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TAXATION AND THE GROWTH OF MOBILE IN EAST AFRICA

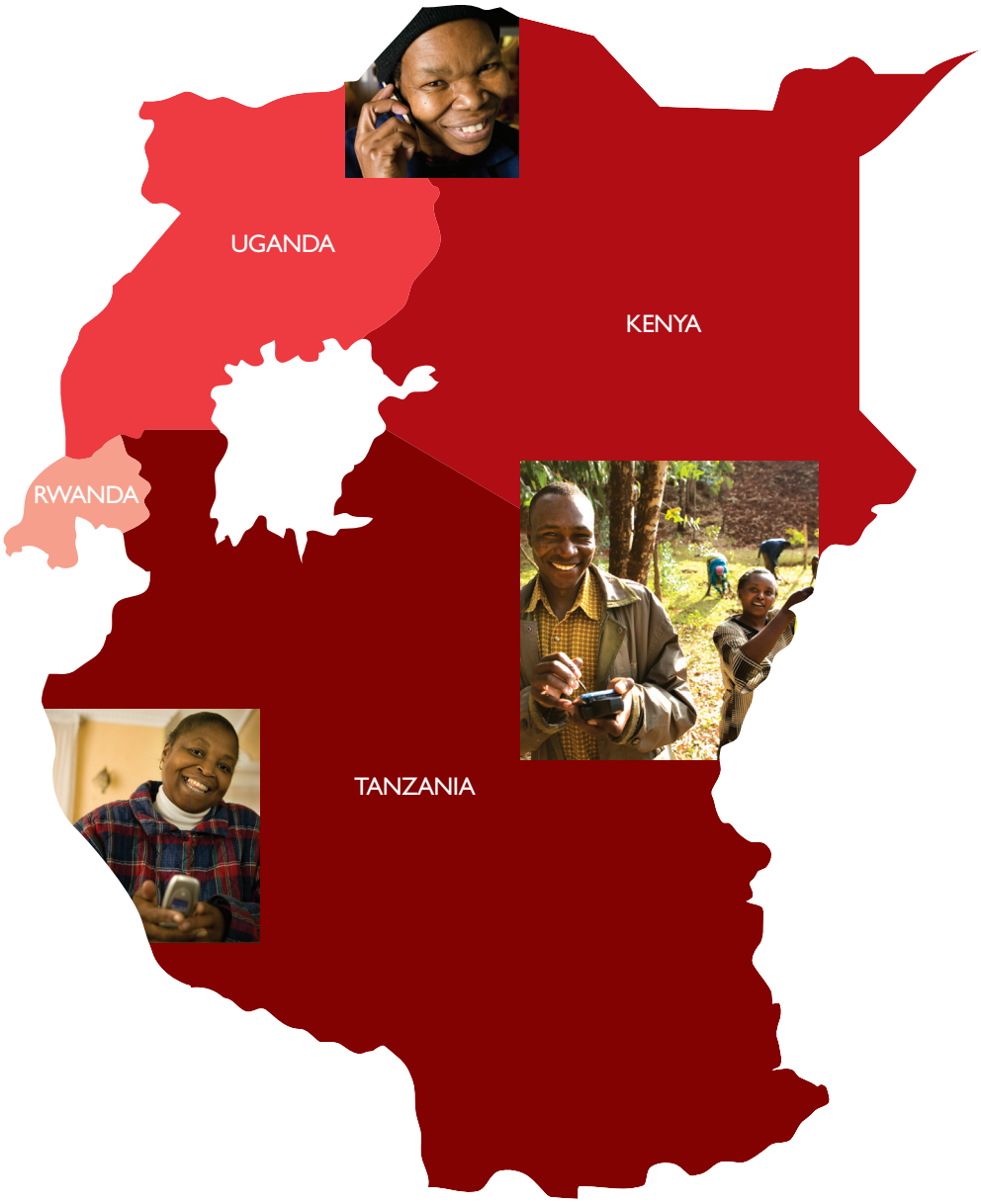
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Taxation and the Growth of Mobile in East Africa



Establishing tax regimes that recognise mobile phones as a necessity not a luxury

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World Bank Perspective

Taxation has a large impact on access to mobile communications. Empirical data demonstrates a direct link between connectivity and economic growth; hence, achieving access at affordable prices to the broadest base of the population is essential to driving economic growth and alleviating poverty.

We believe that any taxation policy should be designed in a way that does not add any further barriers to access or add to the cost of service provision for the poor, and should not deter or undermine competitive market forces.

Another important objective is that taxation policies should ensure that the sector is always managed in a way that will achieve a level playing field and will allow equal distribution of services to all users of the population.

We do not believe that taxation should be designed on the basis of short-term considerations – it should be designed on the basis of achieving the best long-term economic interests for the society and in a way that accelerates the extension of services to the poor. The indirect benefits to the economy of having affordable access to telecommunications services far outweigh any short-term benefit to the budget**.**

Mohsen A. Khalil
Director, Global Information and Communication Technologies

Thailand removes excise duty, January 2007

Information Communications and Technology Minister Sitthi-chai Pookaiyaudom, said the Cabinet had endorsed ending the 2003 resolution that imposed excise tax of 2 per cent and 10 per cent for fixed telephone and cellular services, respectively.

The levying of telecom excise is mentioned in the white paper of the Council for National Security as a policy corruption, which was cited as one of the reasons for the coup against the Thaksin government.

Sitthichai said revoking of excise was based on the reality that telecom services were no longer a luxury but a basic necessity.

1 Introduction from the GSM Association

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, a global trade association that represents more than 700 mobile phone operators in over 200 countries, in collaboration with GSM Africa, commissioned Deloitte to analyse the effect that lowering excise duties would have on the industry, the economy and total government receipts.

The findings are very encouraging. Not only will lowering excise duty extend the essential mobile franchise to the poorer sections of society, but also governments can expect higher levels of economic growth and tax receipts in the long term.

Lowering the excise duty or total waiver will help close the information gap between urban and rural areas, and will add value to the specific strategic plans for each nation in meeting the millennium development goals, as mobile services become available for use by a wider cross-section of the societies and business communities unleashing the entrepreneurial spirit and assisting with poverty reduction.

As the governments in East Africa go into their budgeting rounds, we urge an urgent review of mobile taxation policies. Restructuring mobile taxes can be a win win win for government, business and consumers and may enable governments to respond strategically to the communications needs of its people.

We would like to thank the governments and telecom regulators of East Africa, along with Celtel, MTN, Safaricom, Vodacom, UTL and Nokia for their assistance and contribution to this report and Deloitte for undertaking the analysis.

Gabriel Solomon
Director, Government & Regulatory Affairs
GSM Association

Vitalis Olunga
Chair
GSM Africa

2 Context

The GSMA commissioned Deloitte to conduct a study into the economic and social benefits of mobile services in Kenya, Rwanda, Tanzania and Uganda. For each of these countries, we were asked:

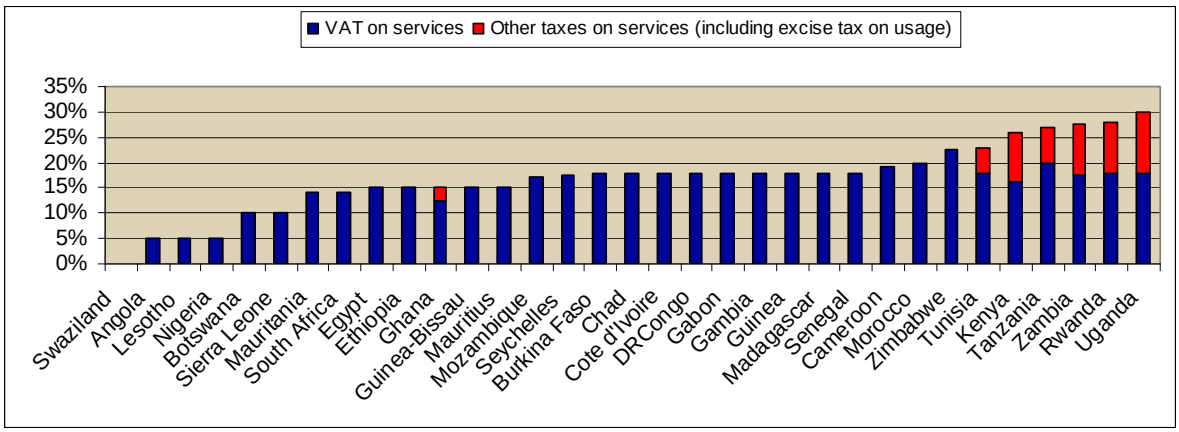
- To estimate the positive contribution that mobile telephony makes to economic and social welfare and, where feasible, to quantify the impact; and
- To examine the impact of an adjusted tax structure on the mobile industry and Government revenues taxation revenues.

3 Executive Summary

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; and
- Delivering universal services, mobile phones account for around 95% of all telecoms connections in East Africa.
- Boosting GDP, recent analysis by Deloitte shows that a 10% increase in mobile penetration leads to a 1.2% increase in annual GDP.[1]

Despite the positive impact of mobile communications, East African community member states impose a sector specific tax on mobile usage that is regressive, hitting poorer consumers harder. The excise duty also restricts the affordability of mobile services for many millions of East Africans. Globally only a small minority of countries, 16 in total, impose mobile specific taxes. In Africa 7 countries do so and as the graph below shows, the East African community is at the top of the mobile tax table.



Source: Deloitte Analysis

This report quantifies the economic impact that the mobile industry has in each of the East Africa Community member states. 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.

Currently, excise taxes are levied at 10%, 7% and 12% in Kenya, Tanzania and Uganda respectively, and the Rwandan Government has proposed setting an excise tax at 10%. The report considers the impact of reducing these taxes to 5% in Kenya and Tanzania and 8% in Uganda. In Rwanda, we consider the impact of introducing a tax at 5%. We also present several scenarios that estimate the impact of reducing taxes gradually over a 10 year period.

[1] "Global Mobile Tax Review" 2006-2007, GSM Association & Deloitte

3.1 Key Findings

The report demonstrates that by lowering mobile specific taxes many millions more consumers will connect, boosting economic growth, and, in the long run increasing total government tax receipts.

The key findings are:

- In 2006, the mobile industry's GDP contribution in East Africa ranged between 4% to 5% and it employed close to 500,000 people
- In Kenya, Tanzania and Uganda, lowering excise duty will be revenue positive for governments in the medium term
- In Kenya and Tanzania, lowering excise duty to 0% may also be revenue neutral to positive, over a ten year period to 2017
- In Rwanda, if a 5% excise duty is imposed in 2007, by 2017 government receipts could be 3% less
- About one third of industry revenues go to the governments of East Africa
- 70% of East African's have access to mobile networks but only 12% are connected. There are close to 100,000 mobile payphones
- Mobile, as a percentage of total connections, ranged between 93% and 96%

3.2 Recommendations

Mobile specific taxes, levied in addition to VAT, discourage the take up and usage of mobile communications and constrain the potential positive social-economic contribution of the industry. Taxation is a critical issue for consideration in spreading the use of mobile to poorer sections of society. Mobile specific taxes should be phased out.

East African telecoms and finance policy makers, in collaboration with the mobile industry, should examine in detail the effect of taxation in their respective jurisdictions. Key considerations should include whether mobile should be taxed in a different manner form the remainder of the economy, i.e. treating mobile communications as a basic need not as a luxury.

In the case of mobile specific taxes, analysis should focus on the impact of lowering as well as restructuring tax regimes to increase the affordability of mobile services. Doing so can create net positive effects for government, industry and consumers.

4 Introduction to the East African Mobile Communications Market

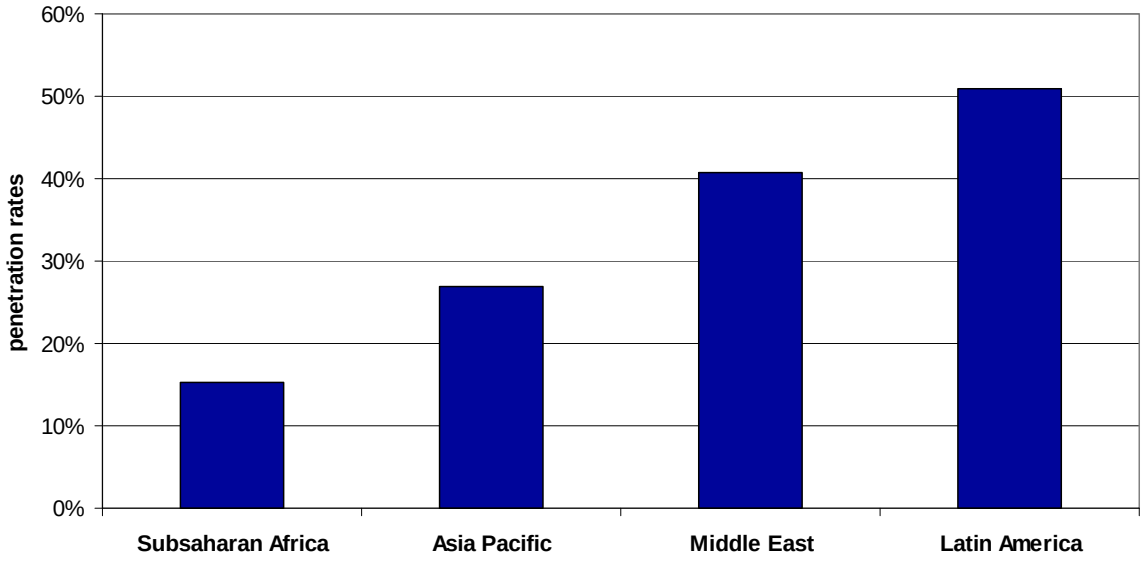
The mobile communications sector is considered a success story in East Africa – increasing the ease of communication between individuals and businesses. There have been significant increases in coverage and penetration over recent years and mobile has, for many consumers, become the preferred method of communication. Investment in mobile communications by all operators has been substantial and is continuing. For example Safaricom in Kenya has recently announced plans to invest a further $160m in extending coverage to underserved areas. 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.

4.1 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 to such an extent that ratios of 10:1 have become common and the pre pay mobile has become the instrument of universal service across Africa. However, despite this growth there is clearly potential for considerable increases in penetration in Africa.

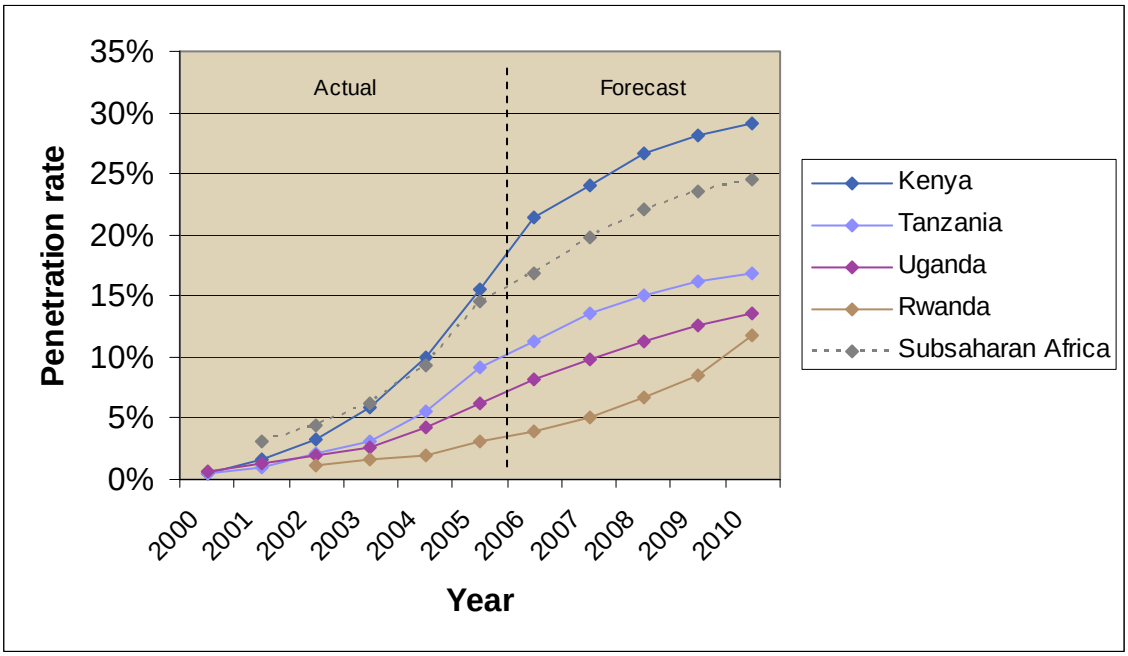
Figure 1: Regional Mobile Penetration Rates



Source: Wireless Intelligence 2006 data

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

Figure 2: **Historical and forecast mobile penetration in East Africa**



Source: Historical from Wireless Intelligence and forecasts from Pyramid

4.2 Successful licensing process with strong market competition

All four East African countries have been liberalised, and in Kenya, Tanzania and Uganda, new entrants have been successful in gaining market share. This has resulted in price competition which has contributed to the affordable nature of mobile services in each of the countries.

In Rwanda, though mobile services are currently offered by MTN only, Terracom are in the process of launching mobile services, which will be expected to lead to lower prices.

Figure 3: Mobile operators and market shares

Mobile operator	Licenced	Market share (December 2006)
Kenya		
Celtel Kenya	Aug 2000	31%
Safaricom	July 1999	69%
VTEL	Oct 2006	n/a
Rwanda		
MTN Rwandacell SARL	Dec 1998	100%
Terracom	Oct 2005	0%[2]
Tanzania		
Celtel Tanzania Ltd	Nov 2001	27%
MIC Tanzania Ltd (Mobitel)	Sep 2000	17%
Vodacom Tanzania Ltd	Aug 2000	53%
Zanzibar Telecom Ltd (Zantel)	Aug 1999	3%
Uganda		
Celtel (Celtel Cellular)	Dec 1994	16%
MTN Uganda Ltd	Oct 1998	58%
UTL Telecel	Jan 2001	26%

Source. Various market intelligence reports and operator data

4.3 Retail prices are low in East Africa compared to other countries

Mobile retail prices are relatively low in all four East African countries.

Figure 4: Average retail price per minute[3]

Country	Average retail price (US$) (Dec 06)
Kenya	0.23
Rwanda	0.23
Tanzania	0.16
Uganda	0.21

Source: Wireless intelligence and mobile operators

In Kenya and Tanzania, prices have been falling. This reduction in prices has occurred despite the operators being faced with increased operating costs – particularly in terms of higher costs of fuel and power.[4] The East African operators are also disadvantaged by the fact that international

[2] Terracom, the privatised former National Incumbent fixed line operator (Rwandatel), is currently in the process of launching mobile services.

[3] 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. These prices are gross of tax. If VAT and excise are taxes were removed, tariffs would be even lower.

[4] 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

connections are facilitated primarily through satellite, which is expensive compared to fibre optic cable.

In Rwanda, prices have remained relatively constant (though they are expected to fall once the fixed operator, Terracom launches mobile services), and in Uganda prices have been rising (given a starting point of low rates).

4.4 Extensive coverage and the ability to provide universal service

The provision of communications in rural areas is necessary for promoting long-term economic growth. Mobile communications has been more successful than fixed line in providing this access with both number of subscribers and population coverage far exceeding the fixed line operators.

Figure 5: Mobile connections and population coverage

	% of connections from mobile (2006)	Mobile population coverage (2006)
Kenya	95%	92%
Rwanda	94%	82%
Tanzania	93%	48%
Uganda	96%	96%

Source: Operator figures and GSMA

The mobile operators have invested heavily in the roll out of payphones. These increase service availability, particularly amongst the poor who are unable to afford even the lowest value pre-paid cards. Furthermore, the provision of payphones provides a valuable source of employment and wages in rural areas.

Figure 6: Number of payphones

	Estimated number of payphones, (Dec 2006)
Kenya	28,047
Rwanda	5,000
Tanzania	27,427
Uganda	32,100

Source: Interviews in EA

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

Figure 7: Universal service funds

	Purpose of fund and distribution	Contribution basis
Kenya	Distribution of fund is unclear	Anticipated 1% of revenue from 2007
Rwanda	Connecting rural areas	2% of revenue
Tanzania	Rural development – specific goals and distribution of fund is undecided	Maximum of 1.5% of revenue, although regulator stated nearer 0.5%
Uganda	Rural communications and development	1% of revenue

Source: Interviews and desk research

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.

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.

4.5 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. Though some operators provide nominal handset subsidies during certain times of the year in order to increase the subscriber base, handset sales is not a large area of their business.

Official dealers and streetside vendors sell handsets. Airtime is mainly sold by streetside and official vendors, with sellers receiving about 10% commission on airtime revenue sold. This method of selling airtime creates high levels of employment. Estimates are shown in the figure below.

Figure 8: Airtime employment and commission

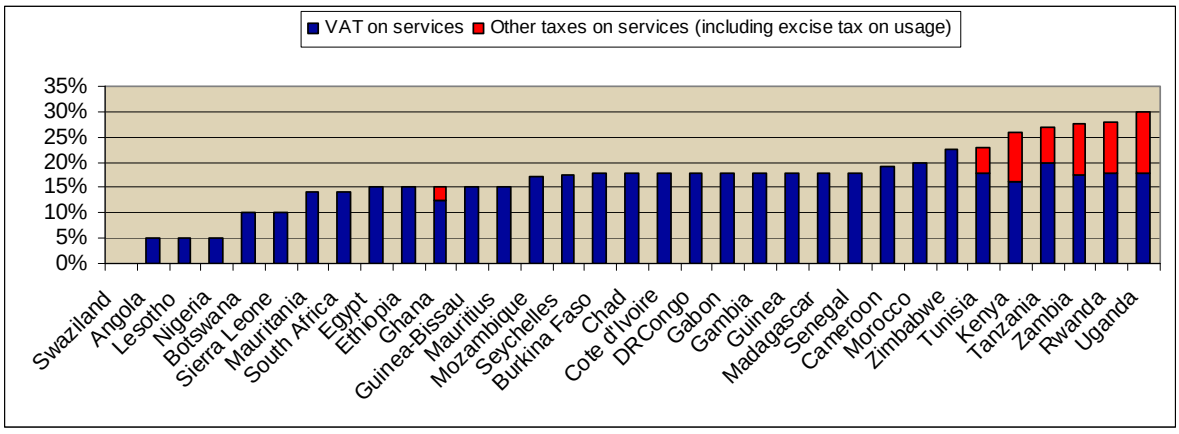
	Estimated employment from airtime sales (Dec 2006)	Commission paid to airtime sellers (Dec 2006)
Kenya	90,000	KES 4,640m
Rwanda	14,250	RWF 504m
Tanzania	60,000	TZS 56,700m
Uganda	30,450	UGX 29,800m

Source: Interviews with operators and handset dealers, December 2006

4.6 Taxation rates

A ranking of the taxes levied on mobile services (excluding the fixed taxes) is shown in the following figure. This shows that the East African countries face the highest tax burden on mobile services. The imposition of an excise tax in Rwanda would substantially increase the tax burden. For example, the imposition of a 10% tax rate would cause Rwanda to have the second highest tax rate in Africa, behind Uganda. This is shown in the graph below.

Figure 9: Breakdown of taxes on mobile services



Source: Deloitte analysis

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

Figure 10: Taxes on mobile services in African countries

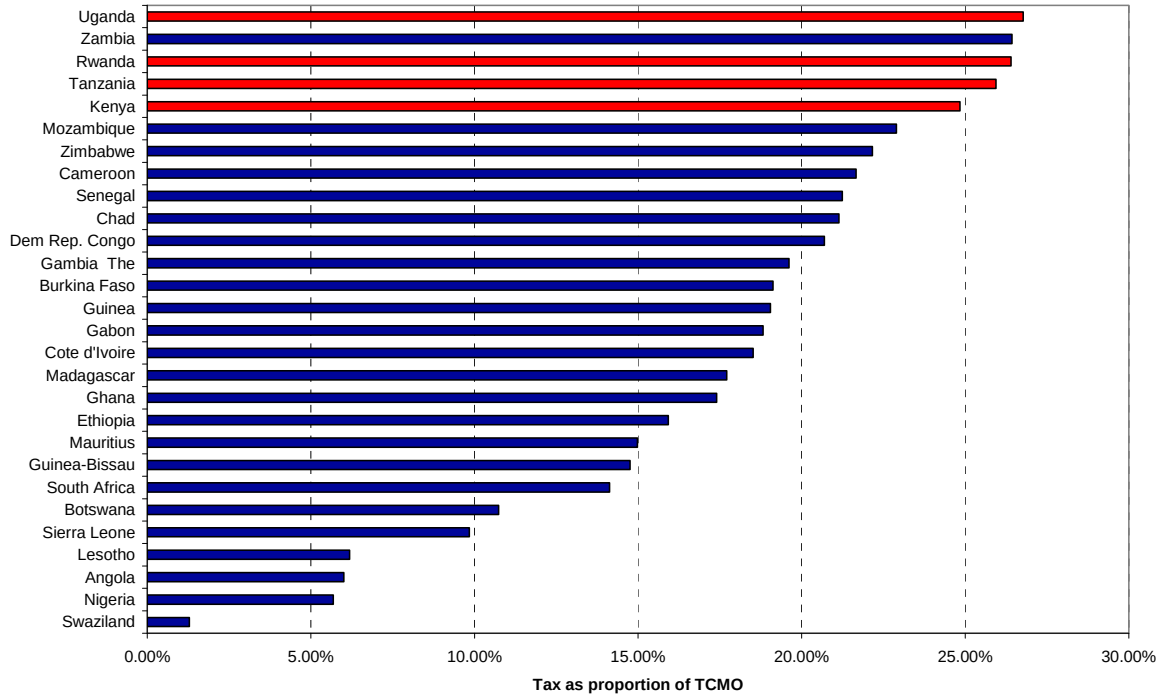
	Taxes on handsets				Taxes on services		
	VAT or similar	Customs Duty	Other	Fixed taxes (US$)	VAT or similar	Other	Fixed taxes (US$)
Angola	10.00%	5.00%			5.00%		
Botswana	10.00%		7.00%		10.00%		
Burkina Faso	18.00%	12.50%			18.00%		0.04-0.10
Cameroon	19.25%	31.50%			19.25%		
Chad	18.00%	30.00%			18.00%		
Cote d'Ivoire	18.00%	5.00%	2.50%		18.00%		
DRCongo	13.00%	20.00%			18.00%		
Egypt	10.00%				15.00%		
Ethiopia	15.00%	10.00%			15.00%		
Gabon	18.00%	10.00%			18.00%		
Gambia	15.00%	20.00%			18.00%		
Ghana	12.50%	20.00%	5.50%		12.50%	2.50%	
Guinea	18.00%	12.50%			18.00%		
Guinea-Bissau	15.00%				15.00%		
Kenya	**16.00%**				**16.00%**	**10.00%**	
Lesotho	14.00%		7.00%		5.00%		
Madagascar	18.00%				18.00%		
Mauritania	14.00%				14.00%		
Mauritius	15.00%				15.00%		
Morocco	20.00%	2.50%			20.00%		
Mozambique	17.00%	25.00%	1.00%		17.00%		
Nigeria	5.00%	10.00%			5.00%		
Rwanda	**18.00%**	*			**18.00%**	**	
Senegal	18.00%	10-20%	1.50%		18.00%		7.18
Seychelles		12.00%			17.60%		
Sierra Leone	10.00%				10.00%		
South Africa	14.00%	8.05%			14.00%		
Swaziland		14.00%					
Tanzania	**20.00%**				**20.00%**	**7.00%**	
Tunisia	10.00%		8.00%		18.00%	5.00%	
Uganda	**18.00%**				**18.00%**	**12.00%**	
Zambia	17.50%	5.00%			17.50%	10.00%	
Zimbabwe	15.00%				22.50%		

* Import duties of 30% were removed in 2006, though this is still to be signed and gazetted.
** In Rwanda, the introduction of a 10% excise tax on usage is currently proposed

Source: Deloitte analysis

Another way to consider the additional burden caused by the excise duty on usage, is calculating tax as a proportion of the cost of mobile ownership[5] represented by taxation.

Figure 11: Tax as a percentage of the total cost of mobile ownership



Source: Deloitte analysis

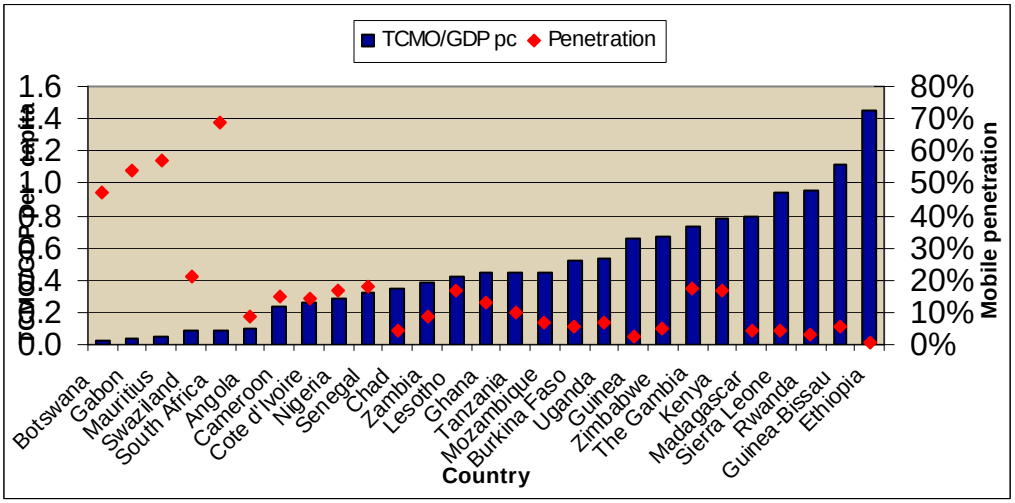
Kenya, Tanzania and Uganda are among the African countries with the highest proportion of tax in the Total Cost of Mobile Ownership. Uganda has the highest average tax burden reaching 27% of the total cost, and Tanzania and Kenya follow closely with almost 26% and 25% tax in TCMO. Of this, the excise makes up over 9% of TCMO in Kenya and Uganda and 6% of TCMO in Tanzania (where the rate is lower).

For Rwanda, the figure includes the proposed excise duty. We note that. imposing this tax would increase the proportion of tax in TCMO. For instance, if a 10% excise tax were to imposed that tax as a proportion of TCMO would increase to 26% from the current level of 18%. Similarly, a 5% excise tax would increase the proportion to 22%.

Calculating TCMO as a proportion of GDP per capita gives a measure of affordability of mobile services for the average citizen. The following figure illustrates the observation that where mobile services are relatively more affordable, penetration rates tend to be higher, using a selection of African countries.

[5] 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.

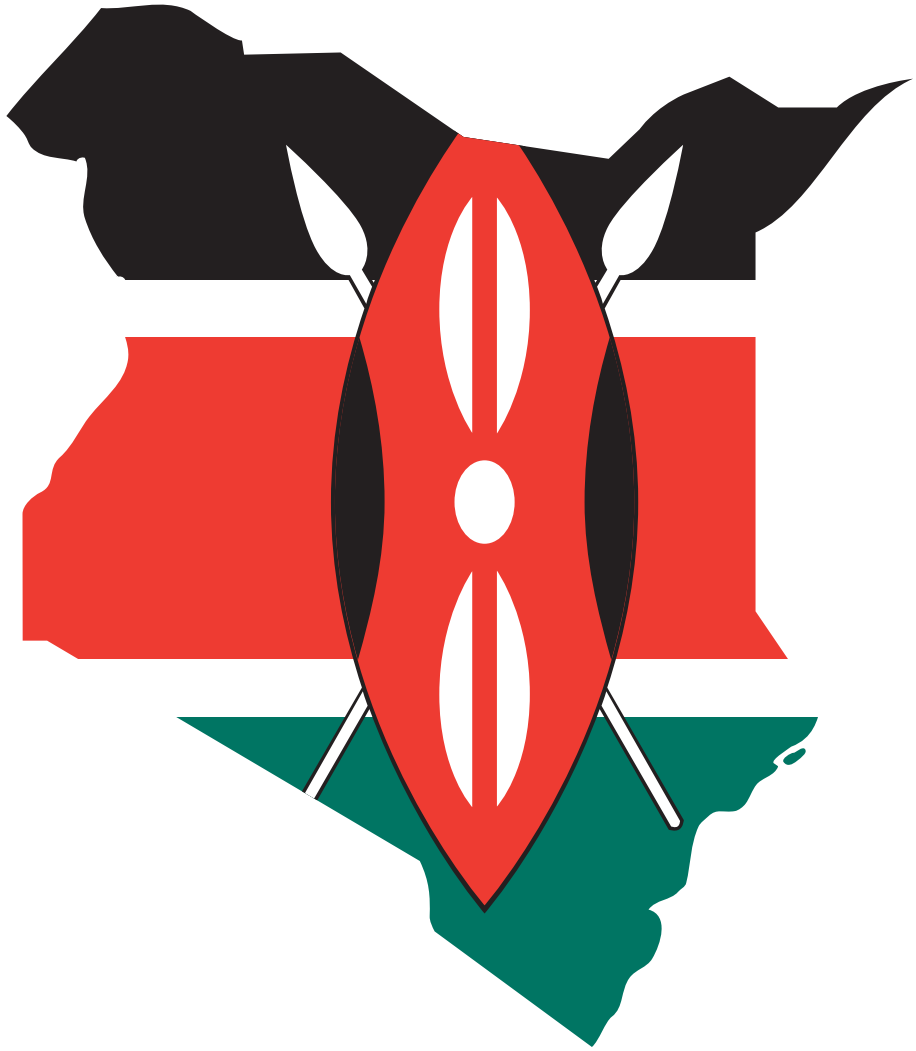
Figure 12: TCMO/GDP per capita, and penetration rates in selected African countries



Source: Wireless Intelligence and Deloitte analysis

GSMA ASSOCIATION

Taxation and the Growth of Mobile in Kenya



Executive Summary

5 Kenya: Executive Summary

The mobile communications sector has brought significant social and economic benefits to Kenya. Celtel and Safaricom have invested heavily, increasing population coverage from 23% to around 90% in just five years. There are over 6 million mobile subscribers, equating to a penetration rate of 19%. The number of mobile connections outnumbers fixed lines by 18 to 1. Mobile networks now reach many rural areas, revolutionising the way in which business is conducted and allowing social contact to be maintained much more easily among family and friends.

The cost of owning and using a mobile phone continues to fall. Safaricom's average international price has fallen by 70% this year and Celtel's One Network is delivering value to its customers through its lack of roaming charges within East Africa. Entry level handset prices continue to trend down.

The mobile communications industry contributed a total of KES 111,243m to the economy in 2006, representing more than 5% of total GDP. Around 200,000 Kenyans are employed by the mobile ecosystem. Increasing mobile penetration by 10% can increase annual Gross Domestic Product by 1.2%.

Despite the industry's significant contribution to Kenya's economic and social development, mobile consumers are subject to a sector specific tax of 10% on mobile usage. This increased from 5% to 10% in July 2003, though retail mobile tariffs have been falling in Kenya. The 10% excise duty is regressive, hitting poorer people harder and makes mobile communications less affordable for many millions of Kenyans.

By reducing the tax, more Kenyans will connect and use mobile services, tax receipts will increase in the medium to long term and GDP will rise. For example if the excise tax were halved in 2007, by 2017 total tax receipts could increase by up to 5%, with revenue neutrality achieved after 6 years. Penetration would also increase by 6% above the base case. Moreover Kenya's GDP could rise 1.3% or KES 33,845m.

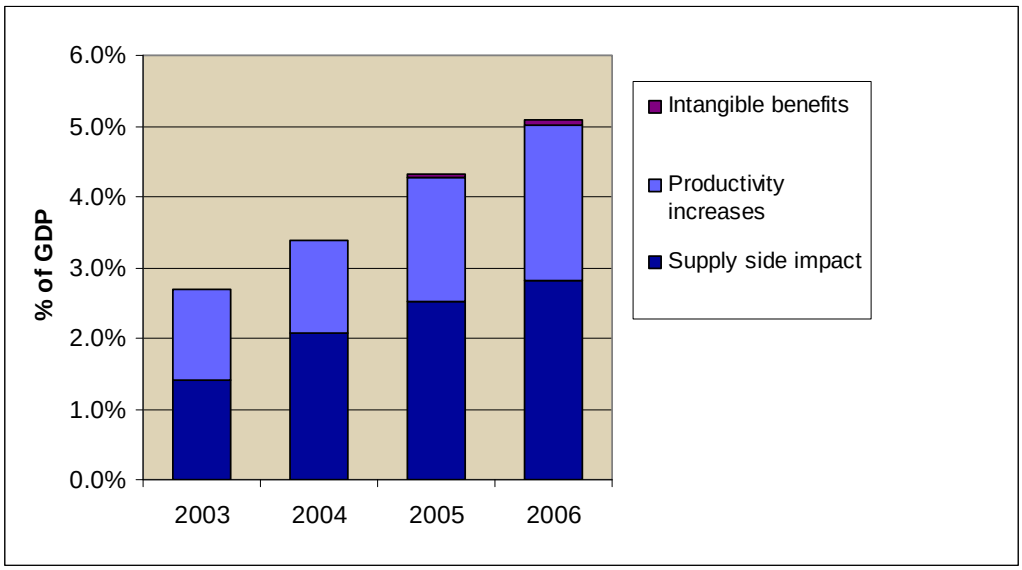
The "tiger" economies in Asia have placed telecommunications at the core of their economic development strategies. If Kenya is to follow a similar path it is imperative that the rapidly developing mobile communications sector is encouraged to continue operating as an engine of growth. The government should not limit this development through policies that restrain consumer demand for mobile services.

5.1 Economic benefit of mobile communications in Kenya

The mobile communications industry's economic contribution has increased by more than 150% from KES 44,031m in 2003 to KES 111,243m in 2006 of which about 30%, KES 33,200m, went to the government in tax revenues. The economic impact, now above 5% of GDP, can be expected to rise with mobile penetration.

Increasing mobile penetration should therefore be a cornerstone of the government's economic and fiscal policy.

Figure 13: Economic impact of mobile communications industry as a percentage of GDP

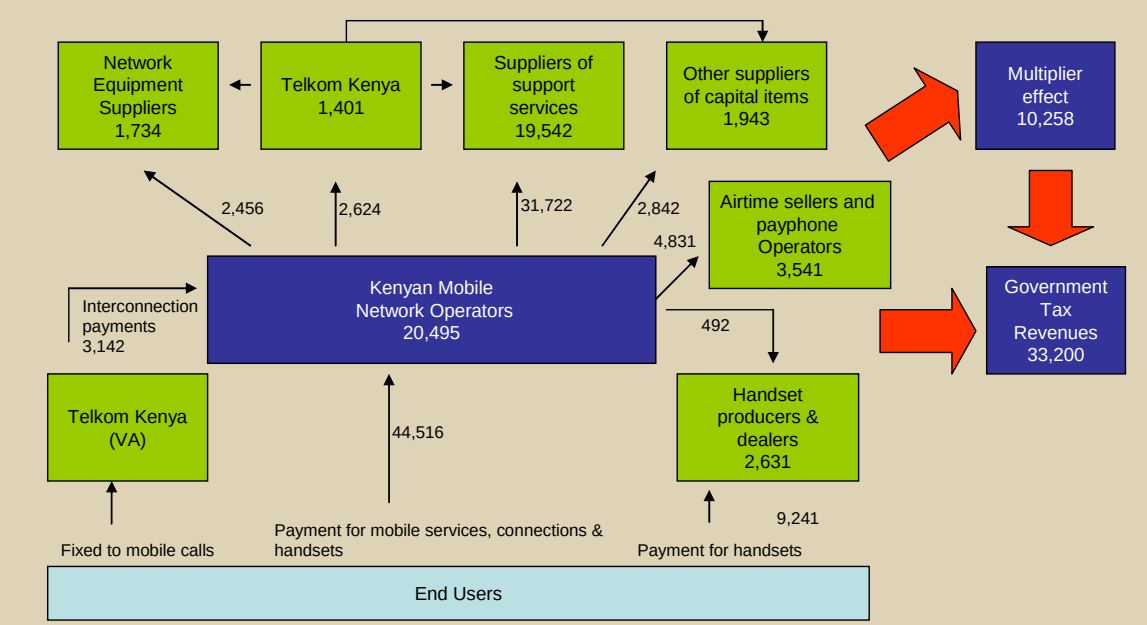


Source: Deloitte Analysis

Supply side impact of mobile communications

The supply side impact of mobile communications is derived from direct, indirect and multiplier[6] impacts. The revenue flows and value add for 2006 are presented below.

Figure 14: Mobile value chain in Kenya in 2006, KES millions



Notes:
(i) Revenue figures represent flows to domestic companies only and exclude all payments to international entities
(ii) Value add is specific to the Kenyan Economy and does not show international value add
(iii) From the revenue received by Telkom Kenya, domestic revenue flows to related industries are estimated as: Ksh 25m to network equipment suppliers; Ksh 0.9m to phone suppliers; Ksh 59m to other capital suppliers; and Ksh 740m to suppliers of support services

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

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

Demand side impact of mobile communications

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;
- 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;
- 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; and
- Mobile banking: Safaricom has recently 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.

Intangible benefits

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

- Promotion of social cohesion;
- Extension of communications to users with low education and literacy and on low incomes;
- Transferring wealth to poorer regions;
- Stimulating local content;
- Assisting in disaster relief; and
- Increased electricity rollout.

Employment creation

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.

Figure 15: Contribution to employment from the mobile value chain

Employment Impact	Number of employees	Number of employees including multiplier
Mobile network operators	1,792	2,151
Fixed telecommunications operators	716	860
Network equipment suppliers	504	604
Handset designers and dealers	1,724	2,069
Other suppliers of capital items	698	838
Suppliers of support services	21,983	26,380
Airtime commission, payphone commission	132,070	158,484
Total	**159,488**	**191,386**

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

5.2 Impact of reducing the excise taxes on usage

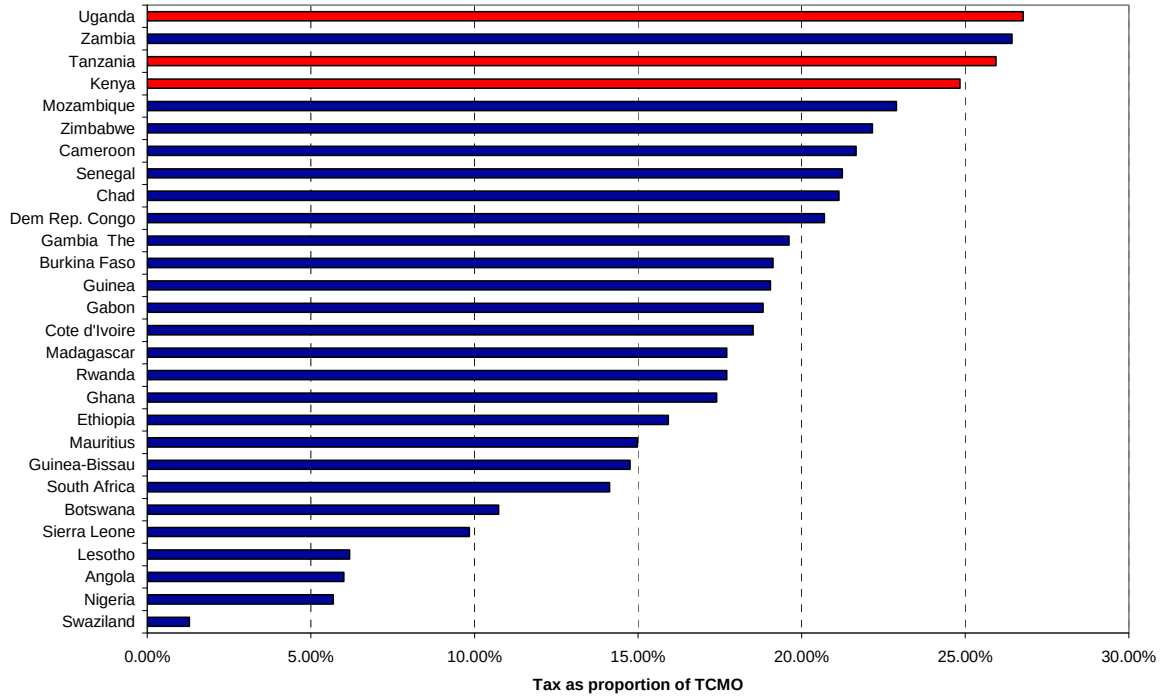
Despite the positive economic impact that mobile communications creates for the Kenyan economy, mobile consumers are subject to some of the highest taxes in Africa. The following figure illustrates the tax burden on mobile services as a percentage of the total cost of mobile ownership ("TCMO")[7]. The reason why members of the East African community are among the worst performers in terms of penetration is the presence of a specific excise tax levied on usage in these countries.

Mobile specific taxes are high and levied in only a handful of jurisdictions globally[8]. In Kenya, tax makes up almost 25% of TCMO, with the excise tax making up over 9% of the total.

[7] 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. Note, in the economic model, an assumption of 2 years for handsets is made.

[8] As identified in the GSMA's 2007 "Global Mobile Tax Review", only 16 out of the 101 jurisdictions considered in the report levy taxes specific to the mobile industry.

Figure 16: Tax as % of total cost of mobile ownership

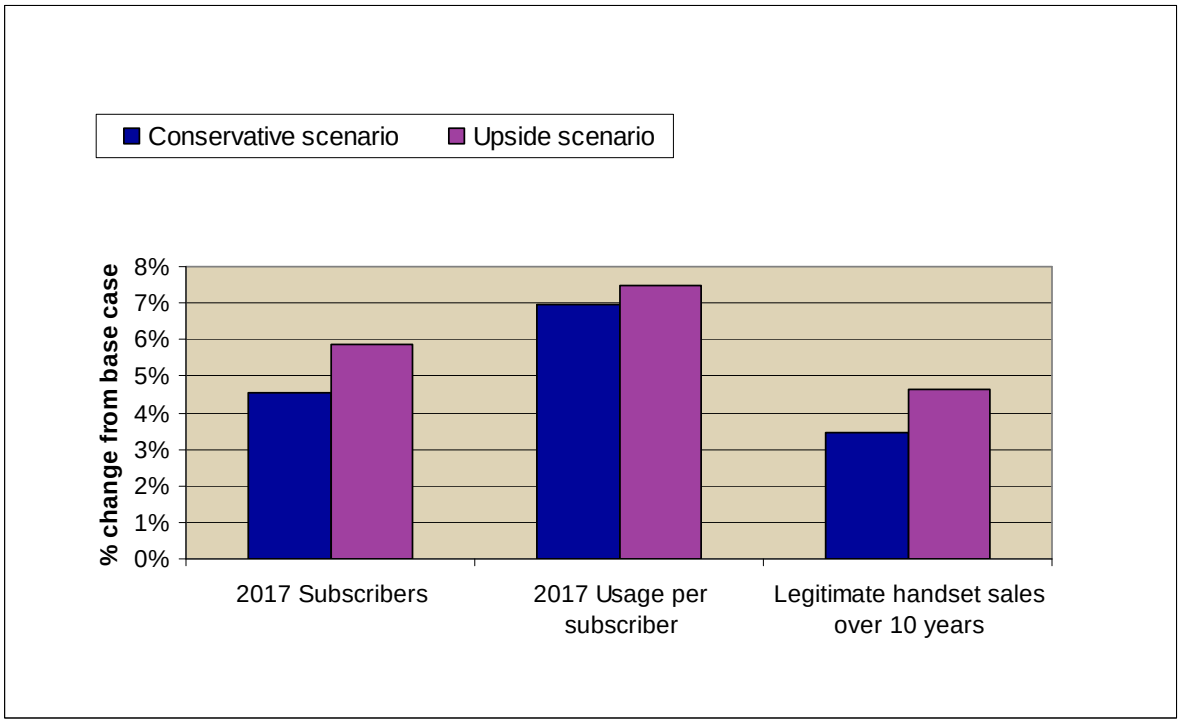


Source: Deloitte analysis

We have analysed the impact of reducing the excise duty applied on mobile usage in Kenya from 10% to 5%. We then compare the changes that result against our base case forecast which projects the development of the mobile industry to 2017 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 2007.

Figure 17: Impact of reduction in excise tax on usage on the mobile industry



Source: Deloitte analysis

The conservative scenario shows that total subscribers are likely to be 4.5% higher in 2017 at 12.4 million, representing mobile penetration of 27%.

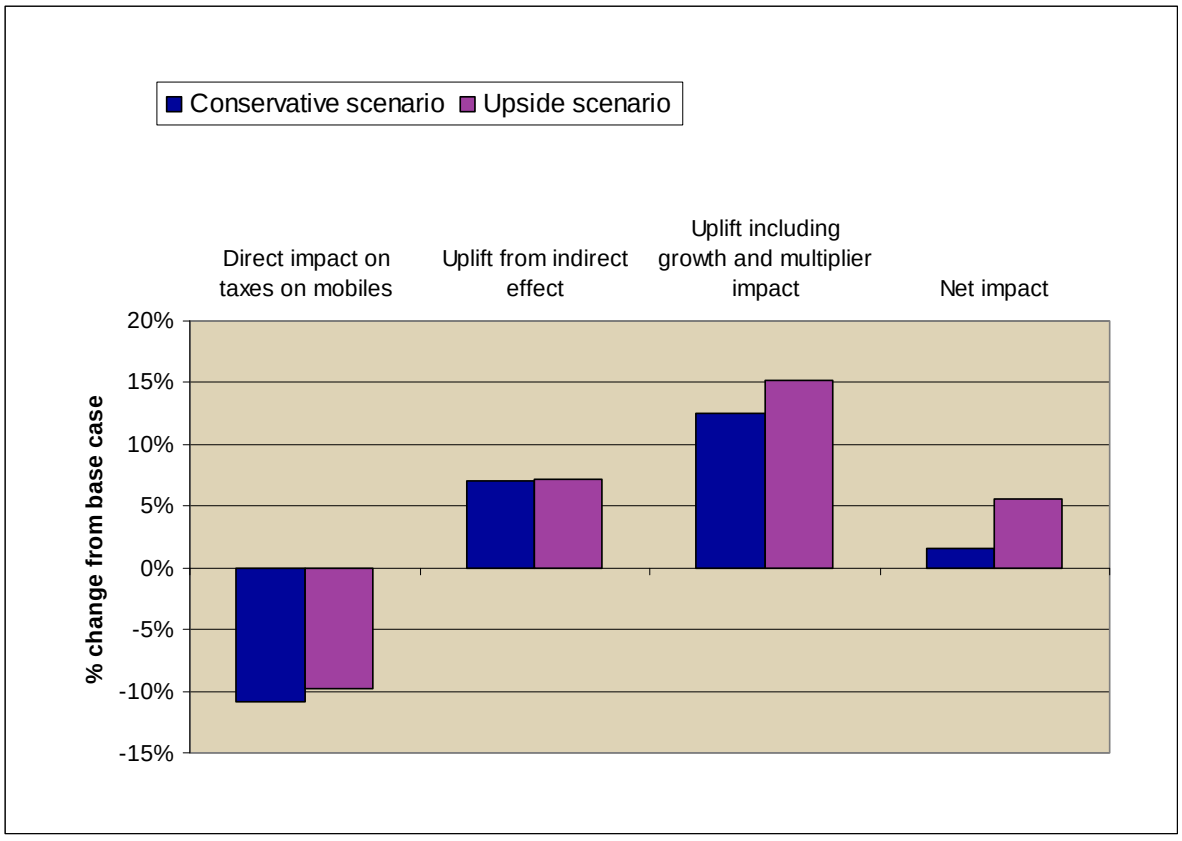
In the upside scenario, mobile penetration is estimated to be 5.9% higher in 2017, reaching 27.4%. The impact on usage is significant at almost 7% in the conservative scenarios and 7.5% in the upside scenario, given the elasticity of usage with respect to price of -0.94.

5.3 Impact on government tax revenues: once off reduction

The following figure shows the impact on government tax revenues 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.

Figure 18: Impact of reduction in excise tax on usage on Government tax revenues, 2007-2017



Source: Deloitte analysis

Lowering excise duty from 10% to 5% will be tax positive under both scenarios, with neutrality being achieved eight years after the tax reduction in the conservative case and after six years in the upside scenario. Over a 10 year period, we estimate that tax revenues could increase by as much as 1.6% in our conservative scenario and 5.5% in our upside scenario.

The analysis demonstrates that under upside assumptions, the complete removal of the excise tax on usage could be tax neutral to positive over the period to 2017 with an increase in tax revenues of as much as 3.4%.

5.4 Impact on government tax revenues: glide path

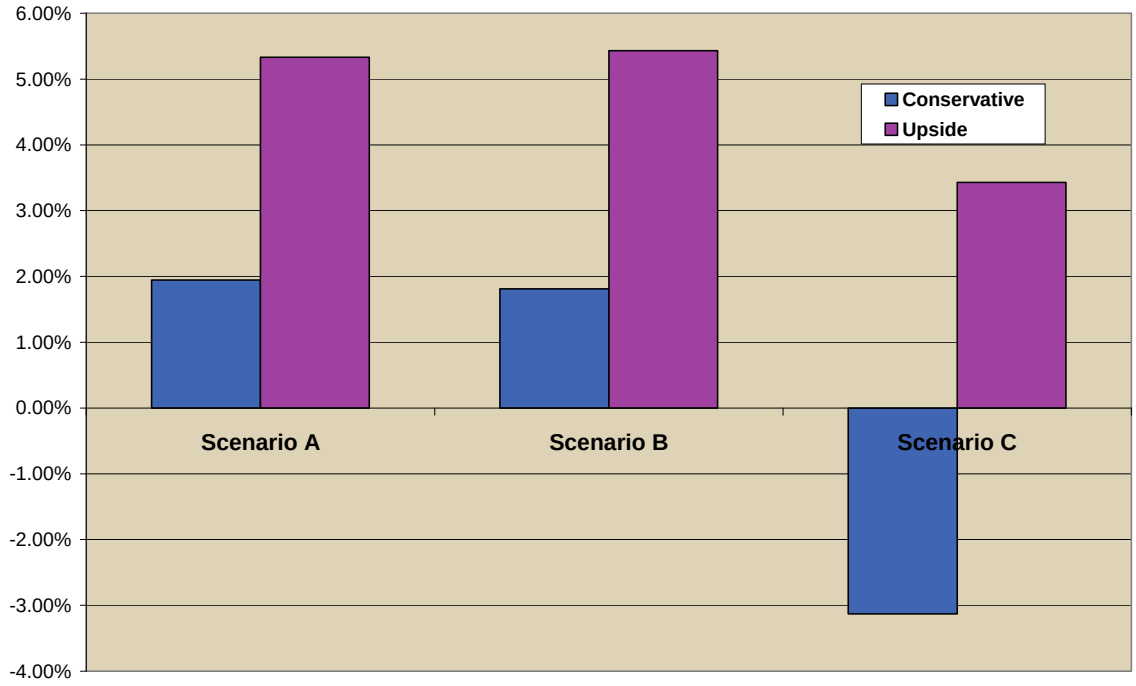
We also analysed the impact of reducing taxes gradually over a ten year period. Our three tax rate scenarios are presented in the table below.

Figure 19: Gradual reduction in excise tax scenarios

Scenario	Excise tax rate in each year										
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Scenario A	9%	8%	7%	6%	5%	5%	5%	5%	5%	5%	5%
Scenario B	9%	7%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Scenario C	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

Reducing the excise tax to 0% immediately may be tax positive in the upside case. A more gradual reduction in tax rates from 10% to 5% over the ten year period to 2017 leads to a higher tax positive result than both our original conservative case and upside case. The impact of each of the scenarios of government tax revenues is shown in the following figure.

Figure 20: Net impact on government revenues of reducing the excise tax gradually



Source: Deloitte analysis

The net effect on government revenues is 1.95% and 1.81% in the conservative case for scenarios A and B respectively. The respective figures for the upside case are 5.3% and 5.4%. As mentioned above, our analysis indicates that in the upside case, the net impact on government revenues of reducing the excise tax to 0% (Scenario C) can by positive, at 3.4%.

6 Kenya: Economic impact of mobile industry

We estimate that the mobile communications industry contributed a total of KES 111,243m to the economy in 2006, representing 5% of total GDP. This was a significant increase on the 2003 contribution of KES 44,031m.

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 validates this and we estimate that mobile communications has raised GDP growth rates in Kenya by 0.12% for each 1% increase in penetration. As such, the 5% increase in penetration rates between 2004 and 2005 may have contributed 0.6% to the Kenyan GDP growth rate.

6.1 Overview of mobile communications in Kenya

Mobile communications has a visible impact on the social and economic structures in Kenya. Celtel and Safaricom have undertaken significant investment in a network which now covers an estimated 90% of the population[9], with mobile connections outnumbering fixed lines by 19 to 1. There are over 7 million mobile subscribers and a penetration rate of 19%. 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.

6.2 Static Supply side impact of mobile communications

We have estimated the value add created by the mobile communications industry. Our estimate of this impact should be regarded as conservative as we have not been able to identify data to document the secondary impact from network equipment suppliers and certain other recipients of cash from the mobile operators. We have also estimated the leakages" from the system, i.e. what 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 Kenyan economy from the total international impact of the mobile communications industry.

6.2.1 Value chain impact

Firstly, we analysed the value add of the mobile network operators in Kenya. We find that they directly contribute KES 20,495m in 2006. The breakdown by category is provided in the figure below.

Figure 21: Value add of mobile network operators (excluding multiplier effect)

Value add (KES millions)	2003	2004	2005	2006
Employee wages and benefits	1,445	1,731	2,132	2,617
Contractors	3	-	37	34
Taxes and regulatory fees	5,501	9,391	13,104	16,197
CSR	286	286	286	451
Dividends	-	-	-	1,197
Total	**7,235**	**11,408**	**15,558**	**20,495**

Source: Deloitte analysis based on information provided by Celtel and Safaricom

Taxes and regulatory fees (including spectrum fees) make up the largest proportion in the above table, accounting for over 79% of the total in 2006. The next largest contributor is employee wages and benefits.

Corporate social responsibility (CSR) programmes received over KES 451m in 2006, including sponsorship of events. The figures for 2003 to 2006 do not include events sponsorship. CSR

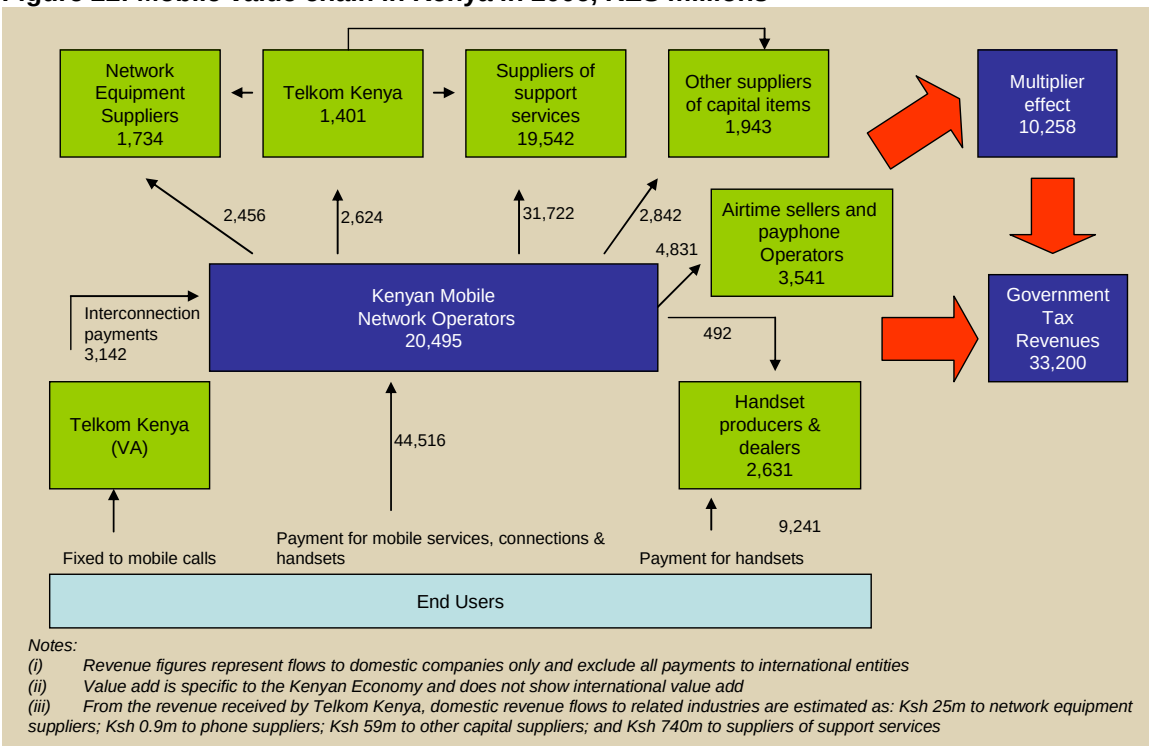
9 Data supplied by GSMA

initiatives include the Safaricom GPS elephant tracking programme, internet into schools and primary healthcare. CSR donations amounted to KES200m in 2006 with an additional KES 200m spent by the sponsorship committee. Celtel chooses a single area for CSR for each year, with education being the chosen programme in 2006. Celtel is expected to increase its CSR expenditure in 2007 as it sets CSR as 1% of profits.

Dividends were not paid by either company in the period 2003-2005 as any profit was reinvested in the network. In 2006, Safaricom paid a dividend of which 40% was paid to Vodafone (UK) and the remainder to Kenyan owners.

We then analysed the revenue flows from Safaricom and Celtel to others in the industry. We also sought to quantify the share of revenue that translated into value add[10]. Our primary source of information was interviews with operators and analysis of operator accounts. The figure below provides revenue flows between providers and estimates of value add. The estimates of value add include the multiplier effect on the wider-economy which is assumed to be 20% of value-add.

Figure 22: Mobile value chain in Kenya in 2006, KES millions



Notes:
(i) Revenue figures represent flows to domestic companies only and exclude all payments to international entities
(ii) Value add is specific to the Kenyan Economy and does not show international value add
(iii) From the revenue received by Telkom Kenya, domestic revenue flows to related industries are estimated as: Ksh 25m to network equipment suppliers; Ksh 0.9m to phone suppliers; Ksh 59m to other capital suppliers; and Ksh 740m to suppliers of support services

Source: Deloitte analysis based on information provided by Celtel 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 table below shows the calculation of value add.

[10] Details on value add margins are contained in the assumptions appendix

Figure 23: Calculation of value add from mobile communications in Kenya in 2006

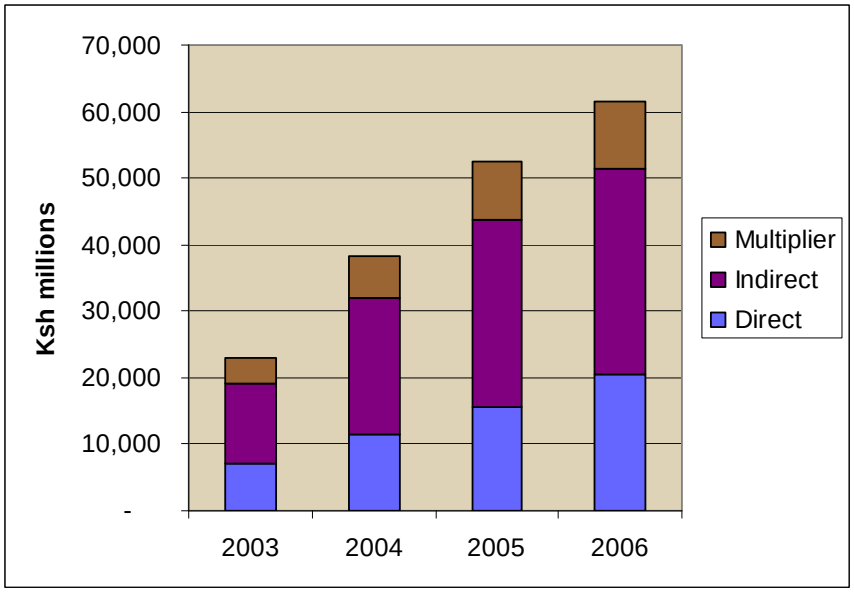
Domestic value add in 2006, KES millions	Total revenue	Domestic revenue	Domestic cost	Domestic value add	Value add with multiplier
Mobile network operators	47,659	47,659	27,163	20,495	24,595
Fixed telecom operators	2,624	2,624	1,223	1,401	1,681
Network equipment suppliers	11,998	2,457	722	1,734	2,081
Handset designers and dealers	10,899	9,733	7,102	2,631	3,158
Other suppliers of capital items	3,218	2,843	900	1,943	2,331
Suppliers of support services	32,903	31,722	12,180	19,542	23,451
Airtime & payphone commission	4,831	4,831	1,289	3,541	4,250
Total	**114,131**	**101,868**	**50,580**	**51,289**	**61,546**

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

80% of the revenue flows from the MNOs are estimated to remain in Kenya, however interconnection payments and airtime and payphone commissions dominate this figure[11]. It is estimated that only 35% of capital expenditure is domestic, primarily low-value non network equipment. Over 95% of support services are purchased from within Kenya, including legal services, marketing and advertising and outsourced network maintenance.

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

Figure 24: Supply side value add from mobile communications 2003 to 2006



Source: Deloitte analysis, calculated as in previous tables

Value add has increased by nearly 170% during the four year period.

[11] The relatively high value of airtime and payphone commissions is due to the fact that only 2% of airtime is sold directly by operators, with the remainder being sold by third parties.

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. We note that Celtel and Safaricom have recently been mandated to pay 1% of revenues into a universal service fund. We have included this contribution, based on 2006 revenue figures, into our tax revenue calculation set out below.

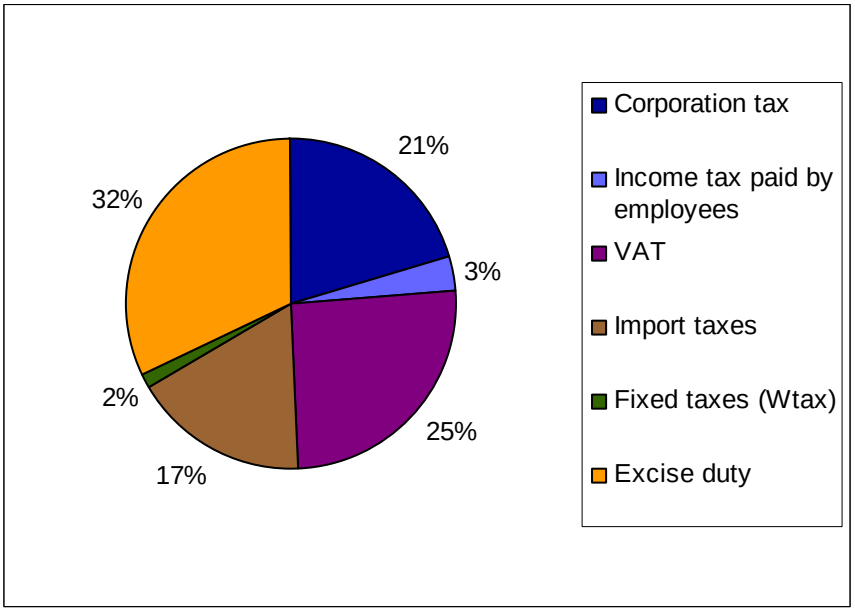
Figure 25: Tax revenues in Kenya from mobile operators

Taxes from mobile network operators, KES millions	2003	2004	2005	2006
Corporation tax	1,155	2,262	2,503	2,804
Income tax paid by employees	259	291	431	464
Sales and mobile specific taxes	3,262	5,360	8,157	10,352
Regulatory fees	824	1,478	2,012	2,577
Total taxes and fees	**5,501**	**9,391**	**13,104**	**16,197**
Tax as a percentage of revenue	**26%**	**30%**	**33%**	**34%**

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 2006, of these the excise tax on usage makes up around 32% of total tax paid in each of the four years. The breakdown for 2006 is illustrated in the figure below:

Figure 26: Breakdown of 2006 tax revenues from mobile operators by source



Tax as a proportion of company revenues averaged 34% in 2006, and this has been increasing steadily since 2003.

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 27: Total tax revenues from the mobile value chain in 2006

Tax Revenue, KES millions	Tax revenue	Tax revenue with multiplier
Mobile network operators	16,197	19,436
Fixed telecommunications operators	589	706
Network equipment suppliers	634	761
Handset designers and dealers	1,355	1,625
Other suppliers of capital items	721	865
Suppliers of support services	7,615	9,138
Airtime commission, payphone commission	558	669
Total	**27,667**	**33,200**

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 MNOs and not total tax revenues from the sector.

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, streetside airtime sellers do not. Interviews with operators, handset manufacturers and dealers revealed that many handsets are imported illegally from Dubai or are reconditioned / stolen. Therefore we assume that only 61% of handsets sold are subject to sales tax.

6.2.2 Impact on employment numbers

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.

Figure 28: Contribution to employment from the mobile value chain

Employment Impact	Number of employees	Number of employees including multiplier
Mobile network operators	1,792	2,151
Fixed telecommunications operators	716	860
Network equipment suppliers	504	604
Handset designers and dealers	1,724	2,069
Other suppliers of capital items	698	838
Suppliers of support services	21,983	26,380
Airtime commission, payphone commission	132,070	158,484
Total	**159,488**	**191,386**

Source: Operator data, interviews and Deloitte analysis on average wage rates. (Note this is employment directly created by revenue flows from the MNOs 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 60,000 streetside airtime outlets and 28,000 payphones.

The number of employees in other sectors is calculated 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.

6.2.3 Demand-side impact: increases in productivity and consumer surplus

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[12]:

- 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, and 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[13];
- Improving efficiency of mobile workers: mobile services improve the efficiency of all workers in the economy. Workers with unpredictable schedules, for example those involved in repair and maintenance, or collection and delivery, will particularly feel this effect. Mobiles will give them greater accessibility and better knowledge of demand; and
- 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

12 See, for example, "Africa: The Impact of Mobile Phones", Vodafone Policy Paper Series, No.3, March 2005.

13 "Africa: The Impact of Mobile Phones", Vodafone Policy Paper Series, No.3, March 2005.

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. These included:

- 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 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; and
- 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. 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 Kenya and, in the time available to us, we have not been able to quantify the impact of these gains[14]. 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".

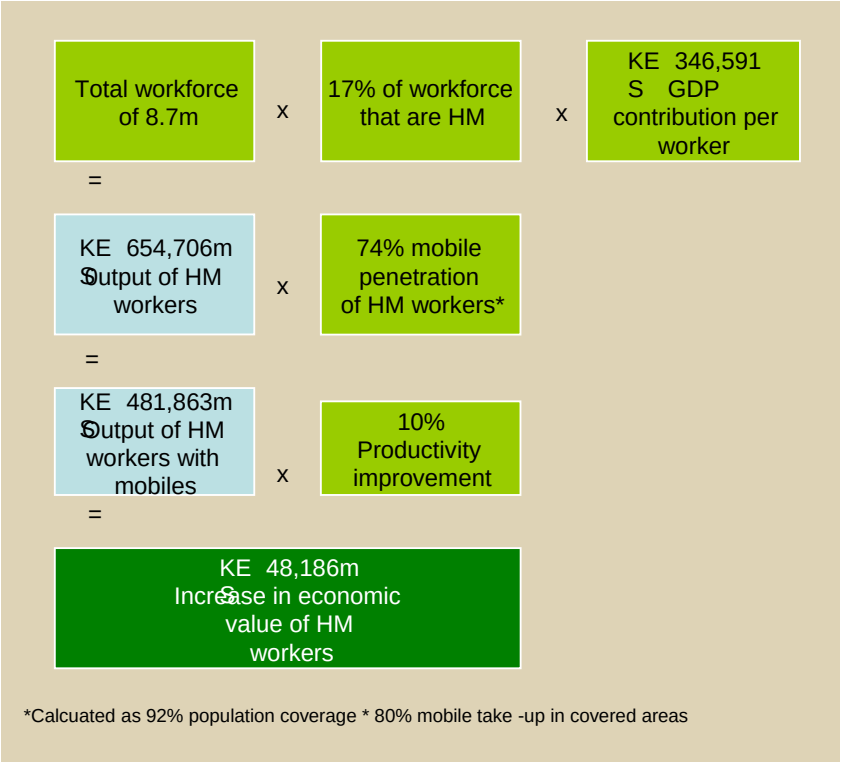
Other surveys have typically quantified productivity improvements to be between 6% and 11%. For example Mckinsey quantified the impact to be 6% in China, whilst the impact in the UK has been estimated to be both 6% and 11%. Based on our interviews, it may be assumed that the productivity increase in Kenya would be at the high-end of this range since:

- Interviewees have all reported on the dramatic impact that mobile telephony has had on the Kenyan 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 of the UK and China;
- Higher levels of informal activity imply greater need for co-ordination between individuals since there is less formal communication at the company level; and
- Kenya is more rural than the UK so the travel-time savings are likely to be greater.

We therefore assume high mobility workers who own a mobile phone have experienced a productivity gain of 10%. Using the economic value concept that we set-out in Section 15, we estimate the incremental impact on the economy was KES 48,186m 2006. This calculation is set out below. We have not considered the impact on low mobility workers in our analysis.

14 Quantification would require consumer and business surveys to be undertaken

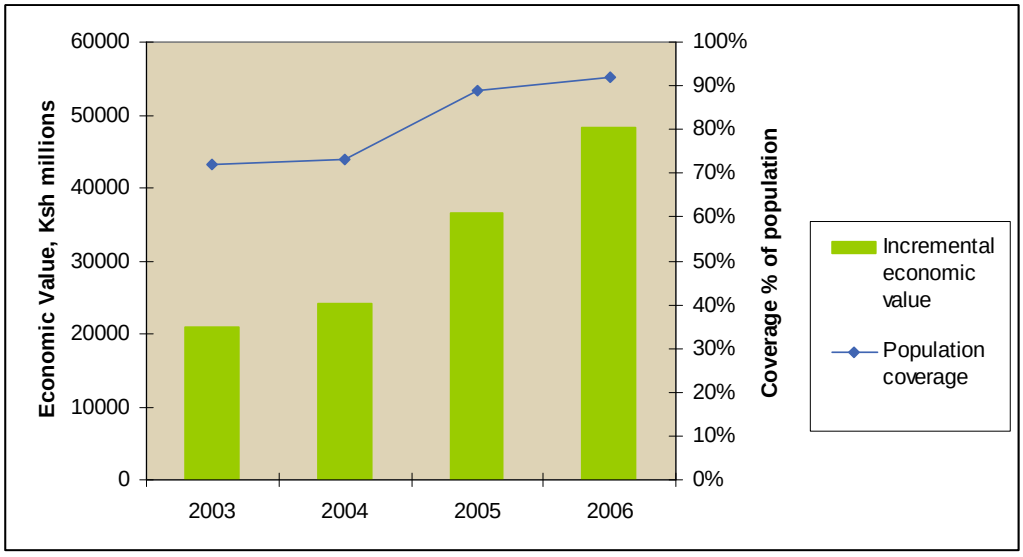
Figure 29: Economic impact in 2006 of increased productivity amongst high mobility workers



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

Our calculations show large increases in productivity between 2003 and 2006. These are driven by the increase in population coverage that allows a greater proportion of high mobility workers to access mobile technology.

Figure 30: Economic value from increases in productivity, 2003 to 2006



Source: Deloitte analysis. Population coverage calculated by GSMA

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)[15] relating to Tanzania. Benefits identified in Kenya include:

- 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;
- 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;
- 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; and
- 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[16]. 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). The total increase in consumer surplus has been calculated as KES 1,150m.

Figure 31: Calculation of intangible benefits using willingness to pay concept

Willingness to pay, KES m	**2003**	**2004**	**2005**	**2006**
Average annual ARPU minus current ARPU	507	407	-	-
New Subscribers	1,900,396	3,245,687	5,094,000	6,205,000
Value add	962,648,538	547,094,560		-
Cumulative value add (KES millions)	**963**	**1,510**	**1,510**	**1,510**

Source: Deloitte calculation based on operator information

These estimates are conservative and are likely to underestimate the true value of intangible benefits since:

15 The specific article referenced is "Linking mobile phone ownership and use to social capital in rural South Africa and Tanzania"

16 Used by McKinsey in "Wireless Unbound", 2006

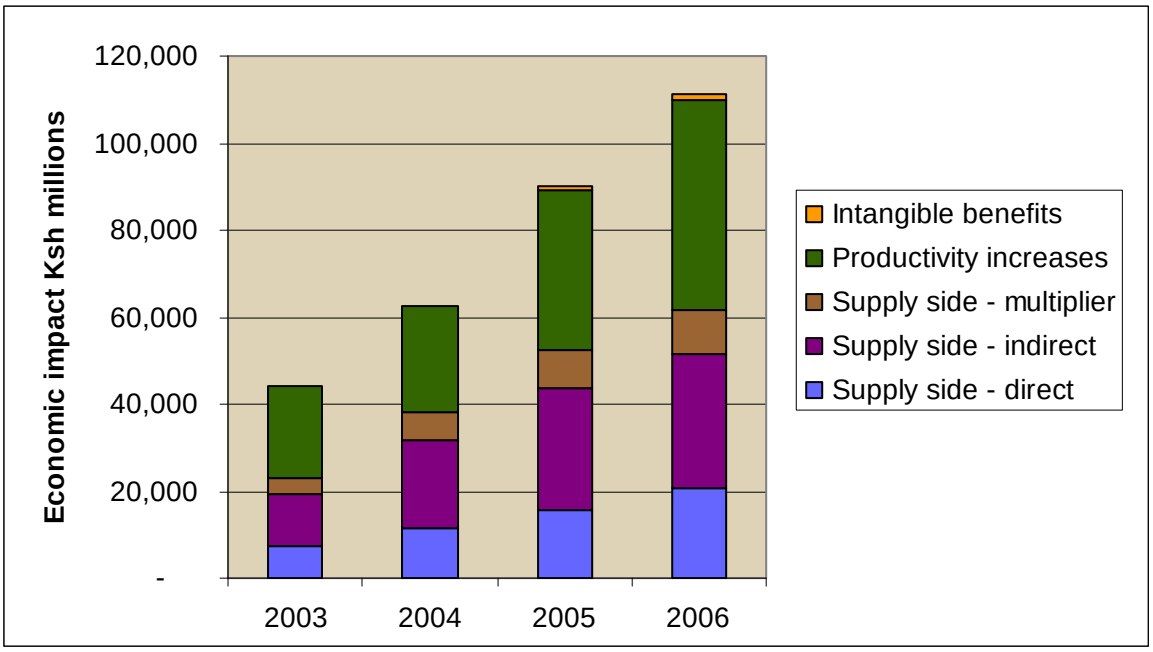
- Due to data limitations, it assumes that all subscribers joined the network in 2003 and does not account for the increased willingness to pay that would have resulted from the higher ARPUs in early years; and
- The calculation assumes that the number of subscribers in each year is a function of price. 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 is likely to be an underestimation of the true value of mobile communications.

6.2.4 Total impact on economic welfare

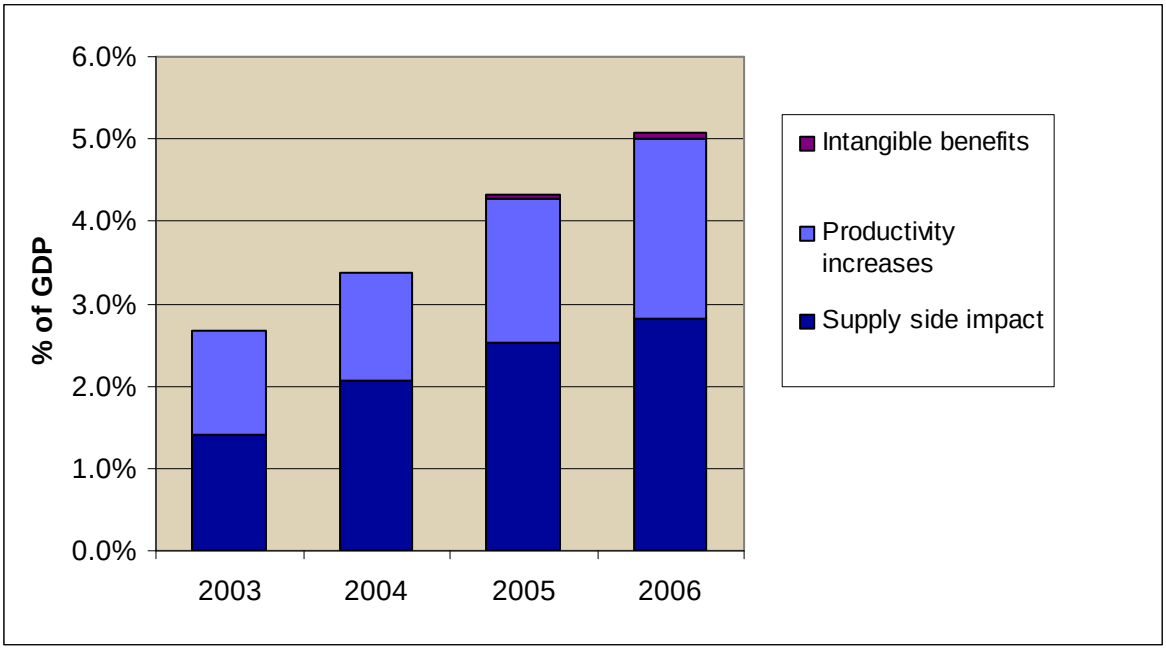
The aggregation of the supply-side, demand side and intangible benefits provides an indication of the total economic impact of mobile communications in Kenya. This is estimated to be KES 111,243m in 2006. The biggest contributors are the direct and indirect supply side impacts and the demand side productivity increases. There has been a substantial increase in the economic impact in 2006

Figure 32: Economic impact of mobile communications in Kenya (KES millions)



The impact of mobile communications on GDP has been substantial. We estimate that the total economic impact of mobile communications was 2.7% of GDP in 2003 increasing to 5.1% of GDP in 2006.

Figure 33: Economic impact as a percentage of GDP



Source: Aggregation of previously calculated effects

6.3 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 economic growth rate. The 5% increase in penetration rates between 2004 and 2005 may have contributed 0.6% to the Kenyan GDP growth rate.

6.4 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 more than 5% of GDP. 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 Kenya is to continue in its economic development, it is imperative that this rapidly developing mobile communications sector is encouraged to continue operating as an engine of growth. In particular, government policy should not limit this development through policies which may restrain consumer demand for mobile services.

7 Kenya: Impact of reducing excise duties

In this section we present the results of our 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.

7.1 Our scenarios for analysis

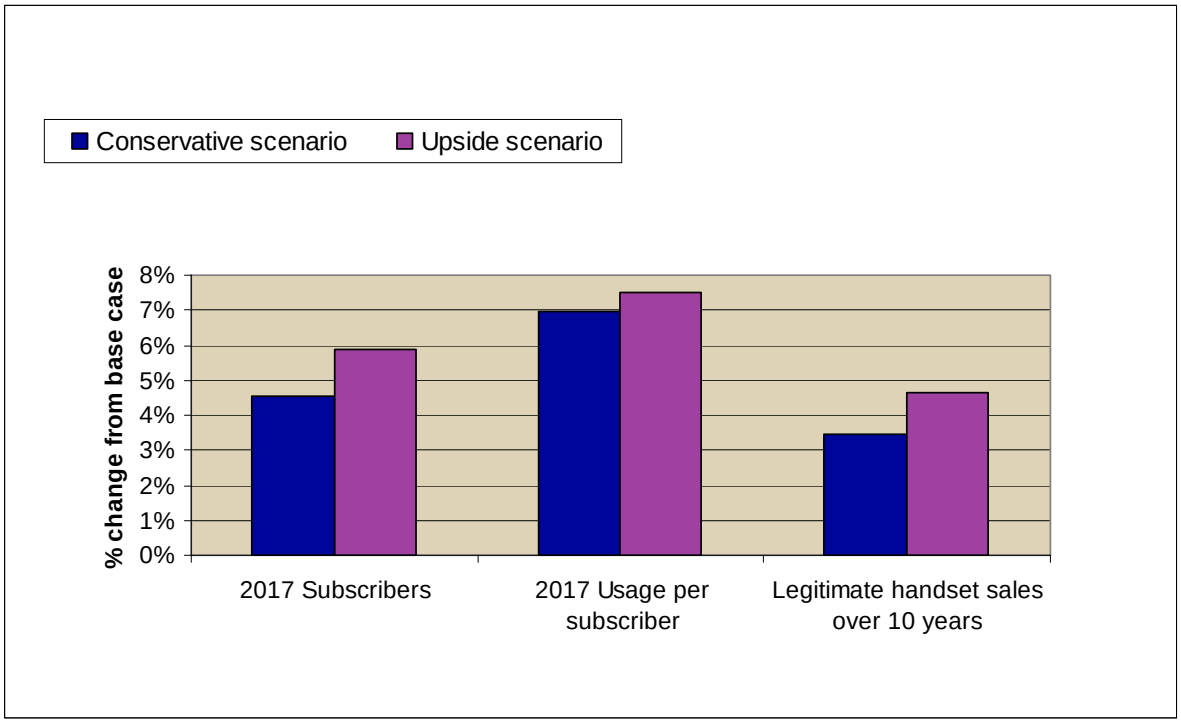
Using the model and assumptions outlined in Section 16 of the report, we have analysed the impact of reducing excise duty applied on mobile usage to 50% of its current value, i.e. 5%. We then compare the changes that result against our base case forecast.

Our conservative scenario involved using the mid-point elasticity of penetration with respect to rate per minute of -0.4, a network effect of 0.3% and using a value-add multiplier of 1.2. In addition, we consider an upside scenario, where the penetration elasticity is higher, at -0.6, the network effect is 0.35% and our multiplier is 1.5.

7.2 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 2007.

Figure 34: Impact of reduction in excise tax on usage on the mobile industry



Source: Deloitte analysis

Our conservative scenario shows that the number of subscribers is likely to be over 4.5% higher than the base case in 2017 at 12.4 million, representing penetration of 27%. Using a higher penetration elasticity in the upside scenario, there is an impact of nearly 6%. The increase in penetration drives the increase in legitimate handset sales.

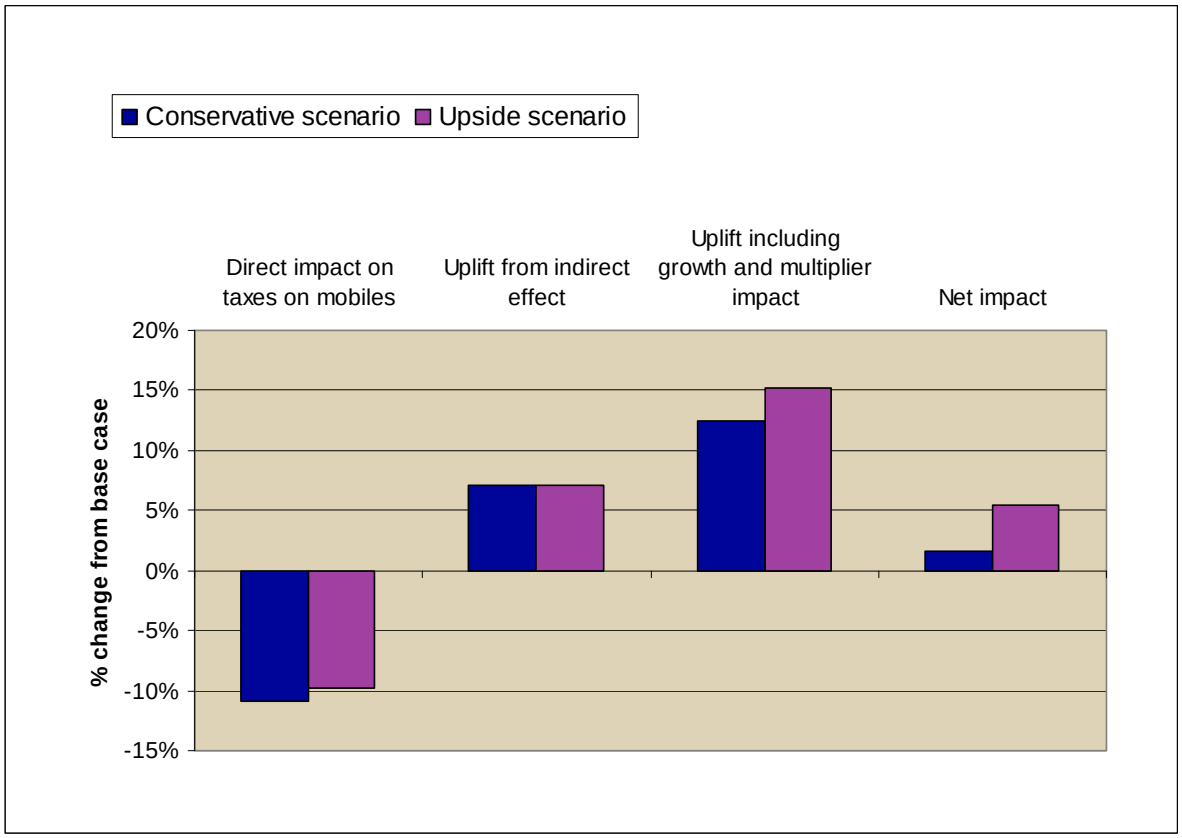
The impact on usage in the conservative scenario is significant at 7% given the elasticity of -0.94. This represents 2.2 extra minutes of use per user per month, or 1.4 extra texts. The impact on usage in the upside scenario is 7.5%. The difference in usage increase between the conservative and upside scenario is due to the higher network effect assumed in the upside case.

7.3 Impact on Government tax revenues

The following figure shows the impact, over the 10 years to 2017, 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.

Figure 35: Impact of reduction in excise tax on usage on Government tax revenues



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 over 10% in the conservative scenario and slightly less in the upside. This impact consists of the impact on VAT and revenues from the excise tax itself. Though the reduction in the excise tax leads to a loss in government revenues due to a lower rate being applied, 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% in the conservative scenario and by 9.6% in the upside scenario over the period. Revenues from excise taxes fall by 46% in the conservative scenario and by 45% in the upside scenario, showing that following the 50% tax cut, the increased volumes create a compensating effect of 4% and 5% respectively 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, resulting from the fact that their revenues and profits will increase following the tax reduction. In the conservative case, company revenues

increase by 8%, while in the upside scenario company revenues increase by 9.5%, driving the change in these additional tax revenues;

- **Uplift including growth and multiplier impact:** This relates to the dynamic impact on GDP resulting from our calculated 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 12% in the conservative scenario and to over 15% in the upside scenario. The higher impact in the upside scenario is a result of the use of a multiplier of 1.5 in this scenario; and
- **Net impact**: Combining the effects on tax revenues, the net result is positive in both scenarios at 1.6% in the conservative scenario, and 5.5% in the upside scenario. A neutral position is reached eight years following the tax reduction in the conservative scenario and after six years in the upside.

We also analysed the impact of reducing taxes gradually over a ten year period. Our three tax rate scenarios are presented in the table below.

Figure 36: Gradual reduction in excise tax scenarios

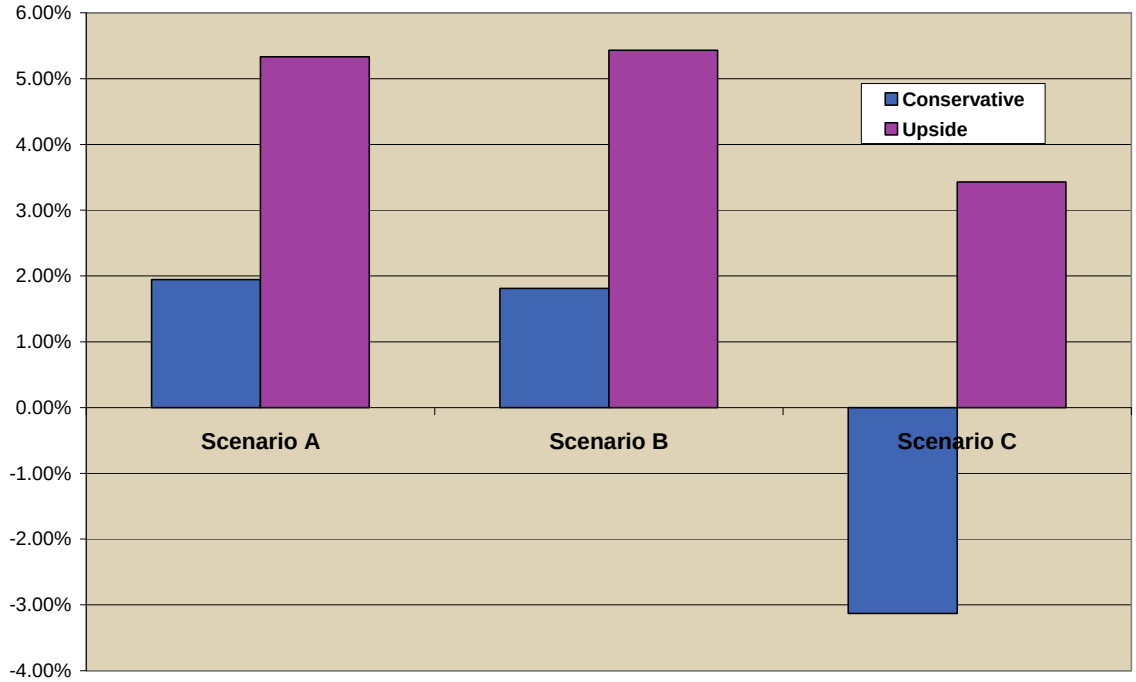
Scenario	Excise tax rate in each year										
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Scenario A	9%	8%	7%	6%	5%	5%	5%	5%	5%	5%	5%
Scenario B	9%	7%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Scenario C	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

A more gradual reduction in tax rates from 10% to 5% over the ten year period to 2017 leads to a higher tax positive result than both our original conservative and upside cases..

Our model suggests that under the higher assumptions for elasticity and the multiplier, the complete removal of the excise tax on usage could be tax neutral to positive over the period to 2017.

The impact of each of the scenarios of government tax revenues is shown in the following figure.

Figure 37: Net impact on government revenues of reducing the excise tax gradually over time



Source: Deloitte analysis

The net effect on government revenues is 1.9% and 1.8% in the conservative case for scenarios A and B respectively. The respective figures for the upside case are 5.3% and 5.4%. As mentioned above, our analysis indicate that in the upside case, the net impact on government revenues of reducing the excise tax to 0% (Scenario C) can by positive, at 3.4%.

7.4 Conclusions

Our analysis shows that the impact of reducing the excise tax on usage to 5% will be significantly tax positive over a 10 year period, with neutrality achieved after eight years in the conservative scenario and six years in the upside scenario. Under the upside scenario, the complete removal of the excise tax could potentially be tax neutral to positive.

Though significant tax revenues are lost in the short term, the increased tax revenues resulting from the growth in the industry, related industries and the economy as a whole compensate these for. We believe that our conservative assumption has used conservative estimates of both elasticity of demand and the multiplier effect, and hence there could be more of a positive net impact as identified in the upside scenario. In addition, our tax model does not capture the intangible benefits of the mobile industry that would grow in line with the increased penetration and usage.

Taxation and the Growth of Mobile in Rwanda



Executive Summary

8 Rwanda: Executive Summary

The mobile communications sector has brought significant social and economic benefits to Rwanda. MTN Rwandacell, the sole mobile operator in Rwanda, has invested heavily bringing the percentage of the population covered by mobile to over 80%, with mobile connections outnumbering fixed lines by 18 to 1. There are currently 350,000 mobile subscribers, equating to a penetration rate of 4%, which is significantly below Rwanda's longer term potential.

The mobile communications industry contributed a total of RWF 45,619m to the economy in 2006, representing approximately 3.5% of total GDP. Some 30,000 Rwandans are employed by the mobile and related industries. Despite this contribution, it is currently proposed that a new excise tax will be levied on usage. The precise level of tax is currently undetermined, but could be as high as 10%17. The proposed excise duty would be regressive, hitting poorer consumers the hardest as their spending on mobile services is likely to represent a higher proportion of their income.

Increasing the prices faced by customers by imposing this new tax on usage will prevent the market reaching its full potential. MTN has forecasted that the mobile market could grow to 1.5 million subscribers, a penetration level of 17%, in five years time. Achieving this will have a significant impact on the Rwanda economy; a 10% increase in mobile penetration can increase Rwanda's GDP by 1.2%. Increasing, rather than constraining, mobile penetration should therefore be a cornerstone of the government's economic and fiscal policy.

Since the exact level of the tax has not been determined, we have analysed the impact on mobile take-up and government tax revenue of imposing a 5% tax on usage. This is also consistent with our tax scenarios analysis for the other EA countries[18]. By imposing a 5% excise duty of mobile usage, net tax revenues in Rwanda will decline compared to our base case forecasts if no new tax were imposed. Moreover there would be a lost opportunity of GDP growth of 1% or RWF 21,047m.

The "tiger" economies in Asia have placed telecommunications at the core of their economic development strategies. If Rwanda is to follow a similar path it is imperative that the rapidly developing mobile communications sector is encouraged to continue operating as an engine of growth. The government should not limit this development through policies that may restrain consumer demand for mobile services.

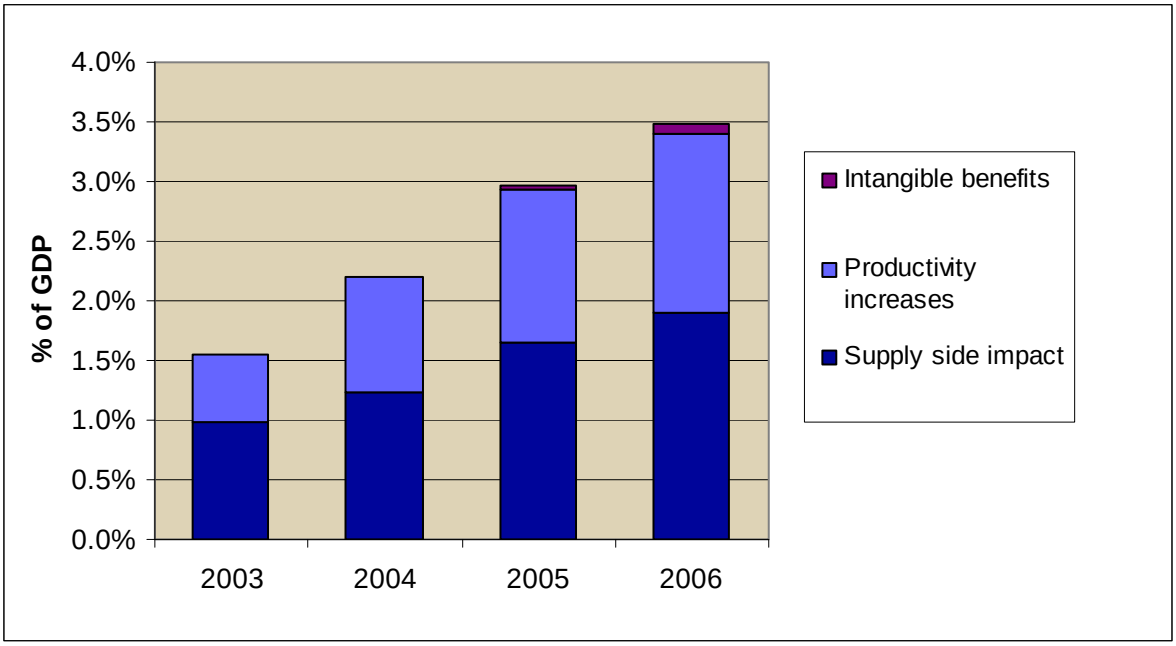
8.1 Economic benefit of mobile communications in Rwanda

The mobile communications industry's economic contribution has increased by more than 125% from RWF 20,352m in 2003 to RWF 45,619m in 2006 of which about 36%, RWF 16,585m, went to the government in tax revenues. The economic impact can be expected to rise steadily with mobile penetration.

[17] In the following graphs, we illustrate the impact of a 10% tax on TCMO, however we note the actual tax imposed may be lower than this since the exact level has not been legislated.

[18] Apart from Uganda, where the tax is currently the highest at 12%, and our analysis is based on a reduction to 8%.

Figure 38: Economic impact of mobile communications industry as a percentage of GDP

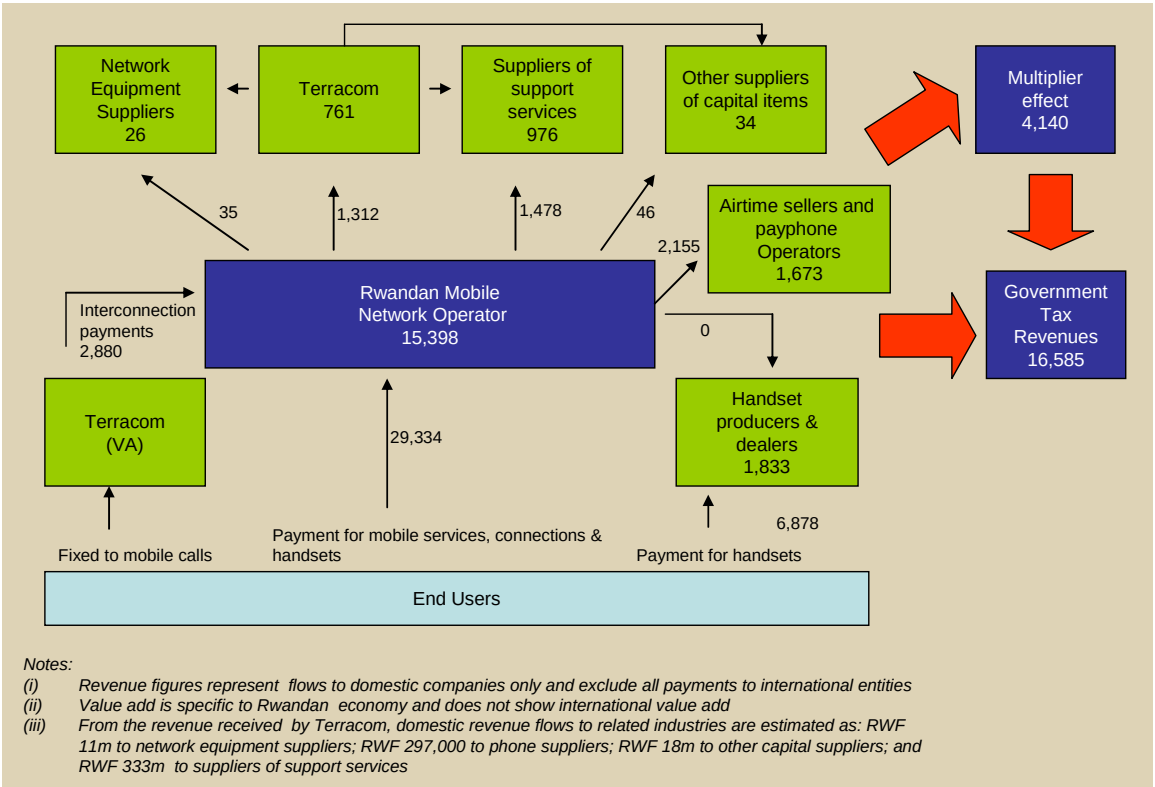


Source: Deloitte Analysis

Supply side impact of mobile communications

The supply side impact of mobile communications is derived from direct, indirect and multiplier [19] impacts. The revenue flows and value add for 2006 are presented below.

Figure 39: Mobile value chain in Rwanda in 2006, RWF millions



Notes:
(i) Revenue figures represent flows to domestic companies only and exclude all payments to international entities
(ii) Value add is specific to Rwandan economy and does not show international value add
(iii) From the revenue received by Terracom, domestic revenue flows to related industries are estimated as: RWF 11m to network equipment suppliers; RWF 297,000 to phone suppliers; RWF 18m to other capital suppliers; and RWF 333m to suppliers of support services

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

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

Demand side impact of mobile communications

We did not conduct 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; and
- Innovation and learning: the launch of GPRS has enabled workers, and in particular farmers, to use the internet to learn about new production techniques.

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.

8.2 Impact of introducing the excise taxes on usage

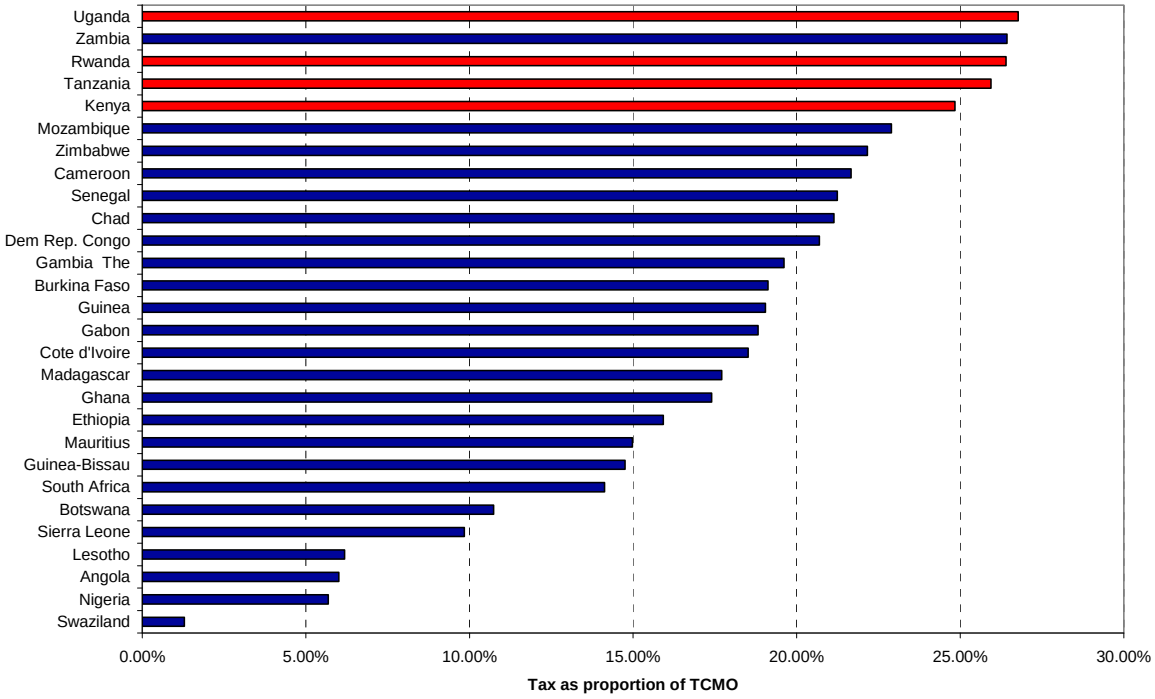
Despite the positive economic impact that mobile communications creates for the Rwandan economy, the Government has proposed to levy a new tax on mobile usage. This would substantially increase the cost of mobile services, and prevent mobile penetration and its impact on the economy, from reaching its full potential.

The following figure illustrates the tax burden on mobile services as a percentage of the total cost of mobile ownership ("TCMO")[20]. The reason why members of the East African community are among the worst performers in terms of penetration is the presence of a specific excise tax levied on usage.

The graph includes the impact of a 10% excise duty in Rwanda. Currently in Rwanda, tax makes up over 18% of TCMO. Imposing an excise tax on usage at a 10% level would increase the proportion of tax in TCMO to 26%, which would make Rwanda one of the most highly taxed countries in Africa in terms of taxes on mobile services. Imposing an excise tax of 5% would still raise tax as a proportion of TCMO to 22% and make the tax rate in Rwanda well above the African average.

[20] 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. Note, in the economic model, an assumption of 2 years for handsets is made.

Figure 40: Tax as percentage of total cost of mobile ownership



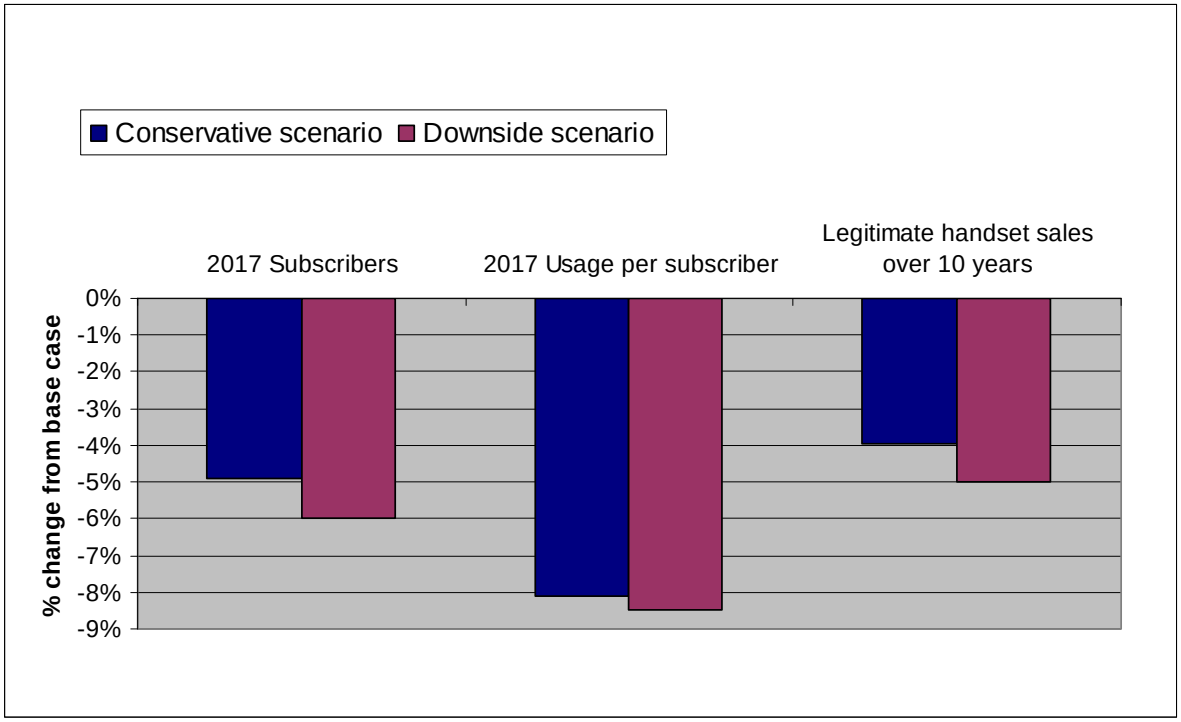
Source: Deloitte Analysis

As identified in the GSMA's 2007 "Global Mobile Tax and the Digital Divide", only 16 out of the 101 jurisdictions considered in the report levy taxes specific to the mobile industry.

We have analysed the impact of introducing an excise duty of 5% on mobile usage in Rwanda.

We compare the changes that result against our base case forecast which projects the development of the mobile industry to 2017 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 2007.

Figure 41: Impact of introducing an excise tax on usage on the mobile industry



Source: Deloitte analysis

Our conservative scenario shows that total subscribers are likely to be nearly 5% lower in 2017, representing mobile penetration of 24.6% (compared to our base case forecast of 26.0%). In the downside scenario, total subscribers can be 6% lower in 2017.

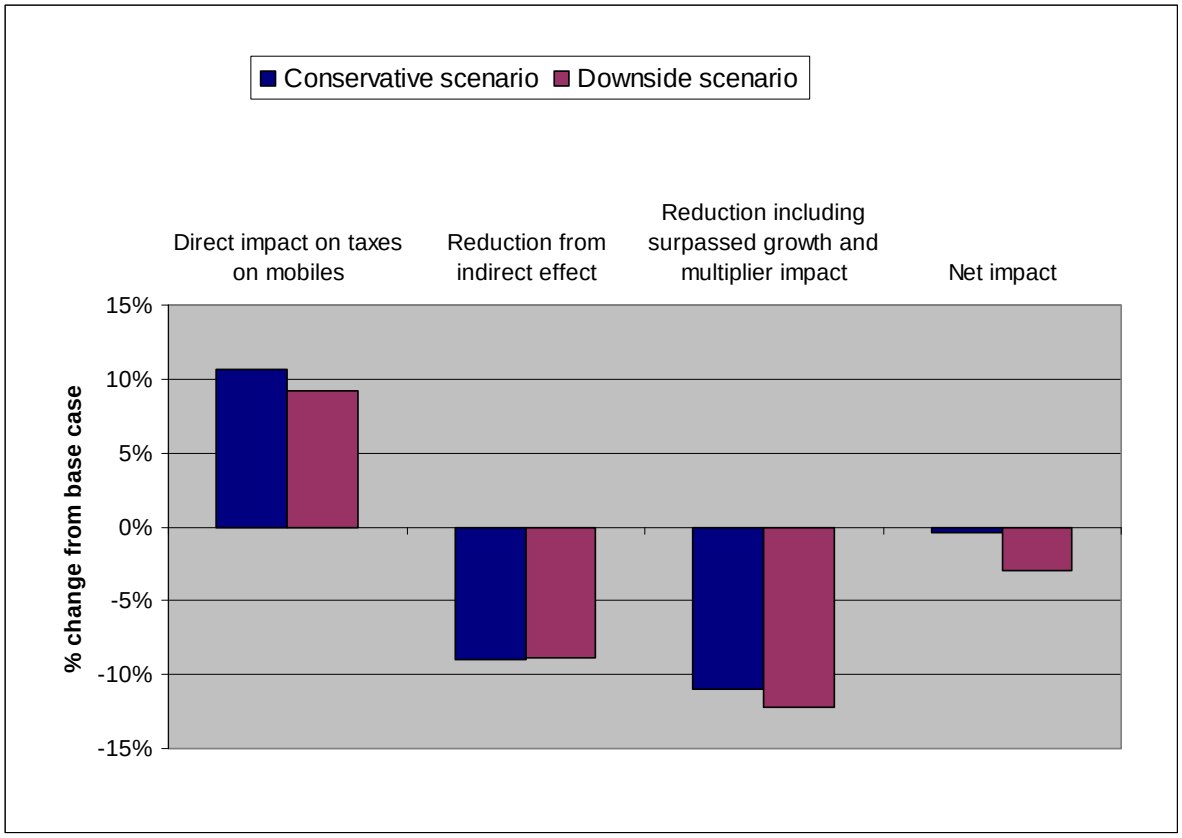
In the conservative scenario, the impact on usage is significant at over negative 8% given the elasticity of usage with respect to price of -1.05., while in the downside scenario the negative impact on usage is 8.5%. The difference between the conservative and the downside scenarios is due to the different network effect assumed in the two cases.

8.3 Impact on Government tax revenues

The following figure shows the impact on government tax revenues split into:

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

Figure 42: Impact of introducing an excise tax on usage on Government tax revenues, 2007-2017



Source: Deloitte analysis

The overall impact is that these tax changes are likely to be tax negative under both of our scenarios.

9 Rwanda: Economic impact of mobile industry

We estimate that the mobile communications industry contributed a total of RWF 45,619m to the economy in 2006, representing approximately 3.5% of total GDP. This was a significant increase of more than 125% on the 2003 contribution of RWF 20,352m. At 4% of population, mobile penetration rates in Rwanda are significantly below their longer term potential and this 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 validates this and we estimate that mobile communications has raised GDP growth rates in Rwanda by 0.12% for each 1% increase in penetration. As such, the 2% increase in penetration rates between 2003 and 2006 may have contributed 0.24% to the Rwandan GDP growth rate.

9.1 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 18 to 1. There are over 350,000 mobile subscribers and a penetration rate of 4%. 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.

9.2 Operator participation in the economic impact study

MTN Rwanda, currently the sole mobile operator in Rwanda, provided us with data for this study.[21]

9.3 Static Supply side impact of mobile communications

We have estimated the value add created by the mobile communications industry in Rwanda. Our estimate of this impact should be regarded as conservative as we have not been able to identify data to document the secondary impact from network equipment suppliers and certain other recipients of cash from the mobile operators. 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.

9.3.1 Value chain impact

Firstly, we analysed the domestic value add of the mobile network operators in Rwanda. We find that they directly contribute RWF 15,398m in 2006. The breakdown by category is provided in the following figure.

[21] The incumbent fixed-line operator Rwandatel, recently renamed Terracom, also has a mobile licence although it has yet to launch services in the country

Figure 43: Value add of mobile network operators (excluding multiplier effect)

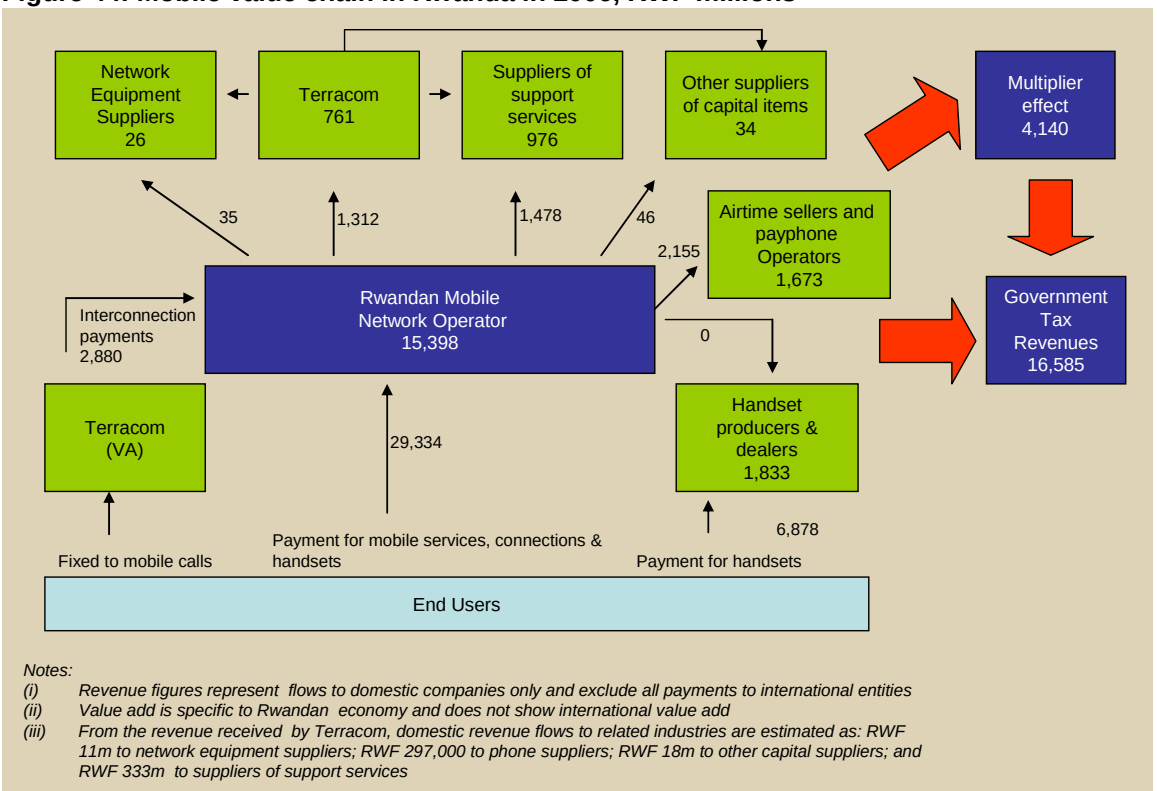
Value add (RWF millions)	2003	2004	2005	2006
Employee wages and benefits (including contractors)	1,594	1,445	1,975	2,233
Taxes and regulatory fees	4,112	7,185	10,123	12,021
CSR	8	2	5	5
Dividends	1,791	1,140	1,140	1,140
Total	**7,505**	**9,773**	**13,243**	**15,398**

Source: Deloitte analysis based on information provided by MTN Rwanda

Taxes and regulatory fees (including spectrum fees) make up the largest proportion in the above table, accounting for over 78% of the total in 2006. The next largest contributor is employee wages and benefits at 15%. Corporate social responsibility (CSR) programmes received over RWF 5m in 2006, including sponsorship of events. 60% of MTN Rwanda is locally owned and the dividends paid to this group of owners are assumed to remain in Rwanda. These represented 7% of the value add of mobile operators in 2006.

We then analysed the revenue flows from MTN to others in the industry. We also sought to quantify the share of revenue that translated into value add[22]. Our primary source of information was interviews with operators and analysis of operator accounts. The following figure provides revenue flows between providers and estimates of value add. The estimates of value add include the multiplier effect on the wider-economy which is assumed to be 20% of value-add.

Figure 44: Mobile value chain in Rwanda in 2006, RWF millions



Notes:
(i) Revenue figures represent flows to domestic companies only and exclude all payments to international entities
(ii) Value add is specific to Rwandan economy and does not show international value add
(iii) From the revenue received by Terracom, domestic revenue flows to related industries are estimated as: RWF 11m to network equipment suppliers; RWF 297,000 to phone suppliers; RWF 18m to other capital suppliers; and RWF 333m to suppliers of support services

Source: Deloitte analysis based on information provided by MTN Rwanda.

[22] Details on value add margins are contained in the assumptions appendix

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.

Figure 45: Calculation of value add from mobile communications in Rwanda in 2006

Domestic value add, RWF millions	Total revenue	Domestic revenue	Domestic cost	Domestic value add	Value add with multiplier
Mobile network operators	32,214	32,214	16,816	15,398	18,477
Fixed telecommunications operators	1,312	1,312	550	761	914
Network equipment suppliers	3,480	35	9	26	31
Handset designers and dealers	7,102	6,878	5,045	1,833	2,200
Other suppliers of capital items	1,546	46	13	34	41
Suppliers of support services	3,016	1,478	502	976	1,171
Airtime commission, payphone commission	2,155	2,155	482	1,673	2,008
Total	**50,825**	**44,118**	**23,416**	**20,702**	**24,842**

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

87% of the revenue flows from the MNOs are estimated to remain in Rwanda. This figure is dominated by handset dealers[23], and airtime and payphone commissions[24].

In terms of capex, it is estimated that less than 2% is domestic, primarily relating to low-value items. Network equipment is imported from overseas; and most non network items (within "other suppliers of capital items" consist of IT equipment and company cars, which are also imported. As the local economy grows then it is likely that more non-network equipment will be purchased domestically (e.g. office furniture and IT equipment) leading to further growth in value-add.

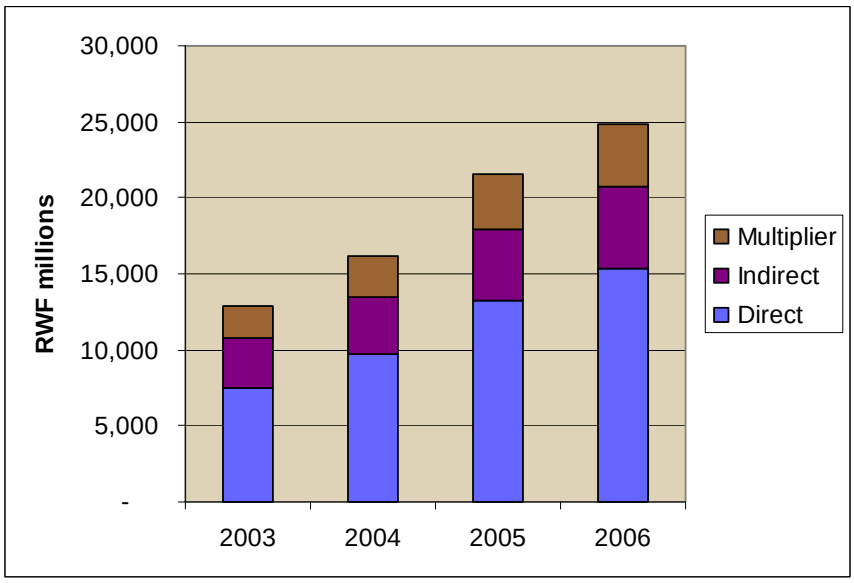
Only 50% of support services are purchased from within Rwanda, consisting of legal services, marketing and advertising and outsourced network maintenance. The other 50% are purchased overseas and relate to Service Level Agreements with Ericsson, Converse and other companies.

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

[23] 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).

[24] The relatively high value of airtime and payphone commissions is due to the fact that only 2% of airtime is sold directly by operators, with the remainder being sold by third parties.

Figure 46: Supply side value add from mobile communications 2003 to 2006



Source: Deloitte analysis, calculated as in previous tables

Value add has increased by over 90% during the four year period, with significant growth in the direct impact, particularly with respect to taxes paid by the mobile operator as subscribers have increased.

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 47: Tax revenues in Rwanda from mobile operators

Taxes from mobile network operators, RWF millions	2003	2004	2005	2006
Corporation tax	2,224	3,410	4,935	5,709
Income tax paid by employees	435	394	539	609
Sales taxes (VAT)	1,077	2,708	3,914	4,804
Regulatory fees	376	673	735	899
Total taxes and fees	**4,112**	**7,185**	**10,123**	**12,021**

Source: Deloitte analysis based on operator data

The largest proportion of tax revenue is raised through corporation tax, followed by VAT, which together account for mobile specific and sales taxes which, together, accounted for 88% of tax paid in 2006. Tax as a proportion of revenues has averaged 34% since 2003[25].

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.

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

Figure 48: Total tax revenues from the mobile value chain in 2006[26]

Tax Revenue	Tax revenue	Tax revenue with multiplier
Mobile network operators	12,021	14,425
Fixed telecommunications operators	355	426
Network equipment suppliers	11	13
Handset designers and dealers	655	786
Other suppliers of capital items	14	17
Suppliers of support services	420	505
Airtime commission, payphone commission	346	415
Total	**13,821**	**16,585**

Source: Deloitte analysis based on Deloitte tax data, analysis of company accounts and interviews

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 legitimate airtime sellers. Our calculations assume only the largest airtime sellers that work through official dealerships pay tax and that, by and large, streetside airtime sellers do not. Interviews with operators, handset manufacturers and dealers revealed that many handsets are imported illegally from Dubai or are reconditioned / stolen. Therefore we assume that only 40% of handsets sold are subject to sales tax.

9.3.2 Impact on employment numbers

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. The figure below shows the contribution to employment in Rwanda from the mobile value chain.

Figure 49: Contribution to employment from the mobile value chain[27]

Employment Impact	Number of employees	Number of employees with multiplier
Mobile network operators	150	181
Fixed telecommunications operators	35	42
Network equipment suppliers	1	1

[26] This represents tax revenues directly created by revenue flows from the MNOs and not total tax revenues from the sector.

[27] This is employment directly created by revenue flows from the MNOs and does not represent total employment in the sector

Handset designers and dealers	1,452	1,742
Other suppliers of capital items	1	1
Suppliers of support services	2,039	2,447
Airtime commission, payphone commission	21,750	26,100
Total	**25,429**	**30,514**

Source: Operator data, interviews and Deloitte analysis on average wage rates

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 9,500 streetside airtime outlets and 5,000 payphones[28].

Traditionally over 99% of capital items have been imported by MTN Rwanda and as such the impact on domestic employment is negligible. However, 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 calculated 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 a review of company accounts.

9.3.3 Demand-side impact: increases in productivity and consumer surplus

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[29]:

- 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[30];
- 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; and
- 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. These included:

[28] This is an estimate of both official and unofficial payphones

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

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

- 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. 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; and
- 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[31]. 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".

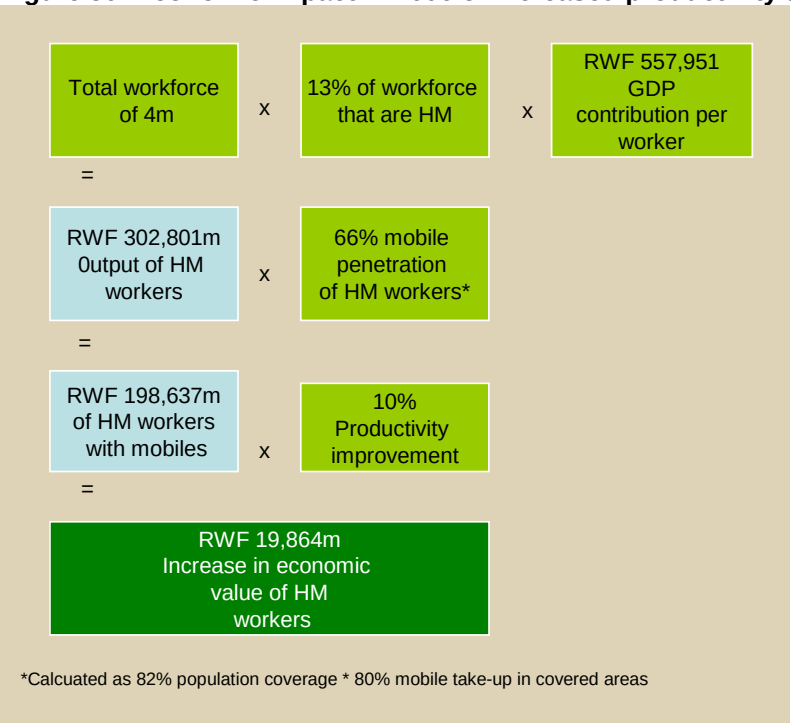
Other surveys have typically quantified productivity improvements to be between 6% and 11%. For example, Mckinsey quantified the impact to be 6% in China, whilst the impact in the UK has been estimated to be both 6% and 11%. Based on our interviews within East Africa, it may be assumed that the productivity increase in Rwanda would be at the high-end of this range since:

- East African mobile telephony is reported to have had a dramatic impact on East African economies. 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 of the UK and China;
- Higher levels of informal activity imply greater need for co-ordination between individuals since there is less formal communication at the company level; and
- Rwanda is more rural than the UK so the travel-time savings are likely to be greater.

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 was RWF 19,864m 2006. This calculation is set out below. We have not considered the impact on low mobility workers in our analysis.

31 Quantification would require consumer and business surveys to be undertaken

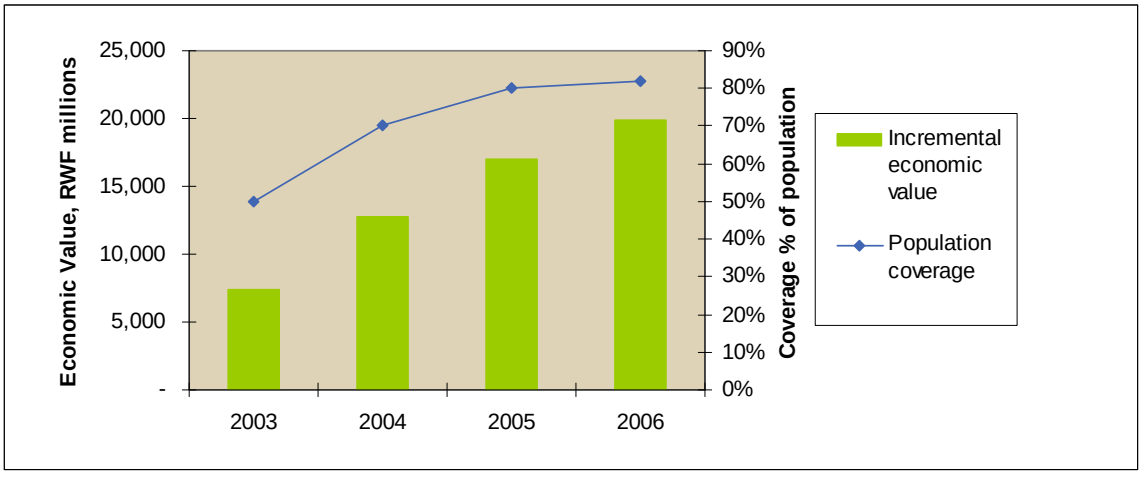
Figure 50: Economic impact in 2006 of increased productivity amongst high mobility workers



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

Our calculations show large increases in productivity between 2003 and 2006. These are driven by the increase in population coverage which allows a greater proportion of high mobility workers to access mobile technology.

Figure 51: Economic value from increases in productivity, 2003 to 2006



Source: Deloitte analysis. Population coverage provided by GSMA and operators

9.3.4 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)[32] relating to Tanzania and those expressed in other interviews we conducted in East Africa. Benefits identified, which are applicable in Rwanda include:

- 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; and
- 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[33]. 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). 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 total increase in consumer surplus has been calculated as RWF 1,657m, as shown in the table below[34].

Figure 52: Calculation of intangible benefits using willingness to pay concept

	2003	2004	2005	2006
Average annual ARPU minus current ARPU	9,108	14,147	7,440	-
New Subscribers	36,500	41,000	100,000	84,733
Value add	332,442,131	580,417,756	744,043,736	-
Cumulative value add (RWF millions)	**332**	**913**	**1,657**	**1,657**

Source: Deloitte calculation based on operator information

These estimates are conservative and are likely to underestimate the true value of intangible benefits since:

- 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; and
- 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

32 The specific article referenced is "Linking mobile phone ownership and use to social capital in rural South Africa and Tanzania"

33 Used by McKinsey in "Wireless Unbound", 2006

34 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.

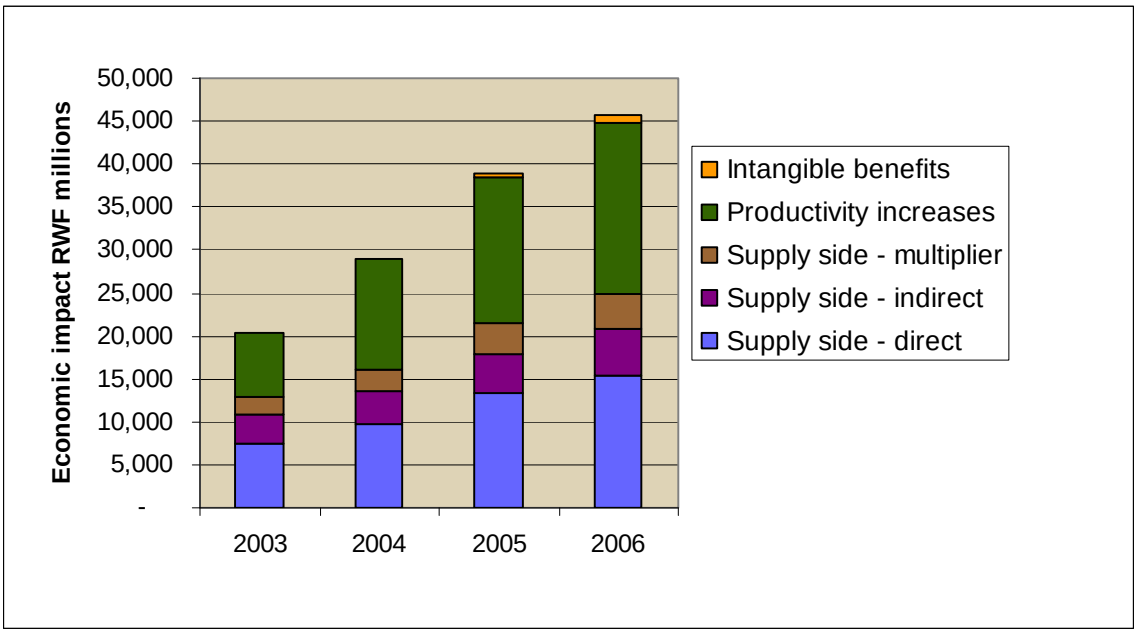
coverage and therefore, had mobile coverage been greater, then it is likely more subscribers would have been signed up at higher ARPUs in the early years.

We have not been able to quantify the impact of these effects. However, we note that they imply our calculation is likely to 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.

9.3.5 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 45,61m in 2006. 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.

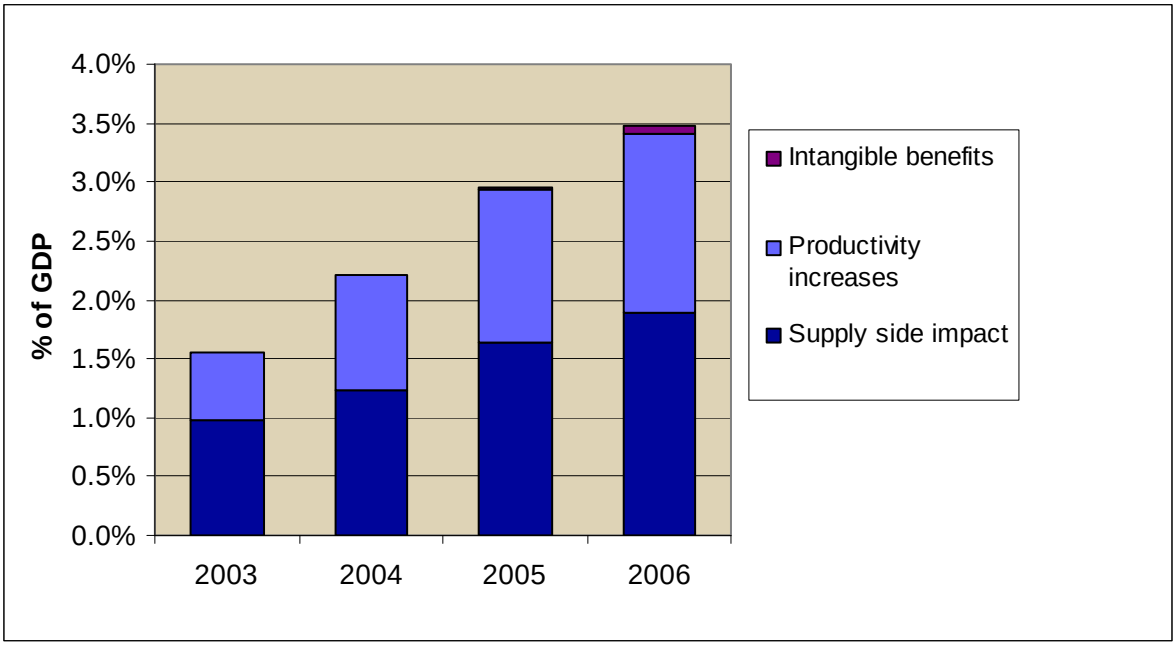
Figure 53: Economic impact of mobile communications in Rwanda (RWF millions)



Source: Aggregation of previously calculated effects

The impact of mobile communications on GDP has been substantial. We estimate that the total economic impact of mobile communications was 1.5% of GDP in 2003 increasing to 3.5% of GDP in 2006. Further increases in mobile coverage can be expected to result in the contribution of the mobile sector continuing to grow further.

Figure 54: Economic impact as a percentage of GDP



Source: Aggregation of previously calculated effects

9.4 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 economic growth rate. The 2% increase in penetration rates between 2003 and 2006 may have contributed 0.24% to the Rwandan GDP growth rate.

9.5 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 3.5% of GDP. 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 Rwanda is to continue in its economic development, it is imperative that this rapidly developing mobile communications sector is encouraged to continue operating as an engine of growth. In particular, government policy should not limit this development through policies that may restrain consumer demand for mobile services.

10 Rwanda: Impact of imposing an excise duty

In this section we present the results of our analysis for Rwanda. We calculate the impact of imposing an excise tax on usage, in terms of impact on:

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

10.1 Our scenarios for analysis

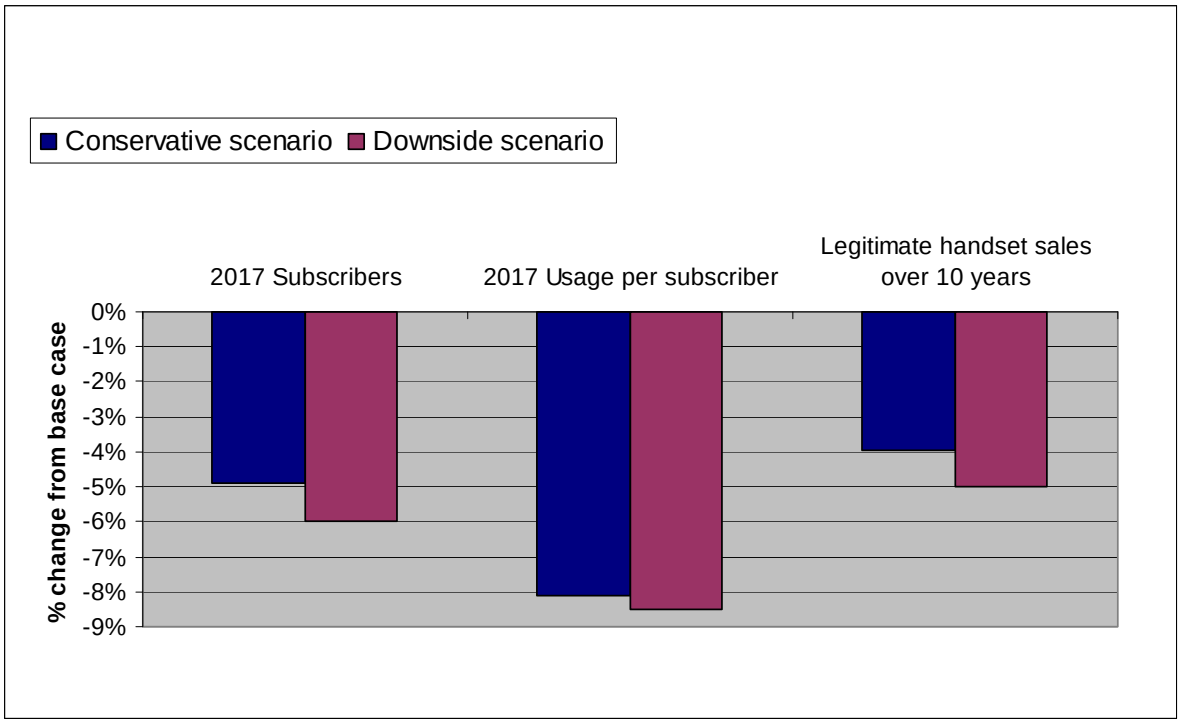
Using the model and assumptions outlined in Section 16 of the report, we have analysed the impact of imposing an excise duty on mobile usage at 5%. This is consistent with the tax rate which we have used as our basis for analysis in the other East African countries and is not intended to be fully reflective of current Government plans[35]. . We then compare the changes that result against our base case forecast of the mobile industry and associated tax revenues.

Our conservative scenario involved using the mid-point elasticity of penetration with respect to rate per minute of -0.4, a network effect of 0.4% and using a value-add multiplier of 1.2. In addition, we consider a "downside" scenario, where the penetration elasticity is higher, at -0.6, the network effect is 0.44% and our multiplier is 1.5.

10.2 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 2007.

Figure 55: Impact of introducing an excise tax on usage on the mobile industry



Source: Deloitte analysis

Our conservative scenario suggests that the number of subscribers is likely to be 5% lower than the base case in 2017 representing penetration of 24.6% (compared to 26% in the base case). Using a higher penetration elasticity in the downside scenario, there is an impact of 6%. The fall in penetration drives the fall in legitimate handset sales.

[35] We understand the final level of tax to be imposed is currently undetermined, but is likely to be between 0% and 10%.

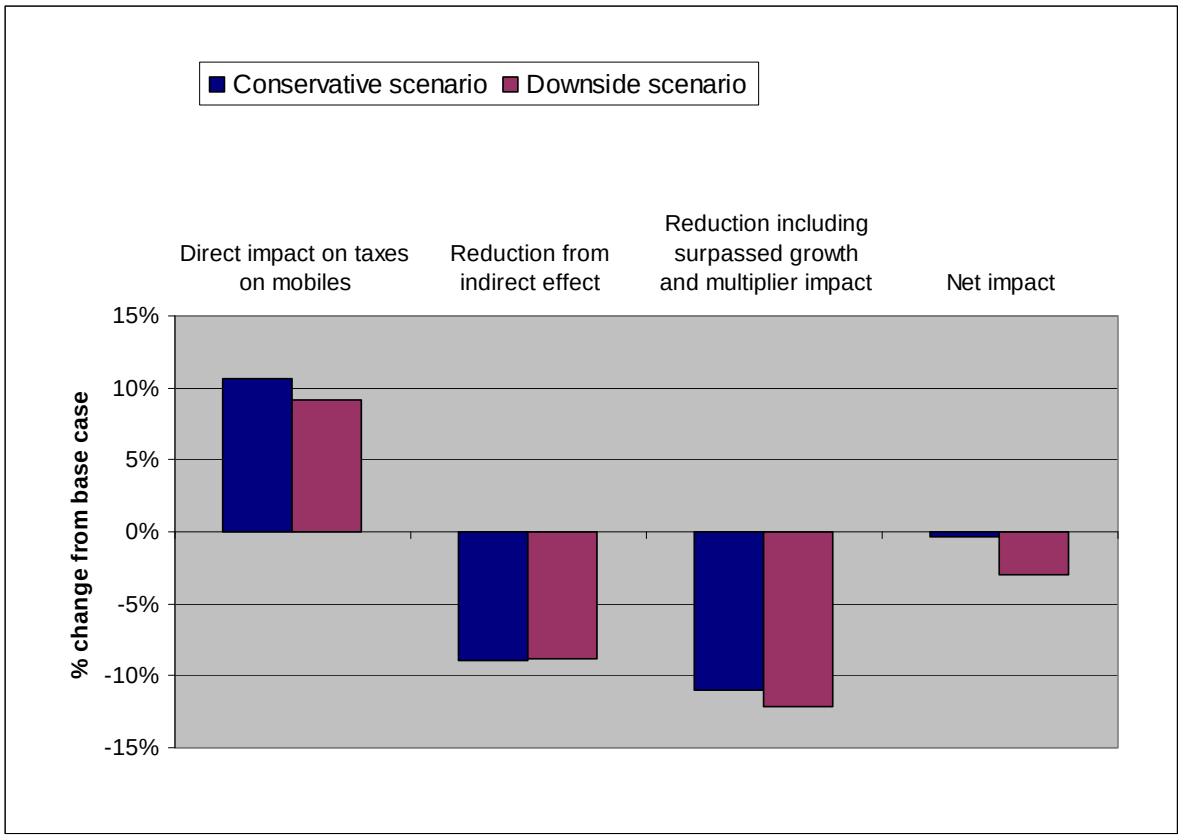
The impact on usage is 8.1% in the conservative scenario and 8.5% in the downside, representing four fewer minutes of use per user per month, or one less text. The impact on usage compared to the base case.is higher in the downside scenario because the network effect is assumed to be larger.

10.3 Impact on Government tax revenues

The following figure shows the impact, over the 10 years to 2017, 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.

Figure 56: Impact of introducing an excise tax on usage on Government tax revenues



Source: Deloitte analysis

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

- **Direct impact on taxes on mobiles**: Imposing a tax on usage leads to an increase in taxes on mobiles due to the existence of this new tax. However, there is also a fall in VAT revenues due to the fact that demand for mobile services (in terms of subscription and usage) have fallen via the negative demand elasticities. The negative effect is larger in the downside scenario since the penetration elasticity is higher at -0.6;
- **Uplift from the indirect effect:** This reduction is the result of the losses in corporation tax and regulatory fee revenues paid by the mobile operators, resulting from the fact that their revenues and profits will fall following the tax imposition. In the conservative case, company revenues fall

by 9.6% in the conservative scenario and by more than 10.7% in the downside case, driving the change in these tax revenues[36];

- **Reduction including growth and multiplier impact:** This relates to the dynamic impact on GDP resulting from our calculated relationship between mobile penetration and GDP growth, combined with our estimate of the lost tax revenues from the forgone multiplier effect. The total reduction in tax revenues is increased to 11% in the conservative scenario and 12% in the downside. The higher impact in the downside scenario is a result of the use of a multiplier of 1.5 in this scenario; and
- **Net impact**: Combining the effects on tax revenues, the net result is negative in both scenarios at 0.37% in the conservative scenario, and 2.9% in the downside scenario.

10.4 Conclusions

Our analysis shows that the impact of imposing the excise tax on usage to 5% will be significantly tax negative over a 10 year period, due to the negative effects on demand for mobile services. Though significant tax revenues can be gained in the short term by imposing a new tax on usage, the reduced tax revenues resulting from the diminished mobile industry eradicate these, related industries and the economy as a whole (relative to our base case scenario where no such tax is imposed). We believe that our conservative scenario has used conservative estimates of both elasticity of demand and the multiplier effect, and hence there could be more of a negative net impact as identified in the downside scenario. In addition, our tax model does not capture the intangible benefits of the mobile industry which would also be forgone due to the lower levels of penetration and usage.

[36] The smaller reduction from indirect impact in the downside scenario is explained by the higher penetration elasticity in the upside scenario. The percentage reduction due to the indirect impact relative to the initial increase in taxes is smaller in the downside. This is due to the fact that the initial increase in taxes on mobiles is smaller in the downside, since the larger fall in penetration mitigates the additional excise taxes to a larger extent.

Taxation and the Growth of Mobile in Tanzania



Executive Summary

11 Tanzania: Executive Summary

The mobile communications sector has brought significant social and economic benefits to Tanzania. The four mobile operators have invested heavily. Population coverage is around 50% and will increase significantly in 2007 as operators install and commission their planned base stations. There are over 5.5 million mobile subscribers, equating to a penetration rate of 14%. The number of mobile connections outnumbers fixed lines by 32 to 1. 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. Vodacom has reduced international rates and Celtel's One Network is delivering value to its customers through its lack of roaming charges within East Africa. Entry level handset prices continue to trend down.

The mobile communications industry contributed a total of TZS 641,452m to the economy in 2006, representing approximately 4.6% of total GDP. Some 150,000 Tanzanians and employed by the mobile and related industries. Increasing mobile penetration by 10% can increase annual Gross Domestic Product by 1.2%.

Despite the industry's significant contribution to Tanzania's social-economic development, mobile consumers are subject to a sector specific tax of 7% on mobile usage. The tax is regressive, hitting poorer people harder and makes mobile communications less affordable for many millions of Tanzanians.

By reducing the tax, more Tanzanians will connect and use mobile services, tax receipts will increase in the medium to long term and GDP will rise. For example, a lowering the excise duty to 5% could be tax positive (with revenue neutrality achieved within five years), leading to a cumulative incremental increase in tax revenues of over TZS 124, 000m by 2017 along with an incremental increase in mobile subscribers of 4%. Moreover GDP could increase by 0.8% or TZS 171,328m.

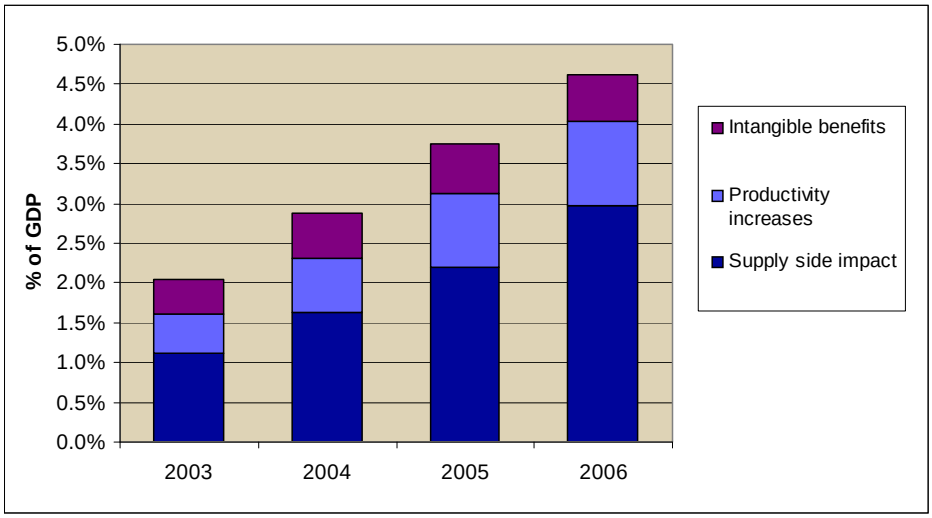
The "tiger" economies in Asia have placed telecommunications at the core of their economic development strategies. If Tanzania is to follow a similar path it is imperative that the rapidly developing mobile communications sector is encouraged to continue operating as an engine of growth. The government should not limit this development through policies that may restrain consumer demand for mobile services.

11.1 Economic benefit of mobile communications in Tanzania

The mobile communications industry's economic contribution has increased by more than 280% from TZS 240,375m in 2003 to TZS 641,452m in 2006 of which about 37%, TZS 238,617m, went to the government in tax revenues. The economic impact can be expected to rise steadily with mobile penetration.

Increasing mobile penetration should therefore be a cornerstone of the government's economic and fiscal policy.

Figure 57: Economic impact of mobile communications industry as a percentage of GDP

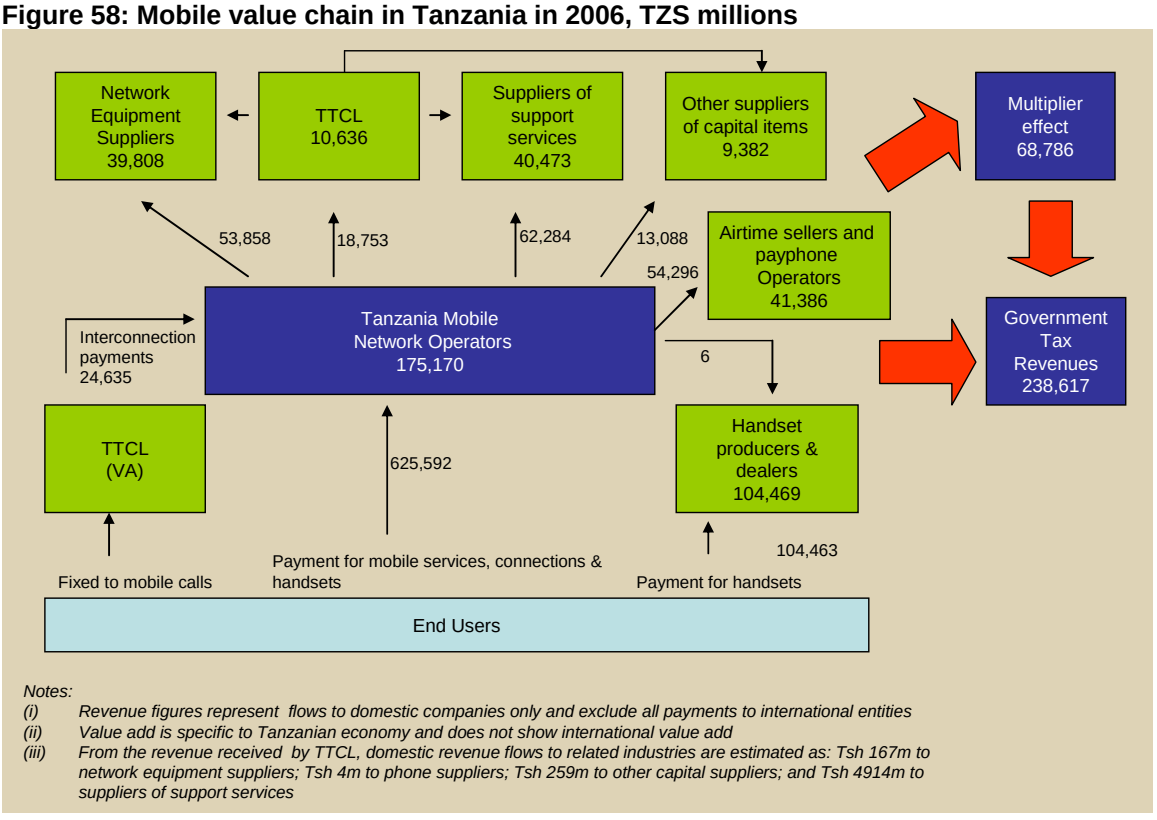


Source: Deloitte Analysis

Supply side impact of mobile communications

The supply side impact of mobile communications is derived from direct, indirect and multiplier [37] impacts. The revenue flows and value add for 2006 are presented below.

Figure 58: Mobile value chain in Tanzania in 2006, TZS millions



Notes:
(i) Revenue figures represent flows to domestic companies only and exclude all payments to international entities
(ii) Value add is specific to Tanzanian economy and does not show international value add
(iii) From the revenue received by TTCL, domestic revenue flows to related industries are estimated as: Tsh 167m to network equipment suppliers; Tsh 4m to phone suppliers; Tsh 259m to other capital suppliers; and Tsh 4914m to suppliers of support services

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

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

Demand side impact of mobile communications

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

Intangible benefits

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

- 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.

11.2 Impact of reducing the excise taxes on usage

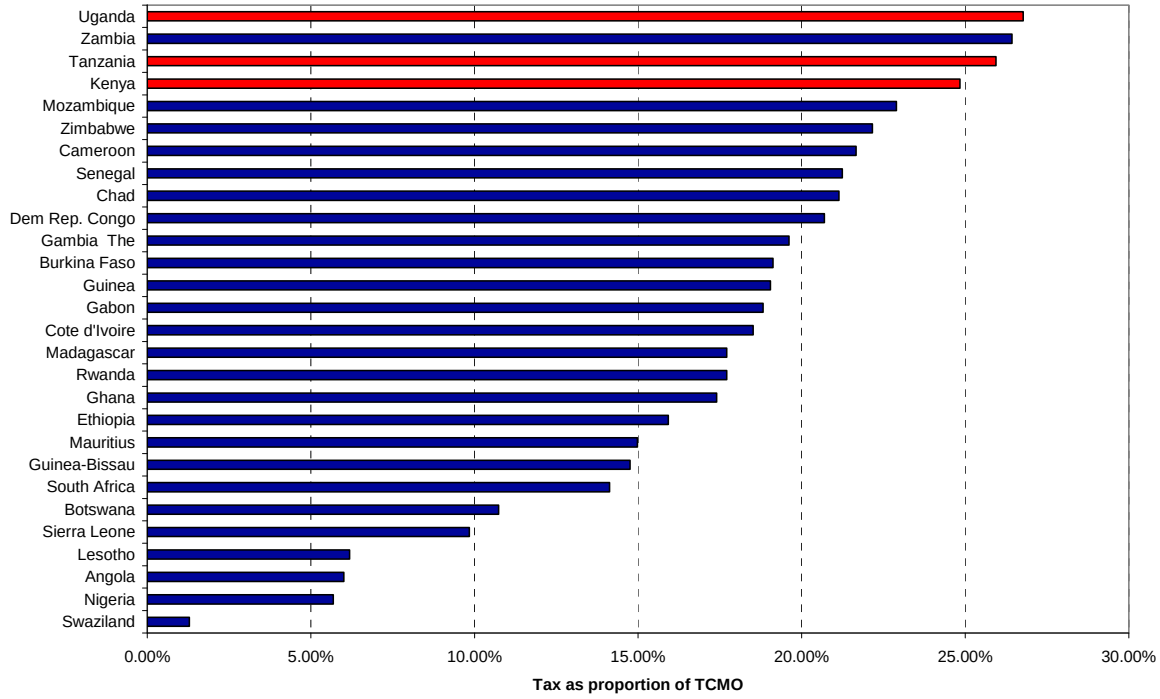
Despite the positive economic impact that mobile communications creates for the Tanzanian economy, mobile consumers are subject to some of the highest taxes in Africa. The following figure illustrates the tax burden on mobile services as a percentage of the total cost of mobile ownership ("TCMO")[38]. The reason why members of the East African community are among the worst performers in terms of penetration is the presence of a specific excise tax levied on usage in these countries.

Mobile specific taxes are high and levied in only a handful of jurisdictions globally[39]. In Tanzania, tax makes up over 26% of TCMO, with the excise tax alone making up 6% of the total cost.

[38] 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. Note, in the economic model, an assumption of 2 years for handsets is made.

[39] As identified in the GSMA's 2007 "Global Mobile Tax Review", only 16 out of the 101 jurisdictions considered in the report levy taxes specific to the mobile industry.

Figure 59: Tax as percentage of total cost of mobile ownership

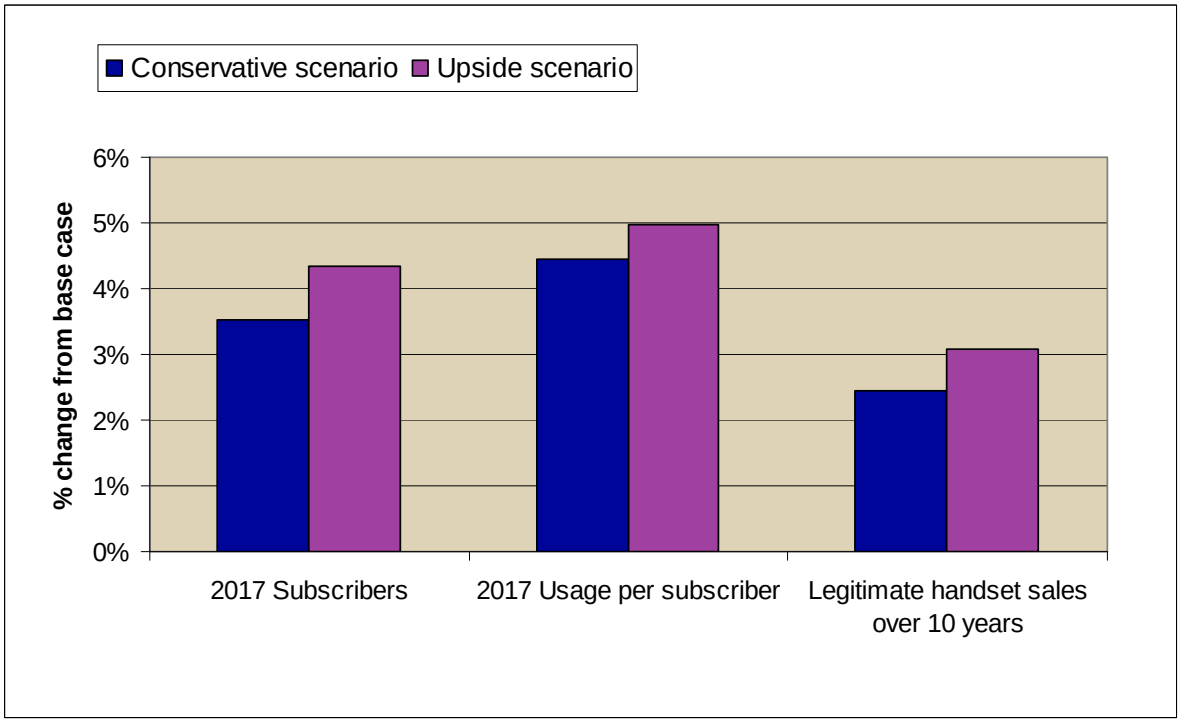


Source: Deloitte Analysis

We have analysed the impact of reducing the excise duty applied on mobile usage in Tanzania from 7% to 5%, representing a reduction of 29%. We then compare the changes that result against our base case forecast that projects the development of the mobile industry to 2017 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 2007.

Figure 60: Impact of reduction in excise tax on usage on the mobile industry



Source: Deloitte analysis

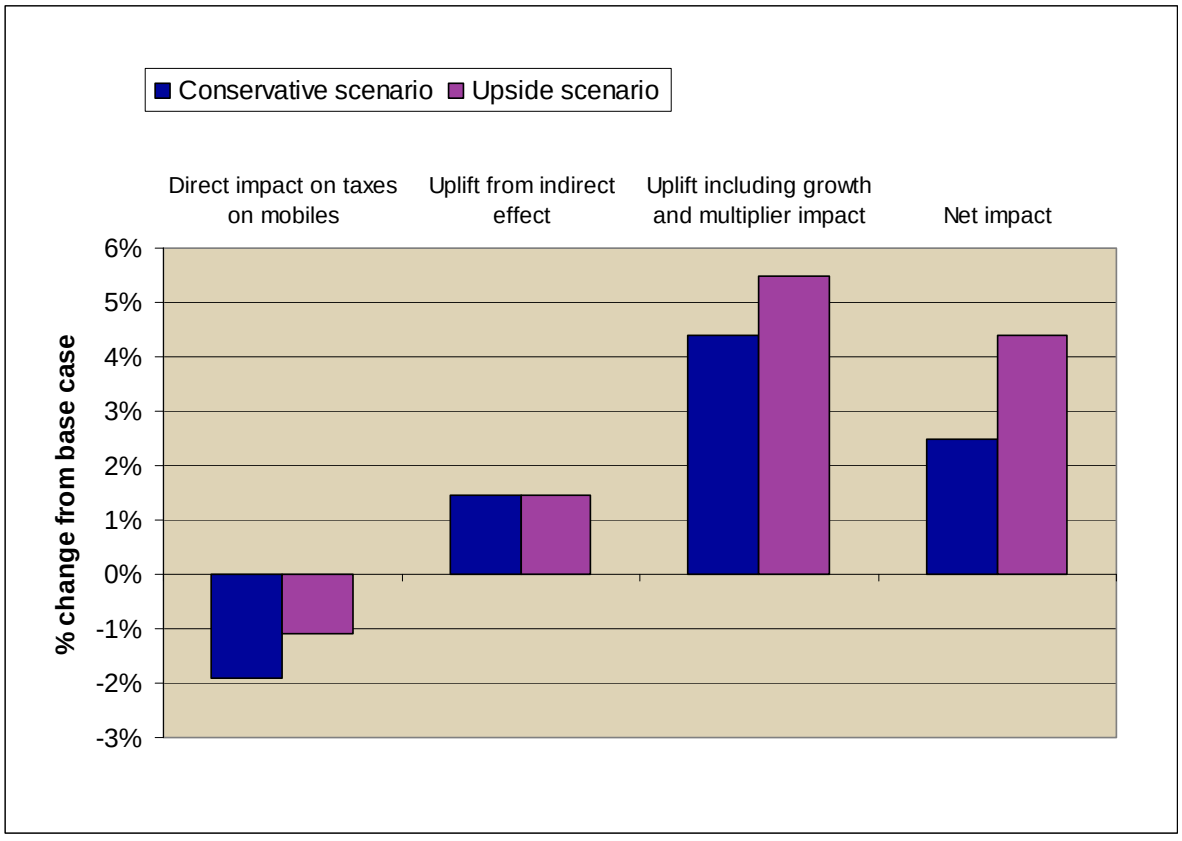
Our conservative scenario shows that total subscribers are likely to be 3.5% higher in 2017 at 12.4 million, representing mobile penetration of 27%. In the upside scenario, total subscribers could be over 4.3% higher in 2017. The impact on usage is significant at 4.5% in the conservative scenario and at almost 5% in the upside scenario, given the elasticity of usage with respect to price of -0.87.

11.3 Impact on government tax revenues: once off reduction

The following figure shows the impact on government tax revenues 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.

Figure 61: Impact of reduction in excise tax on usage on Government tax revenues, 2007-2017



Source: Deloitte analysis

The overall impact is that these tax changes are likely to be tax positive under both of our scenarios, with neutrality being achieved seven years after the tax reduction in the conservative case and after five years in the upside scenario.

11.4 Impact on government tax revenues: glide path

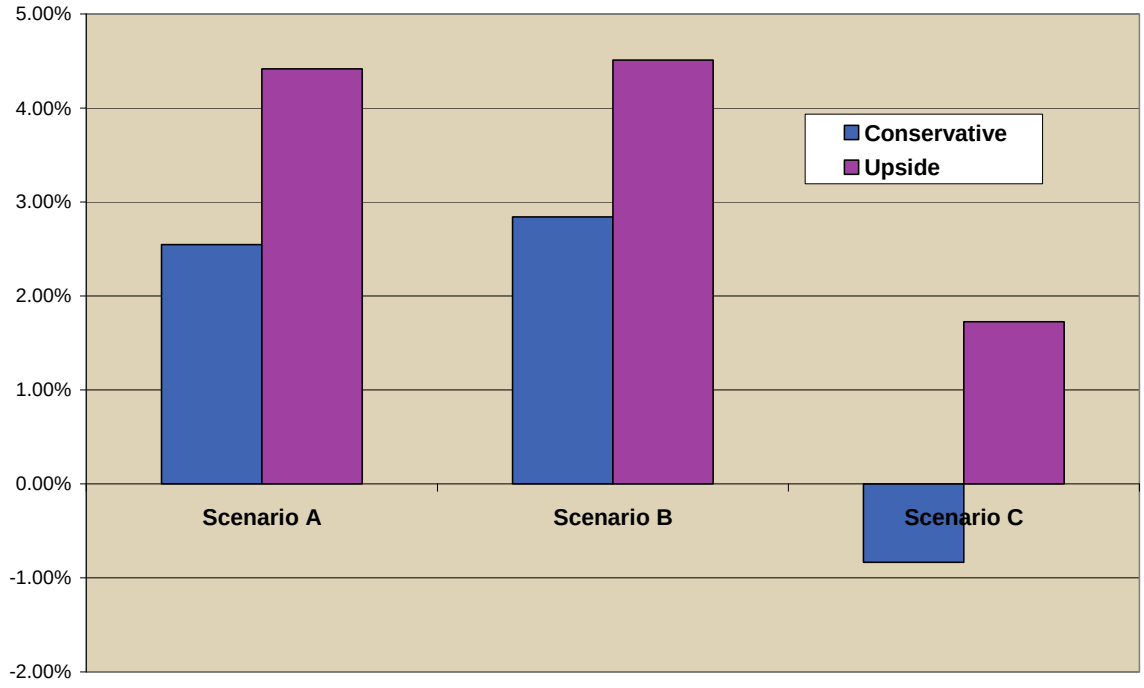
We also analysed the impact of reducing taxes gradually over a ten year period. Our three tax rate scenarios are presented in the table below.

Figure 62: Gradual reduction in excise tax scenarios

Scenario	Excise tax rate in each year										
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Scenario A	6%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Scenario B	6%	6%	6%	6%	6%	5%	5%	5%	5%	5%	5%
Scenario C	6%	6%	5%	5%	4%	4%	3%	2%	1%	0%	0%

A gradual reduction in taxes from 7% to 5% over the ten year period to 2017 leads to a higher tax positive result than both our original conservative and upside cases. Our analysis also indicates that reducing the excise tax to 0% gradually over the ten year period can be tax positive in the upside case. The impact of each of the scenarios on government tax revenues is shown in the following table.

Figure 63: Net impact on government revenues of reducing the excise tax gradually over time



Source: Deloitte analysis

The net effect on government revenues in Scenario A is 2.55% in the conservative case and 4.4% in the upside case. The respective figures for Scenario B are 2.84% and 4.5%. In scenario C, reducing the excise tax to 0% gradually over time could, in the upside case, have a positive net impact on government revenues of 1.7%.

12 Tanzania: Economic impact of the mobile industry

We estimate that the mobile communications industry contributed a total of TZS 641,452m to the economy in 2006, representing approximately 4.6% of total GDP. This was a significant increase of more than 150% on the 2003 contribution of TZS 240,375m. At 14% of population, mobile penetration rates in Tanzania are significantly below their longer term potential and this 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 validates this and we estimate that mobile communications has raised GDP growth rates in Tanzania by 0.12% for each 1% increase in penetration. As such, the 5% increase in penetration rates between 2005 and 2006 may have contributed 0.6% 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[40]. Celtel, Vodacom, Tigo and Zantel have undertaken significant investment in a network which now covers an estimated 48% of the population[41], with mobile connections outnumbering fixed lines by 32 to 1. There are over 5.5 million mobile subscribers and a penetration rate of 14%. 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.

12.2 Operator participation in the economic impact study

Vodacom and Celtel provided us with data for this study. We were unable to obtain data from Tigo and Zantel, although we interviewed staff from Tigo. Using data on subscriber numbers for each operator, we gross up cost, revenue and employment data received from Vodacom and Celtel to provide indicative values for Tigo and Zantel. In this respect, the values presented in the remainder of this chapter are intended to represent the total aggregate impact of the mobile communications sector in Tanzania.

12.3 Static Supply side impact of mobile communications

We have estimated the value add created by the mobile communications industry in Tanzania. Our estimate of this impact should be regarded as conservative as we have not been able to identify data to document the secondary impact from network equipment suppliers and certain other recipients of cash from the mobile operators. We have also estimated the leakages from the system, i.e. what percentage of any Tanzanian shilling spent 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

First, we analysed the domestic value add of the mobile network operators in Tanzania. We find that they directly contribute TZS 175,170 m in 2006. The breakdown by category is provided in the figure below.

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

[41] Data supplied by GSMA

Figure 64: Value add of mobile network operators (excluding multiplier effect)

Value add (TZS millions)	2003	2004	2005	2006
Employee wages and benefits	12,386	16,864	22,175	33,008
Contractors	1	4	9	12
Taxes and regulatory fees	37,224	65,056	102,967	137,665
CSR	1,236	1,626	3,690	4,486
Dividends	0	0	0	0
Total	**50,846**	**83,549**	**128,842**	**175,170**

Source: Deloitte analysis based on information provided by Vodacom and Celtel

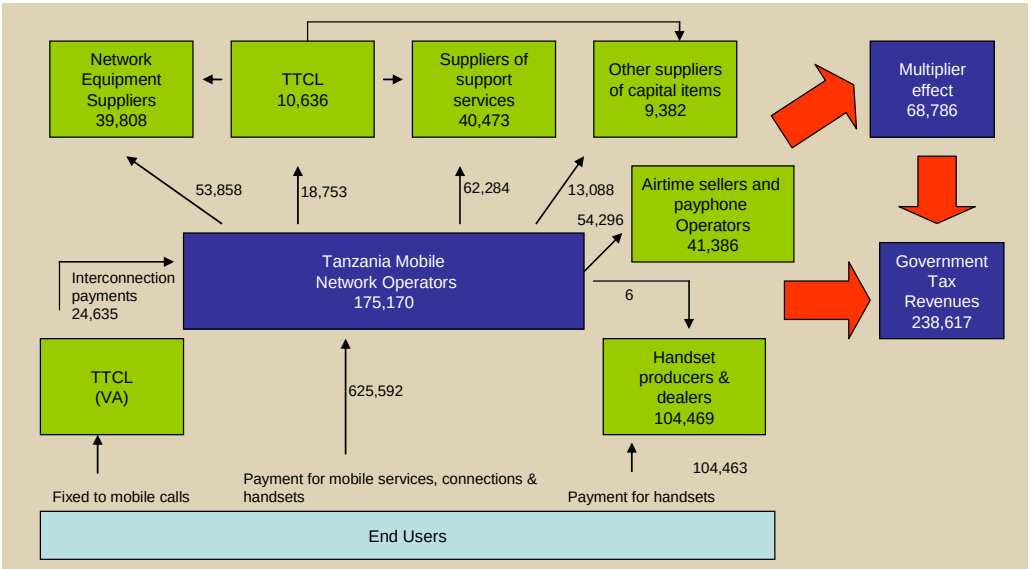
Taxes and regulatory fees (including spectrum fees) make up the largest proportion in the above table, accounting for over 79% of the total in 2006. The next largest contributor is employee wages and benefits at 19%.

Corporate social responsibility (CSR) programmes received over TZS 4,486m in 2006, including sponsorship of events. This figure is a large increase from 2005 and represents the more formalised CSR programmes that both Vodacom and Celtel have put in place. Celtel has specifically chosen to focus on funding education related projects whilst Vodacom focuses on education, health and poverty alleviation to align with the Government's millennium goals.

Despite making an average of profit before tax of 15%, neither of the operators' interviewed opted to pay dividends. Instead both chose to reinvest profits in network expansion.

We then analysed the revenue flows from Vodacom and Celtel to others in the industry. We also sought to quantify the share of revenue that translated into value add[42]. Our primary source of information was interviews with operators and analysis of operator accounts. The figure below provides revenue flows between providers and estimates of value add. The estimates of value add include the multiplier effect on the wider-economy which is assumed to be 20% of value-add.

Figure 65: Mobile value chain in Tanzania in 2006, TZS millions



Notes:
(i) Revenue figures represent flows to domestic companies only and exclude all payments to international entities
(ii) Value add is specific to Tanzanian economy and does not show international value add
(iii) From the revenue received by TTCL, domestic revenue flows to related industries are estimated as: Tsh 167m to network equipment suppliers; Tsh 4m to phone suppliers; Tsh 259m to other capital suppliers; and Tsh 4914m to suppliers of support services

[42] Details on value add margins are contained in the assumptions appendix

Source: Deloitte analysis based on information provided by Celtel and Vodacom, 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 table below shows the calculation of value add.

Figure 66: Calculation of value add from mobile communications in Tanzania in 2006

Domestic value add, TZS millions	Total revenue	Domestic revenue	Domestic cost	Domestic value add	Value add with multiplier
Mobile network operators	650,227	650,227	475,056	175,170	210,205
Fixed telecommunications operators	18,754	18,754	8,118	10,636	12,763
Network equipment suppliers	285,119	53,858	14,050	39,808	47,770
Handset designers and dealers	108,627	104,469	77,395	27,074	32,488
Other suppliers of capital items	20,457	13,089	3,707	9,382	11,258
Suppliers of support services	81,884	62,284	21,811	40,473	48,568
Airtime commission, payphone commission	54,297	54,297	12,911	41,386	49,663
Total	**1,219,364**	**956,978**	**613,049**	**343,928**	**412,714**

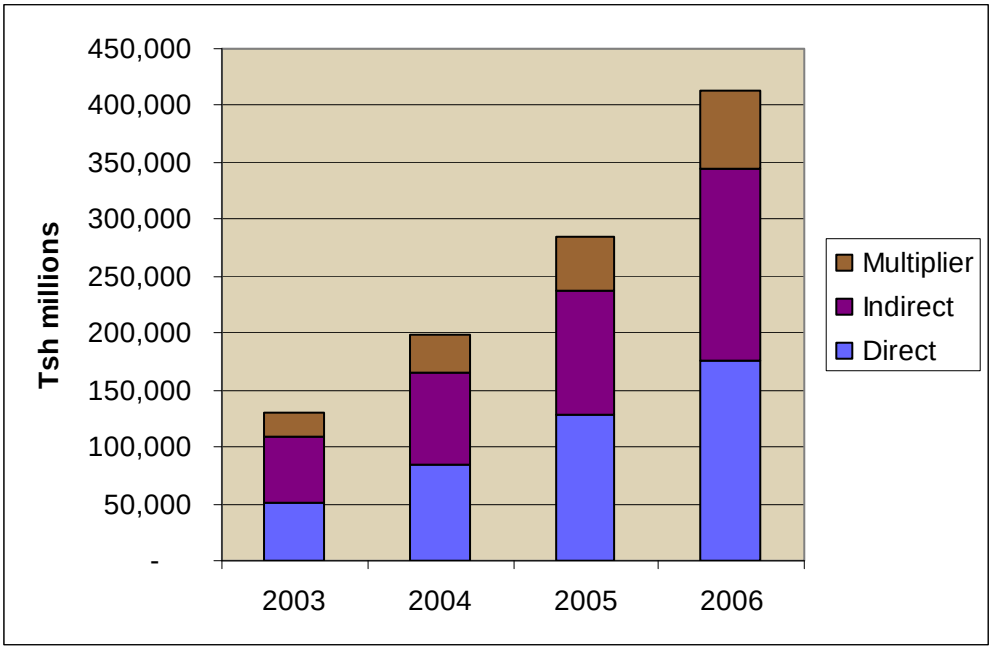
Source: Deloitte analysis based on information provided by Celtel and Vodacom, interviews and analysis of company accounts and industry reports

44% of the revenue flows from the MNOs are estimated to remain in Tanzania. Interconnection payments and airtime and payphone commissions dominate this figure[43]. It is estimated that only 22% of capital expenditure is domestic, primarily low-value non network equipment. Over 76% of support services are purchased from within Tanzania, including legal services, marketing and advertising and outsourced network maintenance.

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

[43] The relatively high value of airtime and payphone commissions is due to the fact that only 2% of airtime is sold directly by operators, with the remainder being sold by third parties.

Figure 67: Supply side value add from mobile communications 2003 to 2006



Source: Deloitte analysis, calculated as in previous tables

Value add has increased by over 280% during the four year period.

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.

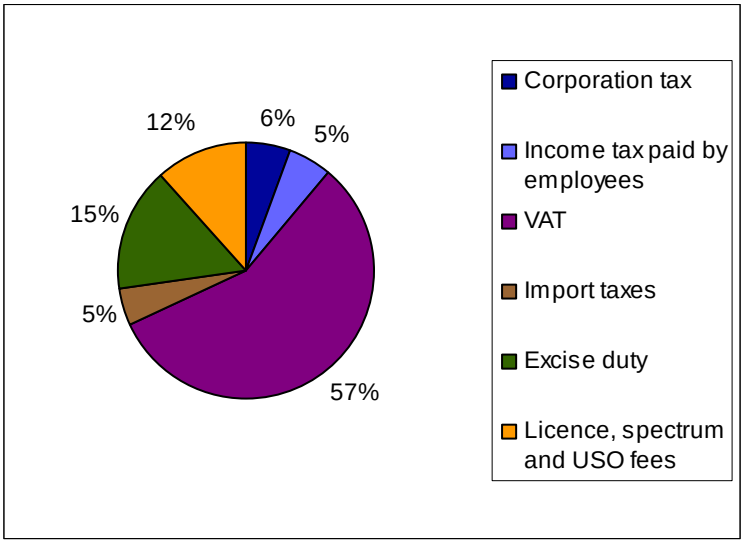
Figure 68: Tax revenues in Tanzania from mobile operators

Taxes from mobile network operators, TZS millions	2003	2004	2005	2006
Corporation tax	-	-	-	7,810
Income tax paid by employees	1,911	2,879	4,311	7,301
Sales and mobile specific taxes	31,308	54,240	87,147	106,348
Regulatory fees	4,005	7,937	11,509	16,206
Total taxes and fees	**37,224**	**65,056**	**102,967**	**137,665**

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 73% of tax paid in 2006. The breakdown for 2006 is shown in the figure below:

Figure 69: Breakdown of 2006 tax revenues from mobile operators by source



Tax as a proportion of revenues has averaged 22% since 2003[44].

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 70: Total tax revenues from the mobile value chain in 2006[45]

Tax Revenue, TZS millions	Tax revenue	Tax revenue with multiplier
Mobile network operators	137,665	165,197
Fixed telecommunications operators	4,830	5,796
Network equipment suppliers	15,686	18,823
Handset designers and dealers	12,023	14,427
Other suppliers of capital items	3,755	4,506
Suppliers of support services	17,054	20,465
Airtime commission, payphone commission	7,835	9,402
Total	**198,847**	**238,617**

Source: Deloitte analysis based on Deloitte tax data, analysis of company accounts and interviews

After the mobile network operators, the largest payers of tax are the suppliers of support services. Substantial tax revenues are also received from network equipment suppliers and handset dealers who operate in the formal market place. Although airtime sellers and payphone operators receive TZS 54,296m from the mobile network operators, a large proportion operate in the informal economy and thus we estimate that as a group they only pay TZS 7,835m in taxes, less than 14% of total revenue received. Our calculations assume only the largest airtime sellers that work through official

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

[45] This represents tax revenues directly created by revenue flows from the MNOs and not total tax revenues from the sector.

dealerships pay tax and that, by and large, streetside airtime sellers do not. Interviews with operators, handset manufacturers and dealers revealed that many handsets are imported illegally from Dubai or are reconditioned / stolen. Therefore we assume that only 50% of handsets sold are subject to sales tax.

12.3.2 Impact on employment numbers

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.

Figure 71: Contribution to employment from the mobile value chain[46]

Employment Impact	Number of employees	Number of employees with multiplier
Mobile network operators	1,285	1,542
Fixed telecommunications operators	341	409
Network equipment suppliers	783	940
Handset designers and dealers	7,045	8,454
Other suppliers of capital items	244	293
Suppliers of support services	14,725	17,670
Airtime commission, payphone commission	101,141	121,369
Total	**125,565**	**150,678**

Source: Operator data, interviews and Deloitte analysis on average wage rates

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 40,000 streetside airtime outlets and 27,000 payphones[47].

The number of employees in other sectors is calculated 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.

12.3.3 Demand-side impact: Increases in productivity and consumer surplus

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[48]:

[46] This is employment directly created by revenue flows from the MNOs and does not represent total employment in the sector

[47] This is an estimate of both official and unofficial payphones

- 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[49];
- 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; and
- 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. These included:

- 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 / 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 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; and
- 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[50]. 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".

48 See, for example, "Africa: The Impact of Mobile Phones", Vodafone Policy Paper Series, No.3, March 2005.

49 "Africa: The Impact of Mobile Phones", Vodafone Policy Paper Series, No.3, March 2005.

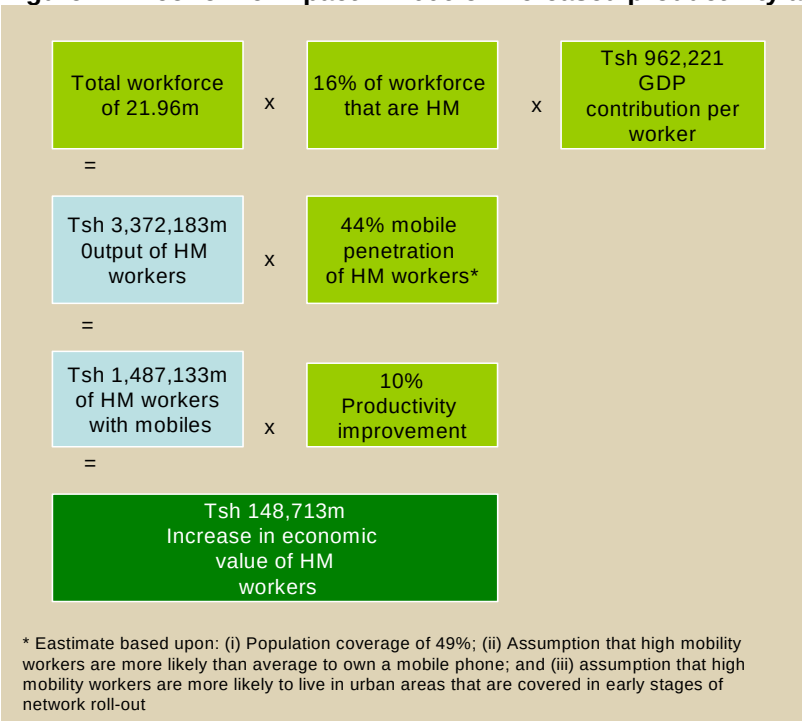
50 Quantification would require consumer and business surveys to be undertaken

Other surveys have typically quantified productivity improvements to be between 6% and 11%. For example, Mckinsey quantified the impact to be 6% in China, whilst the impact in the UK has been estimated to be both 6% and 11%. Based on our interviews, it may be assumed that the productivity increase in Tanzania would be at the high-end of this range since:

- Interviewees have all reported on the dramatic impact that mobile telephony has had on the Tanzanian 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 of the UK and China;
- Higher levels of informal activity imply greater need for co-ordination between individuals since there is less formal communication at the company level; and
- Tanzania is more rural than the UK so the travel-time savings are likely to be greater.

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 TZS 148,713m 2006. This calculation is set out below. We have not considered the impact on low mobility workers in our analysis.

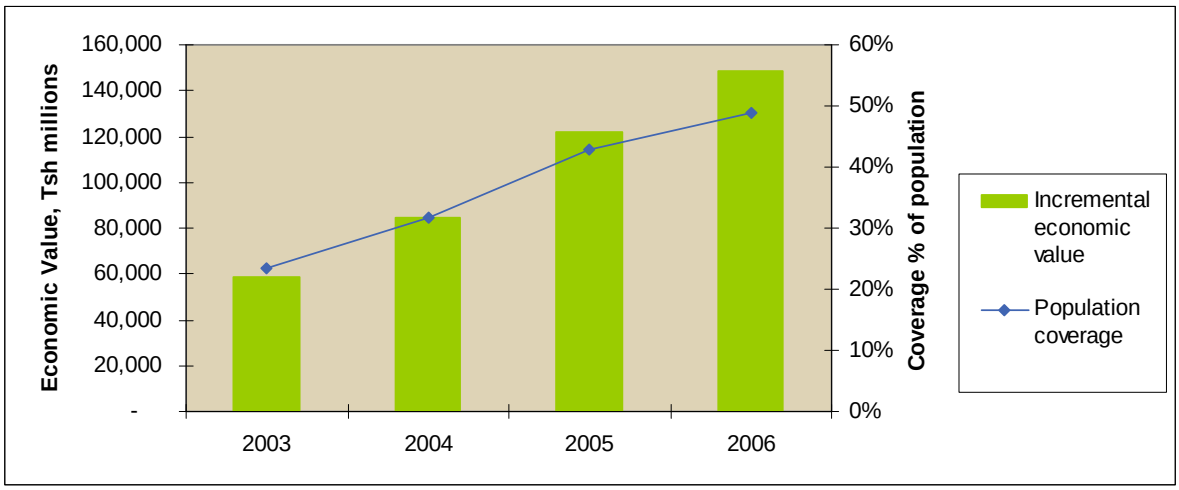
Figure 72: Economic impact in 2006 of increased productivity amongst high mobility workers



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

Our calculations show large increases in productivity between 2003 and 2006. These are driven by the increase in population coverage which allows a greater proportion of high mobility workers to access mobile technology.

Figure 73: Economic value from increases in productivity, 2003 to 2006



Source: Deloitte analysis. Population coverage calculated by GSMA

12.3.4 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)[51] relating to Tanzania and those expressed in other interviews we conducted in East Africa. Benefits identified in Tanzania include:

- 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 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;
- 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; and
- 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[52] 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 a 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). ARPU has remained relatively constant in 2005 and 2006 and therefore most of the

[51] The specific article referenced is "Linking mobile phone ownership and use to social capital in rural South Africa and Tanzania"

[52] Used by McKinsey in "Wireless Unbound", 2006

consumer surplus is generated from reductions in the price of calls during 2003 and 2004. The total increase in consumer surplus has been calculated as TZS 80,825m, as shown in the table below[53].

Figure 74: Calculation of intangible benefits using willingness to pay concept

	2003	2004	2005	2006
Average annual ARPU minus current ARPU	46,310	19,582	7,411	-
New Subscribers	1,106,076	933,995	1,418,579	1,847,678
Value add	51,221,993,854	18,289,479,072	10,513,233,928	-
Cumulative value add (TZS millions)	51,222	69,511	80,025	80,025

Source: Deloitte calculation based on operator information

These estimates are conservative and are likely to underestimate the true value of intangible benefits since:

- 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; and
- 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.

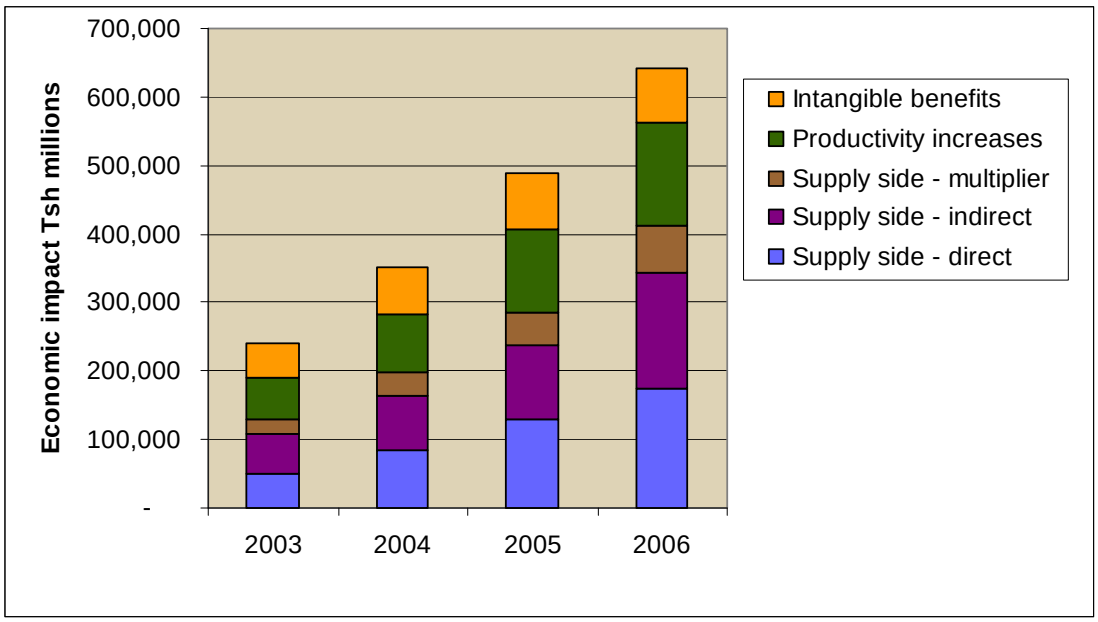
We have not been able to quantify the impact of these effects. However, we note that they imply our calculation is likely to be an underestimation of the true value of mobile communications.

12.3.5 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 TZS 641,451 m in 2006. The biggest contributors are the direct and indirect supply side impacts and the demand side productivity increases. Economic impact has been increasing as a fairly steady rate since 2003, following the steady increase in network coverage and penetration levels.

[53] 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.

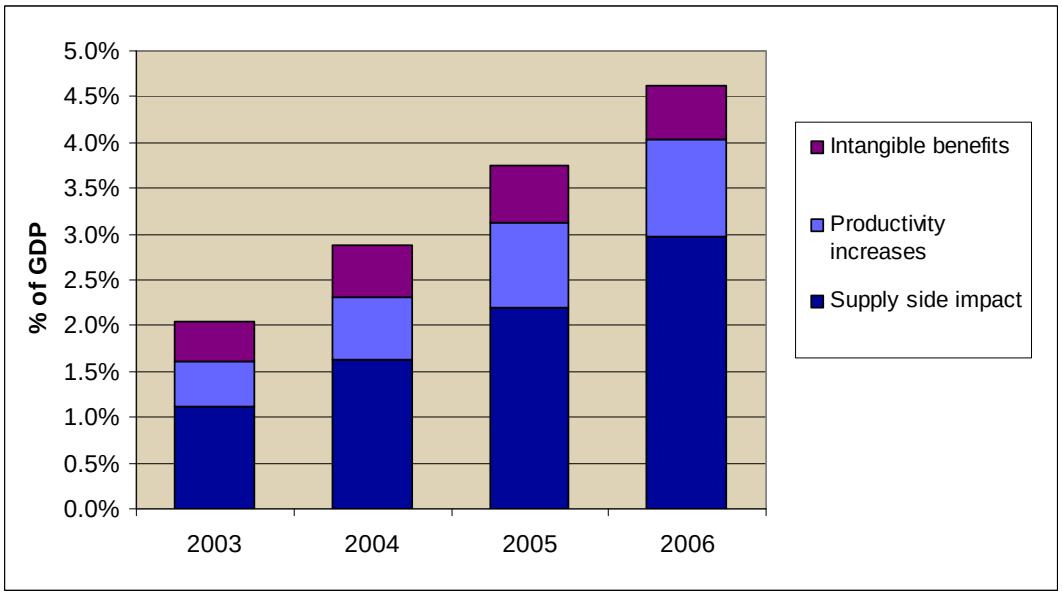
Figure 75: Economic impact of mobile communications in Tanzania (TZS millions)



Source: Aggregation of previously calculated effects

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 4.6% of GDP in 2006[54]. Further increases in mobile coverage can be expected to result in the contribution of the mobile sector continuing to grow further.

Figure 76: Economic impact as a percentage of GDP



Source: Aggregation of previously calculated effects

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

54 Institutions including the Worldbank, CIA factbook, EIU and Tanzania Statistics office report GDP figures. There are differences of up to 10% in these estimates. We have opted to use an average of GDP figures from the CIA factbook and Worldbank. However, using a high-end estimate may reduce economic impact as a percentage GDP, for example from 4.6% to 4.2% in 2006.

penetration there is a 1.2% increase in the economic growth rate. The 5% increase in penetration rates between 2005 and 2006 may have contributed 0.6% 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 4.6% of GDP. 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 Tanzania is to continue in its economic development, it is imperative that this rapidly developing mobile communications sector is encouraged to continue operating as an engine of growth. In particular, government policy should not limit this development through policies that may restrain consumer demand for mobile services.

13 Tanzania: Impact of reducing excise duties

In this section we present the results of our 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 Our scenarios for analysis

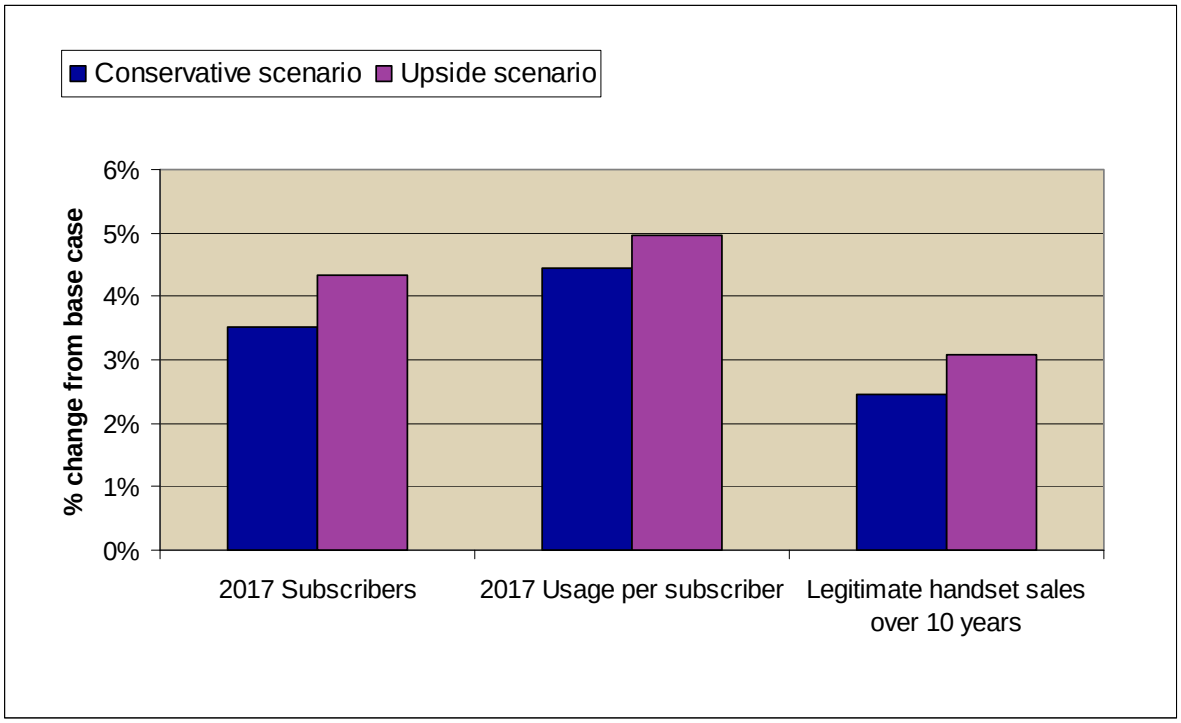
Using the model and assumptions outlined in Section 16 of the report, we have analysed the impact of reducing excise duty applied on mobile usage from 7% to 5%, representing a reduction of 29%. We then compare the changes that result against our base case forecast.

Our conservative scenario involved using the mid-point elasticity of penetration with respect to rate per minute of -0.4, a network effect of 0.3% and using a value-add multiplier of 1.2. In addition, we consider an "upside" scenario, where the penetration elasticity is higher, at -0.6, the network effect is 0.35% and our multiplier is 1.5.

13.2 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 2007.

Figure 77: Impact of reduction in excise tax on usage on the mobile industry



Source: Deloitte analysis

Our conservative scenario shows that the number of subscribers are likely to be 3.5% higher than the base case in 2017 at 12.4 million, representing penetration of 27%. Using a higher penetration elasticity and network effect in the upside scenario, there is an impact of over 4%. The increase in penetration drives the increase in legitimate handset sales.

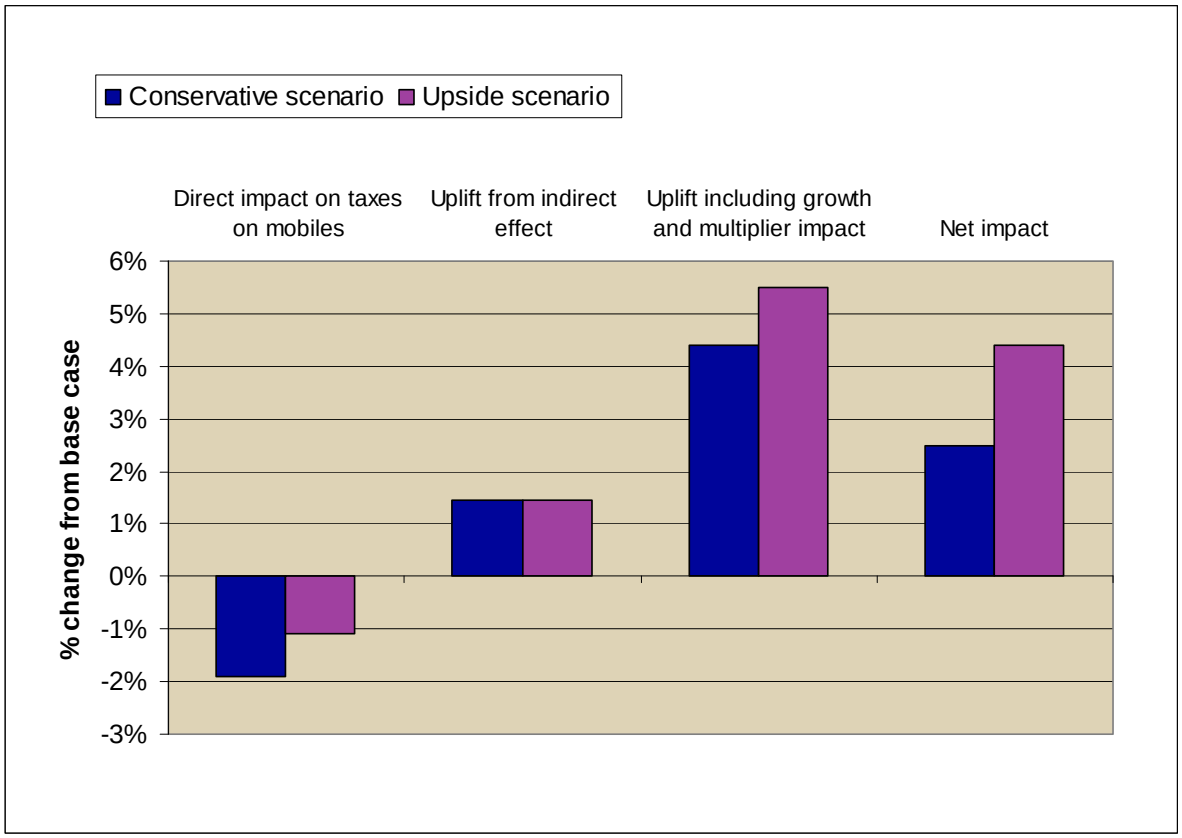
The impact on usage is 4.5% in the conservative scenario, representing 1 extra minute of use per user per month, or 1 extra text. The impact on usage in the upside scenario is 4.97%. The difference in usage increase between the conservative and upside scenario is due to the higher network effect assumed in the upside case.

13.3 Impact on Government tax revenues

The following figure shows the impact, over the 10 years to 2017, 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.

Figure 78: Impact of reduction in excise tax on usage on Government tax revenues



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 nearly 2% in the conservative scenario and by 1% in the upside. This impact consists of the impact on VAT and revenues from the excise tax itself. Though the reduction in the excise tax leads to a loss in government revenues due to a lower rate of 5% being applied compared to the current 7% 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 almost 5% in the conservative scenario and by 5.7% in the upside scenario over the period. Revenues from excise taxes fall by 25% in the conservative scenario, showing that following the 29% tax cut, the increased volumes create a compensating effect of 4% over the ten years. In the upside scenario revenues from excise tax fall by 24%, so that the compensating effect over the ten years is 5%;
- **Uplift from the indirect effect:** This uplift is the result of the additional corporation tax and regulatory fee revenues paid by the mobile operators, resulting from the fact that their revenues and profits will increase following the tax reduction. In the conservative case, company revenues

increase by almost 5%, driving the change in these additional tax revenues, while in the upside scenario company revenues increase by 5.7%;

- **Uplift including growth and multiplier impact:** This relates to the dynamic impact on GDP resulting from our calculated 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 4% in the conservative scenario and to over 5% in the upside scenario. The higher impact in the upside scenario is a result of the use of a multiplier of 1.5 in this scenario; and
- **Net impact**: Combining the effects on tax revenues, the net result is positive in both scenarios at 2.5% in the conservative scenario, and 4.4% in the upside scenario. A neutral position is reached seven years following the tax reduction in the conservative scenario and after five years in the upside.

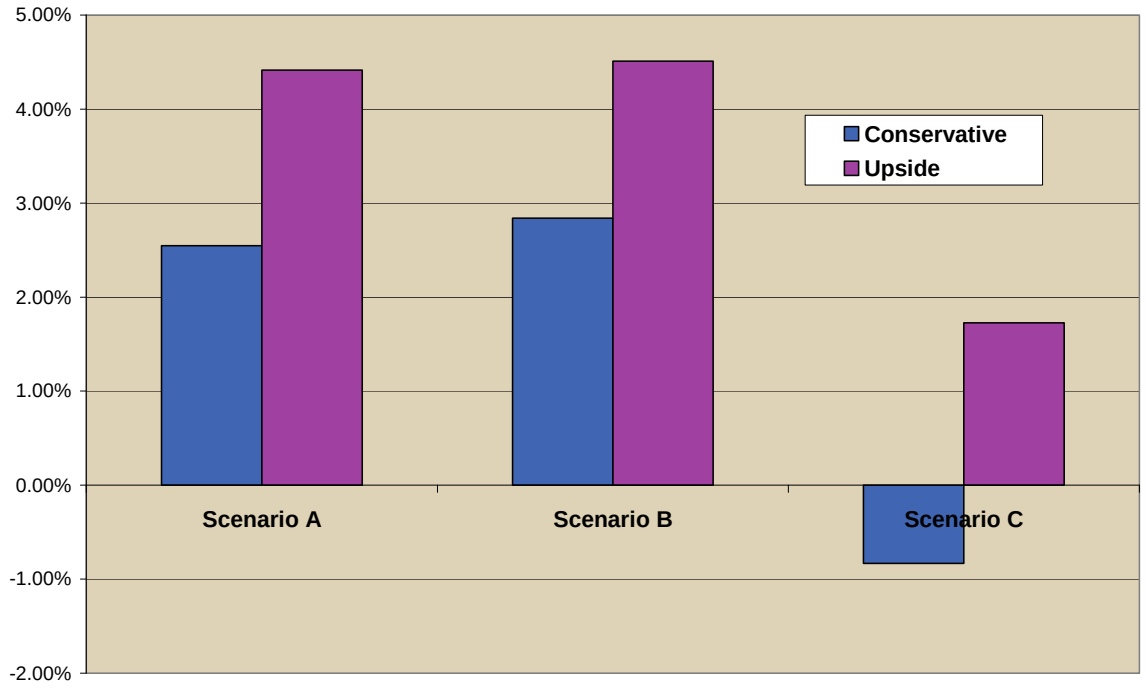
We also analysed the impact of reducing taxes gradually over a ten year period. Our three tax rate scenarios are presented in the table below.

Figure 79: Gradual reduction in excise tax scenarios

Scenario	Excise tax rate in each year										
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Scenario A	6%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Scenario B	6%	6%	6%	6%	6%	5%	5%	5%	5%	5%	5%
Scenario C	6%	6%	5%	5%	4%	4%	3%	2%	1%	0%	0%

A gradual reduction in taxes from 7% to 5% over the ten year period to 2017 leads to a higher tax positive result than both our original conservative and upside cases. Our analysis also indicates that reducing the excise tax to 0% gradually over the ten year period can be tax positive in the upside case. The impact of each of the scenarios on government tax revenues is shown in the following figure.

Figure 80: Net impact on government revenues of reducing the excise tax gradually over time



Source: Deloitte analysis

The net effect on government revenues in Scenario A is 2.55% in the conservative case and 4.4% in the upside case. The respective figures for Scenario B are 2.84% and 4.5%. In scenario C, reducing the excise tax to 0% gradually over time could, in the upside case, have a positive net impact on government revenues of 1.7%.

13.4 Conclusions

Our analysis shows that the impact of reducing the excise tax on usage to 5% will be significantly tax positive over a 10 year period, with neutrality achieved after seven years in the conservative scenario and five years in the upside scenario. Though tax revenues are lost in the short term, the increased tax revenues resulting from the growth in the industry, related industries and the economy as a whole compensate these for. We believe that our conservative scenario has used conservative estimates of both elasticity of demand and the multiplier effect, and hence there could be more of a positive net impact as identified in the upside scenario. In addition, our tax model does not capture the intangible benefits of the mobile industry which would grow in line with the increased penetration and usage.

Taxation and the Growth of Mobile in Uganda



Executive Summary

14 Uganda: Executive Summary

The mobile communications sector has brought significant social and economic benefits to Uganda. The four mobile operators have invested heavily, with population coverage above 90%. There are over 2.5 million mobile subscribers, equating to a penetration rate of 9%. The number of mobile connections outnumbers fixed lines by 22 to 1. 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 Celtel's One Network is delivering value to its customers through its lack of roaming charges within East Africa. Entry level handset prices continue to trend down.

The mobile communications industry contributed a total of UGX 618,464m to the economy in 2006, representing approximately 3.7% of total GDP. Well over 100,000 Ugandans are employed by the mobile and related industries. Increasing mobile penetration by 10% can increase annual Gross Domestic Product by 1.2%.

Despite the industry's significant contribution to Uganda's socio-economic development, mobile consumers are subject to a sector specific tax of 12% on mobile usage. The 12% excise duty, the highest in East Africa, is regressive, hitting poorer people harder and makes mobile communications less affordable for many millions of Ugandans.

By reducing the tax, more Ugandans will connect and use mobile services, tax receipts will increase in the medium to long term and GDP will rise. For example, lowering this tax to 8% this year could be tax positive, leading to a cumulative incremental increase in tax revenues of up to UGX 117,000m by 2017 (with revenue neutrality achieved after four years) along with an incremental increase in mobile subscribers of 6%. Moreover, GDP could rise by 0.6% or UGX 178,896m.

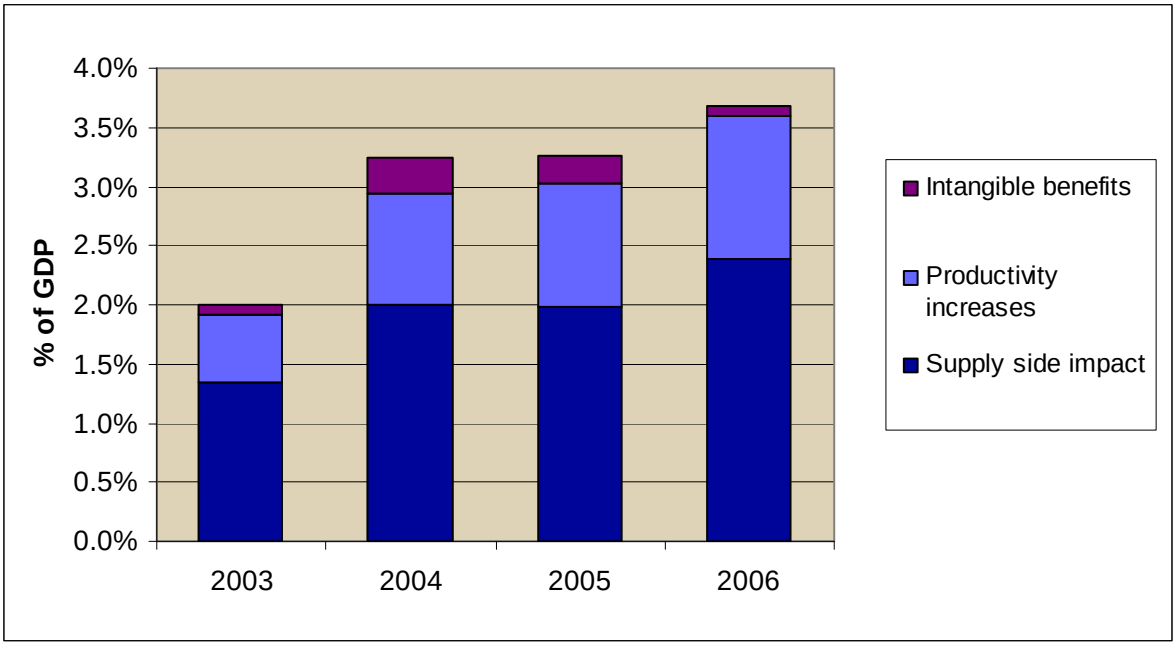
The "tiger" economies in Asia have placed telecommunications at the core of their economic development strategies. If Uganda is to follow a similar path it is imperative that the rapidly developing mobile communications sector is encouraged to continue operating as an engine of growth. The government should not limit this development through policies that may restrain consumer demand for mobile services.

14.1 Economic benefit of mobile communications in Uganda

The mobile communications industry's economic contribution has increased by more than 143% from UGX 254,033m in 2003 to TZS 618,464m in 2006 of which about 46%, UGX 284,291m, went to the government in tax revenues. The economic impact can be expected to rise steadily with mobile penetration.

Increasing mobile penetration should therefore be a cornerstone of the government's economic and fiscal policy.

Figure 81: Economic impact of mobile communications industry as a percentage of GDP

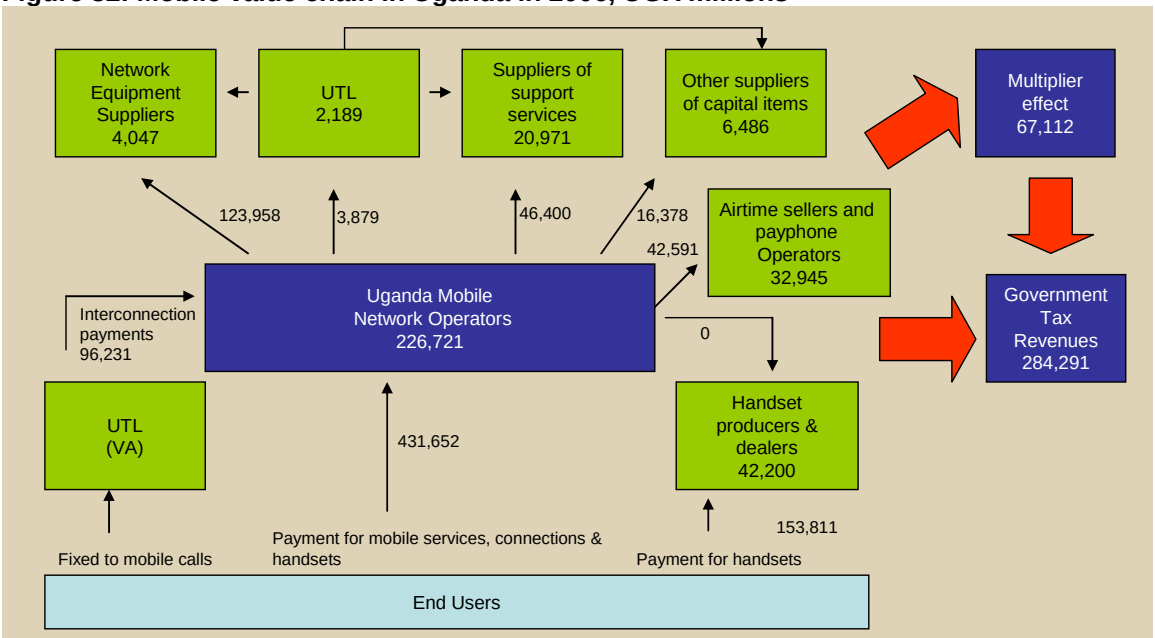


Source: Deloitte Analysis

Supply side impact of mobile communications

The supply side impact of mobile communications is derived from direct, indirect and multiplier [55] impacts. The revenue flows and value add for 2006 are presented below.

Figure 82: Mobile value chain in Uganda in 2006, UGX millions



Notes:
(i) Revenue figures represent flows to domestic companies only and exclude all payments to international entities
(ii) Value add is specific to Ugandan economy and does not show international value add
(iii) From the revenue received by UTL, domestic revenue flows to related industries are estimated as: Ush 34m to network equipment suppliers; Ush 1m to phone suppliers; Ush 53m to other capital suppliers; and Ush 1,008m to suppliers of support services

Source: Deloitte analysis based on information provided by MTN and Celtel, interviews and analysis of company accounts and industry reports. Figures grossed up to capture estimated impact of UTE.

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

Demand side impact of mobile communications

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

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.

14.2 Impact of reducing the excise taxes on usage

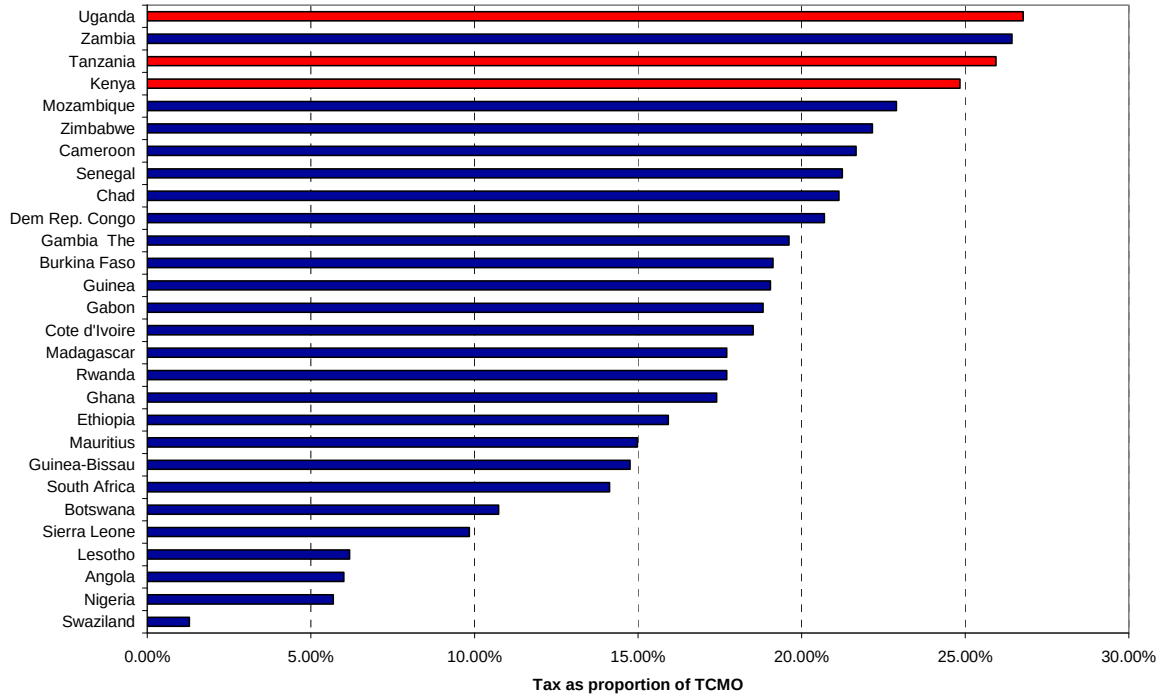
Despite the positive economic impact that mobile communications creates for the Ugandan economy, mobile consumers are subject to some of the highest taxes in Africa. The following figure illustrates the tax burden on mobile services as a percentage of the total cost of mobile ownership ("TCMO")[56]. The reason why members of the East African community are among the worst performers in terms of penetration is the presence of a specific excise tax levied on usage in these countries.

Mobile specific taxes are high and levied in only a handful of jurisdictions globally[57]. Uganda is currently ranked the highest in this respect, with tax making up nearly 27% of TCMO, with the excise tax alone making up 9% of the total cost.

[56] 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. Note, in the economic model, an assumption of 2 years for handsets is made.

[57] As identified in the GSMA's 2007 "Global Mobile Tax Review", only 16 out of the 101 jurisdictions considered in the report levy taxes specific to the mobile industry.

Figure 83: Tax as percentage of total cost of mobile ownership

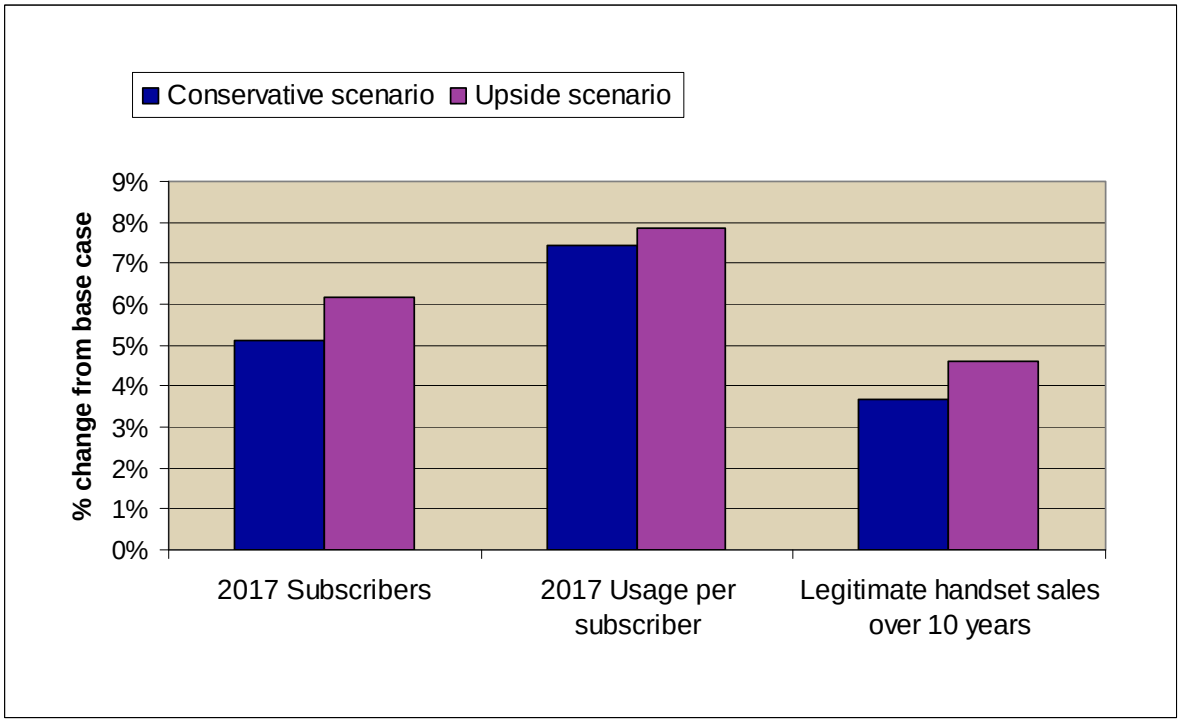


Source: Deloitte Analysis

We have analysed the impact of reducing the excise duty applied on mobile usage in Uganda from 12% to 8%, representing a reduction of 33%. We then compare the changes that result against our base case forecast that projects the development of the mobile industry to 2017 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 2007.

Figure 84: Impact of reduction in excise tax on usage on the mobile industry



Source: Deloitte analysis

Our conservative scenario shows that total subscribers are likely to be 5% higher in 2017 at 5.8 million, representing mobile penetration of 13.2%.

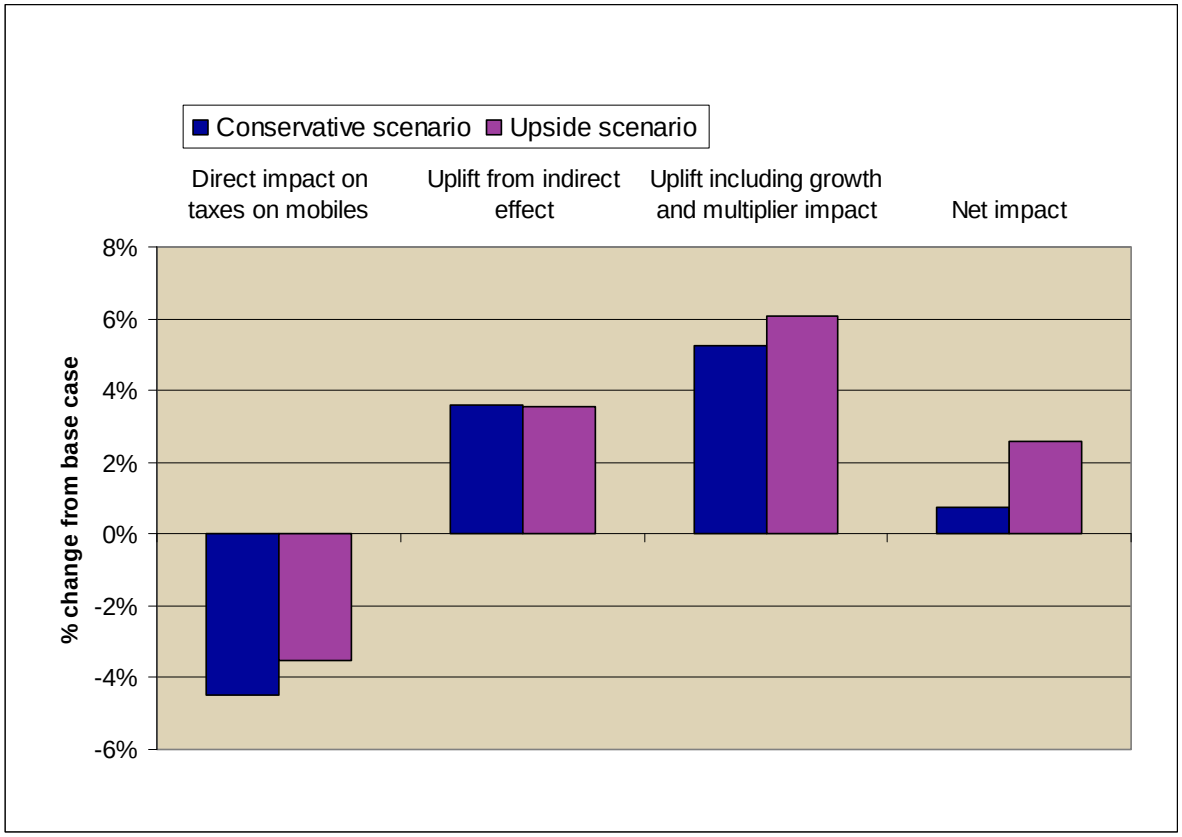
In our upside scenario, total subscribers could be over 6% higher in 2017. The impact on usage is significant at 7.4% in the conservative scenario and 7.8% in the upside scenario given the elasticity of usage with respect to price of -1.05.

14.3 Impact on government tax revenues: once off reduction

The following figure shows the impact on government tax revenues 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.

Figure 85: Impact of reduction in excise tax on usage on Government tax revenues, 2007-2017



Source: Deloitte analysis

The overall impact is that these tax changes are likely to be tax positive under both of our scenarios, with neutrality being achieved nine years after the tax reduction in the conservative case and after seven years in the upside scenario.

14.4 Impact on government tax revenues: glide path

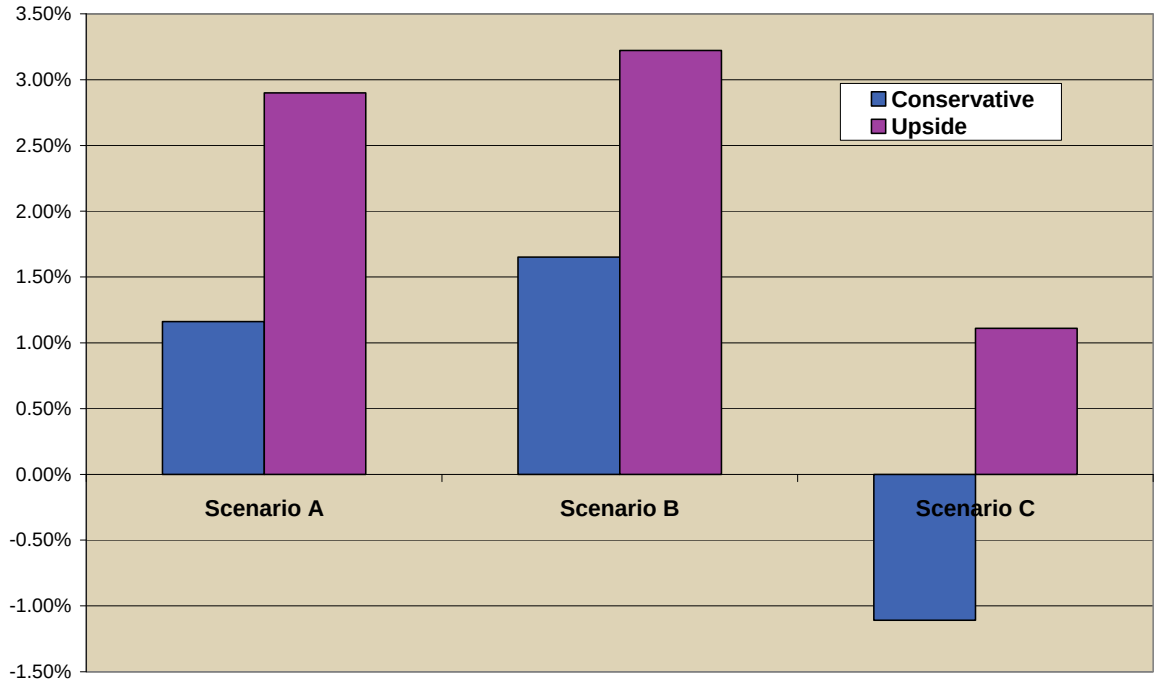
We have also analysed the impact of reducing taxes gradually over a ten year period. Our three tax rate scenarios are presented in the figure below.

Figure 86: Gradual reduction in excise tax scenarios

Scenario	Excise tax rate in each year										
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Scenario A	11%	10%	9%	8%	8%	8%	8%	8%	8%	8%	8%
Scenario B	11%	11%	10%	10%	9%	9%	8%	8%	8%	8%	8%
Scenario C	11%	10%	9%	8%	7%	6%	5%	5%	5%	5%	5%

Lowering taxes from 12% to 8% over the ten year period to 2017 leads to a higher positive result in both the conservative and upside scenarios. Also, reducing the excise tax to 5% gradually over time may be tax positive in the upside case. The impact of each of the scenarios on government revenues is shown in the following figure.

Figure 87: Net impact on government revenues of reducing the excise tax gradually



Source: Deloitte analysis

The net effect on government revenues in scenario A is 1.16% and 2.9% in the conservative and upside case respectively. The respective figures for scenario B are 1.65% and 3.2%. As mentioned above, our analysis indicates that reducing taxes gradually to 5% over time might be tax positive in the upside case, with a net impact of 1.1%.

15 Uganda: Economic impact of the mobile industry

We estimate that the mobile communications industry contributed a total of UGX 767,368m to the economy in 2006, representing 4.6% of total GDP. This was a significant increase on the 2003 contribution of UGX 242,818m.

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 validates this and we estimate that mobile communications has raised GDP growth rates in Uganda by 0.12% for each 1% increase in penetration. As such, the 3% increase in penetration rates between 2005 and 2006 may have contributed 0.36% 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. MTN, Celtel and UTL have undertaken significant investment in a network which now covers an estimated 96% of the population[58], with mobile connections outnumbering fixed lines by 22 to 1. There are over 2.5 million mobile subscribers and a penetration rate of 9%. 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.

15.2 Static Supply side impact of mobile communications

We have estimated the value add created by the mobile communications industry. Our estimate of this impact should be regarded as conservative as we have not been able to identify data to document the secondary impact from network equipment suppliers and certain other recipients of cash from the mobile operators. We have also estimated the "leakages" from the system, i.e. what 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.

15.2.1 Value chain impact

Firstly, we analysed the value add of the mobile network operators in Uganda. We find that they directly contribute UGX 226,721 in 2006. The breakdown by category is provided in the figure below.

Figure 88: Value add of mobile network operators (excluding multiplier effect)

Value add (UGX millions)	2003	2004	2005	2006
Employee wages and benefits	18,114	23,061	25,244	32,167
Taxes and regulatory fees	66,833	106,194	142,743	194,138
CSR	462	492	278	329
Dividends	36	40	50	87
Total	**85,445**	**129,786**	**168,316**	**226,721**

Source: Deloitte analysis based on information provided by MTN and Celtel

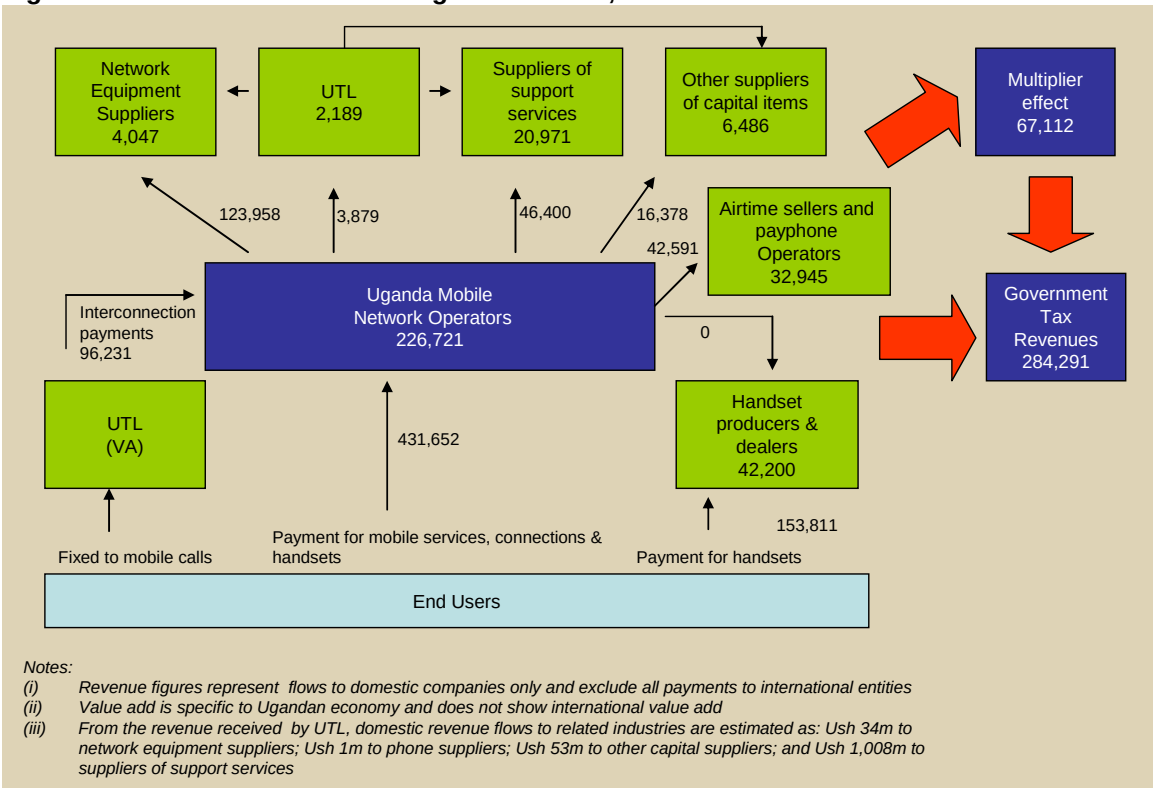
Taxes and regulatory fees (including spectrum fees) make up the largest proportion in the above table, accounting for over 86% of the total in 2006. Increased tax revenues have been the direct result of an increasing subscriber base. The next largest contributor is employee wages and benefits.

[58] Data supplied by GSMA

Corporate social responsibility (CSR) programmes received over UGX 329m in 2006, including sponsorship of events. Dividends were paid only by MTN during the four years considered, which is 97% foreign owned.

We then analysed the revenue flows from MTN and Celtel to others in the industry. We also sought to quantify the share of revenue that translated into value add[59]. Our primary source of information was interviews with operators and analysis of operator accounts. The figure below provides revenue flows between providers and estimates of value add. The estimates of value add include the multiplier effect on the wider-economy which is assumed to be 20% of value-add.

Figure 89: Mobile value chain in Uganda in 2006, UGX millions



Notes:
(i) Revenue figures represent flows to domestic companies only and exclude all payments to international entities
(ii) Value add is specific to Ugandan economy and does not show international value add
(iii) From the revenue received by UTL, domestic revenue flows to related industries are estimated as: Ush 34m to network equipment suppliers; Ush 1m to phone suppliers; Ush 53m to other capital suppliers; and Ush 1,008m to suppliers of support services

Source: Deloitte analysis based on information provided by MTN and Celtel, 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 table below shows the calculation of value add.

59 Details on value add margins are contained in the assumptions appendix

Figure 90: Calculation of value add from mobile communications in Uganda in 2006

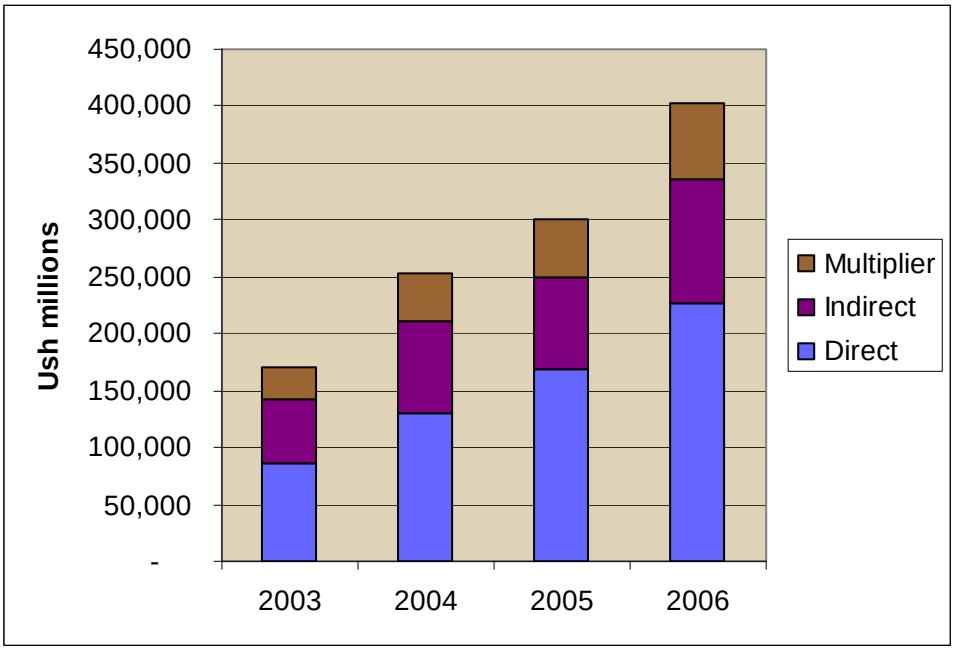
Domestic value add, UGX millions	Total revenue	Domestic revenue	Domestic cost	Domestic value add	Value add with multiplier
Mobile network operators	527,883	527,883	301,162	226,721	272,065
Fixed telecommunications operators	3,879	3,879	1,690	2,189	2,627
Network equipment suppliers	123,958	5,496	1,449	4,047	4,856
Handset designers and dealers	155,133	153,811	111,611	42,200	50,640
Other suppliers of capital items	16,378	9,088	2,602	6,486	7,783
Suppliers of support services	46,400	32,480	11,509	20,971	25,166
Airtime commission, payphone commission	42,591	42,591	9,646	32,945	39,534
Total	**916,221**	**775,227**	**439,668**	**335,559**	**402,671**

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

85% of the revenue flows from the MNOs are estimated to remain in Uganda, however interconnection payments and airtime and payphone commissions dominate this figure[60]. It is estimated that only 10% of capital expenditure is domestic, primarily low-value non network equipment. Over 70% 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 calculated the value-add on an annual basis from 2003.

Figure 91: Supply side value add from mobile communications 2003 to 2006



Source: Deloitte analysis, calculated as in previous tables

Value add has increased by nearly 137% during the four year period.

[60] The relatively high value of airtime and payphone commissions is due to the fact that only 2% of airtime is sold directly by operators, with the remainder being sold by third parties.

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).

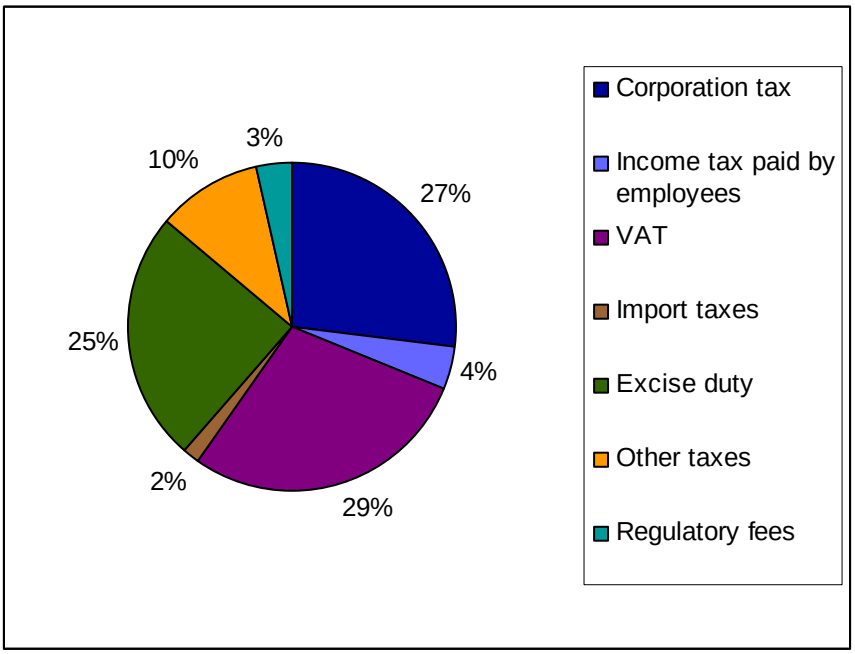
Figure 92: Tax revenues in Uganda from mobile operators

Taxes from mobile network operators, UGX millions	2003	2004	2005	2006
Corporation tax	10,129	24,380	37,294	52,386
Income tax paid by employees	4,631	5,518	7,492	8,069
Sales and mobile specific taxes	48,267	71,844	91,287	126,926
Licence, spectrum and USO fees	3,807	4,452	6,670	6,756
Total taxes and fees	**66,833**	**106,194**	**142,743**	**194,138**
Tax as a percentage of revenue	24%	31%	31%	37%

Source: Deloitte analysis based on operator data

The largest proportion of tax revenue is raised through mobile specific and sales taxes which accounted for 65% of tax paid in 2006, of these the excise tax on usage makes up around 25% of total tax paid in each of the four years. The breakdown for 2006 is illustrated in the figure below:

Figure 93: Breakdown of 2006 tax revenues from mobile operators by source



Tax as a proportion of company revenues averaged 37% in 2006, and this has been increasing steadily since 2003.

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 94: Total tax revenues from the mobile value chain in 2006

Tax Revenue (UGX, millions)	Tax revenue	Tax revenue with multiplier
Mobile network operators	194,138	232,965
Fixed telecommunications operators	988	1,186
Network equipment suppliers	1,585	1,902
Handset designers and dealers	22,133	26,560
Other suppliers of capital items	2,579	3,095
Suppliers of support services	8,759	10,511
Airtime commission, payphone commission	6,726	8,071
Total	**236,909**	**284,291**

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 MNOs and not total tax revenues from the sector.

Other than the MNOs 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, streetside airtime sellers do not. Interviews with operators, handset manufacturers and dealers revealed that many handsets are imported illegally from Dubai or are reconditioned / stolen. Therefore, we assume that only 70% of handsets sold are subject to sales tax.

15.2.2 Impact on employment numbers

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.

Figure 95: Contribution to employment from the mobile value chain

Employment Impact	Number of employees	Number of employees including multiplier
Mobile network operators	1,010	1,212
Fixed telecommunications operators	66	80
Network equipment suppliers	71	85
Handset designers and dealers	6,454	7,745
Other suppliers of capital items	148	178
Suppliers of support services	4,189	5,027
Airtime commission, payphone commission	78,600	94,320
Total	**90,538**	**108,646**

Source: Operator data, interviews and Deloitte analysis on average wage rates. (Note this is employment directly created by revenue flows from the MNOs 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 32,100 streetside airtime outlets and 20,300 payphones. The limited contribution to employment in capital item industries is as a result of the majority of capex being spent internationally. However, as the Ugandan economy continues to develop, more capital expenditure, and hence employment, can be expected domestically.

The number of employees in other sectors is calculated 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.

15.2.3 Demand-side impact: increases in productivity and consumer surplus

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[61]:

- 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[62];
- Improving efficiency of mobile workers: mobile services improve the efficiency of all workers in the economy. Workers with unpredictable schedules, for example those involved in repair and maintenance, or collection and delivery, will particularly feel this effect. Mobiles will give them greater accessibility and better knowledge of demand; and
- 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

61 See, for example, "Africa: The Impact of Mobile Phones", Vodafone Policy Paper Series, No.3, March 2005.

62 "Africa: The Impact of Mobile Phones", Vodafone Policy Paper Series, No.3, March 2005.

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. These included:

- 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; and
- 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[63]. 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".

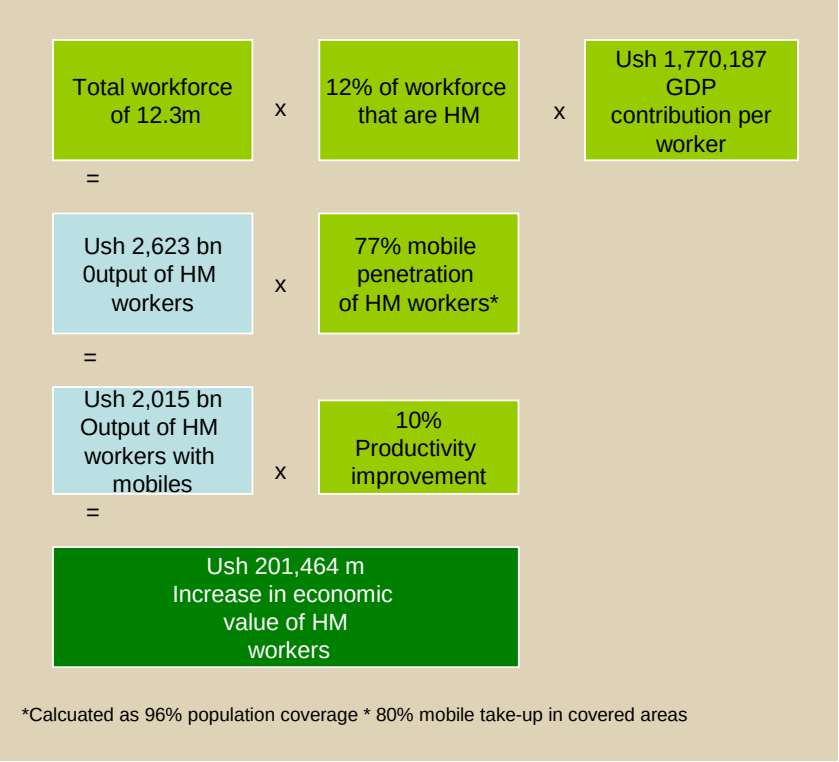
Other surveys have typically quantified productivity improvements to be between 6% and 11%. For example, Mckinsey quantified the impact to be 6% in China, whilst the impact in the UK has been estimated to be both 6% and 11%. Based on our interviews, it may be assumed that the productivity increase in Uganda would be at the high-end of this range since:

- 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 of the UK and China;
- Higher levels of informal activity imply greater need for co-ordination between individuals since there is less formal communication at the company level; and
- Uganda is more rural than the UK so the travel-time savings are likely to be greater.

We therefore assume high mobility workers who own a mobile phone have experienced a productivity gain of 10%. Using the economic value concept that we set-out in the methodology section, we estimate the incremental impact on the economy was UGX 201,464 2006. This calculation is set out below. We have not considered the impact on low mobility workers in our analysis.

63 Quantification would require consumer and business surveys to be undertaken

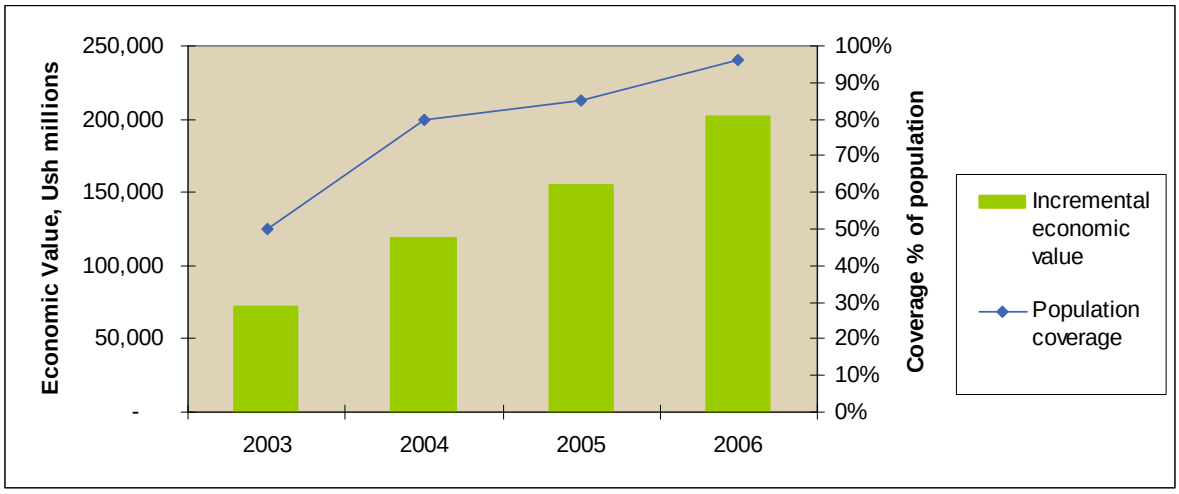
Figure 96: Economic impact in 2006 of increased productivity amongst high mobility workers



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

Our calculations show large increases in productivity between 2003 and 2006. These are driven by the increase in population coverage which allows a greater proportion of high mobility workers to access mobile technology.

Figure 97: Economic value from increases in productivity, 2003 to 2006



Source: Deloitte analysis. Population coverage calculated by GSMA

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)[64] relating to Tanzania. Benefits identified in Uganda include:

64 The specific article referenced is "Linking mobile phone ownership and use to social capital in rural South Africa and 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;
- 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;
- 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;
- 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; and
- 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[65]. 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 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:

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

The following figure provides the total minutes of use relating to subscribers joining the networks in each year since 2002.

65 Used by McKinsey in "Wireless Unbound", 2006

Figure 98: Calculation of intangible benefits using willingness to pay concept

	Average MOU of new subscriber	Number of new subscribers*	Average minutes of use for new subscribers
2002	1,569	263,085	412,660,080
2003	1,019	127,827	130,284,439
2004	594	289,464	171,880,605
2005	425	374,923	159,335,057
2006	143	520,859	74,735,966

Source: Deloitte calculation based on operator information

Following the above, the calculation of the increase in consumer surplus in each year, for each set of new customers, is provided below.

Figure 99: Calculation of consumer surplus[66]

	2003	2004	2005	2006
2002 new Subscribers	7,599,712,830	21,920,364,274	20,293,328,167	9,203,859,096
2003 new Subscribers	-	4,521,295,220	4,007,609,749	506,458,723
2004 new Subscribers	-	-	-	-
2005 new Subscribers	-	-	-	-
2006 new Subcribers	-	-	-	-
Total	7,599,712,830	26,441,659,494	24,300,937,916	9,710,317,820
Total including UTE uplift	**11,214,529,229**	**39,018,680,032**	**35,859,720,576**	**14,329,047,089**

Source: Deloitte calculation based on operator information

The total increase in consumer surplus has been calculated as UGX 14,329m in 2006. This is lower than in earlier years, due an increase in the average price per minute in 2004 and 2005. This implies that consumers joining the network after 2003 will not, on average, have experienced a gain in consumer surplus.

However, we would note that these estimates of consumer surplus are conservative and are may underestimate the true value of intangible benefits:

- 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;; and
- 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.

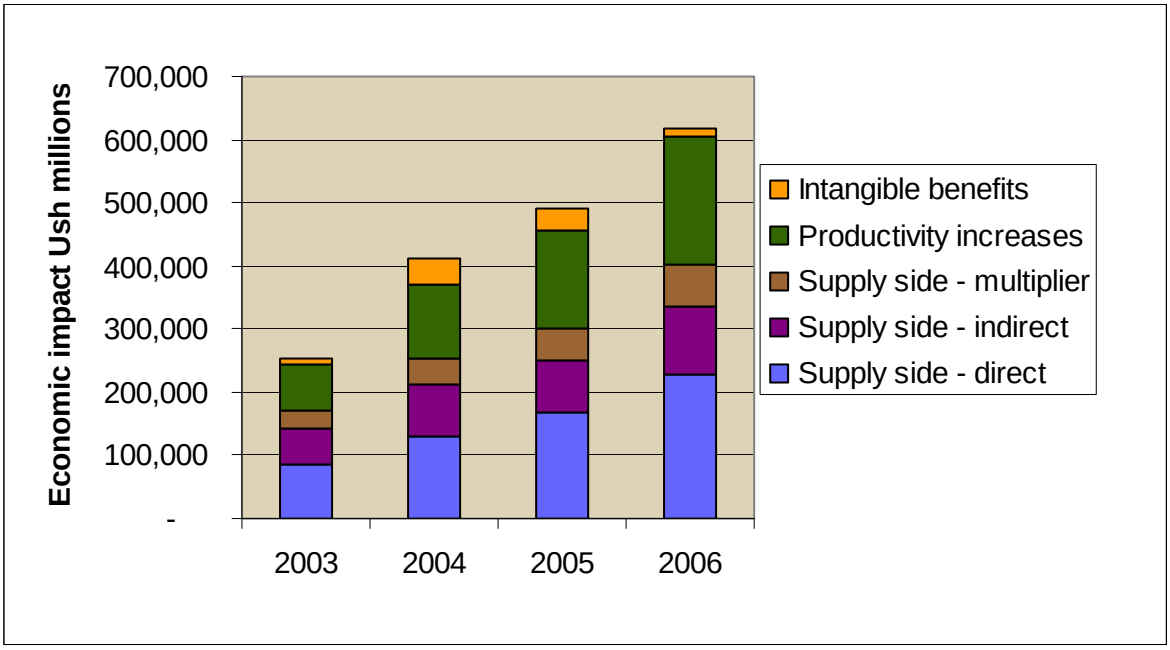
We have not been able to quantify the impact of these effects. However, we note that they imply our calculation may be an underestimation of the true value of mobile communications.

[66] The new subscribers figures do not reflect UTE subscribers. Therefore we uplift the calculated consumer surplus to reflect UTE subscriber numbers.

15.2.4 Total impact on economic welfare

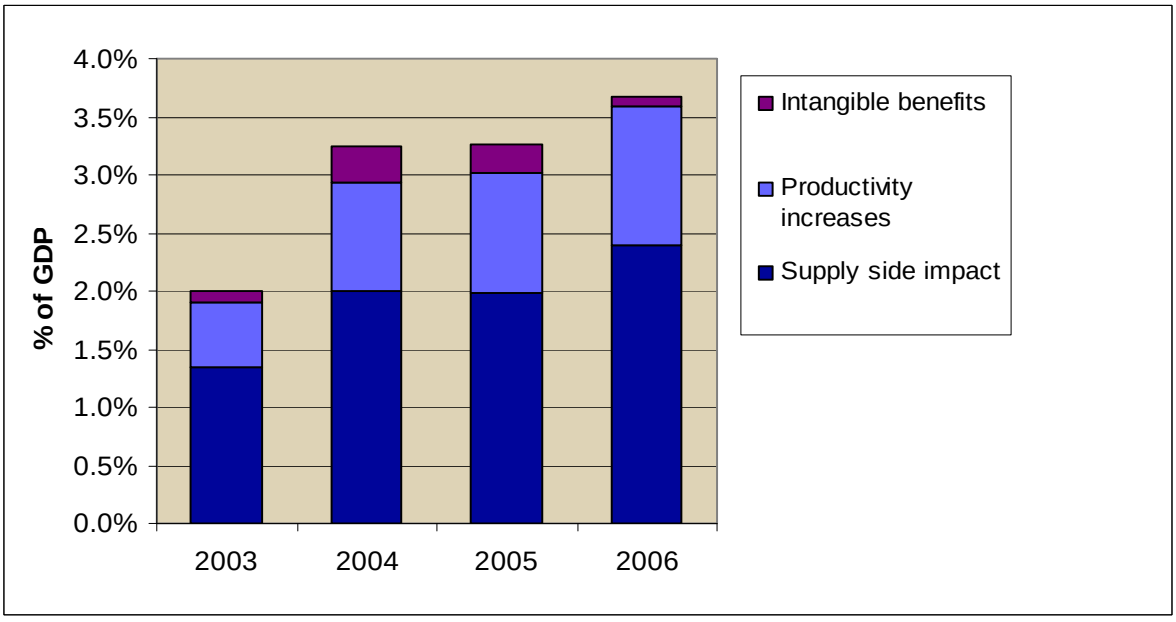
The aggregation of the supply-side, demand side and intangible benefits provides an indication of the total economic impact of mobile communications in Uganda. This is estimated to be UGX 618,464m in 2006. The biggest contributors are the direct and indirect supply side impacts and the demand side productivity increases. There has been a substantial increase in the economic impact in 2006

Figure 100: Economic impact of mobile communications in Uganda (UGX millions)



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 3.7% of GDP in 2006.

Figure 101: Economic impact as a percentage of GDP



Source: Aggregation of previously calculated effects

15.3 Dynamic relationship between mobile communications and growth

As discussed in our methodology (below), 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 economic growth rate. The 3% increase in penetration rates between 2005 and 2006 may have contributed 0.4% to the Ugandan GDP growth rate.

15.4 Conclusion and policy implications

The Ugandan mobile sector creates a substantial and increasing proportion of the country's economic value. It is now responsible for 3.7% of GDP. 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 continue in its economic development, it is imperative that this rapidly developing mobile communications sector is encouraged to continue operating as an engine of growth. In particular, government policy should not limit this development through policies which may restrain consumer demand for mobile services.

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 Our scenarios for analysis

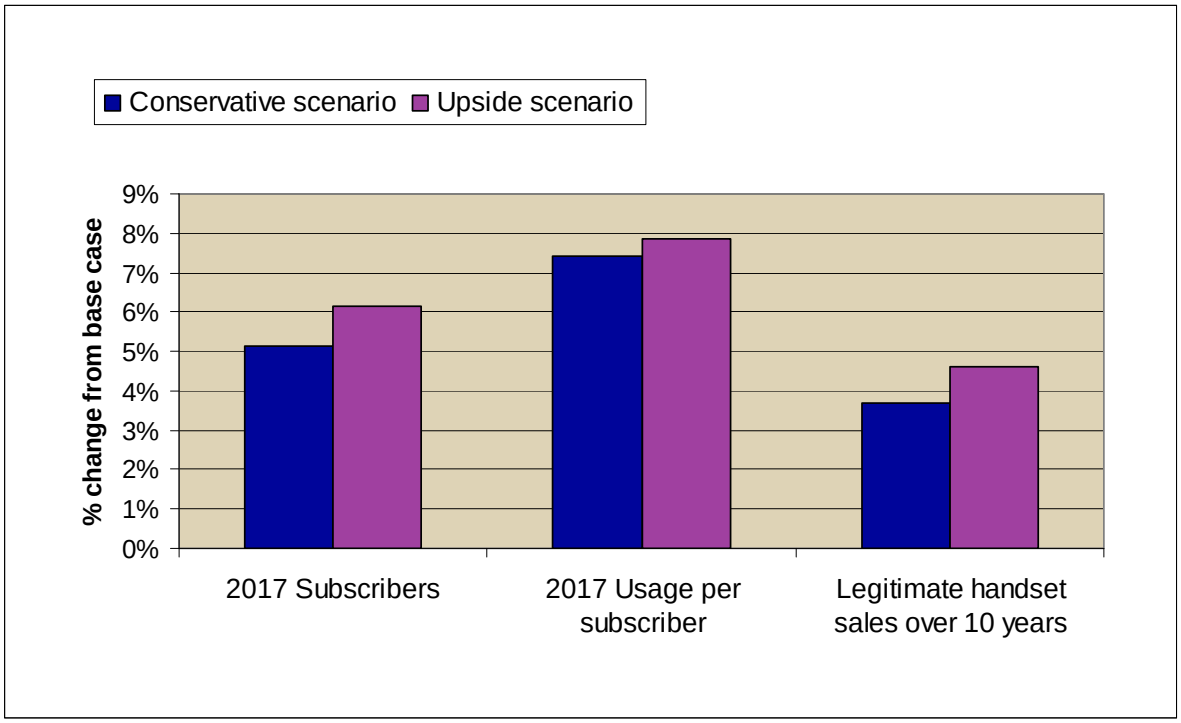
Using the model and assumptions outlined in the methodology section, we have analysed the impact of reducing excise duty applied on mobile usage from 12% to 8%, representing a reduction of 33%. We then compare the changes that result against our base case forecast.

Our conservative scenario involved using the mid-point elasticity of penetration with respect to rate per minute of -0.4, a network effect of 0.4% and using a value-add multiplier of 1.2. In addition, we consider an "upside" scenario, where the penetration elasticity is higher, at -0.6, the network effect is higher at 0.44 and our multiplier is 1.5.

16.2 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 2007.

Figure 102: Impact of reduction in excise tax on usage on the mobile industry



Source: Deloitte analysis

Our conservative scenario predicts that the number of subscribers would be 5% higher than the base case in 2017 at 5.75 million, representing penetration of 13.2%. Using a higher penetration elasticity and network effect in the upside scenario, there is an impact of over 6%. The increase in penetration drives the increase in legitimate handset sales.

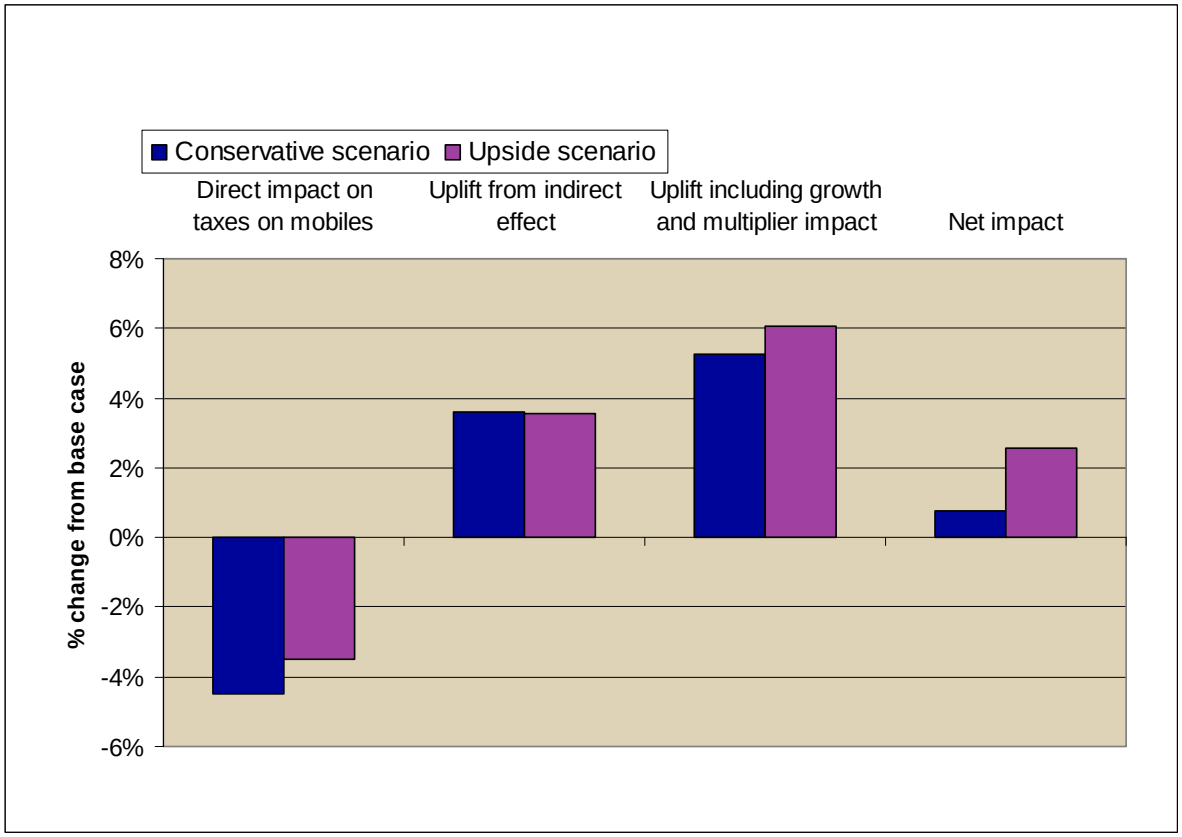
The impact on usage in the conservative scenario is 7.4%, representing nearly 4 extra minutes of use per user per month, or 1 extra text. The impact on usage in the upside scenario is 7.8%. The difference in usage increase between the conservative and upside scenario is due to the higher network effect assumed in the upside case.

16.3 Impact on Government tax revenues

The following figure shows the impact, over the 10 years to 2017, 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.

Figure 103: Impact of reduction in excise tax on usage on Government tax revenues



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 4% in the conservative scenario and 3.5% in the upside. This impact consists of the impact on VAT and revenues from the excise tax itself. Though the reduction in the excise tax leads to a loss in government revenues due to a lower rate of 8% 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 8% in the conservative scenario and 9.2% in the upside scenario over the period. Revenues from excise taxes fall by 27% in the conservative scenario and slightly less in the upside, showing that following the 33% tax cut, the increased volumes create a compensating effect of 6% 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, resulting from the fact that their revenues and profits will increase following the tax reduction., Company revenues increase by 8% in the conservative case and by 9.2% 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 calculated 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 5% in the conservative scenario and 6% in the upside. The higher impact in the upside scenario is a result of the use of a multiplier of 1.5 in this scenario; and
- **Net impact**: Combining the effects on tax revenues, the net result is positive in both scenarios at 0.75% in the conservative scenario, and 2.56% in the upside scenario. A neutral position is reached 9 years following the tax reduction in the conservative scenario and after 7 years in the upside.

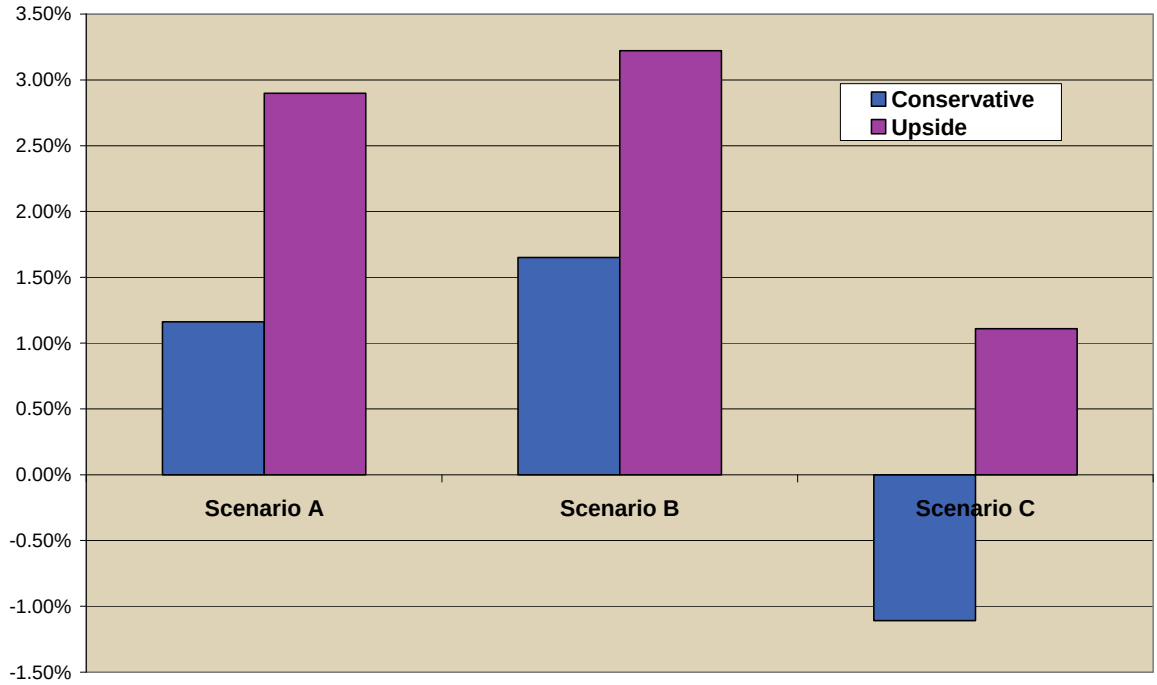
We also analysed the impact of reducing taxes gradually over a ten year period. Our three tax rate scenarios are presented in the following figure.

Figure 104: Gradual reduction in excise tax scenarios

Scenario	Excise tax rate in each year										
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Scenario A	11%	10%	9%	8%	8%	8%	8%	8%	8%	8%	8%
Scenario B	11%	11%	10%	10%	9%	9%	8%	8%	8%	8%	8%
Scenario C	11%	10%	9%	8%	7%	6%	5%	5%	5%	5%	5%

Our analysis shows that a gradual reduction in taxes from 12% to 8% over the ten year period to 2017 leads to a higher positive result in both the conservative and upside scenarios. Also, reducing the excise tax to 5% gradually over time may be tax positive in the upside case. The impact of each of the scenarios on government revenues is shown in the table below.

Figure 105: Net impact on government revenues of reducing the excise tax gradually over time



Source: Deloitte analysis

The net effect on government revenues in scenario A is 1.16% and 2.9% in the conservative and upside case respectively. The respective figures for scenario B are 1.65% and 3.2%. As mentioned above, our analysis indicates that reducing taxes gradually to 5% over time might be tax positive in the upside case, with a net impact of 1.1%.

16.4 Conclusions

Our analysis shows that the impact of reducing the excise tax on usage to 8% will be tax positive over a 10 year period, with neutrality achieved after 9 years in the conservative scenario and 7 years in the upside scenario. Though tax revenues are lost in the short term, the increased tax revenues resulting from the growth in the industry, related industries and the economy as a whole compensate these for.

We believe that our conservative scenario has used conservative estimates of both elasticity of demand and the multiplier effect, and hence there could be more of a positive net impact as identified in the upside scenario. Under upside assumptions, the net impact of larger tax cuts (from 12% to 5%) could also be tax neutral.

In addition, our tax model does not capture the intangible benefits of the mobile industry which would grow in line with the increased penetration and usage.

Though Uganda currently has a higher excise tax rate that the other EA countries, and hence the losses to Government revenues in the short to medium term would be higher; we have shown that overall impact of a reduction may still be tax neutral to positive.

17 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.

17.1 Static Analysis, including intangible benefits

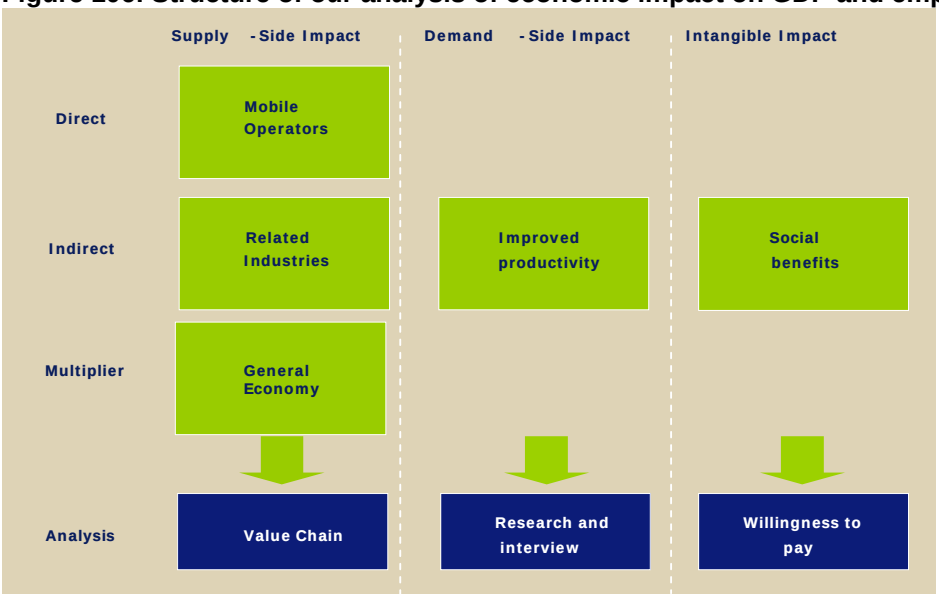
Static analysis refers to the impact of mobile services for a particular period of time and does not seek to estimate the longer term impacts of economic welfare. However, static analysis is extremely useful due to the greater availability of disaggregated data relative to dynamic analysis where a greater 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 EA country. We have defined the total economic impact as consisting of the following elements[67]:

- 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.

We have structured our static analysis as illustrated by the following figure. The different impacts are summed together to give the total economic impact[68].

Figure 106: Structure of our analysis of economic impact on GDP and employment



Source: Deloitte

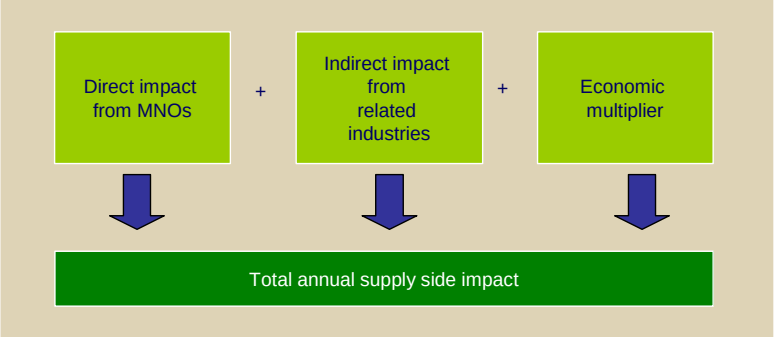
67 Consistent with the McKinsey report , "Wireless Unbound", 2006

68 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.

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.

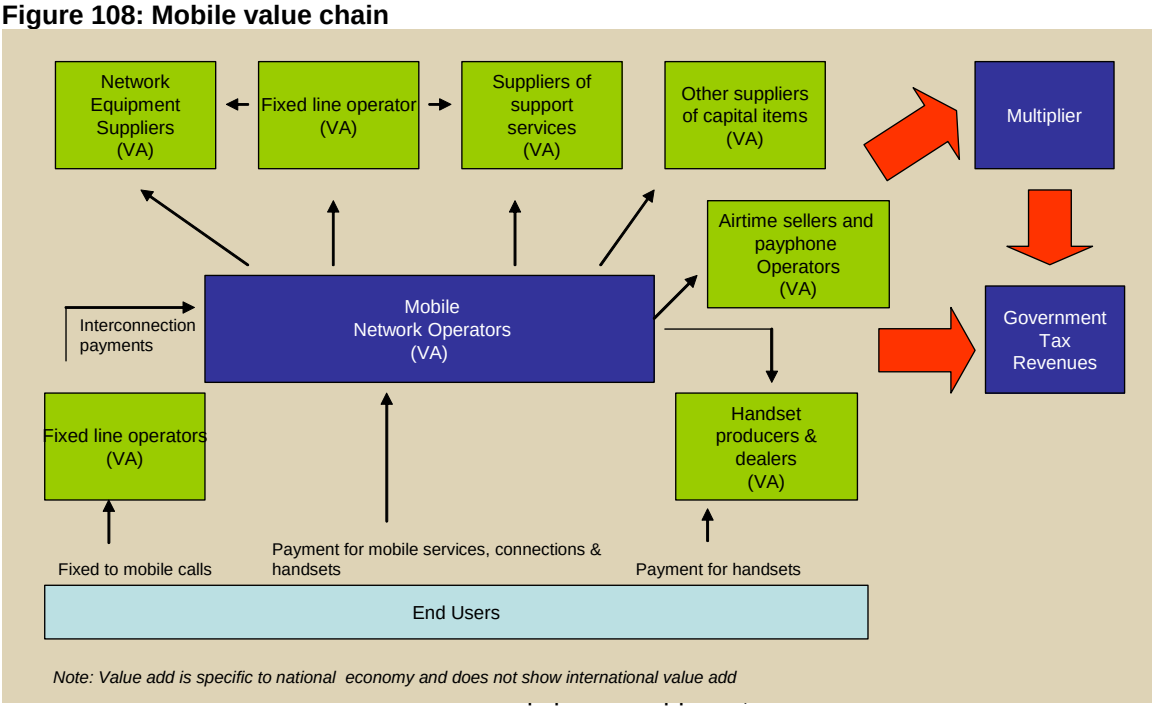
Figure 107: Structure of our supply side analysis



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 (the operators, suppliers, distributors and others); and ultimately in part to the Government via tax revenues. Money flows between these in the industry, 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 focus on the supply side impact on the country in question and ignore international impacts.

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

Figure 108: Mobile value chain



- 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 seek to 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.

Direct value add from mobile network operators

We have determined five categories of economic value which are directly created by the mobile network operators (MNOs). These are:

- 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 which identify the final destination of monetary flows.

Indirect value add

We have identified the revenues that flow directly from the MNOs 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 MNO analysis above. Based upon interviews with industry players, a review of annual reports of similar companies and similar studies, we calculate that the following percentage of revenue is indirect value add:

Figure 109: Indirect value add margins

Indirect value add as % of revenue received from MNO	
Fixed telecommunications operators	53%
Network equipment suppliers	71%
Handset producers and dealers	27%
Other suppliers of capital items	69%
Suppliers of support services	62%
Airtime and payphone commission	73%

Source: Deloitte analysis based on review of company accounts, interviews and Kenya bureau of statistics

Economy wide value add

The value add created by the mobile communications industry will have a positive impact of the economy. We capture this impact by multiplying the direct and indirect value add by a multiplier. The table below shows the values of multipliers that have been calculated in other studies.

Figure 110: 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
Range	**1.1 - 1.7**
* On employment ** On GDP	

Source: As given in table

Based on a review of the above evidence, we have elected to use a multiplier value of 1.2 in this 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. In our upside tax analysis scenario, we opt to use a multiplier of 1.5. This is within the middle of the above range.

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 we assume a degree of leakage from the informal sector.[69]

We have collected information on revenues for the following types of 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.

Calculating the contribution to 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 calculated 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

[69] 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.

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. As discussed above, we have chosen to apply a conservative multiplier of 1.2 on all value add including employment due to the high leakages from the East African economies.

17.1.1 Demand-side impact

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[70]:

- 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[71];
- 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; and
- 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.

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[72], 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.

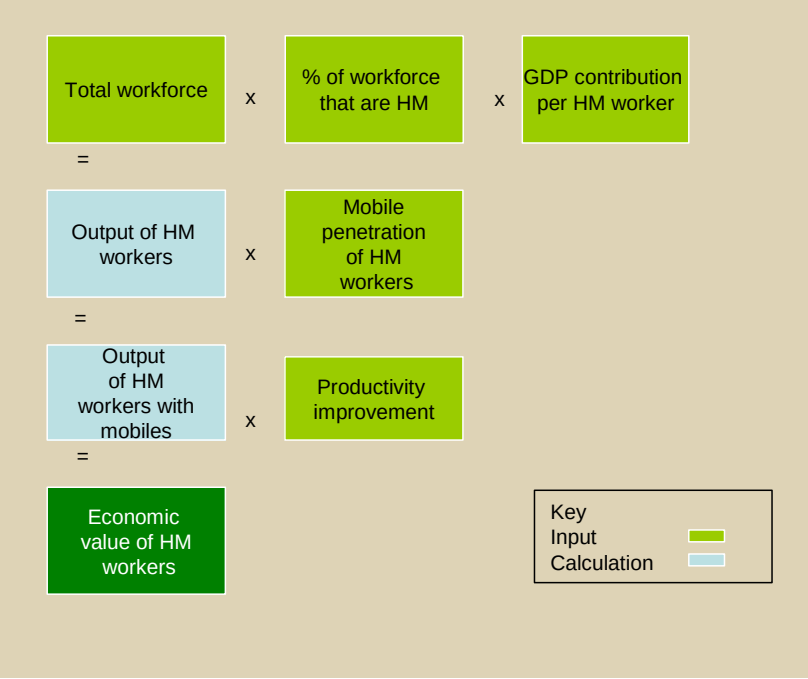
The process for calculating the impact of the productivity improvements on the economy is set out in the figure below.

70 See, for example, "Africa: The Impact of Mobile Phones", Vodafone Policy Paper Series, No.3, March 2005.

71 "Africa: The Impact of Mobile Phones", Vodafone Policy Paper Series, No.3, March 2005.

72 For example, Wireless unbound, the surprising economic value and untapped potential of the mobile phone, Mckinsey & co, September 2006

Figure 111: Calculation of economic impact of productivity improvements



Source: Deloitte methodology

17.1.2 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 we draw upon and extend findings from the Vodafone report (March 2005)[73] relating to Tanzania. This study found that mobile services:

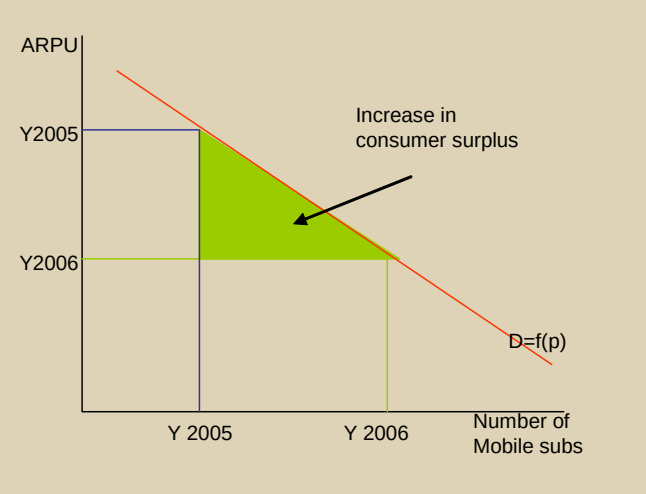
- Promote social cohesion: through enabling contact when family members or friends who have moved away, and building trust through sharing of handsets (which has been found to be common in African countries). In addition, the study found a statistically robust relationship between mobile ownership and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

Whilst it is difficult to assign a specific value to these benefits in terms of contribution to GDP or employment, it is agreed 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[74]. This seeks to calculate the increase in consumer surplus that has resulted from a change in the price of a good.

73 The specific article referenced is “Linking mobile phone ownership and use to social capital in rural South Africa and Tanzania”

74 See McKinsey in “Wireless Unbound”, 2006

Figure 112: Increase in consumer surplus following a reduction in price



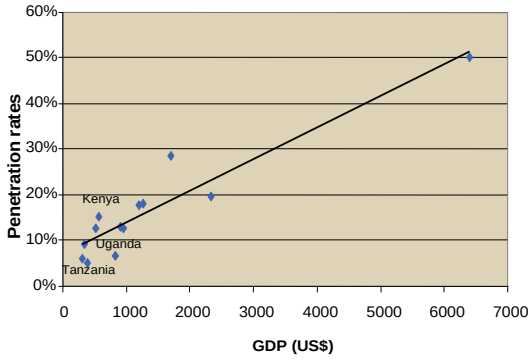
Source: Deloitte methodology

We use the willingness to pay concept to calculate the value of the intangible benefits of mobile phones in East Africa[75]. 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).

17.2 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. A wide range of academic studies has demonstrated that a relationship exists between telecommunications penetration (originally fixed line, and more recently mobile) and economic growth[76]. The following 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 113: Income and mobile penetration in developing countries



Source: Deloitte estimates using Wireless Intelligence and IMF data

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

[76] Studies include those by: United Nations Economic Commission for Europe, 1987; The Telecommunications Industry; Growth and Structural Change by the ITU, 1980; and Information, Telecommunications and

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.

We undertook a regression based on cross section data for developing countries[77]. Similarly to Waverman, Meschi and Fuss (2005)[78], we estimated a model in averages over 24 years, with 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 in the GDP growth rate of 1.2%[79].

Figure 114: 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

The coefficient on average mobile penetration is approximately twice as large as that found by Waverman, Meschi and Fuss (2005). We explain this result as being due to the 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.

Development, commissioned by the World Bank, 1983. More recently, Waverman, Meschi and Fuss (2005) and Sridhar and Sridhar (2004) have looked specifically at the mobile industry.

77 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. Therefore,

78 Waverman L., Meschi M., Fuss M., (2005), "The Impact of Telecoms on Economic Growth in Developing Countries", *Africa: The Impact of Mobile Phones*, The Vodafone Policy Paper Series, Number 2

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

18 Approach to calculating the impact of changes in taxation policy

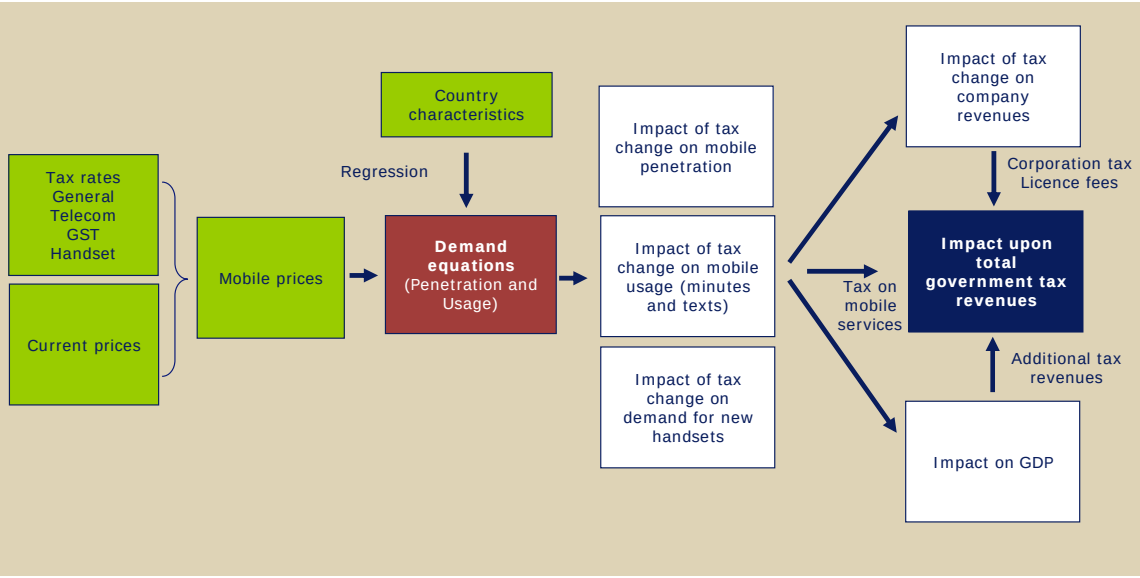
We have developed an Excel based model to quantify the impact of a change in taxation policy in each of the three countries. Specifically, we focus on the impact of the removal or reduction of the excise duties. Our model is constructed to carry out three distinct steps of analysis which we aggregate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

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

18.1 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 calculated the impact on total Government revenues, including taxes on mobile services, corporation tax and regulatory fees.

Figure 115: Structure of the economic model



Source: Deloitte analysis

In order to compare the impact of various taxes:

- A base case scenario was created which projects market development and tax revenue collection for the 10 years to 2017, assuming the application of the current taxation structure. External market projections are used to forecast number of subscribers, usage levels, and handset sales; and
- All changes in penetration, handset sales, usage and Government tax revenue collection were compared to the base case scenario and calculated 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 revenues from these consumer taxes, notably:

- Any reduction in the tax rate is fully reflected in prices faced by consumers (see below for further discussion of this assumption);
- 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 below for further discussion of this assumption);
- 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. 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[80]; and
- 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[81]; and
- Multiplying the additional revenue by the assumed regulatory fee percentage provided the increase in the regulatory fees[82].

80 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 MOU, as do Pyramid forecasts for sub-Saharan Africa.

81 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.

Finally, we included a consideration of the relationship between mobile penetration, economic activity and hence GDP. We econometrically calculated 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 outlined in Section 15.

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 2007. In reality, there could be a lag in this effect given that budgets are likely to be set in mid 2007 following the review in February.

18.1.1 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[83].

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[84], we assume that 100% of any change in tax is reflected in the consumer price.

18.2 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 estimates for the following, using country-specific time series OLS regressions:

- 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 (calculated as a weighted average of the cost of the different types of calls); and

82 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.

83 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.

84 For example, see report by Frontier Economics to the GSMA on the impact of mobile taxation in Bangladesh, 2006

- 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).

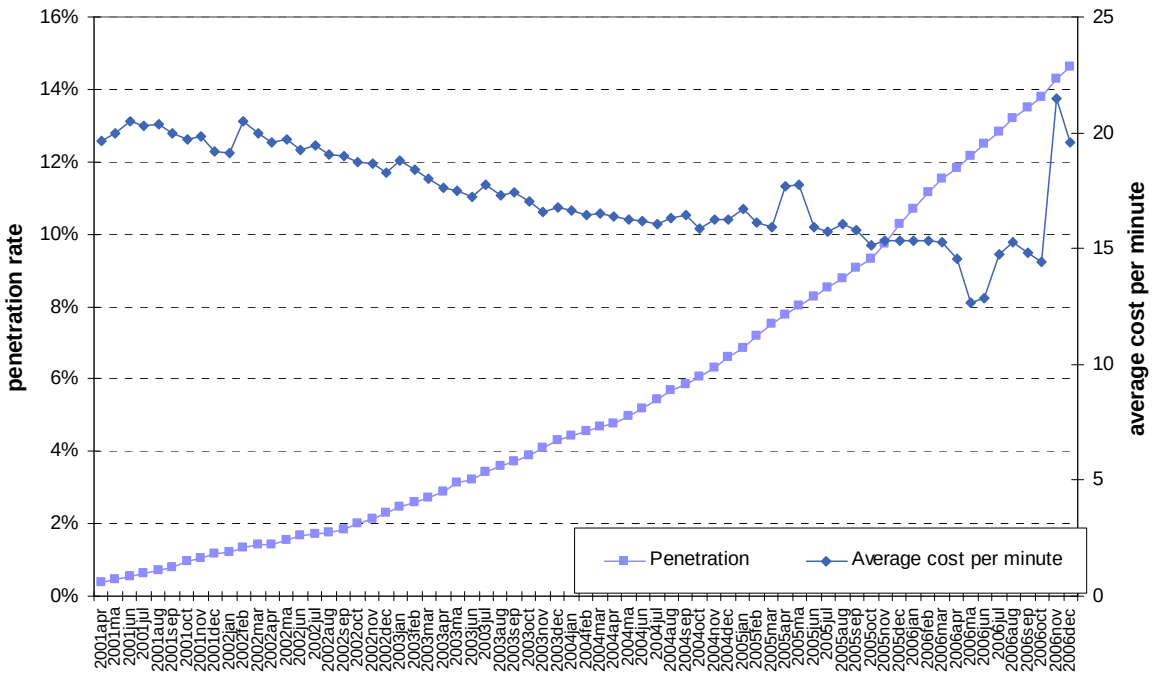
We have calculated a single joint elasticity for post-pay and pre-pay markets since the number of post-pay subscribers is less than 2% in each of the countries. Additionally, data was not available from a sufficient number of operators to support separate regressions for pre-pay and post-pay.

18.2.1 Kenyan elasticities

Penetration

Our model requires the estimation of the sensitivity of penetration with respect to a change in the price of calls per minute. The following figure shows penetration and cost of calls per minute for a mobile operator in Kenya.

Figure 116: penetration and average cost per minute - Kenya



Source: Operator data

Penetration in Kenya has grown at a steady rate throughout the period for which data are available, with little change in the rate of growth in response to changes to call costs. However, there has been a dramatic increase in population coverage of the mobile industry over the last five years which implies that penetration changes are principally supply rather than demand led. As such, regression analysis based on a historical relationship between demand for mobile services and price per minute would not be expected to lead to significant results. Population coverage levels in Kenya are now estimated to have exceeded 90%, and we can expect that a relationship between penetration and price per minute will develop, as changes in the number of mobile subscribers are increasingly demand rather than supply driven.

A potential solution to this problem would be 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 estimate of the penetration and price per minute elasticity on a review of elasticity benchmarks.

The following table shows the elasticities of penetration with respect to price of call per minute reported in studies conducted in several countries around the world.

Figure 117: Elasticity of penetration with respect to price per minute

Source	Elasticity of penetration with respect to price of calls per minute
"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.", 2003, Competition Commission	**-0.48** (DotEcon) -0.26 (Frontier assumption)[1] **-0.13** (Rohlfs)
"Pricing Mobile Termination in Australia" 2004, CRA	**-0.29**[2]
"The importance of price elasticities in the regulation of mobile call termination", 2004, Frontier	**-0.198** (Competition Commission estimate)
"Going mobile slowly", 2005, C.D. Howe Institute Commentary	**-0.706**[3]
Bangladesh Report 2006, Frontier	-0.18[4]

1 The coefficient estimated by Frontier is not statistically significant.

2 This elasticity is calculated from other elasticities, not estimated econometrically

3 This elasticity is with respect to revenues per subscriber, rather that to cost of calls per minute

4 Not statistically significant

The elasticity estimates range from -0.706 to -0.13. It may be argued that elasticity in Kenya could be higher than these benchmarks which were mainly calculated in more developed regions where mobile costs make up a smaller proportion of disposable income. As such, we have run our model under two possible scenarios, reflecting a conservative case (where -0.4 is adopted), and an upside (where -0.6 is adopted).

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

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

Where M_t is the average minute of use per user, P^m_{t-n} is the average price per minute at time t-n, S_t is the number of subscribers and X_t is a matrix of other relevant variables including time trends. We consider prices in previous periods as explanatory variable as consumers might adapt their behaviour after a price change only with some lag (it might take some time before consumers realise that prices in the market have changed and adjust their consumption patterns accordingly). Specifically, our analysis shows that it takes generally two months before consumers react to changes in call prices. Connection and handset prices are found to be statistically insignificant to explain usage.

The relationship is estimated in linear form in Kenya and the elasticity is computed at the mean of the variables[85].

The following table shows the results for the regression estimation for minutes of use in Kenya[86]:

85 The elasticity is calculated as $\varepsilon = \frac{dmuo}{d\cos t} \cdot \frac{\cos t}{mou}$ where $\frac{dmuo}{d\cos t}$ is equal to the coefficient of the regression estimation.

Figure 118: Own price elasticity for minutes of use

Dependent variable: minutes of use per user per month	
Variable	**Elasticity**
Cost of call (lag2)	-2.78 (2.58)
Number of subscribers	0.0000046 (4.65)
Time trend	-1.27 (-7.42)

Source: Deloitte analysis

The elasticity calculated at the mean of the variable is -0.96.

18.2.2 Rwanda elasticities

Penetration

Penetration in Rwanda has grown at a steady rate throughout the period for which data are available, with little change in the rate of growth in response to changes to call costs. This suggests that penetration has until now primarily being driven by supply factors. In particular, population coverage of the mobile industry has been considerably enlarged over the last five years, so that the number of consumers in the market has increased steadily, independently from the call rate level. Population coverage levels in Rwanda are now estimated to be above 90% from a low 50% coverage only a few years ago. Therefore we can expect that a relationship between penetration and price per minute will develop, as changes in the number of mobile subscribers are increasingly demand rather than supply driven.

Unfortunately, the data provided to us do not show sufficient variation over time to allow for regression analysis. Therefore our estimate of the elasticity of penetration with respect to call prices is based on a review of elasticity benchmarks.

The following table shows the elasticities of penetration with respect to price of call per minute reported in studies conducted in several countries around the world.

Figure 119: Elasticity of penetration with respect to price per minute

Source	Elasticity of penetration with respect to price of calls per minute
"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.", 2003, Competition Commission	**-0.48** (DotEcon) -0.26 (Frontier assumption)[1] **-0.13** (Rohlfs)
"Pricing Mobile Termination in Australia" 2004, CRA	**-0.29**[2]
"The importance of price elasticities in the regulation of mobile call termination", 2004, Frontier	**-0.198** (Competition Commission estimate)
"Going mobile slowly", 2005, C.D. Howe Institute Commentary	**-0.706**[3]
Bangladesh Report 2006, Frontier	-0.18[4]

1 The coefficient estimated by Frontier is not statistically significant.

2 This elasticity is calculated from other elasticities, not estimated econometrically

86 Unit root test on the residuals shows that the residuals are stationary, and hence there is no evidence of spurious relations between the variables. There is some evidence that there might be an omitted variable, but given that the elasticity estimate is consistent with those found in other studies, the regression seems appears unbiased.

3 This elasticity is with respect to revenues per subscriber, rather that to cost of calls per minute

4 Not statistically significant

The elasticity estimates range from -0.706 to -0.13. It may be argued that elasticity in Tanzania could be higher than these benchmarks which were mainly calculated in more developed regions where mobile costs make up a smaller proportion of disposable income. As such, we have run our model under two possible scenarios, reflecting a conservative case (where -0.4 is adopted), and a downside (where -0.6 is adopted).

Usage

The usage elasticities are generally 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

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

Where M_t is the average minute of use per user, P^m_{t-n} is the average price per minute at time t-n, S_t is the number of subscribers and X_t is a matrix of other relevant variables including time trends. We consider prices in previous periods as explanatory variable as consumers might adapt their behaviour after a price change only with some lag (it might take some time before consumers realise that prices in the market have changed and adjust their consumption patterns accordingly).

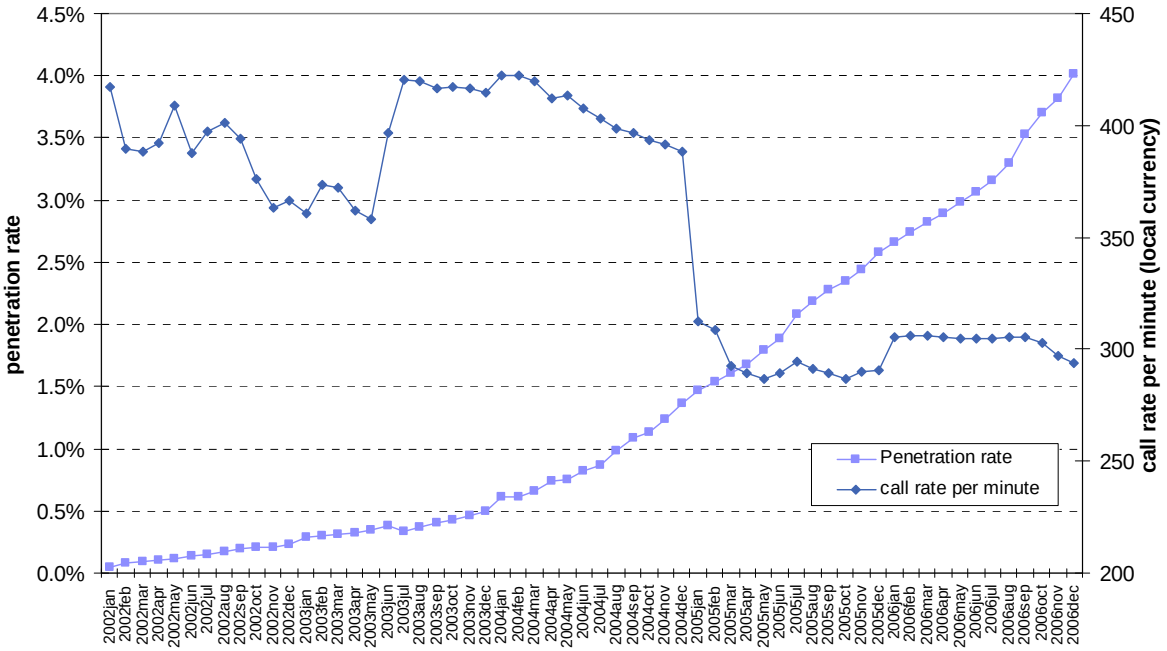
However, even in this case the data provided do not show sufficient variation over time to allow for regression analysis. Therefore, we decided to use the elasticities estimated for Uganda, as we believe these two markets to be sufficiently similar, being in the early stages of development of the mobile industry. This might be a conservative approach, as there are reasons to believe that Rwanda might display higher elasticities than Uganda. The estimated usage elasticity for Uganda is -1.05.

18.2.3 Tanzanian elasticities

Penetration

The following figure shows penetration and cost of calls per minute for mobile operatorS in Tanzania.

Figure 120: penetration and average cost per minute - Tanzania



Source: Operator data

Penetration in Tanzania has grown at a steady rate throughout the period for which data are available, with little change in the rate of growth in response to changes to call costs. This suggests that penetration, in the time period considered has primarily being driven by supply factors. In particular, population coverage of the mobile industry has considerably increased over the last five years, so that the number of consumers in the market has increased steadily, independently from the call rate level. In this case, a regression analysis based on a historical relationship between demand for mobile services and price per minute did not lead to significant results. Population coverage levels in Tanzania are now estimated to be approximately 49%, and we can expect that a relationship between penetration and price per minute will develop, as changes in the number of mobile subscribers are increasingly demand rather than supply driven.

Our estimate of the elasticity of penetration with respect to call prices is, even in this case, based on a review of elasticity benchmarks.

The following table shows the elasticities of penetration with respect to price of call per minute reported in studies conducted in several countries around the world.

Figure 121: Elasticity of penetration with respect to price per minute

Source	Elasticity of penetration with respect to price of calls per minute
"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.", 2003, Competition Commission	**-0.48** (DotEcon) -0.26 (Frontier assumption)[1] **-0.13** (Rohlfs)
"Pricing Mobile Termination in Australia" 2004, CRA	**-0.29**[2]
"The importance of price elasticities in the regulation of mobile call termination", 2004, Frontier	**-0.198** (Competition Commission estimate)
"Going mobile slowly", 2005, C.D. Howe Institute Commentary	**-0.706**[3]
Bangladesh Report 2006, Frontier	-0.18[4]

1 The coefficient estimated by Frontier is not statistically significant.

2 This elasticity is calculated from other elasticities, not estimated econometrically

3 This elasticity is with respect to revenues per subscriber, rather that to cost of calls per minute

4 Not statistically significant

The elasticity estimates range from -0.706 to -0.13. It may be argued that elasticity in Tanzania could be higher than these benchmarks which were mainly calculated in more developed regions where mobile costs make up a smaller proportion of disposable income. As such, we have run our model under two possible scenarios, reflecting a conservative case (where -0.4 is adopted), and an upside (where -0.6 is adopted).

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

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

Where M_t is the average minute of use per user, P^m_{t-n} is the average price per minute at time t-n, S_t is the number of subscribers and X_t is a matrix of other relevant variables including time trends.

We consider prices in previous periods as explanatory variable as consumers might adapt their behaviour after a price change only with some lag (it might take some time before consumers realise that prices in the market have changed and adjust their consumption patterns accordingly). Our analysis of Tanzania data shows that it takes generally two months before consumers react to changes in call prices (which is consistent with our findings from our Kenyan analysis). Unfortunately, we are not provided with handset data for Tanzania and connection data do not show sufficient variation over time to have any significant explanatory power. These two variables have not thus been included[87].

The relationship is estimated in linear form in Tanzania and the elasticity is computed at the mean of the variables[88].

The following table shows the results for the regression estimation for minutes of use in Tanzania[89]:

Figure 122: Own price elasticity for minutes of use[90]

Dependent variable: minutes of use per user per month	
Variable	**Coefficient**
Cost of call (lag2)	-0.08 (-4.95)
Number of subscribers	-0.0000235 (-6.96)
Time trend	1.42 (10.93)

Source: Deloitte analysis

The elasticity calculated at the mean of the variable is -0.87.

18.2.4 Uganda elasticities

Penetration

The following figure shows penetration and cost of calls per minute for a mobile operator in Uganda.

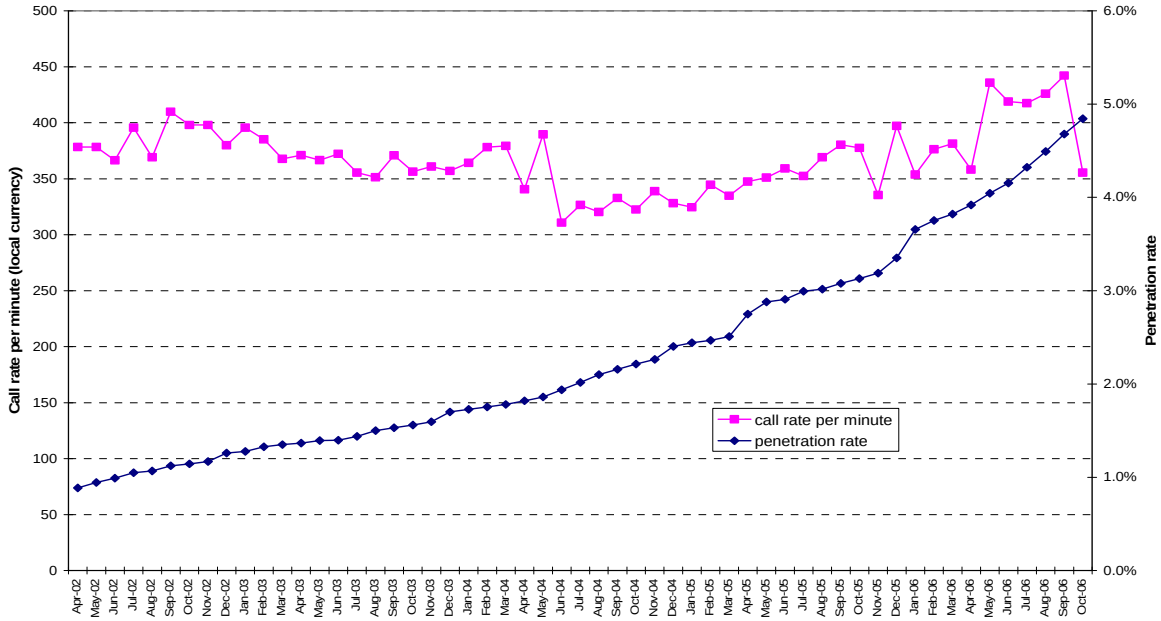
87 The regression analysis was conducted on only one of the two mobile operators in Tanzania, because of the unavailability of sufficiently long time series for the other operator.

88 The elasticity is calculated as $\varepsilon = \frac{dmuo}{d\cos t} \cdot \frac{\cos t}{mou}$ where $\frac{dmuo}{d\cos t}$ is equal to the coefficient of the regression estimation.

89 Unit root test on the residuals shows that the residuals are stationary, and hence there is no evidence of spurious relations between the variables. There is some evidence that there might be an omitted variable, but given that the elasticity estimate is consistent with those found in other studies, the regression seems appears unbiased.

90 For ease of presentation, statistically significant intercept and dummy variable are not here reported.

Figure 123: penetration and average cost per minute - Uganda



Source: Operator data

Penetration in Uganda has grown at a steady rate throughout the period for which data are available, with little change in the rate of growth in response to changes to call costs. This suggests that penetration, in the time period considered has primarily being driven by supply factors. In particular, population coverage of the mobile industry has been considerably enlarged over the last five years, so that the number of consumers in the market has increased steadily, independently from the call rate level. In this case, a regression analysis based on a historical relationship between demand for mobile services and price per minute did not lead to significant results. Population coverage levels in Uganda are now estimated to be approximately 96%, and we can expect that a relationship between penetration and price per minute will develop, as changes in the number of mobile subscribers are increasingly demand rather than supply driven.

Our estimate of the elasticity of penetration with respect to call prices is, even in this case, based on a review of elasticity benchmarks.

The following table shows the elasticities of penetration with respect to price of call per minute reported in studies conducted in several countries around the world.

Figure 124: Elasticity of penetration with respect to price per minute

Source	Elasticity of penetration with respect to price of calls per minute
"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.", 2003, Competition Commission	**-0.48** (DotEcon) -0.26 (Frontier assumption)[1] **-0.13** (Rohlfs)
"Pricing Mobile Termination in Australia" 2004, CRA	**-0.29**[2]
"The importance of price elasticities in the regulation of mobile call termination", 2004, Frontier	**-0.198** (Competition Commission estimate)
"Going mobile slowly", 2005, C.D. Howe Institute Commentary	**-0.706**[3]
Bangladesh Report 2006, Frontier	-0.18[4]

1 The coefficient estimated by Frontier is not statistically significant.

2 This elasticity is calculated from other elasticities, not estimated econometrically

3 This elasticity is with respect to revenues per subscriber, rather that to cost of calls per minute

4 Not statistically significant

The elasticity estimates range from -0.706 to -0.13. It may be argued that elasticity in Uganda could be higher than these benchmarks which were mainly calculated in more developed regions where mobile costs make up a smaller proportion of disposable income. As such, we have run our model under two possible scenarios, reflecting a conservative case (where -0.4 is adopted), and an upside (where -0.6 is adopted).

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

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

Where M_t is the average minute of use per user, P^m_{t-n} is the average price per minute at time t-n, S_t is the number of subscribers and X_t is a matrix of other relevant variables including time trends. We consider prices in previous periods as explanatory variable as consumers might adapt their behaviour after a price change only with some lag (it might take some time before consumers realise that prices in the market have changed and adjust their consumption patterns accordingly). However, our analysis of Uganda data shows that consumers in this country seem to react to changes in call prices very quickly. Indeed, it was not necessary to include lags of the cost variable as the contemporary value was significant. Unfortunately, we are not provided with handset data for Uganda and connection data do not show sufficient variation over time to have any significant explanatory power. These two variables have not thus been included.

The relationship is estimated in log-linear form in Uganda so that the coefficient has the interpretation of an elasticity.

The regression analysis for Uganda is based on the data provided by two operators. However, as the call rates for the two operators seem to follow opposite trends over the period considered, it was not in this case meaningful to aggregate the data into a weighted average. Rather, separate regressions have been conducted for the two operators and the separate elasticities have been combined into a weighted average, where the weights are given by the proportion of MOU of each operator on the total usage.

The following table shows the two elasticities obtained and their weighted average[91]:

Figure 125: Own price elasticity for minutes of use[92]

Dependent variable: minutes of use per user per month			
Variable	**Elasticity (Operator 1)**	**Elasticity (Operator 2)**	**Combined elasticity**
Cost of call	-1.453414 (-6.01)	-.8140018 (-6.98)	**-1.04**
Time trend	-.0057193 (-3.29)	-.0195327 (-32.92)	

Source: Deloitte analysis

91 Unit root test on the residuals shows that the residuals are stationary, and hence there is no evidence of spurious relations between the variables. There is some evidence that there might be an omitted variable, but given that the elasticity estimate is consistent with those found in other studies, the regression seems appears unbiased.

92 For ease of presentation, statistically significant intercept is not here reported.

18.3 Kenya specific model inputs and assumptions

The following inputs and assumptions specific to Kenya were made within our model (for more detail, see Appendix 2):

- Country characteristics: most recent data on Kenya's Population, GDP and tax as a percentage of GDP were obtained from the World Bank and CIA. GDP in the base case is forecast to grow at 4%, based upon an average of various data source including EIU and World Bank. Population is forecast to grow at 2.57% based upon the CIA 2006 estimated growth rate;
- 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 98% of users, and this is expected to continue as future subscriptions growth is likely to 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 61% (following discussion with operators and vendors);
- Penetration forecasts: penetration is forecast to grow according to Pyramid growth rates, applied to 2006 subscriber numbers (obtained from the operators). 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 conservative scenario and 0.35% in the upside scenario;
- Usage forecasts: usage is forecast to remain constant in the base case scenario, given the trend witnessed to date and the Pyramid forecasts. In the scenario, we have assumed that the greater usage will create network effect which implies a shift in the S-curve, thus increasing forecast usage rates by 0.3% per year in the conservative 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 (calculated 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);
- Profit before tax margins were calculated as a weighted average (based on subscribers) of the margins of each operator, sourced from the financial statements;
- Elasticities: we used -0.4 as the conservative case penetration elasticity and -0.6 as an upside; -0.96 was used for the usage elasticity;
- Dynamic growth coefficient: 0.12 was applied to the change in penetration following a tax reduction to calculate the GDP uplift under the dynamic growth effect (see Section 15 for discussion of the derivation of this coefficient); and
- The following assumptions were included in the tax model flowing from our economic impact analysis: The percentage of value add was assumed to be 43%; and The Multiplier to be applied to tax (1.2 or 1.5).

18.4 Rwanda specific mobile inputs and assumptions

The following inputs and assumptions specific to Rwanda were made within our model (for more detail, see Appendix 2):

- Country characteristics: most recent data on Rwanda's Population, GDP and tax as a percentage of GDP were obtained from the World Bank and CIA. GDP in the base case is

forecast to grow at 5%, based upon an average of various data source including EIU and World Bank. Population is forecast to grow at 2.8% based upon the EIU data;

- Mobile industry data: details on the prices, subscribers and usage were obtained from the one operator in Rwanda. It was assumed that all subscribers are on prepaid plans given that this is the case for over 98% of users, and this is expected to continue as future subscriptions growth is likely to 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 40% (following discussion with operators and vendors);
- Penetration forecasts: base case penetration forecasts are formed using a combination of Wireless Intelligence data, operator forecast for the market, and witnessed trends in other sub-Saharan African countries. In the scenario, we have assumed that the lower penetration rates will imply a backwards shift in the S-curve, thus reducing forecast penetration rates by 0.4% in the conservative scenario and by 0.44% in the downside scenario per year. This is higher than the assumed network effect in Kenya and Tanzania, since the mobile industry is at an earlier stage of development in Rwanda;
- Usage forecasts: usage is forecast to remain constant in the base case scenario, given the trend witnessed to date and the Pyramid forecasts. In the scenario, we have assumed that the reduced usage will create negative network effect and a shift in the S-curve, thus reducing forecast usage rates by 0.4% % in the conservative scenario and by 0.44% in the downside scenario per year This is higher than the assumed network effect in Kenya and Tanzania, since the mobile industry is at an earlier stage of development in Rwanda;
- Current tax structure: the relevant current tax rates being applied in Rwanda are VAT of 20%, and Corporation tax at 30%. The import tax of 30% on handsets has been removed, though the statute is currently being signed and gazetted. Therefore, in our forward looking model, it has been assumed that handsets are not subject to any import duties;
- Regulatory fees: our assumption on total regulatory fees was derived of the known licence fees (at 2% of revenues) and 0.1% Spectrum fees (calculated by taking the amounts paid by the operator as percentages of consumer revenues). The assumption is that as subscribers increase, more spectrum is needed;
- Profit before tax margin was provided by the operator;
- Elasticities: we used -0.4 as the conservative case penetration elasticity and -0.6 as a downside; -1.05 was used for the usage elasticity as previously set out;
- Dynamic growth coefficient: 0.12 was applied to the change in penetration following a tax reduction to calculate the GDP uplift under the dynamic growth effect (see Section 15 for discussion of the derivation of this coefficient); and
- The following assumptions were included in the tax model flowing from our economic impact analysis: The percentage of value add was assumed to be 48%; and The Multiplier to be applied to tax (1.2 or 1.5).

18.5 Tanzania specific mobile inputs and assumptions

The following inputs and assumptions specific to Tanzania were made within our model (for more detail, see Appendix 2):

- Country characteristics: most recent data on Tanzania's Population, GDP and tax as a percentage of GDP were obtained from the World Bank and CIA. GDP in the base case is

forecast to grow at 4%, based upon an Economic Intelligence Unit 2003-2008 average. Population is forecast to grow at 1.83% based upon the CIA 2006 estimated growth rate;

- 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 is likely to 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 according to Pyramid growth rates, applied to 2006 subscriber numbers (obtained from the operators). 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 conservative scenario and 0.35% in the upside scenario;
- Usage forecasts: usage is forecast to remain constant in the base case scenario, given the trend witnessed to date and the Pyramid forecasts. 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 conservative 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 7%, and Corporation tax at 30%;
- Regulatory fees: 2.6% consists of a 1% USO fund, licence and spectrum fees. The latter two are calculated by using a weighted average of the fees paid as a percentage of revenues of the two largest operators (Vodacom and Celtel Tanzania);
- 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;
- Elasticities: we used -0.4 as the conservative case penetration elasticity and -0.6 as an upside; -0.87 was used for the usage elasticity;
- Dynamic growth coefficient: 0.12 was applied to the change in penetration following a tax reduction to calculate the GDP uplift under the dynamic growth effect (see Section 15 for discussion of the derivation of this coefficient); and
- The following assumptions were included in the tax model flowing from our economic impact analysis: The percentage of value add was assumed to be 27%; and The Multiplier to be applied to tax (1.2 or 1.5).

18.6 Uganda specific mobile inputs and assumptions

The following inputs and assumptions specific to Uganda were made within our model (for more detail, see Appendix 2):

- Country characteristics: Most recent data on Uganda's Population and GDP were obtained from the World Bank and CIA. Tax as a percentage of GDP of 13% was obtained from the URA. GDP in the base case is forecast to grow at 5.3%, based upon an Economic Intelligence Unit 2003-2008 average. Population is forecast to grow at 3.53% based upon the CIA 2006 estimated growth rate;
- 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 is likely to 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 according to Pyramid growth rates, applied to 2006 subscriber numbers (obtained from the operators). 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 0.4% per year in the conservative scenario and 0.44% in the upside scenario;
- Usage forecasts: Usage is forecast to remain constant in the base case scenario, given the trend witnessed to date and the Pyramid forecasts. 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 0.4% per year in the conservative scenario and 0.44% 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;
- Elasticities: We used -0.4 as the conservative case penetration elasticity and -0.6 as an upside; -1.05 was used for the usage elasticity;
- Dynamic growth coefficient: 0.12 was applied to the change in penetration following a tax reduction to calculate the GDP uplift under the dynamic growth effect (see Section 15 for discussion of the derivation of this coefficient); and
- The following assumptions were included in the tax model flowing from our economic impact analysis: The percentage of value add was assumed to be 43%; and The Multiplier to be applied to tax (1.2 or 1.5).

19 Appendix 1: Data limitations and Detailed Assumptions

19.1 Kenya specific assumptions

19.1.1 Assumptions used in the economic impact assessment

<table>
<tr><th>Assumption</th><th>Value</th></tr>
<tr><td>Employment levels</td><td>Direct employment by MNOs
Data was obtained directly from operators
Indirect employment
Employment figures calculated for each segment of the value chain as revenue inflow * wages as % of revenue * average wage. Wages as % of revenue calculated based on accounts of similar companies in other geographies and best estimates. Average wage calculated using assumptions on operator wage and average wage in Kenya.
For airtime employment, interviews identified 1.5 employees per airtime outlet.
A multiplier of 1.2 was applied to direct and indirect levels to guage the total employment effect in the economy.</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.
Direct value add of MNOs
All data was obtained directly from MNOs
Indirect value add
These percentages are estimated based on interviews and a review of accounts of companies in Kenya and similar companies internationally.
<table>
<tr><th>Margin on domestic revenues</th><th>% value add margin</th></tr>
<tr><td>MNO</td><td></td></tr>
<tr><td>Fixed telecommunications operators</td><td>53%</td></tr>
<tr><td>Network equipment suppliers</td><td>71%</td></tr>
<tr><td>Handset designers and dealers</td><td>27%</td></tr>
<tr><td>Other suppliers of capital items</td><td>69%</td></tr>
<tr><td>Suppliers of support services</td><td>62%</td></tr>
<tr><td>Airtime commission, payphone commission</td><td>73%</td></tr>
</table></td></tr>
<tr><td>Airtime commission</td><td>99% of airtime revenues are assumed sold through third parties with an average commission based on weighted average of figures provided by 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</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.
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.</td></tr>
</table>

Employment by sector (formal only)	2003	2004	2005	2006	% workers who are high mobility
Agriculture and Forestry	316,100	320,600	327,400	334,887	5%
Mining and Quarrying	5,400	5,500	5,700	5,830	5%
Manufacturing	239,800	242,000	247,500	253,160	5%
Electricity and Water	21,100	20,900	20,300	20,764	5%
Building and Construction	76,600	77,300	78,200	79,988	20%
Wholesale and Retail Trade, Restaurants and Hotels	162,800	168,000	175,700	179,718	50%
Transport and Communications	86,800	100,800	117,300	119,982	60%
Finance,Insurance, Real Estate and Business services	83,700	83,700	85,700	87,660	80%
Community, Social and Personal	735,000	744,900	749,400	766,538	5%
Average high mobility					**17%**

Notes

1. Employment information for 2003 to 2005 obtained from national statistics office

2. 2006 employment figures predicted by multiplying 2005 figure by average labour force growth rate

3. % high mobility workers are Deloitte assumptions based on benchmarks from previous reports and past experience

4. Average high mobility is a weighted average

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 Kenyan economy. A multiplier of 1.2 was assumed following a literature review and interviews with Kenyan officials.

19.1.2 Assumptions used in the tax model

Assumption	Value
Profit before tax margins	31% is assumed, based upon a weighted average of the profit before tax margins of the operators, from the published financial accounts, weighted by number of subscribers.
Regulatory fees	4.1% consists of 0.5% license fees, 1% USO fund (proposed to be impletemented in 2007) and spectrum fees. A weighted average of spectrum fees paid by the two operators, as a percentage of consumer revenues, is 3.1%.
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 2%, 59% and 39% respectively. Therefore, legitimate channels make up 61%. 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 4,335 KES and 2,546 KES respectively.
Prices of connection and usage	These were estimated as weighted averages from the operator's submissions, weighted by the subscriber base of each operator. Estimates of the December 2006 prices were used as the input into our model, but with usage, the average for 2006 was taken to allow for seasonality in the data. 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 98% 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 4%. This was based on an average of various studies including World Bank and EIU.
Forecast penetration rates	Penetration is forecast to grow according to Pyramid growth rates, applied to 2006 subscriber numbers (obtained from the operators). 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 0.3% per year in the conservative scenario and 0.35% in the upside scenario
Forecast usage	Usage is forecast to remain constant in the base case scenario, given the trend witnessed to date and the Pyramid forecasts. 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 penetration rates by 0.3% per year in the conservative 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 of 0.12.
Value Add margin	The value add margin of 43% is calculated by dividing the total value add of mobile operators (calculated in the economic impact model) by total revenues of operators.
Multiplier	Two multiplier assumptions are used in the tax model, 1.2 as a conservative case and 1.5 as an upside. These were considered reasonable assumptions based on literature review and interviews.
Handset lives of 2 years	Based upon discussions with operators and vendors

19.2 Rwanda specific assumptions

19.2.1 Assumptions used in the economic impact assessment

Assumption	Value
Employment levels	Direct employment by MNOs Data was obtained directly from operators Indirect employment Employment figures calculated for each segment of the value chain as revenue inflow * wages as % of revenue * average wage. Wages as % of revenue calculated based on accounts of similar companies in other geographies and best estimates. Average wage calculated using assumptions on operator wage and average wage in Rwanda. For airtime employment, interviews identified 1.5 employees per airtime outlet. A multiplier of 1.2 was applied to direct and indirect levels to gauge the total employment effect in the economy.
Value add margins for each segment of the value chain	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. Direct value add of MNOs All data was obtained directly from MNOs Indirect value add These percentages are estimated based on interviews and a review of accounts of companies in Rwanda and similar companies internationally.
Airtime commission	98% of airtime revenues are assumed sold through third parties with an average commission of 6% based on weighted average of figures provided by the operator
Payphone commission	Payphones commission obtained on a per payphone basis from the operator and grossed up for estimated number of payphones in Rwanda
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 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. High mobility workers are estimated as 13% of the total workforce based on data from the Statistics Department of Rwanda the World Bank. 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. A multiplier of 1.2 was assumed following a literature review and interviews with Tanzanian officials.

Margin on domestic revenues	% value add margin
MNO	
Fixed telecommunications operators	57%
Network equipment suppliers	74%
Handset designers and dealers	26%
Other suppliers of capital items	72%
Suppliers of support services	65%
Airtime commission, payphone commission	76%

19.2.2 Assumptions used in the tax model

Assumption	Value
Profit before tax margins	45% is was supplied by MTN Rwanda
Regulatory fees	2.1% to be applied to revenues consists of a known 2% licence fee, and calculated spectrum fees (0.1% of revenues in 2005 and 2006). It is assumed that as subscribers and hence revenues grow, more spectrum is needed.
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 3%, 37% and 60% respectively. Therefore, legitimate channels make up 40%. We assume a two year lifetime for handsets in Rwanda, 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 35,000 RWF and 30,000 RWF respectively in 2006, with the typical price of handsets sold by operators being 30,000 RWF.
Prices of connection and usage	These were estimated from the operator's submissions. Estimates of the December 2006 prices were used as the input into our model, but with usage, the average for 2006 was taken to allow for seasonality in the data. 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 98% 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 5%. This was based on the average of various studies including World Bank and EIU.
Forecast penetration rates	Base case penetration forecasts were formed using a combination of Wireless Intelligence data, operator forecast for the market, and witnessed trends in other sub-Saharan African countries. In the scenario, we have assumed that the lower penetration rates will imply a backwards shift in the S-curve, thus reducing forecast penetration rates by 0.4% per year. This is higher than the assumed network effect in Kenya and Tanzania, since the mobile industry is at an earlier stage of development in Rwanda.
Forecast usage	Usage is forecast to remain constant in the base case scenario, given the trend witnessed to date. In the scenario, we have assumed that the reduced usage will create a negative shift in the S-curve, thus reducing forecast penetration rates by 0.4% per year. This is higher than the assumed network effect in Kenya and Tanzania, since the mobile industry is at an earlier stage of development in Rwanda.
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 of 0.12.
Value Add margin	The value add margin of 48% is calculated by dividing the total value add of mobile operators (calculated in the economic impact model) by total revenues of operators.
Multiplier	Two multiplier assumptions are used in the tax model, 1.2 as a conservative case and 1.5 as a downside. These were considered reasonable assumptions based on literature review and interviews.
Handset lives of 2 years	Based upon discussions with operators and vendors

19.3 Tanzania specific assumptions

19.3.1 Assumptions used in the economic impact assessment

Assumption	Value
Employment levels	Direct employment by MNOs Data was obtained directly from operators Indirect employment Employment figures calculated for each segment of the value chain as revenue inflow * wages as % of revenue * average wage. Wages as % of revenue calculated based on accounts of similar companies in other geographies and best estimates. Average wage calculated using assumptions on operator wage and average wage in Tanzania. For airtime employment, interviews identified 1.5 employees per airtime outlet. A multiplier of 1.2 was applied to direct and indirect levels to gauge the total

<table>
<tr><td></td><td>employment effect in the economy.</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.
<u>Direct value add of MNOs</u>
All data was obtained directly from MNOs
<u>Indirect value add</u>
These percentages are estimated based on interviews and a review of accounts of companies in Tanzania and similar companies internationally.
<table>
<tr><th>Margin on domestic revenues</th><th>% value add margin</th></tr>
<tr><td>MNO</td><td></td></tr>
<tr><td>Fixed telecommunications operators</td><td>57%</td></tr>
<tr><td>Network equipment suppliers</td><td>74%</td></tr>
<tr><td>Handset designers and dealers</td><td>26%</td></tr>
<tr><td>Other suppliers of capital items</td><td>72%</td></tr>
<tr><td>Suppliers of support services</td><td>65%</td></tr>
<tr><td>Airtime commission, payphone commission</td><td>76%</td></tr>
</table></td></tr>
<tr><td>Airtime commission</td><td>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</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 Tanzania</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.
High mobility workers are estimated as 17% 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.</td></tr>
<tr><td>Multiplier</td><td>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.
A multiplier of 1.2 was assumed following a literature review and interviews with Tanzanian officials.</td></tr>
</table>

19.3.2 Assumptions used in the tax model

Assumption	Value
Profit before tax margins	14.77% is assumed, based upon a weighted average of the profit before tax margins of the Celtel and Vodacom from the published financial accounts or management accounts, weighted by number of subscribers of each operator in 2006.
Regulatory fees	2.6% consists of a 1% USO fund, licence and spectrum fees. The latter two are calculated by using a weighted average of the fees paid as a percentage of revenues of the two largest operators (Vodacom and Celtel Tanzania).
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 6%, 44% and 50% respectively. Therefore, legitimate channels make up 50%. 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 from legitimate dealers and illegitimate dealers are 51,401 TZS and 44,976 TZS respectively in 2006, with the typical price of handsets sold by operators being 64,242 TZS.
Prices of connection and usage	These were estimated as weighted averages from the operator's submissions, weighted by the subscriber base of each operator. Estimates of the December 2006 prices were used as the input into our model, but with usage, the average for 2006 was taken to allow for seasonality in the data. 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 98% 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 4%. This was based on the average of various studies including World Bank and EIU.

Forecast penetration rates	Penetration is forecast to grow according to Pyramid growth rates, applied to 2006 subscriber numbers (obtained from the operators). 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 0.3% per year.
Forecast usage	Usage is forecast to remain constant in the base case scenario, given the trend witnessed to date and the Pyramid forecasts. 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 penetration rates by 0.3% per year.
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 of 0.12.
Value Add margin	The value add margin of 27% is calculated by dividing the total value add of mobile operators (calculated in the economic impact model) by total revenues of operators.
Multiplier	Two multiplier assumptions are used in the tax model, 1.2 as a conservative case and 1.3 as an upside. These were considered reasonable assumptions based on literature review and interviews.
Handset lives of 2 years	Based upon discussions with operators and vendors

19.4 Uganda specific assumptions

19.4.1 Assumptions used in the economic impact assessment

<table>
<tr><th>Assumption</th><th>Value</th></tr>
<tr><td>Employment levels</td><td>Direct employment by MNOs
Data was obtained directly from operators, and grossed up for the market share of UTL.
Indirect employment
Employment figures calculated for each segment of the value chain as revenue inflow * wages as % of revenue * average wage. Wages as % of revenue calculated based on accounts of similar companies in other geographies and best estimates. Average wage calculated using assumptions on operator wage and average wage in Uganda.
For airtime employment, interviews identified 1.5 employees per airtime outlet.
A multiplier of 1.2 was applied to direct and indirect levels to gauge the total employment effect in the economy.</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.
Direct value add of MNOs
All data was obtained directly from MNOs
Indirect value add
These percentages are estimated based on interviews and a review of accounts of companies in Tanzania and similar companies internationally.
<table>
<tr><th>Margin on domestic revenues</th><th>% value add margin</th></tr>
<tr><td>MNO</td><td></td></tr>
<tr><td>Fixed telecommunications operators</td><td>57%</td></tr>
<tr><td>Network equipment suppliers</td><td>74%</td></tr>
<tr><td>Handset designers and dealers</td><td>26%</td></tr>
<tr><td>Other suppliers of capital items</td><td>72%</td></tr>
<tr><td>Suppliers of support services</td><td>65%</td></tr>
<tr><td>Airtime commission, payphone commission</td><td>76%</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</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 Uganda.</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.
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.</td></tr>
</table>

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. A multiplier of 1.2 was assumed following a literature review and interviews with Ugandan officials.

19.4.2 Assumptions used in the tax model

Assumption	Value
Profit before tax margins	31% is assumed, based upon the margins of MTN Uganda. Celtel have not historically paid taxes, however they are assumed to do so going forward.
Regulatory fees	1.4% consists of a USO which is known to be 1% of revenues, and 0.4% which is calculated as the frequency fees paid by MTN as a percentage of revenues. This corresponds to Celtel data where regulatory fees in total make up 1.4% of revenues. It is assumed that as subscribers grow, more spectrum is required.
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 3%, 67% and 30% respectively. Therefore, legitimate channels make up 70%. 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 from legitimate dealers and illegitimate dealers are 127,425 UGX and 123,732 UGX respectively in 2006, with the typical price of handsets sold by operators being lower at 92,337 UGX. The reason Operator handset prices are less than Dealer handset retail prices is that the Operators do not fully participate in the handset industry, but enter the market during the specific high retail activity periods and then offer only low-end hand set with the sole view to driving acquisition. Conversely, dealers participate in the handset market throughout the year and offer the full range of handsets
Prices of connection and usage	These were estimated as weighted averages from the operator's submissions, weighted by the subscriber base of each operator. Estimates of the December 2006 prices were used as the input into our model, but with usage, the average for 2006 was taken to allow for seasonality in the data. 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 98% 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 5.3%. This was based on the average of various studies including World Bank and EIU.
Forecast penetration rates	Penetration is forecast to grow according to Pyramid growth rates, applied to 2006 subscriber numbers (obtained from the operators). 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 0.4% per year. This is higher than the assumed network effect in Kenya and Tanzania, since the mobile industry is at an earlier stage of development in Uganda.
Forecast usage	Usage is forecast to remain constant in the base case scenario, given the trend witnessed to date and the Pyramid forecasts. 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 penetration rates by 0.4% per year. This is higher than the assumed network effect in Kenya and Tanzania, since the mobile industry is at an earlier stage of development in Uganda.
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 of 0.12.
Value Add margin	The value add margin of 43% is calculated by dividing the total value add of mobile operators (calculated in the economic impact model) by total revenues of operators.
Multiplier	Two multiplier assumptions are used in the tax model, 1.2 as a conservative case and 1.3 as an upside. These were considered reasonable assumptions based on literature review and interviews.
Handset lives of 2 years	Based upon discussions with operators and vendors

Important notice from Deloitte

This report has been prepared on the basis of the scope and limitations as set out below.

The report has been prepared solely for the purposes of assisting the GSMA in understanding the potential impact of excise taxation on mobile penetration and usage and subsequently mobile growth in the four East African countries of Kenya, Tanzania, Rwanda and Uganda. The distribution of this document to other parties is subject to the restrictions on use specified in the Engagement Letter. No other party is entitled to rely on this document for any purpose whatsoever and we accept no responsibility or liability to any other party in respect of the contents of the Report. Deloitte & Touche LLP accepts no responsibility for any reliance that may be placed on this document should it be used by any party other than the Recipient Parties or for any purpose that is not in accordance with the terms of the Engagement Letter.

The scope of our work has been limited by the time, information and explanations made available to us. We have relied upon the documents and data provided by GSMA and its members. We have no responsibility for the accuracy or completeness of this information and have not reviewed its overall reasonableness. The results produced by our modelling depend upon the information with which we have been provided. Actual results are likely to be different from those projected by the model due to unforeseen events and accordingly we can give no assurance as to whether or how closely the actual results ultimately achieved will correspond to the outcomes projected in the model.

Our work and our findings do not in any way constitute a recommendation as to whether policy makers should or should not proceed with any changes to the taxation structure. In particular, we draw the GSMA's attention to the fact that if we were to perform additional procedures then other matters might come to our attention that might be relevant to our predictions on the impact of the taxation structure on mobile communications and on our policy recommendations. Similarly, if others were instructed to conduct appropriate independent procedures, other relevant matters might come to light.