluded in this update as a large amount of employment will already be captured by the first round flows. |

<table>
<tr><th>Assumption</th><th>Value</th></tr>
<tr><td>Value add margins for each segment of the value chain</td><td>
Value add margins are the total % of revenue spent domestically on (i) sales, import, income, corporate and regulatory taxes; (ii) wages; (iii) CSR; and (iv) profit.<br><br>
<u>Direct value add of mobile network operators</u><br><br>
All data was obtained directly from mobile network operators<br><br>
<u>Indirect value add</u><br><br>
These percentages are estimated based on interviews and a review of accounts of companies in Kenya and similar companies internationally. We have applied different margins prior to 2007 and post 2007 to reflect the changing market conditions and improved data availability.<br><br>
<table>
<tr><th>Margin on domestic revenues</th><th>% value add margin pre 2007</th><th>% value add margin 2007 onwards</th></tr>
<tr><td>Fixed telecommunications operators</td><td>53%</td><td>53%</td></tr>
<tr><td>Network equipment suppliers</td><td>71%</td><td>66%</td></tr>
<tr><td>Handset designers and dealers</td><td>64%</td><td>66%</td></tr>
<tr><td>Other suppliers of capital items</td><td>68%</td><td>33%</td></tr>
<tr><td>Suppliers of support services</td><td>62%</td><td>66%</td></tr>
<tr><td>Airtime commission, payphone commission</td><td>73%</td><td>68%</td></tr>
</table>
</td></tr>
<tr><td>Airtime commission</td><td>Commissions pre 2007 were estimated based on 99% of airtime revenues assumed to be sold through third parties with an average commission based on weighted average of figures provided by operators. For 2007 onwards however commission data was provided by the network operators.</td></tr>
<tr><td>Payphone commission</td><td>Payphones commission obtained on a per payphone basis from operators and grossed up for estimated number of payphones in Kenya. Post 2007, operators provided this commission.</td></tr>
<tr><td>Handsets</td><td>Handset prices and percentage of handsets sold by operators, following legal import and on the black market estimated following obtained following interviews with handset dealers, data from Nokia and estimates from operators.</td></tr>
<tr><td>Productivity improvement</td><td>
An annual productivity improvement of 10% for high mobility workers is assumed based on interviews and a review of similar studies.<br><br>
High mobility workers are estimated as 17% of the total workforce based on data from Kenya office of national statistics. The estimate of the percentage of high mobility workers in each employment activity is provided below.<br><br>
<table>
<tr><th>Employment by sector</th><th>2003</th><th>2004</th><th>2005</th><th>2006</th><th>2007</th><th>2008</th><th>% High Mobility</th></tr>
<tr><td>Agriculture & Forestry</td><td>316,100</td><td>320,600</td><td>327,400</td><td>334,887</td><td>342,546</td><td>350,379</td><td>5%</td></tr>
<tr><td>Mining & Quarrying</td><td>5,400</td><td>5,500</td><td>5,700</td><td>5,830</td><td>5,964</td><td>6,100</td><td>5%</td></tr>
<tr><td>Manufacturing</td><td>239,800</td><td>242,000</td><td>247,500</td><td>253,160</td><td>258,949</td><td>264,871</td><td>5%</td></tr>
<tr><td>Electricity & Water</td><td>21,100</td><td>20,900</td><td>20,300</td><td>20,764</td><td>21,239</td><td>21,725</td><td>5%</td></tr>
<tr><td>Building & Construction</td><td>76,600</td><td>77,300</td><td>78,200</td><td>79,988</td><td>81,818</td><td>83,689</td><td>20%</td></tr>
<tr><td>Wholesale & Retail Trade, Restaurants & Hotels</td><td>162,800</td><td>168,000</td><td>175,700</td><td>179,718</td><td>183,828</td><td>188,032</td><td>50%</td></tr>
<tr><td>Transport & Communications</td><td>86,800</td><td>100,800</td><td>117,300</td><td>119,982</td><td>122,726</td><td>125,533</td><td>60%</td></tr>
<tr><td>Finance,Insurance, Real Estate & Business services</td><td>83,700</td><td>83,700</td><td>85,700</td><td>87,660</td><td>89,665</td><td>91,715</td><td>80%</td></tr>
<tr><td>Community, Social & Personal Services</td><td>735,000</td><td>744,900</td><td>749,400</td><td>766,538</td><td>784,068</td><td>801,998</td><td>5%</td></tr>
<tr><td>Average High Mobility</td><td></td><td></td><td></td><td></td><td></td><td></td><td>17%</td></tr>
</table>
<br>
Employment information for 2003-2005 is obtained from the national statistics office. Post 2005 employment is estimated on the basis of the labour force growth rate. Percentage of workers who are high mobility are Deloitte assumptions based on benchmarks from previous studies and experience. Average high mobility is a weighted average.<br><br>
The GDP contribution of these workers is estimated by calculating the total GDP relating to high mobility sectors and dividing by the total number of high mobility workers.
</td></tr>
</table>

| Assumption | Value |
|---|---|
| Multiplier | A multiplier of 1.2 was applied to supply side direct and indirect value add in order to capture the full impact on the Kenyan economy.<br><br>A multiplier of 1.2 was assumed following a literature review and interviews with Kenyan officials. |

**Assumptions used in the tax model**

| Assumption | Value |
|---|---|
| Profit before tax margins | 35% is assumed, based upon average of the profit before tax margins one operators observed over 5 years. |
| Regulatory fees | 1.9% of revenue consists of license fees and spectrum fees. This is the average observed across the market in 2008. |
| Handset sales | From our discussions with handset vendors and operators, we understand that the handset market share of operators, legitimate to make up 70%.<br><br>We assume a two year lifetime for handsets in Kenya, based on discussion with the operators and handset vendors. |
| Handset prices | From our discussions with handset vendors and operators we understand that typical handset prices from legitimate dealers and illegitimate dealers are around KES 5,000. |
| Prices of connection and usage | These were estimated as weighted averages from the operator's submissions, weighted by the subscriber base of each operator where possible It is assumed that prices will be constant in the base case, reflecting the conflicting trends of increased competition which should bring prices down, and general inflation or price rises which could occur due to higher investment needs of the operators. |
| Subscriber base | It was assumed that all subscribers are prepaid in our model. This is because over 99% of subscribers are currently prepaid, and this is expected to continue as future subscriptions growth is likely to be from the lower income and more rural segments of the population. |
| GDP growth | GDP is assumed to grow at 6% falling to 4% in 2013. This was based on an average of various studies including World Bank and EIU. |
| Forecast penetration rates | Penetration growth has been estimated on the basis of industry reports and data from Wireless Intelligence. In the central scenario, we have assumed that the greater penetration rates will create network effect which implies a shift in the S-curve, thus increasing forecast penetration rates by 0.3% per year. In the upside scenario this is increased to 0.35%. |
| Forecast usage | Usage is forecast to fall at 5% per year. This is based on an increasing proliferation of multiple SIMs as users switch networks to obtain the better deal and newer subscribers consuming fewer minutes on average. Falling minutes with increasing subscribers has been found in our econometric analysis in section 5.3.2<br><br>In the scenario, we have assumed additionally that the greater usage in the scenario will create network effects shifting the S-curve, thus increasing forecast penetration rates. We have assumed increase of 0.3% per year in the central scenario and 0.35% in the upside scenario. |
| Tax pass through effect | Approach taken in similar studies and justified by brief review of market. |
| GDP growth and penetration relationship | Based on the outputs of our regression analysis, we have estimated a relationship between the growth rate of GDP and a change in penetration. This finds that a 10% shift in penetration is associated with a 1.2% increase in GDP growth in the long-run. |
| Value Add margin | The value add margin of 41% is estimated by dividing the total value add of mobile operators (estimated in the economic impact model) by total revenues of operators. |
| Multiplier | Two multiplier assumptions are used in the tax model, 1.2 as a central case and 1.3 as an upside. These were considered reasonable assumptions based on literature review and interviews. |

# A.2 Rwanda specific assumptions

**Assumptions used in the economic impact assessment**

<table>
<tr><th>Assumption</th><th>Value</th></tr>
<tr><td>Employment levels</td><td><u>Direct employment by mobile network operators</u><br><br>Data was obtained directly from operators<br><br><u>Indirect employment</u><br><br>Employment figures estimated for each segment of the value chain as revenue inflow multiplied by wages as a percentage of revenue divided by an average wage. Wages as a percentage of revenue estimated based on accounts of similar companies in other geographies and best estimates. Average wage estimated using assumptions on operator wage and average wage in Rwanda.<br><br>For airtime employment, interviews with operators identified the number of points of sale and distributors by type. We then assumed an appropriate level of employment for each type. On average 1.4 FTEs were assumed for each point of sale. This is lower than in Deloitte (2007) given better information regarding the airtime supply chain was available.<br><br>A multiplier of 1.2 was applied to indirect levels to gauge the total employment effect in the economy. In Deloitte (2007) a multiplier was also applied to direct employment, this has been excluded in this update as a large amount of employment will already be captured by the first round flows.</td></tr>
<tr><td>Value add margins for each segment of the value chain</td><td>Value add margins are the total % of revenue spent domestically on (i) sales, import, income, corporate and regulatory taxes; (ii) wages; (iii) CSR; and (iv) profit.<br><br><u>Direct value add of mobile network operators</u><br><br>All data was obtained directly from mobile network operators<br><br><u>Indirect value add</u><br><br>These percentages are estimated based on interviews and a review of accounts of companies in Rwanda and similar companies internationally. We have applied different margins prior to 2007 and post 2007 to reflect the changing market conditions and improved data availability.<br><br>
<table>
<tr><th>Margin on domestic revenues</th><th>% value add margin pre 2007</th><th>% value add margin 2007 onwards</th></tr>
<tr><td>Fixed telecommunications operators</td><td>25%</td><td>25%</td></tr>
<tr><td>Network equipment suppliers</td><td>28%</td><td>20%</td></tr>
<tr><td>Handset designers and dealers</td><td>20%</td><td>21%</td></tr>
<tr><td>Other suppliers of capital items</td><td>28%</td><td>10%</td></tr>
<tr><td>Suppliers of support services</td><td>26%</td><td>20%</td></tr>
<tr><td>Airtime commission, payphone commission</td><td>15%</td><td>4%</td></tr>
</table>
</td></tr>
</table>

| Assumption | Value |
|---|---|
| Airtime commission | Commission pre 2007 were estimated based on 98% of airtime revenues assumed to be sold through third parties with an average commission of 6% based on weighted average of figures provided by the operator. For 2007 onwards however commission data was provided by the network operators |
| Payphone commission | Payphones commission obtained on a per payphone basis from the operator and grossed up for estimated number of payphones in Rwanda. Post 2007, operators provided this commission. |
| Handsets | Handset prices and percentage of handsets sold by operators, following legal import and on the black market estimated following obtained following interviews with handset dealers, data from Nokia Siemens and estimates from operators. |
| Productivity improvement | An annual productivity improvement of 10% for high mobility workers is assumed based on interviews and a review of similar studies.<br><br>High mobility workers are estimated as 13% in 2008. We then assume 75% of these use communications. This is a Deloitte assumption based benchmarked off the other countries in the study. The GDP contribution of these workers is estimated by calculating the total GDP relating to high mobility sectors and dividing by the total number of high mobility workers. |
| Multiplier | A multiplier of 1.2 was applied to supply side direct and indirect value add in order to capture the full impact on the Rwandan economy.<br><br>A multiplier of 1.2 was assumed following a literature review and interviews with Tanzanian officials. |

# A.3 Tanzania specific assumptions

**Assumptions used in the economic impact assessment**

<table>
<tr><th>Assumption</th><th>Value</th></tr>
<tr><td>Employment levels</td><td><u>Direct employment by mobile network operators</u><br><br>Data was obtained directly from operators<br><br><u>Indirect employment</u><br><br>Employment figures estimated for each segment of the value chain as revenue inflow multiplied by wages as percentage of revenue divided by an average wage. Wages as percentage of revenue estimated based on accounts of similar companies in other geographies and best estimates. Average wage estimated using assumptions on operator wage and average wage in Tanzania.<br><br>For airtime employment, interviews with operators identified the number of points of sale and distributors by type. We then assumed an appropriate level of employment for each type. On average 1.2 FTEs were assumed for each point of sale. This is lower than in Deloitte (2007) given better information regarding the airtime supply chain was available.<br><br>Network equipment employment was estimated on the basis of interviews with Ericsson and benchmarks off equipment markets in Kenya and Uganda. This information was uplifted on the basis of market share to account for other equipment suppliers.<br><br>A multiplier of 1.2 was applied to indirect levels to gauge the total employment effect in the economy. In Deloitte (2007) a multiplier was also applied to direct employment, this has been excluded in this update as a large amount of employment will already be captured by the first round flows.</td></tr>
<tr><td>Value add margins for each segment of the value chain</td><td>Value add margins are the total % of revenue spent domestically on (i) sales, import, income, corporate and regulatory taxes; (ii) wages; (iii) CSR; and (iv) profit.<br><br><u>Direct value add of mobile network operators</u><br><br>All data was obtained directly from mobile network operators<br><br><u>Indirect value add</u><br><br>These percentages are estimated based on interviews and a review of accounts of companies in Tanzania and similar companies internationally. We have applied different margins prior to 2007 and post 2007 to reflect the changing market conditions and improved data availability.<br><br>
<table>
<tr><th>Margin on domestic revenues</th><th>% value add margin pre 2007</th><th>% value add margin 2007 onwards</th></tr>
<tr><td>Fixed telecommunications operators</td><td>61%</td><td>61%</td></tr>
<tr><td>Network equipment suppliers</td><td>79%</td><td>66%</td></tr>
<tr><td>Handset designers and dealers</td><td>83%</td><td>77%</td></tr>
<tr><td>Other suppliers of capital items</td><td>76%</td><td>33%</td></tr>
<tr><td>Suppliers of support services</td><td>69%</td><td>66%</td></tr>
<tr><td>Airtime commission, payphone commission</td><td>79%</td><td>64%</td></tr>
</table>
</td></tr>
</table>

| Assumption | Value |
|---|---|
| Airtime commission | Commission pre 2007 were estimated based on 92.7% of airtime revenues are assumed sold through third parties with an average commission of 9.37% based on weighted average of figures provided by operators. For 2007 onwards we have asked directly for commissions paid |
| Payphone commission | Payphones commission obtained on a per payphone basis from operators and grossed up for estimated number of payphones in Tanzania pre 2007. Post 2007 operators provided this commission. |
| Handsets | Handset prices and percentage of handsets sold by operators, following legal import and on the black market estimated following obtained following interviews with handset dealers, data from Nokia Siemens and estimates from operators. |
| Productivity improvement | An annual productivity improvement of 10% for high mobility workers is assumed based on interviews and a review of similar studies.<br><br>High mobility workers are estimated as 16% of the total workforce based on data from Tanzania office of national statistics and the Worldbank. The GDP contribution of these workers is estimated by calculating the total GDP relating to high mobility sectors and dividing by the total number of high mobility workers. |
| Multiplier | A multiplier of 1.2 was applied to supply side direct and indirect value add in order to capture the full impact on the Tanzanian economy.<br><br>A multiplier of 1.2 was assumed following a literature review and interviews with Tanzanian officials. |

**Assumptions used in the tax model**

| Assumption | Value |
|---|---|
| Profit before tax margins | 25% is assumed, based on a profit margin observed by one of the mobile operators over several years. |
| Regulatory fees | 1.6% of revenues are related to regulatory fees consisting of licence and spectrum fees. This is lower than in Deloitte (2007) given USO fees are excluded as to date they are unpaid. |
| Handset sales | From our discussions with handset vendors and operators, we understand that the handset market share of operators, legitimate dealers and illegitimate dealers are 10%, 40% and 50% respectively. Therefore, legitimate channels make up 50%.<br><br>We assume a two year lifetime for handsets in Tanzania, based on discussion with the operators and handset vendors. |
| Handset prices | From our discussions with handset vendors and operators we understand that typical handset prices are around Tsh 45,000 with operators average prices slightly higher than this at Tsh 55,000 |
| Prices of connection and usage | These were estimated as weighted averages from the operator's submissions, weighted by the subscriber base of each operator. It is assumed that prices will not increase going forward, reflecting the conflicting trends of increased competition which should bring prices down, and general inflation or price rises which could occur due to higher investment needs of the operators. |
| Subscriber base | It was assumed that all subscribers are prepaid in our model. This is because over 99% of subscribers are currently prepaid, and this is expected to continue as future subscriptions growth is likely to be from the lower income and more rural segments of the population. |
| GDP growth | GDP growth has been taken as the average of forecasts from the IMF and EIU. |
| Forecast penetration rates | Penetration is forecast to grow according to Wireless Intelligence subscriber growth rates and population growth rates from the IMF. These forecasts however needed to be extended to 2019. This was achieved projecting and amending future rates based on Deloitte market expectations.<br><br>In the central scenario, we have assumed that the greater penetration rates will create network effect which implies a shift in the S-curve, thus increasing forecast penetration rates by 0.3% per year. In the upside this is increased to 0.35% per year, |
| Forecast usage | Usage is forecast to fall in the base case by 5% a year. The rationale being, all things equal, the marginal consumer will present lower consumption preferences. This was found in the regression analysis in section 5.3.3. |
| Tax pass through effect | Approach taken in similar studies and justified by brief review of market. |
| GDP growth and penetration relationship | Based on the outputs of our regression analysis, we have estimated a relationship between the GDP growth and a change in penetration. This finds that a 10% shift in penetration is associated with a 1.2% increase in GDP growth in the long-run. |
| Value Add margin | The value add margin of 32% is estimated by dividing the total value add of mobile operators (estimated in the economic impact model) by total revenues of operators. |
| Multiplier | Two multiplier assumptions are used in the tax model, 1.2 in the central scenario and 1.3 in the upside. These were considered reasonable assumptions based on a literature review and interviews. |

# A.4 Uganda specific assumptions

**Assumptions used in the economic impact assessment**

<table>
<tr><th>Assumption</th><th>Value</th></tr>
<tr><td>Employment levels</td><td><u>Direct employment by mobile network operators</u><br><br>Data was obtained directly from operators, and grossed up for the market share for Hits and .UTL.<br><br><u>Indirect employment</u><br><br>Employment figures estimated for each segment of the value chain as revenue inflow multiplied by wages as percentage of revenue divided by an average wage. Wages as percentage of revenue estimated based on accounts of similar companies in other geographies and best estimates. Average wage estimated using assumptions on operator wage and average wage in Uganda.<br><br>For airtime employment, interviews with operators identified the number of points of sale and distributors by type. We then assumed an appropriate level of employment for each type. On average 1.2 FTEs were assumed for each point of sale. This is lower than in Deloitte (2007) given better information regarding the airtime supply chain was available.<br><br>Network equipment employment was estimated on the basis of interviews with Ericsson. This information was uplifted on the basis of market share to account for other equipment suppliers.<br><br>A multiplier of 1.2 was applied to indirect levels to gauge the total employment effect in the economy. In Deloitte (2007) a multiplier was also applied to direct employment, this has been excluded in this update as a large amount of employment will already be captured by the first round flows.</td></tr>
<tr><td>Value add margins for each segment of the value chain</td><td>Value add margins are the total % of revenue spent domestically on (i) sales, import, income, corporate and regulatory taxes; (ii) wages; (iii) CSR; and (iv) profit.<br><br><u>Direct value add of mobile network operators</u><br><br>All data was obtained directly from mobile network operators<br><br><u>Indirect value add</u><br><br>These percentages are estimated based on interviews and a review of accounts of companies in Uganda and similar companies internationally.<br><br>
<table>
<tr><th>Margin on domestic revenues</th><th>% value add margin pre 2007</th><th>% value add margin 2007 onwards</th></tr>
<tr><td>Fixed telecommunications operators</td><td>56%</td><td>56%</td></tr>
<tr><td>Network equipment suppliers</td><td>74%</td><td>66%</td></tr>
<tr><td>Handset designers and dealers</td><td>67%</td><td>85%</td></tr>
<tr><td>Other suppliers of capital items</td><td>71%</td><td>33%</td></tr>
<tr><td>Suppliers of support services</td><td>65%</td><td>66%</td></tr>
<tr><td>Airtime commission, payphone commission</td><td>77%</td><td>65%</td></tr>
</table>
</td></tr>
<tr><td>Airtime commission</td><td>93% of airtime revenues are assumed sold through third parties with an average commission of 10% based on information provided by operators. Post 2007 operators provided this commission.</td></tr>
</table>

| Assumption | Value |
|---|---|
| Payphone commission | Payphones commission obtained on a per payphone basis from operators and grossed up for estimated number of payphones in Uganda. Post 2007 operators provided this commission. |
| Handsets | Handset prices and percentage of handsets sold by operators, following legal import and on the black market estimated following obtained following interviews with handset dealers, data from Nokia Siemens and estimates from operators. |
| Productivity improvement | An annual productivity improvement of 10% for high mobility workers is assumed based on interviews and a review of similar studies.<br><br>High mobility workers are estimated as 12% of the total workforce based on data from Uganda office of national statistics and the Worldbank. The GDP contribution of these workers is estimated by calculating the total GDP relating to high mobility sectors and dividing by the total number of high mobility workers. |
| Multiplier | A multiplier of 1.2 was applied to supply side direct and indirect value add in order to capture the full impact on the Ugandan economy.<br><br>A multiplier of 1.2 was assumed following a literature review and interviews with Ugandan officials. |

**Assumptions used in the tax model**

| Assumption | Value |
|---|---|
| Profit before tax margins | 15% is assumed, based upon a weighted average of operator's profit margin in the first half of 2008. Weights are based on subscribers. |
| Regulatory fees | Regulatory fees as a proportion of revenue are estimated by dividing half year regulatory fees paid by half year revenues for the mobile market. Regulatory fees as proportion of revenue are 3.2% |
| Handset sales | From our discussions with handset vendors and operators, we understand that the handset market share of operators, legitimate to make up 67%.<br><br>We assume a two year lifetime for handsets in Uganda, based on discussion with the operators and handset vendors. |
| Handset prices | From our discussions with handset vendors and operators we understand that typical handset prices range from around USh 40,000 to USh 80,000. From our discussions and data provided by operators we have assumed an average handset price of USh 66,000. |
| Prices of connection and usage | These were estimated as weighted averages from the operator's submissions, weighted by the subscriber base of each operator where possible. It is assumed that prices will be constant in the base case, reflecting the conflicting trends of increased competition which should bring prices down, and general inflation or price rises which could occur due to higher investment needs of the operators. |
| Subscriber base | It was assumed that all subscribers are prepaid in our model. This is because over 99% of subscribers are currently prepaid, and this is expected to continue as future subscriptions growth is likely to be from the lower income and more rural segments of the population. |
| GDP growth | GDP is assumed to grow at around 10% on average over the period. This was based on various studies including IMF and the EIU. |
| Forecast penetration rates | Penetration growth has been estimated on the basis of industry reports and data from Wireless Intelligence. In the central scenario, we have assumed that the greater penetration rates will create network effect which implies a shift in the S-curve, thus increasing forecast penetration rates by 0.3% per year. In the upside scenario this is increased to 0.35% in the upside scenario. |
| Forecast usage | Usage is forecast to fall at 5% per year. This is based on an increasing proliferation of multiple SIMs as users switch networks to obtain the better deal and newer subscribers consuming fewer minutes on average. Falling average minutes per subscriber over time have been found in our econometric analysis in section 5.3.4.<br><br>In the scenario, we have assumed additionally that the greater usage in the scenario will create network effects shifting the S-curve, thus increasing forecasted penetration. We have assumed increases of 0.3% per year in the central scenario and 0.35%. |
| Tax pass through effect | Approach taken in similar studies and justified by brief review of market. |
| GDP growth and penetration relationship | Based on the outputs of our regression analysis, we have estimated a relationship between the growth rate of GDP and a change in penetration. This finds that a 10% shift in penetration is associated with a 1.2% increase in GDP growth in the long-run. |
| Value Add margin | The value add margin of 40% is calculated by dividing the total value add of mobile operators (estimate in the economic impact model) by total revenues of operators. |
| Multiplier | Two multiplier assumptions are used in the tax model, 1.2 as a central case and 1.3 |

| Assumption | Value |
| --- | --- |
| | as an upside. These were considered reasonable assumptions based on literature review and interviews. |