



Economic Impact of Mobile Communications in Serbia, Ukraine, Malaysia, Thailand, Bangladesh and Pakistan

A report prepared for Telenor ASA

January 2008

Important notice

This report has been prepared in accordance with our Engagement Letter dated 26 September 2007 and on the basis of the scope and limitations as set out below.

This report has been prepared solely for the purposes of assisting Telenor ASA in quantifying the economic impact of the mobile industry in Serbia, Ukraine, Malaysia, Thailand, Bangladesh and Pakistan. The distribution of this document to other parties is subject to the restrictions on use specified in the Engagement Letter dated 26 September 2007. We have agreed that Telenor ASA may publish this report in its entirety or for a specific country by deleting only the executive summary and findings chapters for the other 5 countries and inserting the liability notice provided as Annex 7 to this report. No other party other than Telenor ASA 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.

This report is based on information that was available to us up until 19th December 2007 for all countries except for Bangladesh. Our Bangladesh findings were based on information that was available to us up until 12th January 2007.

Our work has been limited by the scope, the time, information and explanations made available to us. We have relied upon the documents and data provided by Telenor ASA, its subsidiaries, third parties and publicly available sources. 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 regulations and legislation imposed on the mobile telecommunications sector or related industries. In particular, we draw Telenor ASA'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 economic impact of the mobile communications industry. Similarly, if others were instructed to conduct appropriate independent procedures, other relevant matters might come to light.

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1 Introduction

Telenor ASA has commissioned Deloitte & Touche LLP (“Deloitte”) to examine the economic contribution of its business units and the mobile communications industry in six markets in which it operates.

For each country of operations, we have:

- Provided an overview of the key players and trends in the mobile communications market;
- Estimated the direct and indirect, static economic contribution of the mobile industry in terms of taxation revenues, employment and GDP; and
- Estimated the long-term impact of mobile contributions on economic growth.

Our report is based on data provided to us by Telenor business units and associates, interviews with participants in the wider industry and publicly available data.

The report is set out in the following sections:

- Section 2 summarises the main findings of our analysis;
- Section 3 presents the methodology used to calculate the economic impact in each country;
- Sections 4 provide executive summaries of the results of our study in each of the countries;
- Section 5 comprises the main body of the report with full analysis of impacts for each of the six countries; and

Annexes to this report:

- Set out the underlying assumptions used in each of the countries; and
- Provide a liability statement in relation to this report.

2 Key Findings Across the Markets

Mobile communications boost economic and social development in a series of ways:

- **Access to communications.** Mobile phones provide the ability to communicate to those sectors of the community typically underserved by fixed line technology. This is particularly notable in developing countries where fixed line services are often not extended beyond the major urban areas and the connection and line rental prices are unaffordable to many. By achieving high population coverage, the sale of top-up cards in small denominations and improved affordability through low mobile handset prices, mobile telephony often replaces fixed line as the provider of universal service.
- **Social impacts.** Economic migration, from rural to urban areas and, increasingly, overseas has led to dispersion of family members. Mobile phones are facilitating regular communication and also allowing for wealth transfer, for example through mobile remittances. Mobile phone services also provide a structure for the wider sharing of Internet access in developing countries.
- **Productivity.** Mobile phones allow businesses to both develop and prosper through the provision of timely information and communications on the move. Positive efficiency effects can be seen in both the formal and informal sectors, for example through the sharing of taxis or SMS based price notifications in the agricultural industry.

These benefits combine to create wealth and increase economic activity, employment and tax receipts. As such, the growth of mobile communications benefits the entire economy and its citizens.

Our approach

Deloitte was engaged by Telenor to calculate the economic impact of mobile telephony in six varied countries in which Telenor has operations:

- Bangladesh (Grameenphone);
- Malaysia (DTAC);
- Pakistan (Telenor);
- Serbia (Telenor);
- Thailand (DTAC); and
- Ukraine (Kyivstar).

We initially considered the 'static' economic impact of the mobile sectors in each of these countries. This requires an analysis of the annual supply-side and demand side impact of mobile telephony:

- **Supply side impact:** We analysed the flow of funds across the mobile supply chain to estimate the value-add created by the mobile network operators and other participants in the mobile

supply chain. An economic multiplier was added to this to capture the knock-on impact to the wider economy.

- Demand side impact: We estimated the increase in productivity that occurred through the use of mobile telephony for business purposes. The intangible and social benefits of mobile telephony, which mean that the consumer values the service received above the price they pay, were aggregated with the productivity impact.

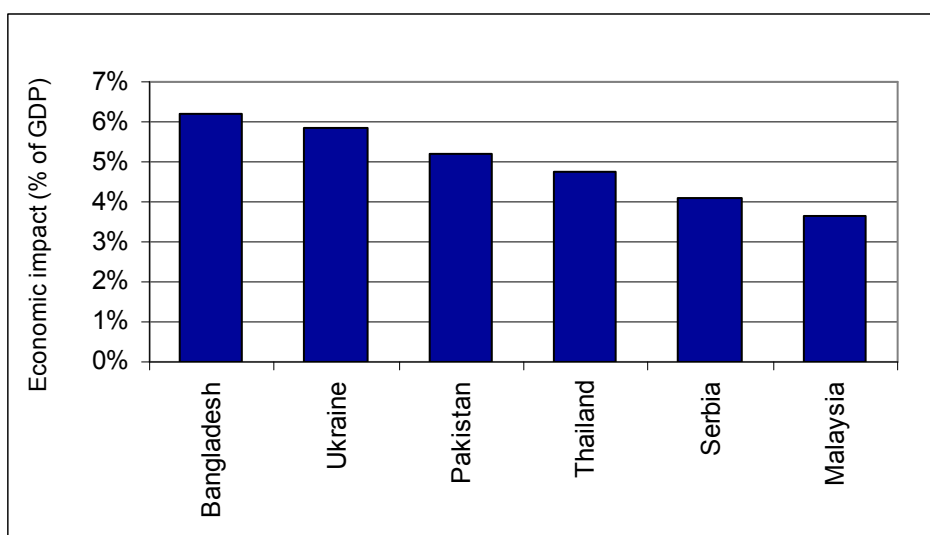
Our analysis was undertaken using publicly available statistics, company accounts and interviews with stakeholders in the mobile industry. By combining our supply-side and demand-side analysis, we were able to estimate the GDP contribution, employment created and taxation paid in each of the countries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

Impact on GDP

In all six countries, mobile telephony made a positive impact to economic welfare, by increasing GDP and generating employment opportunities both in the mobile communications sector and the wider economy. Furthermore, the MNOs were amongst the largest contributors to government tax receipts.

We estimate that the mobile industry contributed between 3.7% and 6.2% of GDP in 2007 in the six countries analysed.

Figure 1: Economic impact of the mobile communications industry in 2007 as a percentage of total GDP



Source: Deloitte analysis

The proportion of the economic impact created by demand-side versus supply-side effects varied across the countries, depending upon the nature of its economy and its mobile sector.

We estimate that the direct impact of the MNOs and other parties in the mobile supply chain, including infrastructure providers and handset and SIM retailers, account for between 1.3% and 2.9% of GDP. The impact was highest in those countries where a large proportion of expenditure remained in the domestic economy and where the MNOs were undertaking large investment

programmes, for example Mobi63 investing in GPRS and improving the range of services. A particularly high direct impact was found within Bangladesh as a result of the high level direct investment by the MNOs, mainly in rolling out nationwide GPRS, and the high level of domestic manufacture of civil work infrastructure.

The positive impact of the MNO's in the wider economy was noted during interviews. Mobile operators are often a large contributor to FDI, for example the MNOs contributed 35% to total FDI inflows in Pakistan in 2005-6. This "signalling effect" of foreign investors' generally increases business confidence whilst the presence of a reliable communications sector facilitates business and encourages investment. The addition of an economic multiplier of between 1.2 and 1.4 to reflect the knock-on impact on the wider economy, results in the supply impact accounting for between 1.7% in Malaysia and 3.5% in Ukraine of the total GDP across the six countries¹.

Productivity increases and intangible benefits provided to the populations of the six countries were also substantial. Productivity increases from the operation of mobile communications are estimated through an analysis of factors such as the number of mobile workers reliant upon a phone and the additional revenue or time savings that access to a phone may bring and the extent to which fixed line services could fulfil this role. For example, mobile services:

- Reduce transaction costs. Improvements in the information flows between buyers and sellers allow for the trading of information without travelling.
- Provide opportunities for business expansion. In the small trade and import / export businesses at the Odessa seaport, Ukraine, mobile communications proved a powerful tool to estimating demand, updating estimates and finding new customers.
- Encourage entrepreneurialism. Mobile phones reduce the cost of starting and running businesses. Many women in Pakistan have been able to start small businesses for the provision of beauty and hairstyle services, without the need to incur the initial costs of setting up beauty salons. Taxis are often shared in Thailand with a mobile phone being used to agree time shares.
- Improve the ability to search for employment. This is particularly important for countries such as Serbia which has high unemployment (20%) or Thailand where there is a high-level of temporary, informal employment.
- Facilitate mobile banking. This reduces the need to "meet in person" to conduct business.

We estimate that the increase in GDP due to raised productivity is between 0.8% in Thailand and 2.1% in Bangladesh. The higher value in Bangladesh represents the large of subscribers who use a phone for business purposes and the lack of an established fixed line voice and data network in many areas.

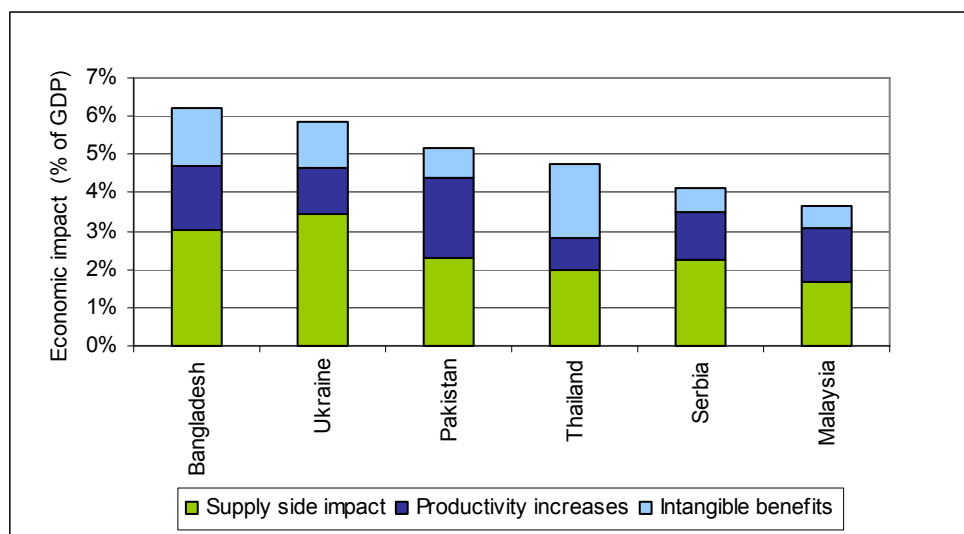
¹ The economic multiplier is added to capture subsequent spending rounds and its value depends on the relative openness of the economy and the proportion of subsequent expenditure that is on domestic, as opposed to imported, products

Intangible benefits of mobile ownership are widespread. These include the creation of social cohesion from the sharing of handsets and by allowing dispersed families to remain in contact to the stimulation of local content and increased access to emergency response services. Specific examples include:

- Mobile based remittance services: These are being launched in four of the countries covered by our project. Digi Malaysia, in partnership with Citigroup, has recently launched a money transfer service allowing for the transfer of airtime credit between subscribers. This allows for wealth sharing, but is also expected to empower people by giving them access to banking services. In Bangladesh, remittances are sent from non-resident Bangladeshi's back to relatives in Bangladesh.
- Mobile phones allowing people to pay for car parks by sending a text to a specified number: This has replaced cash payments for car parks in Serbian cities but also in most rural villages.
- The promotion of social cohesion through the use of Location Base Services (LBS) and child tracking devices: These have been launched by Digi Malaysia and Kyvistar Ukraine.
- Assistance during disaster relief: During the recent floods in Indonesia, DiGi was able to identify all its subscribers in Malaysia that were registered as being immigrants from Indonesia and then gave them free airtime vouchers. The MNOs have also been active in disaster relief efforts in Thailand and Pakistan, providing emergency communications infrastructure as well as monetary donations.
- Mobile services are being used to disseminate educational and health information. Grameenphone in Bangladesh works closely with the health sector to raise awareness of immunisation campaigns by sending out SMS messages to subscribers.

Due to their nature such intangible factors are difficult to monetise. We have used the willingness of the public to pay for services and used the surplus they pay on top of this as an estimate of the value they place on such factors.

Figure 2: Economic impact of the mobile communications industry in 2007 as a percentage of total GDP, by type of impact



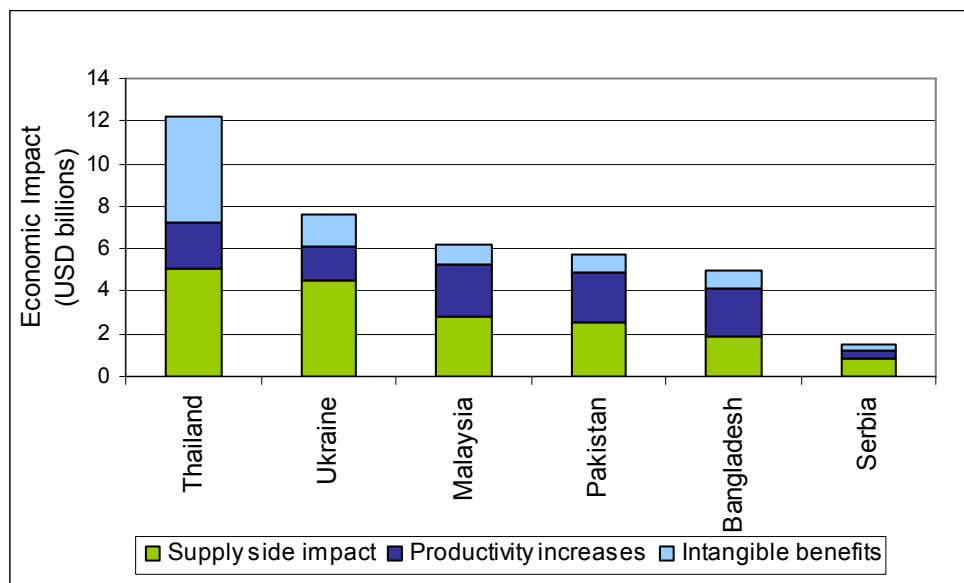
Source: Deloitte analysis

Variations in the contribution of the mobile sector to GDP and the proportion generated from supply-side versus demand-side impacts can be explained by many factors including:

- The level of network roll-out undertaken during the year and the proportion of equipment obtained domestically: In those countries where GRPS is actively being rolling out on a national basis, particularly Serbia and Bangladesh, the supply side impact is increased.
- Extent of alternative communications infrastructure: Increases in productivity are larger where mobile is reaching into previously uncovered areas. In Pakistan the mobile population coverage is estimated to be over 70% and the ratio of mobile phone to fixed line subscribers stands at 13:1. The lack of substitute forms of communications results in concentration of productivity increases around mobile usage.
- Mobile coverage and penetration levels: High population coverage, combined with affordable services, boosts mobile penetration levels. Through network effects, a higher subscriber base increases the opportunity for productivity improvements and the value of intangible benefits.
- Range of service offerings and price: intangible benefits are usually higher where retail prices are low and the mobile operators have a varied service offering.
- Alternative sectors contributing to GDP: In countries, such as Malaysia, where there are a number of alternative sectors contributing to economic growth then the proportionate, but not absolute, impact of mobile telephony on GDP will be lower.

The absolute level of GDP created differs significantly across the countries. As may be expected, a positive relationship between the level of GDP creation and the size of the country and its mobile subscriber base.

Figure 3: Economic impact of the mobile communications industry in 2007 (USD billions)



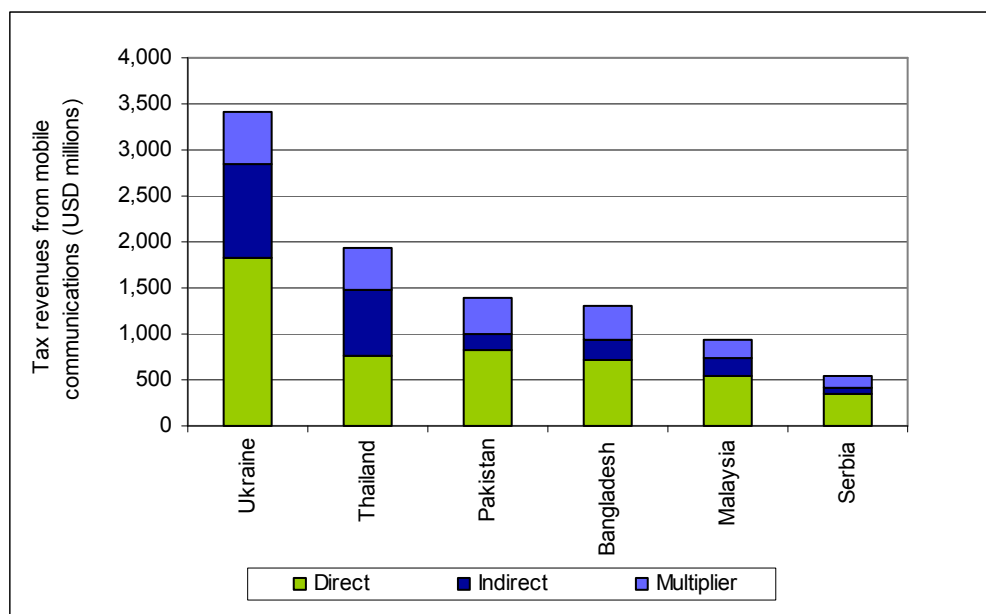
Source: Deloitte analysis

In addition to the 'static' economic impact of the mobile sector there are also longer term positive impacts upon the national economies of countries. We identified a statistically significant relationship between mobile penetration and the GDP growth rate in developing countries. This result is consistent with the academic literature but is focused on developing countries and therefore of more practical relevance to this study. We found that a 10% increase in penetration will, holding other factors equal, lead to a 1.2% increase in long-term growth rates. Based on this relationship, the mobile sector is estimated to have contributed between 1.6% and 1.8% to total growth in 2006/07 for five of our countries, although this impact has been slightly lower at 0.6% in Bangladesh where the growth in mobile penetration rates has been lower.

Impact on taxation revenues

In addition to the impact on GDP, we also estimated the taxation revenue created for Governments by the operation of the mobile sector. Taxation revenue was estimated for the MNOs themselves, their supply chain and other industry retailers and also for the additional economic impact caused by the wealth created, i.e. the multiplier effect.

Figure 4: Tax revenues from mobile communications and related industries in 2007 (USD millions)



Source: Deloitte analysis

In all six countries the direct tax contributions from MNOs outweighed those from indirect players as Governments directly captured revenue from the operations of these companies. On average, the MNOs contributed 26% of their total revenues in taxes. This rose to 29% where regulatory fees were included, although this varied considerably across the countries.

Figure 5: MNO taxation and regulatory fees as a percentage of MNO revenues for 2007

Country	MNO tax and regulatory fees paid as % of total MNO revenue
Bangladesh	43.1%
Serbia	39.0%
Ukraine	36.9%
Pakistan	26.2%
Malaysia	17.0%
Thailand	11.1%

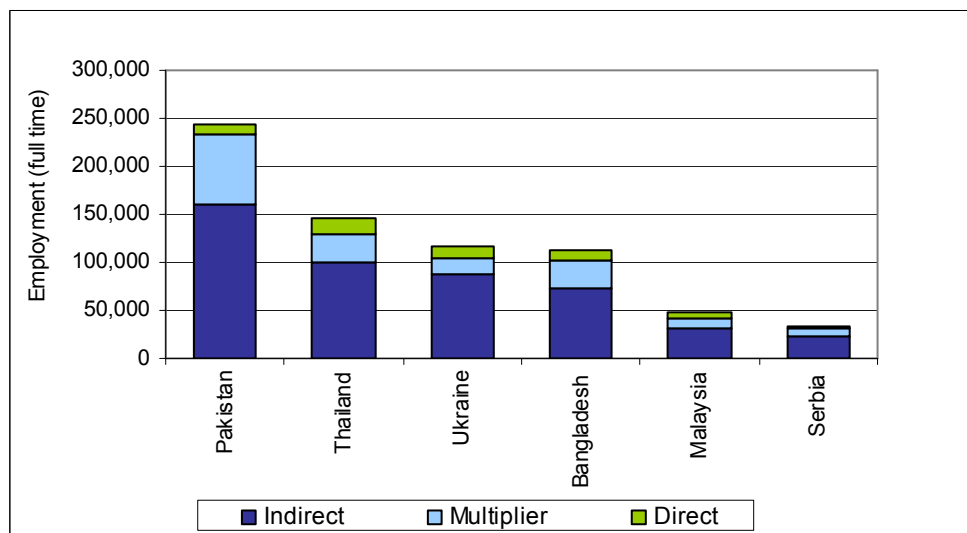
Source: Deloitte analysis

These calculations include direct taxation (corporate, employment, etc), indirect taxation (such as VAT) and mobile specific taxes. Mobile specific taxes are only levied in a small number of countries across the world, but are present in Ukraine, Bangladesh and Pakistan within this small group. There has been considerable debate as to the impact of these taxes on longer term national development as they reduce the demand for mobile services and hence reduce the potential economic and social impact of the sector.

Impact on employment

Employment in the mobile communications sector in 2007 was significant, ranging from 244,000 full time equivalents (FTEs) in Pakistan to 36,000 FTEs in Serbia.

Figure 6: Contribution to employment from the mobile value chain²



Source: Deloitte analysis

The MNO's themselves create only limited employment, although that which they do create is highly paid and sought after. However, the major impact of their operations is felt in the retail space through the sale of handsets, airtime and SIM sales activities (captured within indirect above). These employment opportunities are created in both urban and rural areas.

Conclusion

Mobile communications have a substantial economic impact upon the economies of the six countries considered. The results of our study are in line with similar investigations conducted for the GSM Association in recent years and suggest that the sector has the ability to contribute significantly to both the short and long term economic prospects of a country.

² Estimates for Bangladesh exclude part-time employment created through the Village Phone scheme. Including this increases employment in Bangladesh from 362,461 to 391,695 people.

3 Methodology

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

3.1 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 information provided by Telenor associates, together with interviews with industry players and assumptions based on economic literature and public sources to estimate the value of the mobile communications to the economy in terms of employment and GDP, both direct and indirect, for each country. We have defined the total economic impact as consisting of the following elements³:

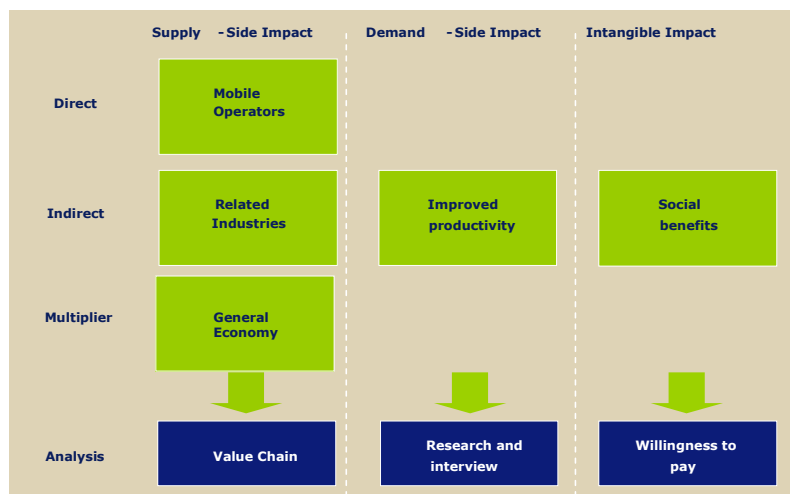
- The direct impact from the mobile operators;
- The indirect impact from other industries related to mobile services;
- The indirect impact due to the surplus enjoyed by end users in terms of productivity improvements; and
- The indirect impact due to more qualitative social benefits enjoyed by the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

We have structured our static analysis as illustrated by the following figure. The different impacts are summed together to give the total economic impact⁴.

³ Consistent with the McKinsey report, "Wireless Unbound", 2006 and previous Deloitte reports for the GSMA on the economic impact of mobile telephony in East Africa and Pakistan.

⁴ 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 and as such our estimates of economic impact should be regarded as an upper bound.

Figure 7: Structure of our analysis of economic impact on GDP and employment

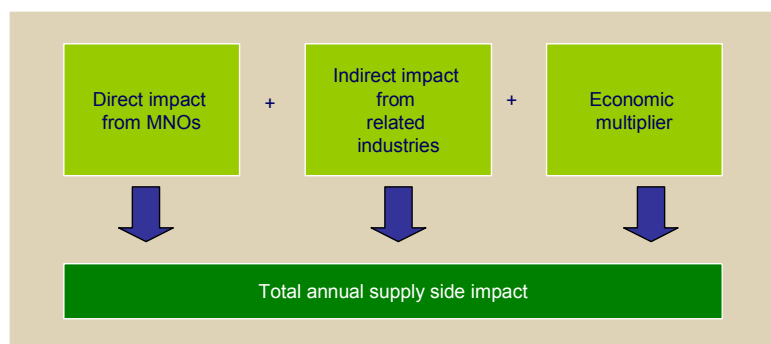


Source: Deloitte

3.2 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. The multiplier captures the idea that an initial spending rise can cause a further change in aggregate output for the economy as money circulates through sectors of the economy.

Figure 8: Structure of our supply side analysis

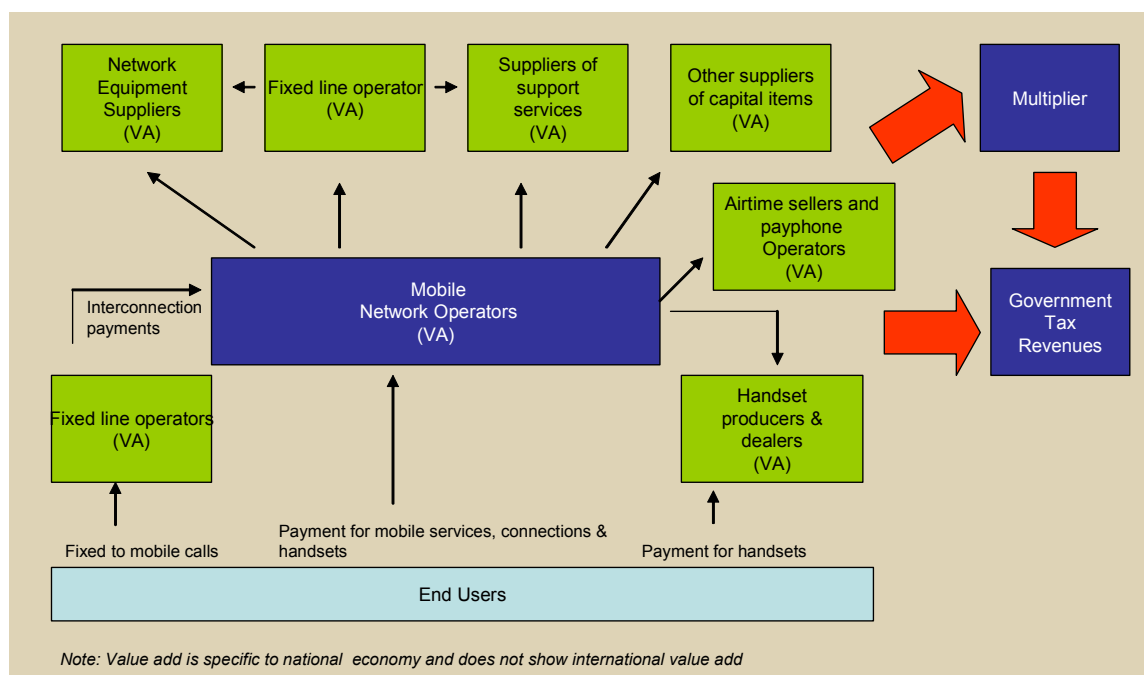


Source: Deloitte

This static based analysis 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 payments. Money flows between those companies in the industry, and the amounts retained are used to pay wages, taxes, buy inputs and other costs. Finally, the Government collects taxes 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 9: Mobile value chain



Source: Deloitte

Our estimates of the flows are based on:

- Discussions with Telenor and its associates in each country;
- Operating information from suppliers of network equipment and support services;
- Discussions with handset importers and dealers, airtime distributors and retailers;
- Discussions with other stakeholders (suppliers, chamber of commerce, etc);
- Analysis of Government statistics; and
- Analysis of accounts and billing information for Telenor associates;

The revenue flows were calculated for each of Telenor's associates. Based on subscriber market shares, these were then increased to reflect the entire mobile market proportionately

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.

3.3 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 is inferred from Telenor information which allows for the identification of the final destination of monetary flow. This assumes ownership and business structures of the other MNOS are similar to Telenor's. These value-add proportions are applied to the revenue flows calculated for both Telenor and other MNOs in the country.

3.3.1 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 above⁵. Estimates of proportions are based on interviews with industry players, operating and financial data from third parties and a review of annual reports of similar companies and similar studies.

3.3.2 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 used in other studies.

Figure 10: Multiplier benchmarks

Title of study	Multiplier
The contribution of mobile phones to the UK economy, 02 for ONS	1.13
Ovum studies on economic impact of mobile telephony in Bangladesh and USA based on review of various other studies*	1.6
Association Française des Opérateurs Mobiles *	1.7
Economic impact of spectrum use in the UK, Europe economics, based on ONS	1.1
Sicrana, R., and de Bonis, R.: "The Multiplier Effects of Telecommunications Investments on Economic Growth and Restructuring**"	1.5
Radio authority, UK 1995, Economic impact of radio	1.4
Deloitte for GSMA, 2006, Economic Impact of mobile telephony in East Africa	1.2
Deloitte for GSMA, 2007, Economic Impact of mobile telephony in Pakistan	1.4
Range	1.1 - 1.7
* On employment	
** On GDP	

Source: As given in table

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. However, we conduct a review of the country specific operating conditions, we select a suitable multiplier for each country.

⁵ Value add is the economic value created by factors of production (labour, capital, land) within a country.

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 by the Government from all components in the value chain, however we assume a degree of leakage from the informal sector.⁶

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 through several channels:

- 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 studies have used a ratio of 1.1 to 1.7 for induced employment. We have chosen to apply the same multiplier to employment as we use for GDP.

3.1.3 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 previously identified⁷.

- 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. Further, in certain occupations mobile services allow the “middle man” to be cut out;

⁶ 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.

⁷ See, for example, “Africa: The Impact of Mobile Phones”, Vodafone Policy Paper Series, No.3, March 2005 and our reports for the GSMA on Economic Impact of Mobile Telephony in East Africa (January 2007) and in Pakistan (April 2007).

- 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;
- 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; and
- Encouraging entrepreneurialism: mobile has encouraged the growth of small business and has increased its efficiency. For example, by being constantly reachable on their mobiles, many women in Pakistan have been able to start small businesses for the provision of beauty and hairstyle services, without the need to incur the initial costs of setting up beauty salons.

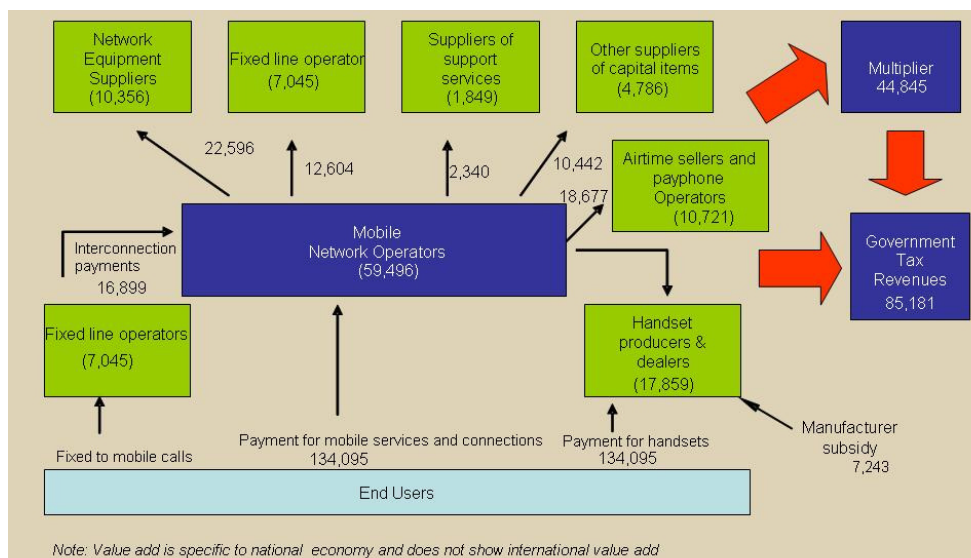
No established economic methodology exists to estimate the GDP and employment effects of such productivity improvements across the economy. As such, we have considered available evidence from the literature in the area and conducted interviews with stakeholders (including business and government representatives) 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 those employees who are likely to use their mobile phones within the economy. These are often defined as high-mobility workers and, in line with similar studies⁸, 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). However where fixed line communications is under-developed then low mobility workers will also utilise a mobile phone for business purposes. We calculate the proportion of workers using their mobile phone for business purposes by reference to data from the national bureau of statistics and international labour databases. We have estimated the productivity gain of workers with business 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.

⁸ For example, *Wireless unbound, the surprising economic value and untapped potential of the mobile phone*, McKinsey & co, September 2006

Figure 11: Calculation of economic impact of productivity improvements



Source: Deloitte methodology

3.1.3 Intangible Impacts

Finally, we seek to identify the intangible impact of the mobile industry. We utilise information provided to us during interviews with Telenor, key stakeholders in the mobile industry, government and the communications regulator. We also draw upon findings from other reports on this subject.⁹ The types of intangible impacts that we sought to identify included:

- Promoting social cohesion: through enabling contact when family members or friends who have moved away, and building trust through sharing of handsets;
- Extending 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;
- 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;
- Extending 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; and

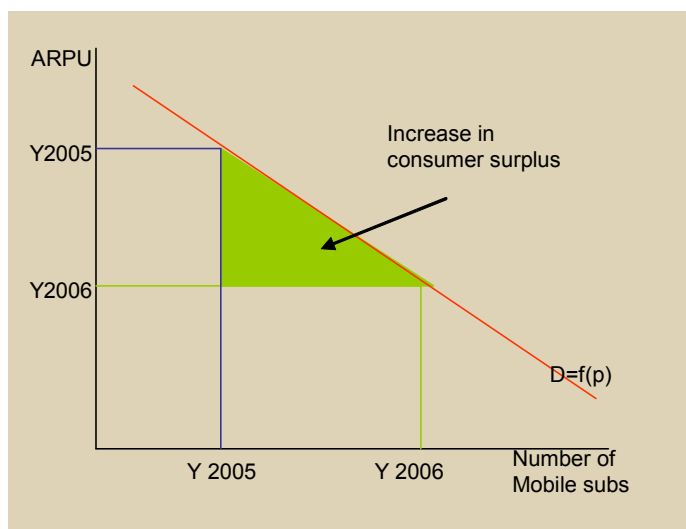
Whilst it is difficult to assign a specific value to these benefits in terms of contribution to GDP or employment, it is agreed that many of these social and educational benefits could make people happier, healthier and more motivated; and hence more employable and able to contribute to GDP. One method for estimating a value using actual data is the willingness to pay concept¹⁰. This seeks

⁹ These include, Vodafone policy services The specific article referenced is "Linking mobile phone ownership and use to social capital in rural South Africa and Tanzania" and Deloitte reports.

¹⁰ See McKinsey in "Wireless Unbound", 2006

to calculate the increase in consumer surplus that has resulted from a change in the price of a good.

Figure 12: 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 telephony¹¹. 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 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). This calculation may under-estimate the true level of consumer surplus since we assume that all consumers have a willingness to pay based on their ARPU in 2003 / 2004, whereas many would have joined the network before this time, when prices were higher, and hence have a higher willingness to pay.

3.4 Dynamic impact: estimating the relationship between mobile communications and GDP

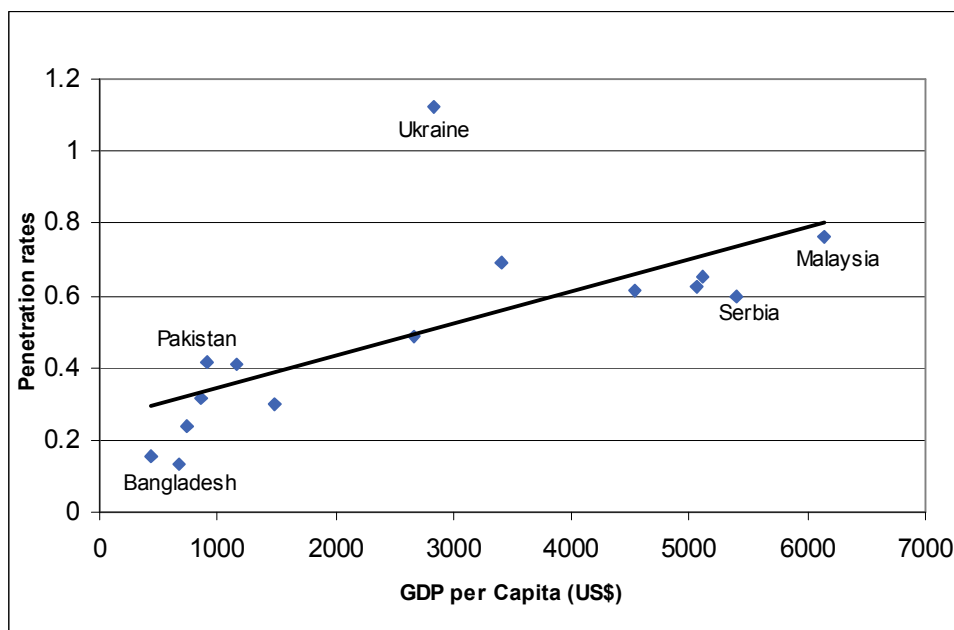
We have sought to estimate the dynamic relationship between mobile communications and GDP. That is, the longer term impact that investment in mobile communications may have on general economic welfare and GDP growth rates in particular.

A wide range of academic studies have demonstrated that a relationship exists between telecommunications penetration (originally fixed line, and more recently mobile) and economic growth¹². The following simple scatter plot demonstrates the basis of this relationship, showing a positive correlation between penetration rates and GDP per capita for a basket of developing countries.

¹¹ There is double counting between the productivity improvement and the intangible impact.

¹² 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 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.

Figure 13: Income and mobile penetration in developing countries



Source: Deloitte estimates using Wireless Intelligence and IMF data

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 countries¹³. Similarly to Waverman, Meschi and Fuss (2005)¹⁴, 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 Asia Pacific region, Africa and Latin America. For this sample, we estimate that a 10% increase in penetration could increase in the GDP growth rate of 1.2%¹⁵.

¹³ 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 meant there were insufficient data points to undertake this analysis. Therefore, we utilised a cross-sectional model.

¹⁴ 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

¹⁵ The regression passes all standard econometric diagnostic tests. For ease of presentation, a significant constant term is omitted.

Figure 14: Relationship between GDP growth and mobile penetration

Explanatory variables	Dependent variable: average GDP growth	
	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

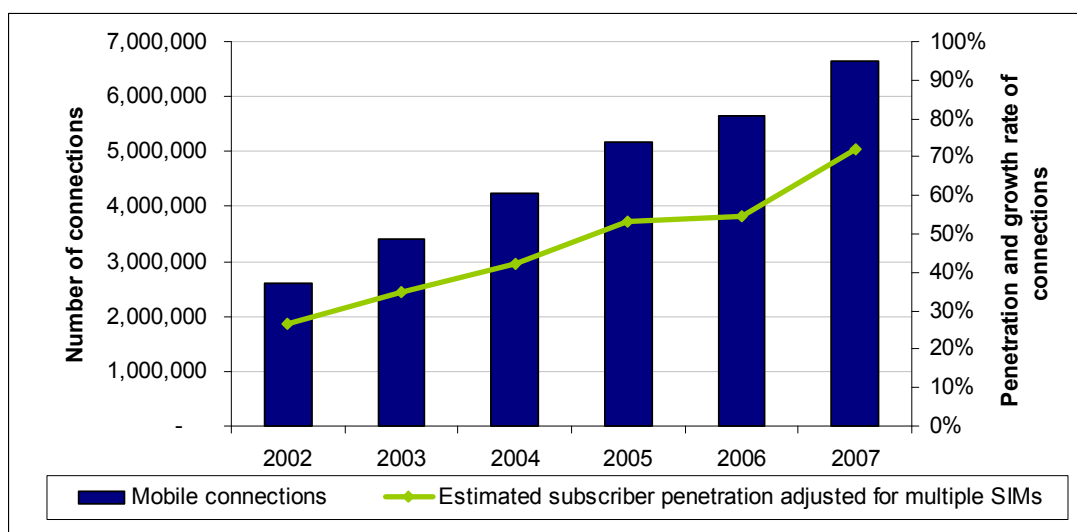
Source: Deloitte

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 developing countries, fixed phones have often 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.

4 Executive Summary for Serbia

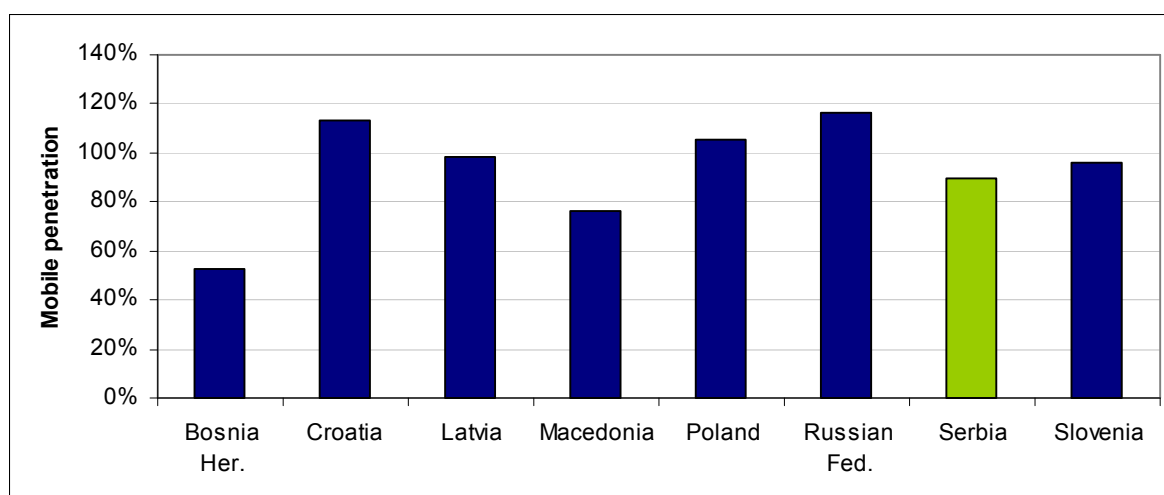
Serbia's mobile market has experienced a marked growth in the last four years with connections increasing from 2 million in 2002 to over 6.5 million 2007. Penetration rates are reported to be 90% of population, standing at an estimated 72% when multiple SIM cards are accounted for. Penetration rates are in line with the average of the region. Whilst subscriber acquisition slowed slightly in 2005 and 2006, it picked up quite significantly since Telenor's acquisition of Mobi63 in 2006 and is expected to keep increasing as the market becomes more competitive and new services are launched in the market place.

Figure 15: Connections and penetration in Serbia



Source: Wireless Intelligence and Deloitte estimate based on Telenor data

Figure 16: Regional levels of mobile penetration



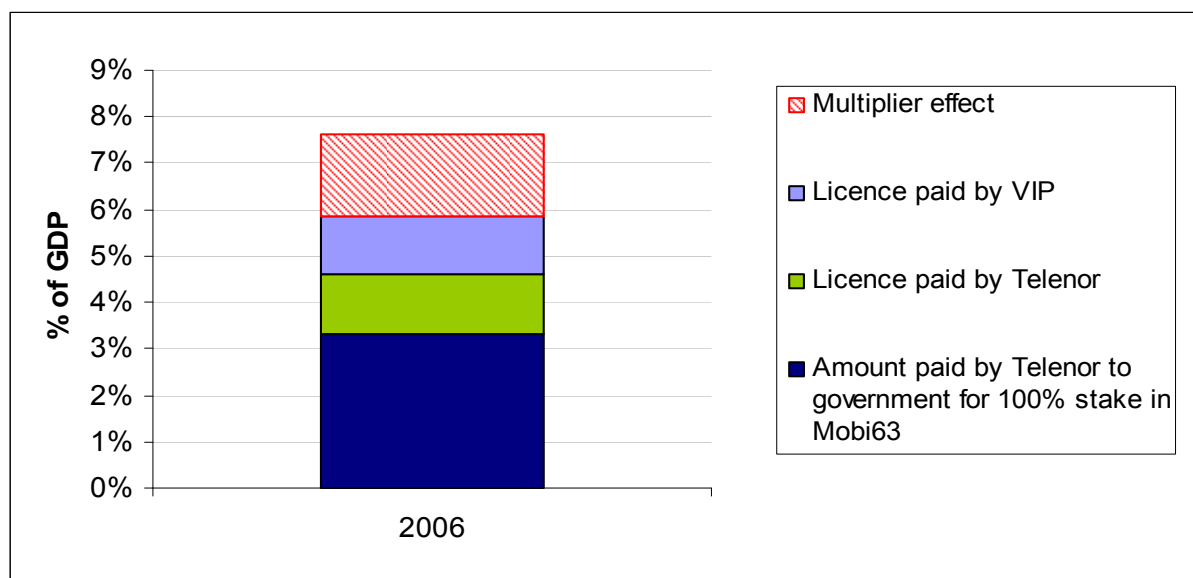
Source: Wireless Intelligence

Until May 2007, only two mobile network operators have been active in the market. These are the incumbent fixed operator, Telekom Serbia, and another company partly controlled by the Serbian government, Mobi63. The latter was completely privatised in 2006, when Telenor acquired it for a

sum of €1,513m. In addition, at the end of 2006, Austrian mobile operator VIP was awarded a third 10-year licence for €320m.

The economic benefits of the 2006 privatisation and liberalisation policies in the mobile market are numerous. The benefit also extended to outside the industry as the Government used the proceeds of the licence award and privatisation to fund infrastructure development. A national plan was developed to allocate the one-off proceeds: all national infrastructures, from roads and railways to the water supply infrastructure were redeveloped and upgraded¹⁶. A source within the Serbian Privatisation Agency claimed that the benefits of this one-off payment were not comparable with any other Eastern and Central European countries. The nature of the expenditures carried out within the national plan implies that the economic multiplier associated with the value added by the proceeds is likely to be extremely high. We estimate that the impact of the privatisation and liberalisation policies in the Serbian mobile market in 2006 was over 5.7% of the Serbian GDP. Using a conservative estimate of 1.3 for the economic multiplier, we estimate that the total one-off impact was over 7.5% of GDP in 2006. This excludes the value add generated by the economic activity of MNOs and related industries, which will be analysed later in this report.

Figure 17: Impact on GDP of the proceeds from the privatisation of Mobi63 and from the award of two mobile communications licences



Source: Deloitte analysis based on data provided by key industry players in interviews, analysis of company accounts and industry reports and data provided by Telenor

Interviewees at the Telecommunications Regulatory Authority and within the Serbia Government provided us with their views on a number of other economic benefits of the 2006 privatisation and liberalisation policies. These include:

- Foreign direct investment: The presence of Telenor, as a long-term foreign investor in Serbia, increases the likelihood of additional investment. This is due to communications

¹⁶ This information was provided during interviews with the Communications Ministry and Regulator
2008 Deloitte & Touche LLP. Private and confidential

infrastructure facilitating business growth¹⁷ but also due to the “signalling effect” of Telenor generally increasing business confidence;

- Change in corporate culture that results from foreign direct investment: These include a transparent and professional corporate culture that exercises a positive influence on domestic businesses and on the government; and
- Consumer benefits from increased competition: Since the entrance in the market of Telenor in 2006 and of VIP in May 2007, Serbian consumers have benefited from a significant increase and diversification in the service offer and a fall in prices of 14%. The range and number of handsets available in the market has also increased during this period.

The Serbian communication market has undergone significant policy and regulatory changes in the last 18 months. Interviewees have noted the positive steps that the regulator has begun to take in discussing and implementing some of the regulations that are typically seen in more developed regulatory environments including the EU. This includes a review of interconnection. However, there are a number of regulatory areas in which Serbia lags behind EU countries and the EU Communications Regulatory Framework¹⁸. Interviewees identified the lack of effective regulation in a number of these areas as hindering the development of the mobile communications sector. Areas of concern included:

- Process for rolling out new base stations: Operators identified a number of bureaucratic restrictions to their expansion plans. Interviewees stated that it takes an average 8 months to build a site due to the number of permissions that must be acquired. Operators are in the process of building out a 3G network, but the speed of roll out is being impeded by planning permission requirements;
- Regulation of wholesale leased lines and infrastructure sharing: Leased line prices are high compared to EU averages¹⁹ and therefore Telenor supplies its services through the radio network, including at backhaul level contribute to the low internet penetration, currently at 13% of population, while broadband penetration is less than 1%. Encouraging infrastructure competition at the backbone level could relieve this problem²⁰. The Serbian electricity operator has developed a fibre optic network throughout the country and the promotion of a

¹⁷ The link between communications infrastructure and growth is well documented in the academic literature.

¹⁸ The EU Communications Regulatory Framework for electronic communications networks and services, covering all forms of fixed and wireless telecoms, data transmission and broadcasting (2002). This is a package of 7 legal instruments including Directives on access, interconnection and LLU.

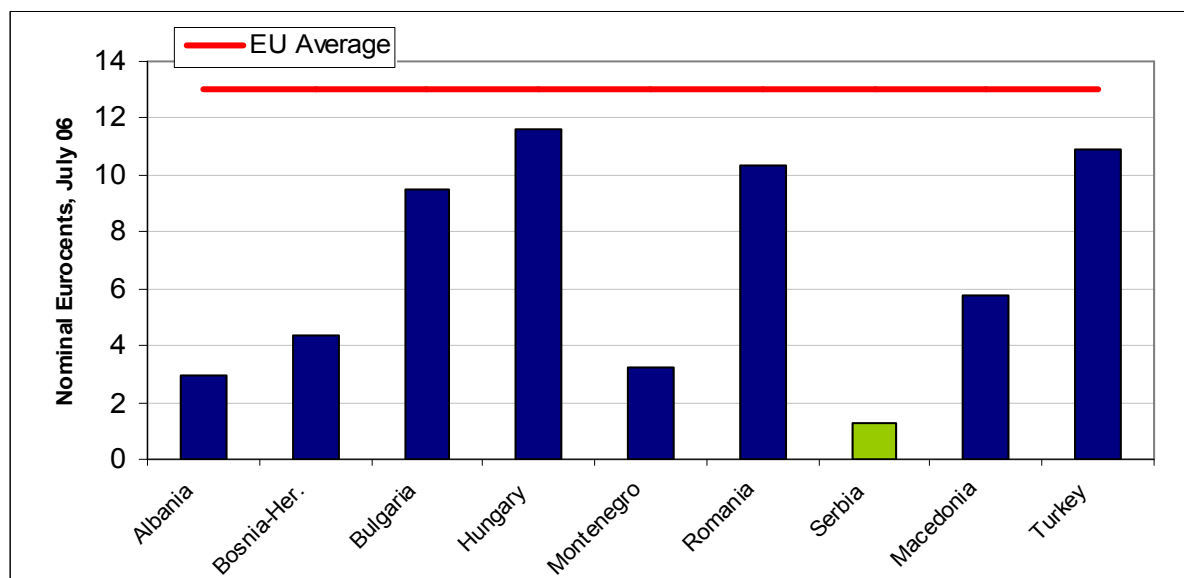
¹⁹ EU leased line prices obtained from the 12th report on the implementation of the EU telecommunications package, 2006. Available at: http://ec.europa.eu/information_society

²⁰ Promoting competition at the backbone, trunk, level is often an aim of EU regulators. Competition may come from other fixed line licensed operator, mobile operators, utility companies or cable tv operators. Where competition is insufficient then wholesale access and pricing regulations are typically imposed on the dominant operator. It is usually accepted that competition at the access level is harder to promote and therefore wholesale regulation of the access network is usually used to create a level playing field at the retail level.

joint usage of the optic fibre network for electricity and communications could be encouraged along with a review of retail and wholesale leased line prices²¹; and

- Regulation of fixed line retail prices: Fixed line subscription and call prices have not been rebalanced and remain among the lowest in Europe. A process for rebalancing prices so that they are reflective of the costs of providing the service is usually undertaken by regulatory authorities who are seeking to encourage entry in the communications market²².

Figure 18: Price of a three minute local call in nominal Eurocent, 2006

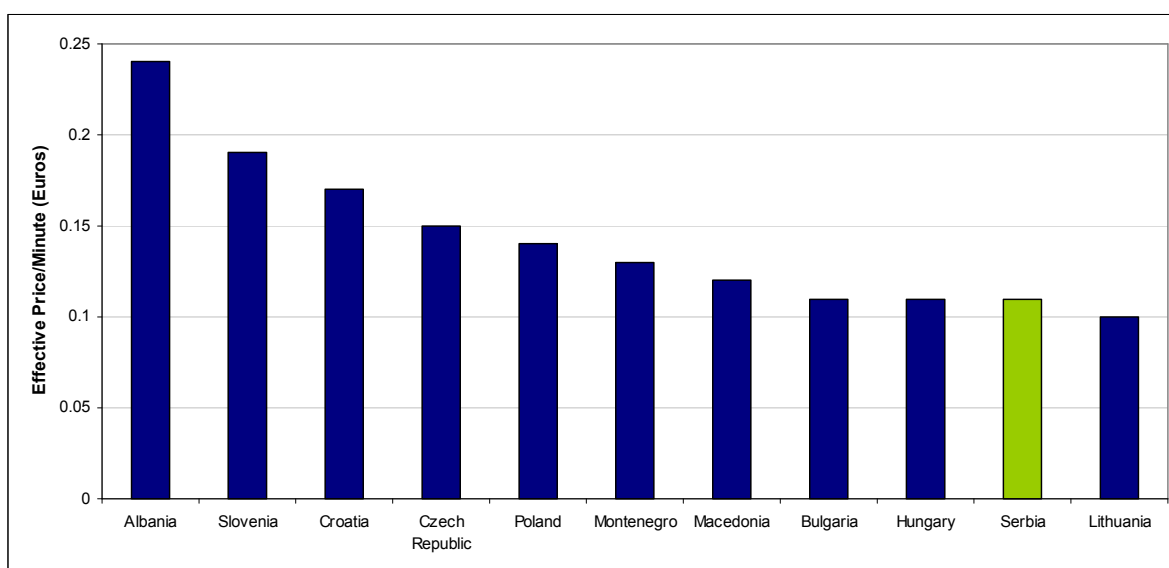


Source: Cullen Report, Supply of services in monitoring of South East Europe – Telecommunications services sector and related aspects, March 2007

²¹ A review of the wholesale and retail leased line markets is recommended by the EU as part of its Communications Directive, 2002. Should the market be found to be non-competitive then cost based pricing remedies are usually imposed.

²² This process is typically undertaken within a price cap context, where access and local calls prices are increased above the rate of inflation until the retail price of the service is aligned with its cost of provision.

Figure 19: Effective mobile price per minute in a sample of Eastern and Central European countries



Source: Wireless Intelligence (Price is calculated as ARPU / Minutes of Use per user per month where both ARPU and minutes include incoming, outgoing and roaming minutes)

As part of the 2006-2010 strategy for the development of Telecommunication in Serbia, the Serbian government has set 10 key objectives. Among these are:

- The development of telecommunications infrastructure;
- Widespread availability of the Internet; and
- The promotion of the web economy.

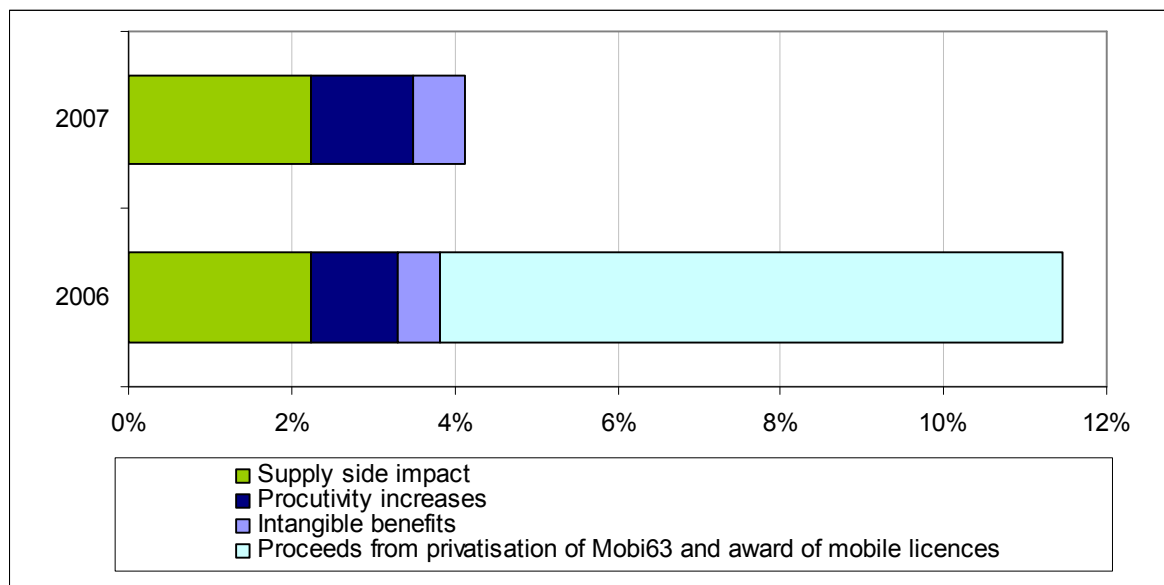
The MNOs' contribution to meeting the 10 key objectives could be significant in areas such as the provision of mobile broadband, in particular in rural areas. Mobile broadband could boost internet availability and promote the web economy. In order to deliver such services to consumers, a level playing field between fixed and mobile operators would be beneficial. MNOs need to receive support to develop and utilise alternative networks.

4.1 The economic benefit of mobile communications in Serbia

We have estimated the economic impact of mobile communications in Serbia for years 2006 and 2007. However, for 2006, only the four months from September to December were analysed. This period corresponds to when actual competition in the market developed, following Telenor's acquisition of Mobi63. Therefore, for 2006, the economic impact of mobile services is measured as a proportion of the GDP generated in the four months from September to December.

We estimate that the economic impact of the mobile sector in Serbia is DIN 104bn in 2007, representing over 4.1% of GDP.

Figure 20: Economic impact of the mobile communications industry in Serbia (%of GDP)



Source: Deloitte analysis based on data provided by key industry players in interviews, analysis of company accounts and industry reports and data provided by Telenor

Figure 20 highlights the economic impact of the mobile industry in terms of:

- Supply-side effects: these are the value-add and employment from direct and indirect firms in the value chain;
- Demand side effects: the productivity increases resulting from people using their phones for business purposes; and
- Intangible benefits: the social benefits enjoyed by consumers.

For 2006, this figure includes the impact of the proceeds from the privatisation of Mobi63 and the award of two mobile licences to Telenor and VIP. It can be seen that for 2006 the total impact represents almost 12% of the GDP.

The figure below illustrates both direct and indirect employment throughout the whole value chain associated with mobile services.

An economic multiplier of 1.3 was utilised to estimate the leakage effects in the economy. This estimation is based on reviews of international economic literature and on interviews undertaken in Serbia, in particular with government agencies. From interviews it appeared that the industrial structure of Serbia and its increasing trade exchanges would point to a rather high value for the economic multiplier. We have therefore opted for a value of 1.3. Regarding employment, the multiplier is applied only to indirect employment.

Figure 21: Employment in Serbia (FTEs)

	2006	2007
Mobile network operators	2,680	2,860
Fixed telecommunications operators	620	630
Network equipment suppliers	175	180
Network support suppliers	780	785
Handset importers	200	270
Other suppliers of capital items	115	115
Suppliers of non-network support services	930	960
Airtime/SIM sellers and mobile phone sellers	18,500	20,750
Multiplier	6,400	7,110
Total domestic employment	30,400	33,660

Source: Deloitte analysis based on data provided by key industry players in interviews, analysis of company accounts and industry reports and data provided by Telenor

We estimate that the mobile sector employs around 33,600 Serbians in 2007. This figure includes 2,900 employees working directly for the MNOs, but also employees working for network equipment suppliers, supplier of related services such as advertising, auditing and consulting services, and it also includes employees in retail shops selling handsets, SIM cards and airtime. However, the total figure may not be representative of future employment opportunities. New retail shop chains are opening both in urban and rural areas, and other points of sale will soon add mobile scratch cards among their services. Since Telenor started operations, the MNOs are developing their own retail shops. Telenor has now around 40 retail shops and VIP around 25 shops.

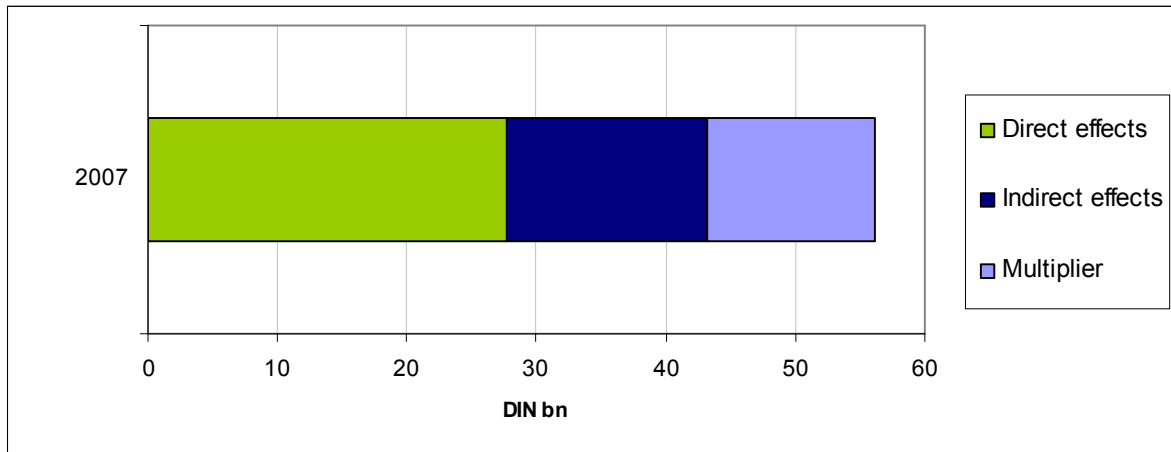
Supply-side impact of mobile communications

The supply side impact of mobile communications consists of:

- Direct effects: the value add and employment created by the MNOs themselves;
- Indirect effects: the value add and employment created by other parties in the value chain; and
- Multiplier effects: the knock-on impact of the direct and indirect effects on the rest of the economy.

Our estimates show that the supply-side value-add impact of the mobile communication industry in Serbia is DIN 43bn in 2007. When the multiplier effects are included, the supply side impact increases to DIN 56bn for 2007. The figure below shows a breakdown of the supply side impact in its three components.

Figure 22: Supply side impact of mobile communications in Serbia, 2007 (DIN bn)

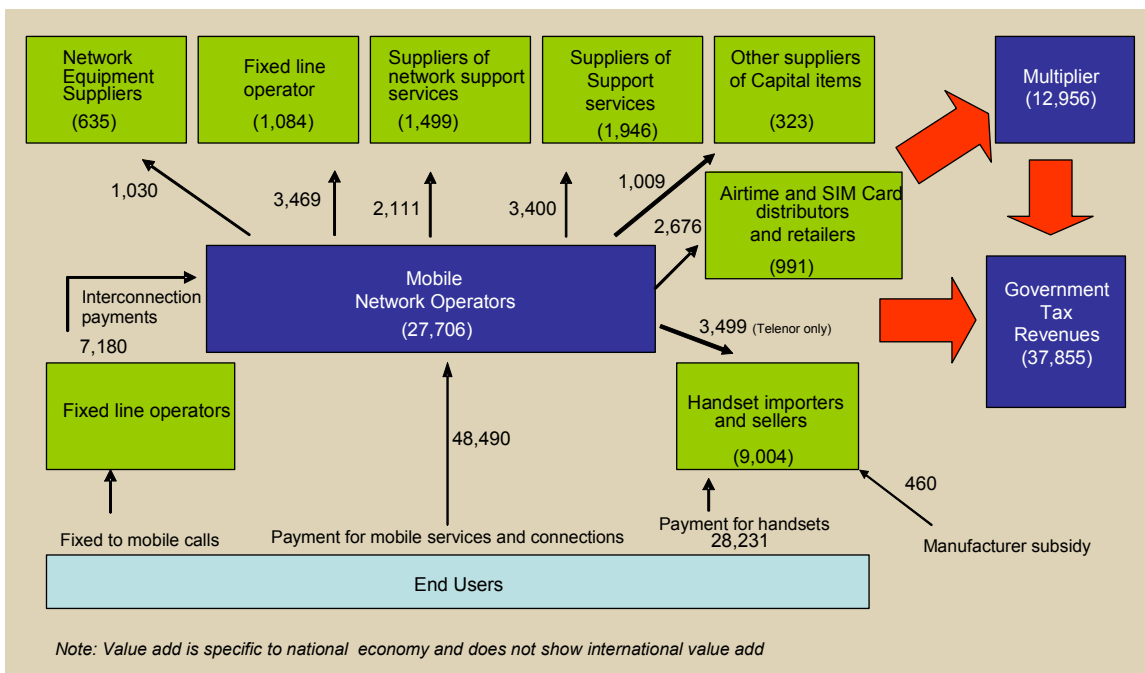


Source: Deloitte analysis based on data provided by key industry players in interviews, analysis of company accounts and industry reports and data provided by Telenor

From our analysis, we estimate that 67% of this value add consists of taxes and other licence and regulatory fees. The remainder of the value add is formed by wages and dividends paid out in Serbia and by Corporate Responsibility (CR) activities.

Figure 23 illustrates the value add chain associated with mobile services in Serbia for year 2007. The figure includes revenues directly generated by mobile customers for both mobile services and handsets. A significant proportion of the revenues related to handsets are generated through the sale of second hand handsets. Interviews suggest that in 2007 almost 60% of the handsets circulated in the country were second hand.

Figure 23: Mobile value chain in Serbia in 2007 (DIN millions)



Source: Deloitte analysis based on data provided by key industry players in interviews, analysis of company accounts and industry reports and data provided by Telenor

Demand side impact

The impact of mobile telephony on the productivity of workers occurs through a number of channels. The most important effects are usually identified as an improvement in the information flows between buyers and sellers and as the reduction in travelling time associated with mobile communications. Work becomes more flexible and accessible to all areas of the country. These effects are important for a country such as Serbia where many small businesses are field based, and constant accessibility of people who work on the field makes them more productive. These effects contribute to enhance general economic productivity and have therefore an impact on the economic performance of a country.

We have estimated the proportion of workers that use mobile phones for business purposes. Using international benchmarks and interviews carried out in Serbia, we estimate that the business usage of mobile communication contributes to an increase in the productivity of an individual worker by 7% in 2007. This is lower than in some country studies since the fixed network in Serbia currently offers relatively low prices. These prices act as an incentive for workers to use fixed lines. Therefore the incremental productivity impact of mobile communications is lower. For 2006 we estimate that the increase is 6%. Interviewees observed a rise in the average productivity improvement between 2006 and 2007. All respondents noted a marked increase in the offer of mobile services since Telenor entered the Serbian market, and in particular a marked change in the availability of business post-paid contracts was recognised. Business contracts are now available in retail shops to a wider audience.

We estimate that mobile communications increase GDP by DIN 32bn in 2007 as a result of productivity improvements. This represents 1.27% of GDP and is a 27% increase on 2006.

Consumer benefits

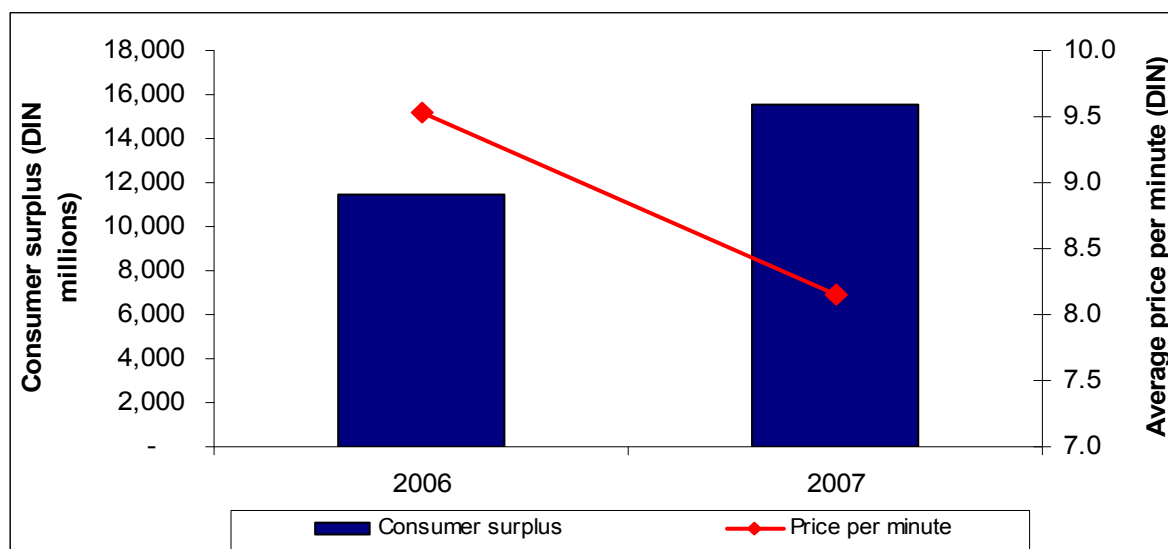
Mobile communications provide a number of intangible benefits to consumers. These include

- The development of interpersonal and family communications, in particular between urban and rural areas;
- The promotion of social cohesion; and
- The extension of communication to those on low income.

We have estimated the intangible consumer benefits using a willingness to pay analysis, which combines data on usage increases and price decreases over the years. Results are shown in the figure below.

The total increase in consumer surplus is estimated as DIN 15.6bn in 2007.

Figure 24: Increasing intangible benefits enjoyed by consumers in Serbia



Source: Deloitte analysis based on data provided by key industry players in interviews, analysis of company accounts and industry reports and data provided by Telenor. Price per minute refers to outgoing minutes only.

Other benefits

In addition to their contribution to economic growth, productivity and social benefits, MNOs contribute to the improvement of the Serbian society via a number of CR programmes.

Corporate responsibility was not part of the Serbian corporate culture until 2006, when one mobile operator launched a series of environmental and social campaigns. An independent foundation, the Telenor Foundation, was created by Telenor to manage CR projects. The activities of the foundation are transparent and span a number of areas. These include the provision of broadband connections to students and teachers, the founding of the largest Digital Media Documentation in libraries across Serbian, as well as a number of social programmes in Kosovo and Serbia. Telenor has also been the first company to launch a national recycling campaign aimed at collecting used mobile phones.

4.2 Conclusions

The Serbian mobile sector has undergone a number of significant changes in the last two years. This includes the sale of Mobi63 to Telenor, the award of new licences including for 3G and developments in the regulatory regime. Competition is delivering a wider range of services at lower prices to consumers. There is wider accessibility to a diversified tariff structure and easier availability of handsets. Subscriber growth rates have increased since the liberalisation of the market in 2006.

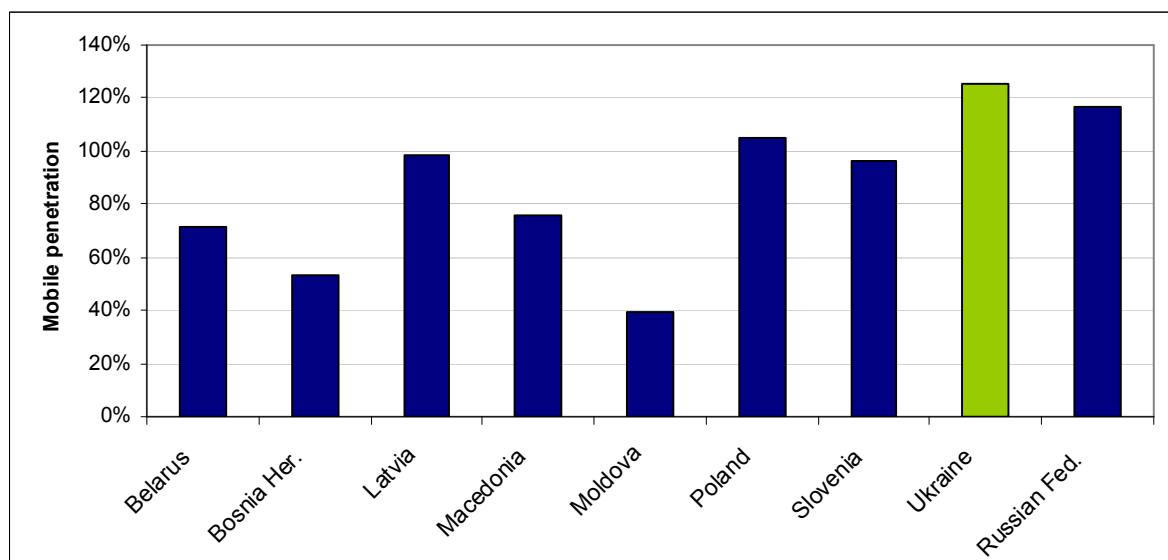
Mobile operators have delivered a range of benefits to the Serbian economy and the mobile sector is now estimated to constitute over 4% GDP. The Inclusion of licensing and privatisation proceeds increased the contribution of GDP to 11.6% in 2006. In addition, mobile operators have played a significant role in attracting additional foreign investment in the country and in rolling out

communication networks to under-served rural areas, increasing the potential economic activity in these areas.

5 Executive Summary for Ukraine

Ukraine's mobile market has experienced exponential growth since 2002. Mobile subscribers increased from 3.7 million in 2002 to over 57 million in 2007, growing at an average 70% per year. Penetration levels are one of the highest in the region and mobile connections now outnumber fixed line connections by 5 to 1.

Figure 25: Regional levels of mobile penetration, Q3 2007

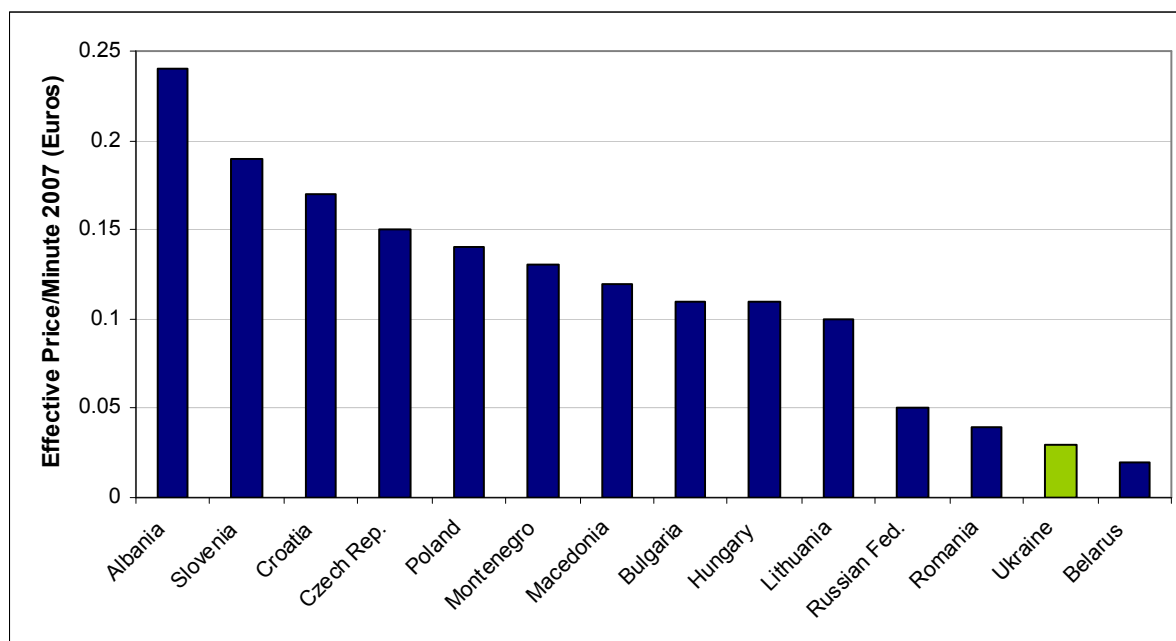


Source: *Wireless Intelligence*

Mobile services are the preferred method of communication in a country where fixed line penetration stood at 23% of population in 2005. Mobile services have therefore contributed to overall telephony penetration and have helped bridging the communication gap between rural and urban areas. In addition, by providing a universal and reliable telephony services, mobile services have promoted economic development and direct investment in the country.

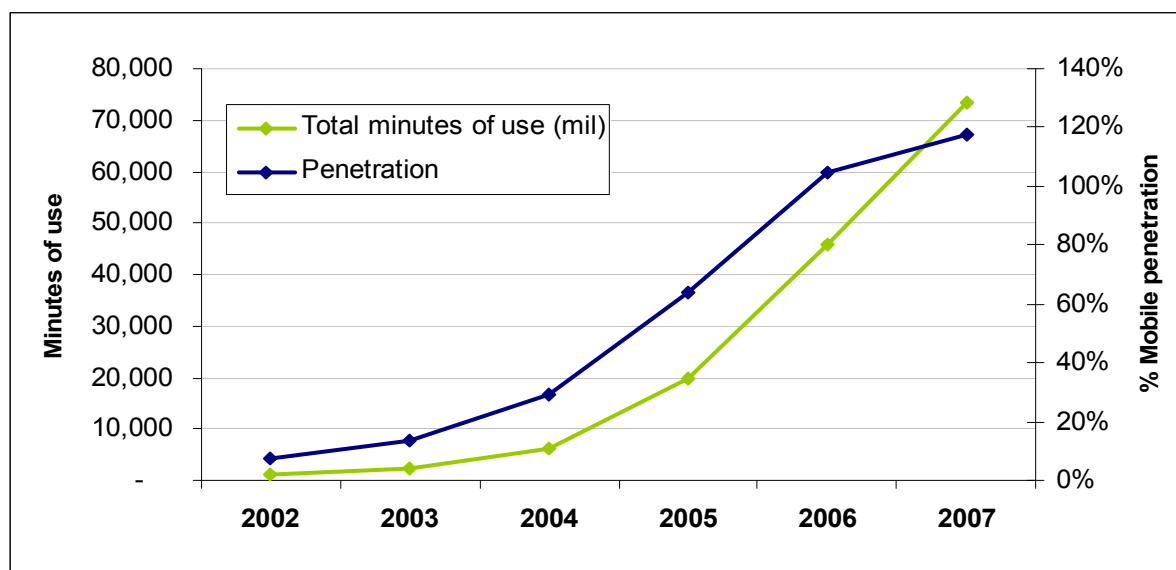
Mobile coverage is now effectively universal as 99% of the country's territory is served by at least one operator and Minutes of Use (MOU) peaked at 150 per month in 2007. There are currently five mobile operators in Ukraine, competing to deliver low tariffs and innovative services to consumers. The average price of an outgoing call has dropped by nearly 80% in the last five years. Effective mobile prices per minute are among the lowest in Eastern and Central Europe. However, in 2007 subscriber growth declined significantly due to a saturated market: five million new connections are estimated for 2007, compared to over 18 millions in 2006.

Figure 26: Effective mobile price per minute in a sample of Eastern and Central European countries, 2007



Source: Wireless Intelligence (Price is calculated as ARPU / Minutes of Use per user per month where both ARPU and minutes include incoming, outgoing and roaming minutes)

Figure 27: Mobile penetration and Total Outgoing Minutes of Use in Ukraine



Source: Wireless Intelligence and Deloitte analysis

The maturing voice market has caused voice average revenue per user (ARPU) to decrease by over 70% in the last four years. In response, operators have shifted focus towards the mobile data market, with EDGE-technology services recently introduced and MMS services.

3G (third generation) has yet to be launched by the MNOs. Licences were awarded to the fixed line operator UkrTelecom in 2005, which launched 3G services in November 2007 in five cities. Ukraine lags behind most of other countries in Eastern and Central Europe in terms of the development of 3G networks and the take-up of services. However, this situation could be reversed following the issuing of 3G licences and a swift network build out. Issuing additional 3G licences may also speed

up the roll out of mobile broadband and could assist the Ukrainian government in achieving higher internet penetration.

The Ukrainian communication market has benefited from foreign investors taking a long term interest in Ukraine. Their presence increases the likelihood of additional investment as:

- Foreign mobile operators bought technical expertise and attracted business partners, for example network equipment suppliers, to register businesses in Ukraine;
- Mobile operators have contributed to raise the quality of services allowing investors to rely on optimal coverage in a country with low fixed lines penetration. The presence of a reliable communication system is regarded as a factor in attracting foreign investment; and
- Foreign investors have a “signalling effect” of generally increasing investors’ confidence about Ukraine.

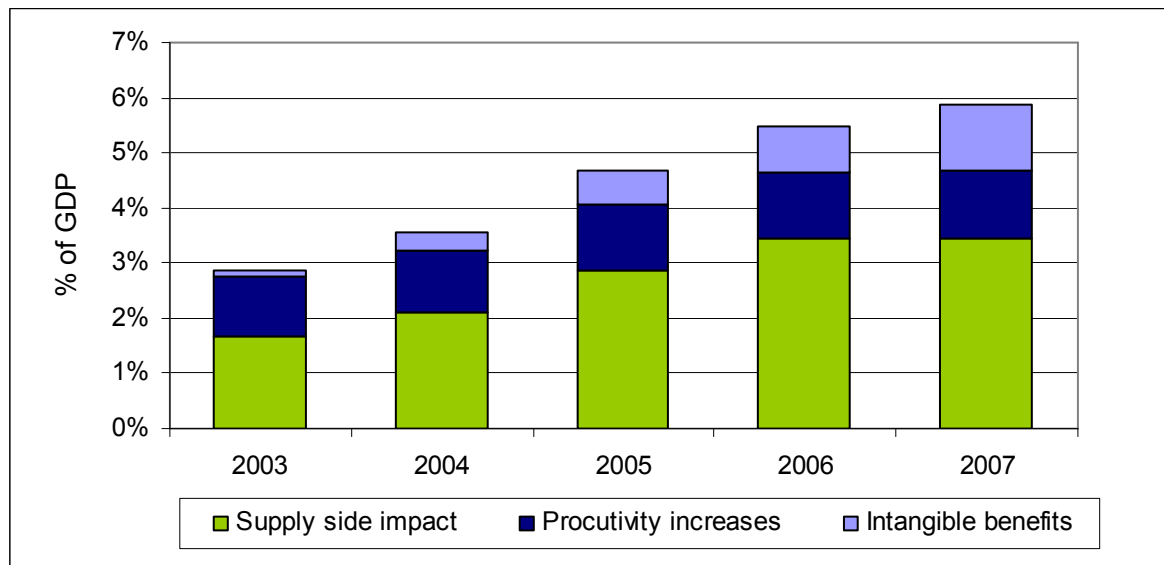
Mobile operators face a high level of direct and indirect taxation in Ukraine. A joint GSMA/Deloitte report prepared in 2007²³ showed that in Ukraine taxes as a total share of cost of mobile ownership were the fifth highest in a sample of 100 countries worldwide. Operators are subject to mobile-specific pension fund contributions of 7.5% of subscriber revenues. This contribution does not apply to fixed lines. In addition a similar type of pension fund tax applies to handset revenues (1.5%) and, along with the required \$2 per handset permit necessary to import handsets, is a tax ultimately paid by consumers.

5.1 The economic benefit of mobile communications in Ukraine

We estimate that the economic impact of the mobile sector in Ukraine in 2007 is UAH 37bn, representing 5.9% of total GDP. In 2003 the estimated impact represented 2.9% of the GDP.

²³ GSMA/Deloitte report ‘Global Mobile Tax Review’, 2006-2007, available at <http://www.gsmworld.com/TAX/2008> Deloitte & Touche LLP. Private and confidential

Figure 28: Economic impact of the mobile communications industry in Ukraine



Source: Deloitte analysis based on data provided by key industry players in interviews, analysis of company accounts and industry reports and data provided by Telenor

Figure 28 shows the three different effects of the mobile industry's economic impact:

- Supply-side effects: value-add and employment from direct and indirect firms in the value chain;
- Demand side effects: productivity increases resulting from people using their phones for business purposes; and
- Intangible benefits: the social benefits enjoyed by consumers.

Figure 29 sets out the impact of the mobile communications industry on domestic employment. Our estimates include the whole value-add chain associated with mobile services, and it is therefore a measure of both direct and indirect employment. In addition, an economic multiplier of 1.2 is applied to the employment to take into account the wider effects on employment generated by the mobile industry.

Figure 29: Employment in Ukraine (FTEs)

	2003	2004	2005	2006	2007
Mobile network operators	3,470	4,950	6,900	7,890	12,300
Fixed telecommunications operators	5,000	5,000	6,960	6,970	6,970
Network equipment suppliers	720	760	930	950	1,050
Network support services	3,370	2,890	3,150	3,880	7,090
Handset importers	190	200	230	250	280
Suppliers of support services	1,100	1,220	1,630	1,540	1,450
Airtime and mobile phone sellers	47,800	52,650	58,000	63,700	70,080
Multiplier effect	12,350	13,530	15,560	17,000	19,840
Total employment	74,000	81,200	93,360	102,180	119,060

Source: Deloitte analysis based on data provided by key industry players in interviews, analysis of company accounts and industry reports and data provided by Telenor

Our analysis shows that the contribution of the mobile sector has been significantly increasing over the last four years and that the mobile industry employs almost 120,000 Ukrainian full time employees (FTEs). This compares with 75,000 FTEs in 2003.

Employment directly by MNOs is estimated to have increased by around 9000 FTEs in 4 years. These workers receive work shadowing, apprenticeships and other formal training and receive the opportunity to work in a competitive environment. Kyivstar has been named the best employer in 2006 by business magazine Dilavoi and by an international consultancy firm.

Supply side impact of mobile communications

The supply side impact of mobile communication is formed of three components:

- Direct effects: the value add and employment created by the MNOs themselves;
- Indirect effects: the value add and employment created by other parties in the value chain; and
- Multiplier effects: the knock-on impact of the direct and indirect effects on the rest of the economy.

Our estimates show that the value-add impact of the mobile communication industry in Ukraine was UAHs 18.3bn in 2007.

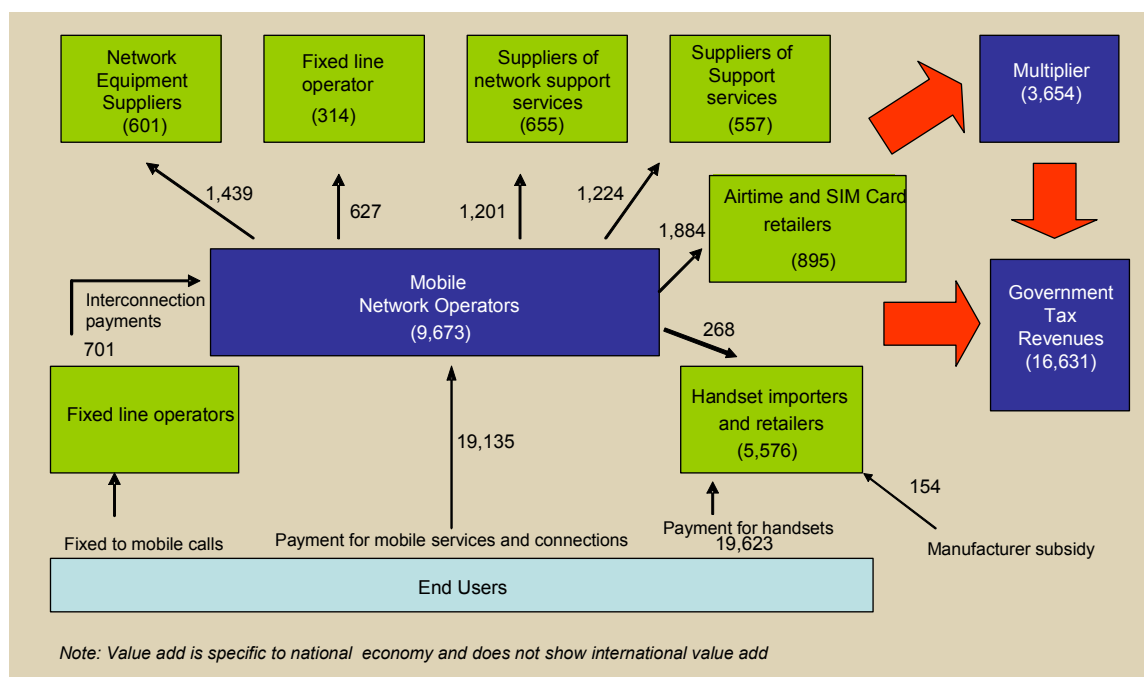
We estimate a multiplier effect for the Ukrainian economy of 1.2. We base our decision on literature reviews and interviews we undertook in Ukraine. This value reflects both the industrial structure of the country and its increasing exposure to foreign trade in particular with European countries and with the Russian Federation. This higher level of imports reduces the economic multiplier compared to other countries.

Including multiplier effects, we estimate that the supply-side value add to the Ukrainian economy for 2007 is UAHs 22bn. Government revenues under the form of direct taxation, regulatory fees and mobile-specific pension fund contributions constitute 75% of the value add. This proportion is higher than for other countries due to the mobile-specific taxes and pension fund contributions,

which apply to subscribers' revenues and to imported handsets, as well as to the high level of social contributions. We estimate that the amount collected by the government through the pension fund contribution on mobile traffic, handsets and through the handset import permit will reach UAHs 1.6bn in 2007. Kyivstar is the biggest taxpayer within the Kiev region.

The remaining proportion of the value add is formed by net wages, dividends of domestic companies and corporate responsibility programmes.

Figure 30: Mobile value chain in Ukraine in 2007 (UAHs millions)



Source: Deloitte analysis based on data provided by key industry players in interviews, analysis of company accounts and industry reports and data provided by Telenor

Demand side impact

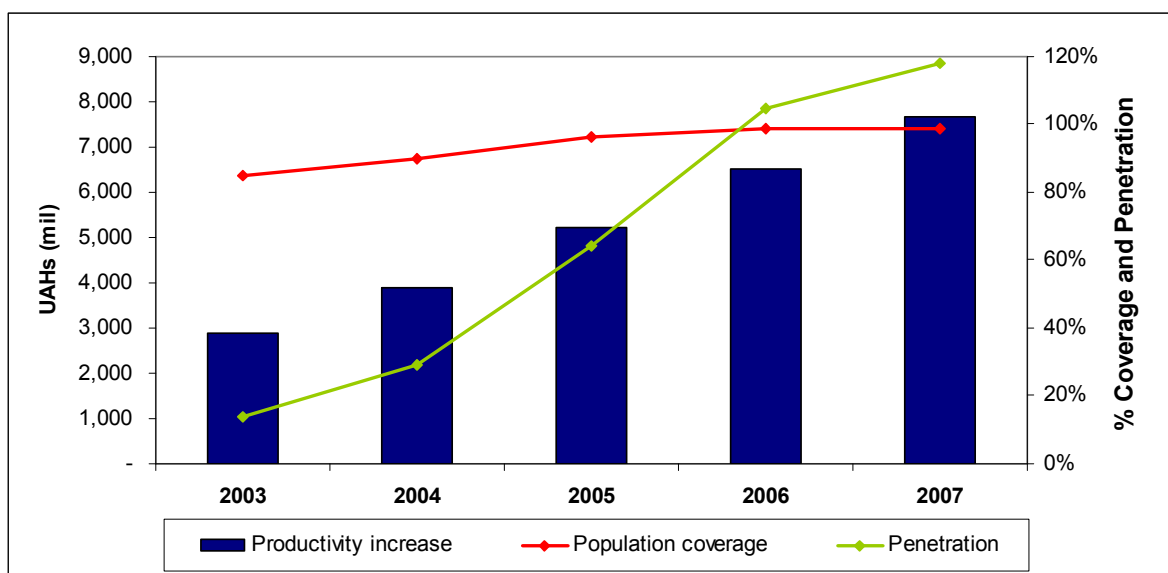
In order to estimate the demand side impact of mobile communications we have undertaken an analysis of Ukraine's labour market and have estimated the proportion of workers that use mobile phones for business purposes. Labour productivity increases in both urban and rural areas as workers can communicate continuously with trade partners. Interviews suggested that mobile phones have had a strong impact on the following sectors:

- Small trade and import/export businesses, for example in the Odessa seaport. Mobile communications proved a powerful tool to estimating demand, updating estimates and finding new customers;
- Logistics for large companies, in particular for internal communications and transportation; and
- Transport sector in urban areas: a number of cab drivers companies have started coordinating actions through mobile phones.

We estimate that the business usage of mobile communication would contribute to increase the productivity of an individual worker by 9%. This estimate is based on international benchmarks and on interviews undertaken in Ukraine, in which we found that the totality of respondents described mobile phones as the only source of universal communication in Ukraine. Low fixed line penetration and an internet penetration of only 12% of population implies the incremental productivity associated with mobile services is likely to be higher than in other countries with more developed alternative infrastructures.

We estimate that mobile communications will increase GDP by UAHs 7.7bn in 2007 as a result of productivity improvements. Universal coverage combined with high quality of service meant that the mobile-related productivity impacts have been significant over time, representing approximately 1.2% of GDP in 2007 and increasing from 1% in 2003.

Figure 31: Productivity impact of mobile communications



Source: Deloitte analysis based on data provided by key industry players in interviews, analysis of company accounts and industry reports and data provided by Telenor

Consumer benefits

The intangible benefits of mobile communications enjoyed by consumers can be estimated using a 'willingness to pay' analysis. By combining data on usage and data on prices, we find that usage increase and price decreases create growing net benefits for consumers over time.

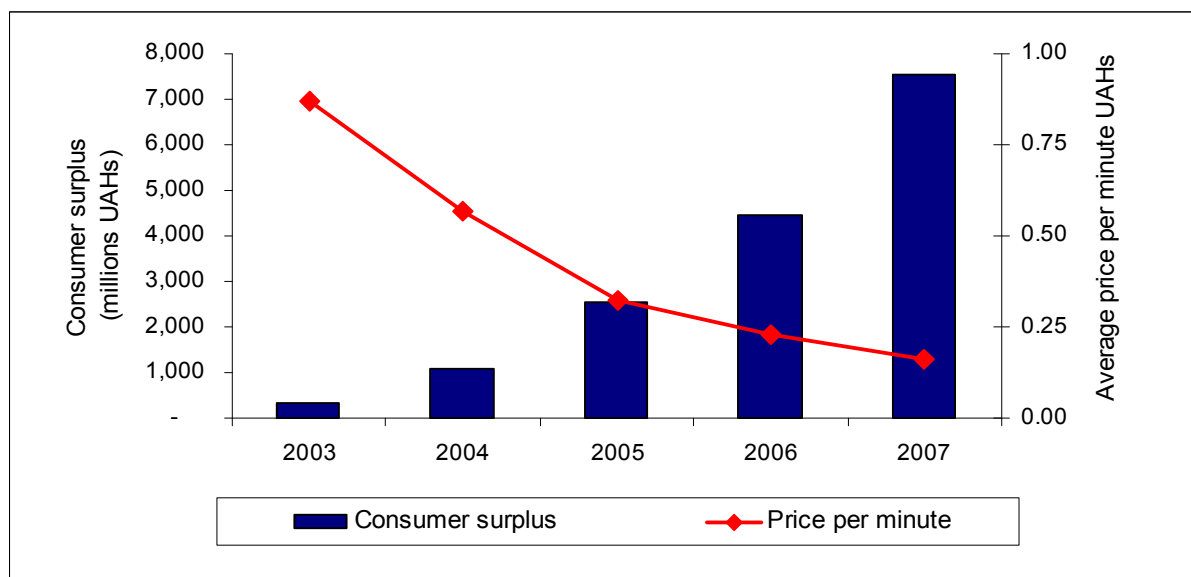
Social benefits generated by mobile communications in Ukraine include:

- The contribution of mobile communications to the democracy development and to the openness of society;
- The contribution to developing interpersonal and family communications;
- The promotion of social cohesion through the use of Location Base Services (LBS) and child tracking devices;

- The extension of communications to users with low education and literacy, particularly elderly people living in rural areas; and
- The extension of communications to those on low incomes.

We estimate that intangible benefits enjoyed by consumers in 2007 amount to UAH 7.6bn. Figure 32 illustrates the significant benefits enjoyed by consumers as a result of falling prices and increasing range of services over time.

Figure 32: Increasing intangible benefits enjoyed by consumers in Ukraine



Source: Deloitte analysis based on data provided by key industry players in interviews, analysis of company accounts and industry reports and data provided by Telenor

Other benefits

In addition to the benefits estimated above, MNOs in Ukraine contribute to various groups in society through a number of Corporate Responsibility projects.

Charity related programmes organised by MNOs include schemes aimed at helping orphan children, particularly in the Chernobyl area, by providing administrative help to orphanages and by funding IT courses. Other projects provide help to social centres for invalids, such as the Kiev Polytechnical Institute, and to elderly people in retirement homes, particularly in rural areas, who are provided with opportunities of communication.

5.2 Conclusions

The Ukrainian mobile sector has experienced exceptional subscriber growth since 2002 and creates a substantial and increasing proportion of the country's economic value. It estimated to have contributed 2.9% of GDP in 2004, increasing to 5.9% in 2007. In 2007, approximately 119,000 FTEs were employed directly and indirectly by the industry.

The impact of the communications is demonstrated through supply side and productivity impacts. However, consumers have also benefited from an increased range of services and falling prices.

The average price per minute is estimated to have fallen 50% in 3 years²⁴. The fall in prices has been accompanied by an increase in coverage levels and this has contributed to the general accessibility of mobile services.

By continuing to grow its subscriber base and provide new services, the mobile sector may be able to increase its GDP contribution. A regulatory and licensing regime that combines international best practice with local considerations would be supportive of this growth opportunity²⁵. For example, the issuing of additional 3G licences would allow for further service innovation including the delivery of data connectivity to larger proportion of the Ukrainian population. In addition, the government could further support the sector's development through fiscal policies consistent with the remainder of the economy, notably a review of the current pension funding requirements.

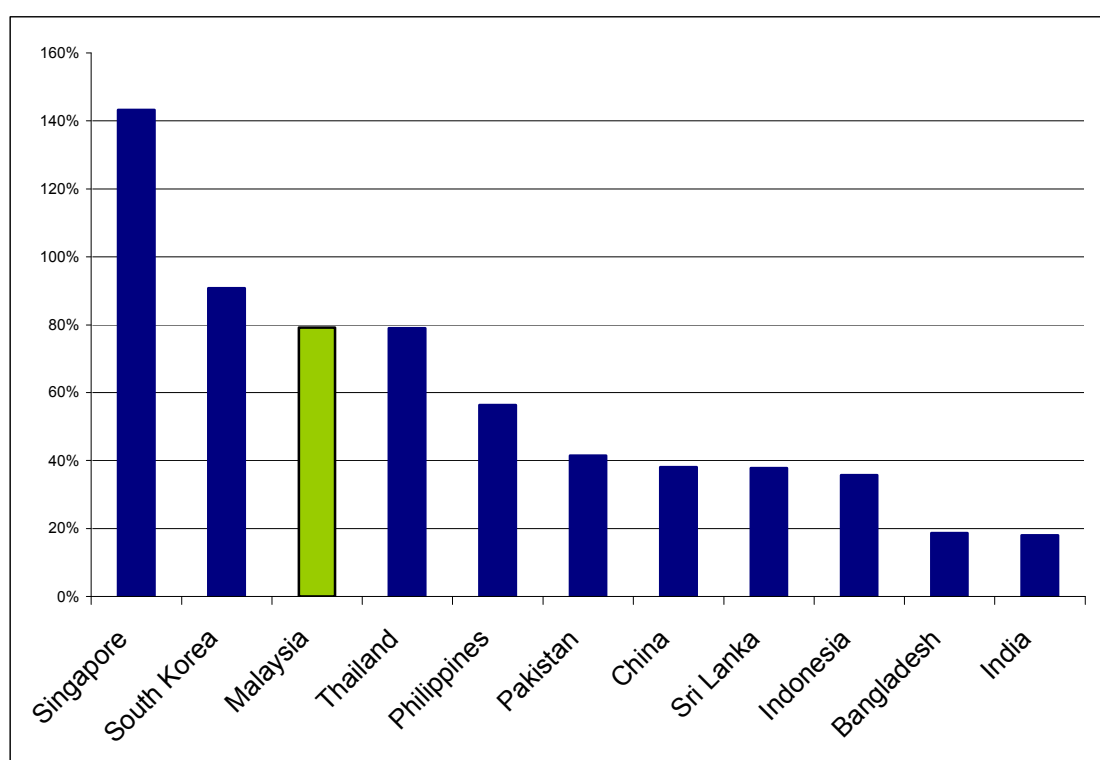
²⁴ Based on outgoing calls only.

²⁵ International regulation of note includes the EU Communications Regulatory Framework for electronic communications networks and services, covering all forms of fixed and wireless telecoms, data transmission and broadcasting (2002). This is a package of 7 legal instruments including Directives on access, interconnection and LLU.

6 Executive Summary for Malaysia

The Malaysian mobile industry is rapidly growing and bringing widespread economic benefits to the national economy through value-add, employment and productivity improvements. Malaysians also enjoy substantial social benefits from mobile communications. In the mid-1990s, the Malaysian mobile industry experienced subscriber growth rates in excess of 50% per year. While growth slowed during the Asian financial crisis in the late 1990s, the mobile industry picked up pace in 2000/01. Mobile subscribers which stood at 7.5 million at the beginning of 2002 and now exceed 21 million implying a population penetration of almost 80% giving Malaysia the third highest mobile penetration in the region.

Figure 33: Mobile penetration in a sample of South East Asian countries, Q3 2007



Source: *Wireless Intelligence*

Mobile networks have been rolled out in rural, as well as urban, areas and population coverage is around 95%. The number of mobile connections now exceeds those of the fixed line operator, Telekom Malaysia, by almost 5 to 1. This has meant that even those in the most rural areas have access to communications and this has assisted in the establishment of new businesses in these areas. Intense competition between the mobile network operators (MNOs) has led to falling retail prices and, combined with the high coverage, this has led to mobile networks being able to act as universal service providers in many areas. A potential case exists for the MNOs to receive USO funding for this role.

As penetration stands at 80%, the possibility for further subscriber growth is limited. Therefore, future growth may arise from increased usage as new services are brought to market. Technological innovation is therefore particularly important for the development of the industry.

Interviewees provided us with examples of the innovation of mobile operators in Malaysia. These include:

- The launch of a mobile based remittance service by DiGi in partnership with Citigroup which allows people to transfer airtime credit between each other including, for example, from parents to children and urban based subscribers to those in rural areas. This mobile service is expected to empower people by giving them access to banking services even if they do not have bank accounts. This is particularly beneficial for those on low incomes; and
- A service which allows people to locate other mobile subscribers based on the nearest base station. This service is particularly useful to parents.

As Malaysia continues its economic development towards higher value add industries such as services and intellectual property the need for advanced communications infrastructure, in particular, broadband access is likely to further increase.

The Ministry of Energy, Water and Communications (MEWC) has set out its eight key objectives for information and communications services in Malaysia (MyICMS 886).²⁶ These objectives include:

- Increasing broadband and 3G take-up;
- Promoting mobile television; and
- Providing universal service for voice and data services in rural areas.

These objectives have been developed in the National Broadband Plan by the government's investment holding arm (Khazanah Nasional) which is responsible for developing selected industries in Malaysia in order to pursue the country's long term interests.

A review of these objectives demonstrates the role of MNOs in supporting the Government to meet its objectives by 2010. The MNOs are currently providing voice services in rural areas and, could potentially, become a provider of data and broadband services in both urban and rural areas²⁷. In some, particularly underserved rural areas, mobile networks may be preferable to fixed networks. For example, in Johor (south Malaysia) last year's serious floods badly compromised fixed line services, however mobile services were able to continue providing services to both individuals and business.

The provision of sufficient and efficient access to spectrum alongside the creation of incentives to invest in uneconomic areas, are important in realising MEWC's objectives. The role of regulatory and government policy towards MNOs will be decisive and a collaborative approach to defining policies and incentives is required between the various parties.

²⁶ The Malaysia Information, Communications and Multimedia Strategy (MyICMS) was developed in 2006 and sets out the country's objectives for the industry to be achieved by 2010 (<http://www.myicms.com/index.html>).

²⁷ This would potentially require additional spectrum to be allocated to the MNOs and for significant investment to be undertaken

The Malaysian Communications and Multimedia Commission (MCMC) and MEWC have played a positive role in the development of the mobile communications industry. Both the regulator and the government have a proactive approach to balancing the need for regulation and promoting competition. If the government and the regulator were to continue to adopt an open and consultative policy towards the regulation of the mobile communications market, this might help to avoid excessive intervention in the market and to promote the efficient functioning of the market. In this way, MCMC, MEWC and the MNOs can work in partnership to deliver affordable communications for all.

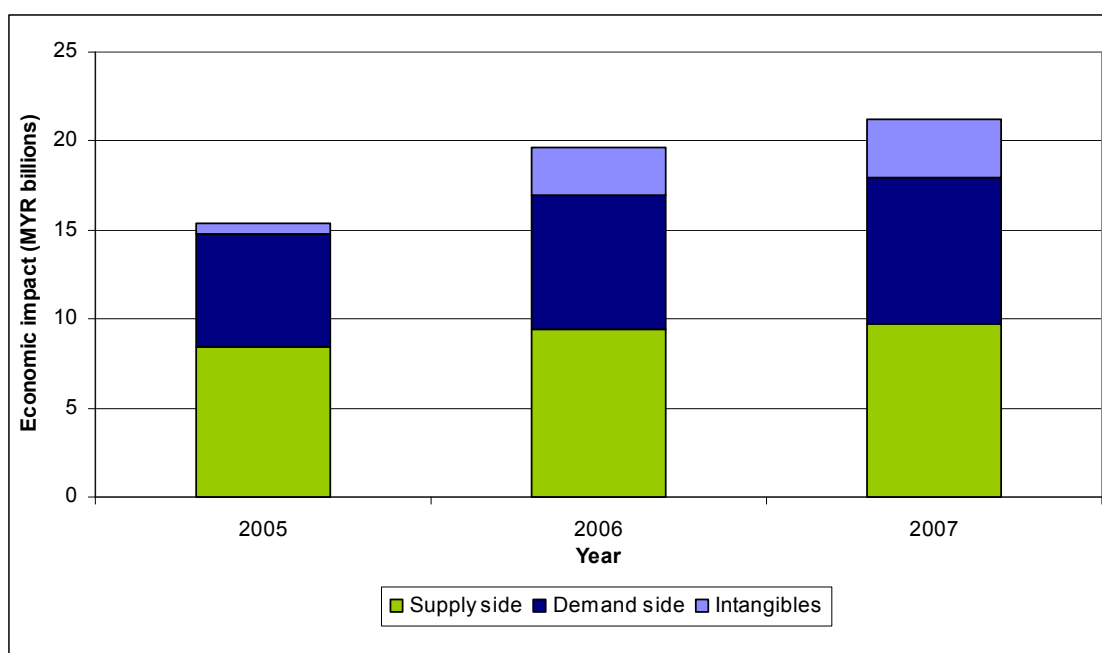
6.1 The economic benefit of mobile communications in Malaysia

The mobile sector in Malaysia is estimated to contribute MYR 21.3 billion to the national economy in 2007 representing 3.7% of total GDP. This compares to MYR 15.3 billion in 2005 (around 3.1% of GDP).

Figure 34 illustrates the three different components of the mobile industry's economic impact:

- Supply side effects (value-add and employment from direct and indirect firms in the value chain);
- Demand side effects (productivity increases resulting from people using their phones for business purposes); and
- Intangible benefits (the benefits enjoyed by consumers).

Figure 34: Economic impact of the mobile communications industry in Malaysia



Source: Deloitte analysis based on data provided by key industry players in interviews, analysis of company accounts and industry reports and data provided by DiGi.

Supply side impact of mobile communications

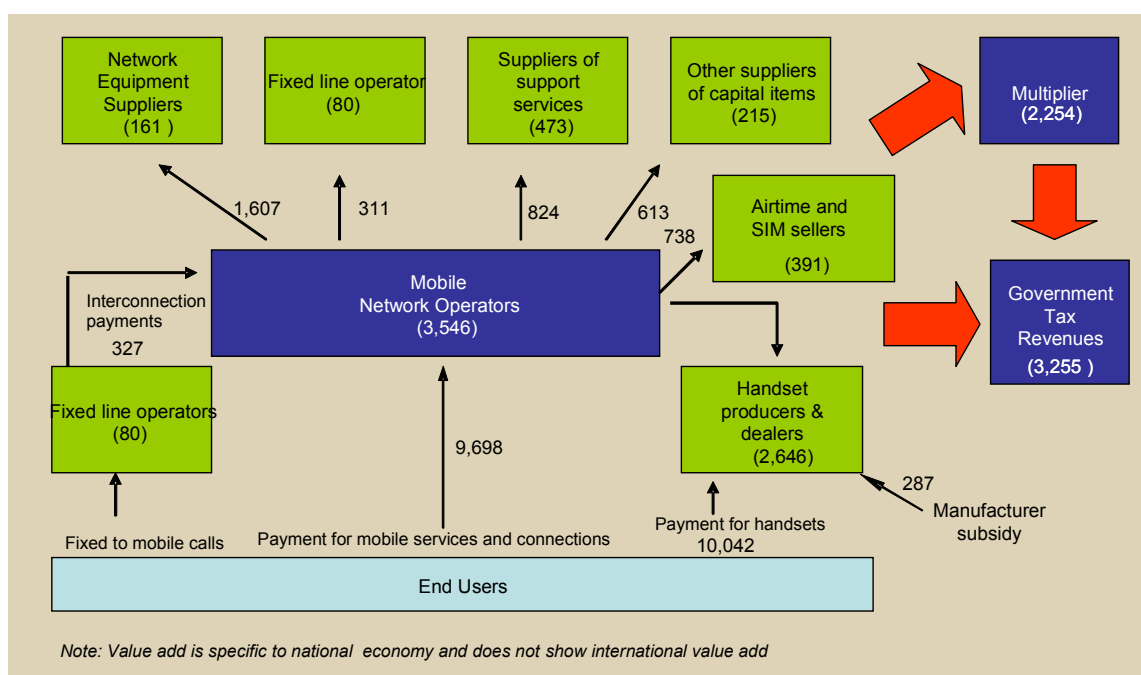
The supply side impact of mobile communications is comprised of three parts:

- Direct effects (the value add and employment created by the MNOs themselves);
- Indirect effects (the value add and employment created by other parties in the value chain); and
- Multiplier effects (the knock-on impact on the rest of the economy of the direct and indirect effects).

We consider only the domestic impact of mobile communications and subtract international revenue flows from our analysis. We chose to use a value for the economic multiplier of 1.3. This was assumed following a literature review and interviews with producers in Malaysia and is reflective of the relatively high proportion of goods and services produced within Malaysia rather than being imported.

Figure 35 below illustrates the revenue flows between MNOs and other parts of the value chain (arrows) and the value-add (values in brackets).

Figure 35: Mobile value chain in Malaysia in 2007 (MYR millions)



Source: Deloitte analysis based on data provided by key industry players in interviews, analysis of company accounts and industry reports and data provided by DiGi.

We estimate that the mobile communications industry will contribute MYR7.4 billion of value-add to the Malaysian economy in 2007.²⁸ When multiplier effects are taken into account, the value-add the mobile industry will contribute in 2007 will be MYR9.8 billion. Of this value-add, 33% consists

²⁸ We assumed that DiGi was representative of other MNOs and grossed up the DiGi figures by market shares to calculate the aggregate impact of the MNOs.

of tax and regulatory fees, the rest is made up of wages, dividends and expenditure on corporate responsibility (CR).

Figure 36 sets out the MNOs direct and indirect contribution to employment in terms of full time employees (FTEs) in 2007. It can be seen that employment in related industries (indirect employment) constitutes a large proportion of the employment created by the mobile industry. This is due to the large number of parties who act as either suppliers to the MNOs or retailers or distributors of mobile services. Related industries include network equipment and other capital suppliers; fixed line operators; suppliers of support services; airtime and SIM sellers; and handset producers and dealers (as set out in Figure 35 above).

Figure 36: Direct and indirect employment (2007)

Contribution to employment	FTEs
Direct (MNOs)	7,000
Indirect (related industries)	32,000
Multiplier effect	12,000
Total employment (FTEs)	51,000

Source: Deloitte analysis based on data provided by key industry players in interviews, analysis of company accounts and industry reports and data provided by DiGi.

As the mobile sector continues to expand and develop new services, its contribution to GDP is likely to further increase. Our analysis suggests that the dynamic effects of a 10% increase in mobile penetration would increase the long term GDP growth rate of a developing country by 1.2% (in comparison to 0.6% in developed countries). This means that the rapid increase in penetration experienced Malaysia may have contributed to long term economic welfare.

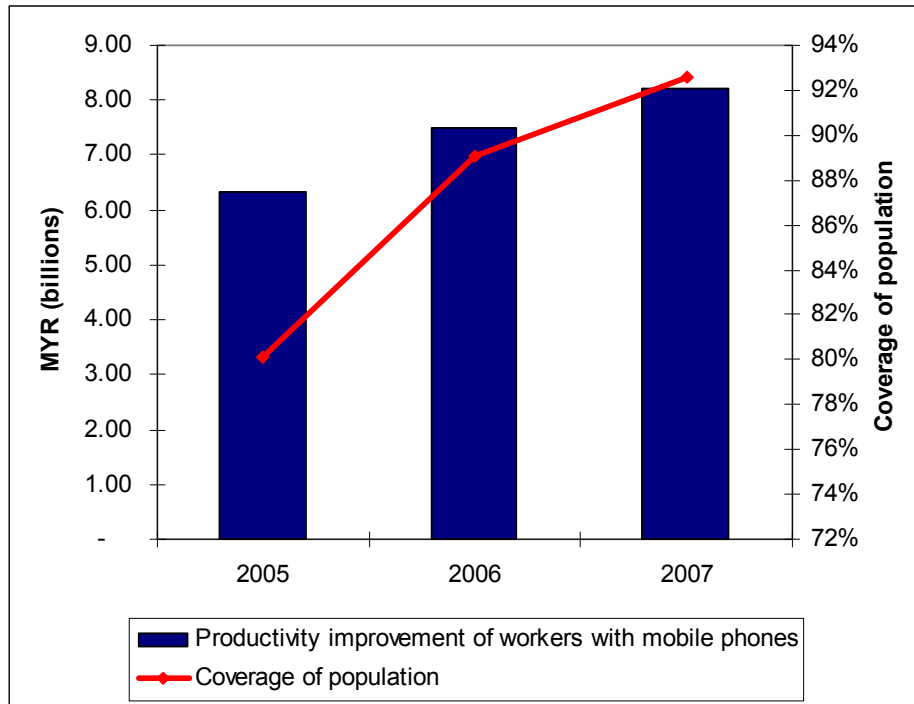
Productivity impact of mobile communications

Mobile communications can be instrumental in increasing the productivity of workers across sectors in both rural and urban areas. In particular, access to mobile communications can

- Improve information flows within companies and between buyers and sellers;
- Increase work flexibility; and
- Promote business in previously underserved rural areas.

We estimate the proportion of workers that use their mobile phones for business purposes. This includes workers who undertake a moderate to high degree of travel in the course of their employment, e.g. example, taxi drivers, logistics workers, agricultural workers selling produce in markets and sales people. Based on interviews and international benchmarks, we estimate that each individual using mobile communications for business purposes would benefit, on average, from a 7% increase in productivity. This is lower than in some international studies, reflecting the fact that Malaysian's have better access to fixed line voice and data services than workers in less developed countries. These other forms of communications also account for a proportion of the productivity impact that can be associated with improved access to communications. We estimate that this has increased GDP output by MYR 8.2 billion in 2007.

Figure 37: Productivity impact of mobile communications



Source: Deloitte analysis based on data provided by key industry players in interviews, analysis of company accounts and industry reports and data provided by DiGi.

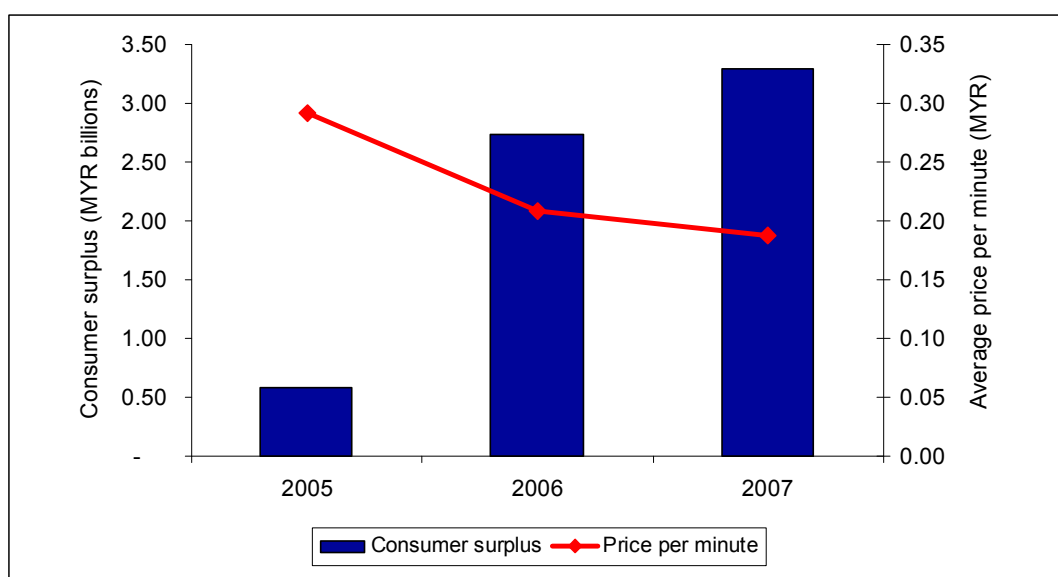
Consumer benefits

Intangible benefits are the benefits of mobile communications enjoyed by consumers less what they actually pay to buy these services. Using a “willingness to pay” analysis, which allows us to quantify how much consumers value mobile communications, combined with data on their usage and price decreases over the years, we see that consumers derive increasing net benefits from mobile communications. These benefits, identified during interviews with industry participants, include:

- Subscribers being able to contact their friends and family;
- Peace of mind for parents who give their children mobile phones;
- Being able to access health and education services more easily; and
- Access to value add services.

Figure 38 illustrates how the intangible consumer benefits have been increasing over time. This is a direct result of the falling prices in the industry.

Figure 38: Increasing intangible benefits enjoyed by consumers in Malaysia



Source: Deloitte analysis based on data provided by key industry players in interviews, analysis of company accounts and industry reports and data provided by DiGi.

Other benefits

In addition to its contribution to economic growth and social benefits via its core activities, MNOs also contribute to economic and social welfare via their CR programmes. These include:

- A joint project with the Malaysian Ministry of Health to expand radio communications between ambulances and hospitals to areas that are not currently covered nationwide: The emergency hospital services will be permitted to use the MNO's transmission towers so that the emergency services have better communications. This helps the emergency services to respond to calls more quickly and also that the right number of emergency service people attend to incidents; and
- Disaster relief: During the recent floods in Indonesia, DiGi was able to identify all its subscribers in Malaysia that were registered as being immigrants from Indonesia. DiGi then gave them free airtime vouchers so that they could contact their family and friends at home. In this way, MNOs are able made a very real contribution to the value of have a mobile phone.

6.2 Conclusions

The Malaysian mobile sector is estimated to have contributed 3.7% of GDP in 2007 and to directly and indirectly 51,000 FTEs. Government policies have encouraged mobile operators to locate research and technology centres in Malaysia, supporting the Government's agenda of promoting Malaysia as a regional technology hub.

The rapid development of the mobile communications industry in Malaysia has led to high population coverage and penetration rates that are above the regional average. As the market has matured in terms of the number of subscribers, operators are focussing on developing new product offerings to increase the value of mobile communications to consumers. To the extent that MNOs

have become more efficient and have been able to lower their capital and operating expenditure, they have passed on a significant proportion these benefits onto consumers in the form of lower prices.

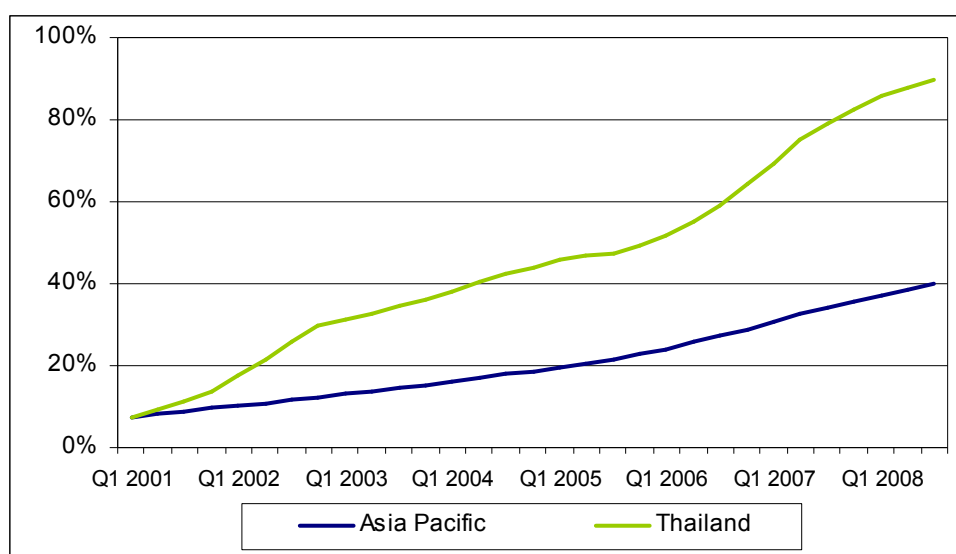
As Malaysia continues to develop its economy further and the focus of investment shifts towards service-based industries, the need for advanced communications infrastructure becomes increasingly important. Such infrastructure is also necessary to provide universal and affordable coverage to all Malaysians.

The continuation and development of the open and consultative partnership between the MNOs and the MCMC and government is central to ensuring that the mobile networks are rolled out effectively to deliver the substantial economic and social benefits of mobile communications to all Malaysians.

7 Executive Summary for Thailand

The mobile communications industry in Thailand has experienced rapid growth and development and this has brought about extensive economic and social benefits for Thai people. At present, there are over 49 million mobile subscribers in Thailand, which equates to a penetration rate of 75%. The figure below illustrates the growth in mobile penetration in Thailand and the Asia-Pacific region. By 2008, it is anticipated that the Thai penetration rate will be more than double the average penetration rate for the region. The number of mobile connections outnumbers fixed line connections by 7 to 1, as the mobile network operators (MNOs) have effectively taken on the role of universal service provider.

Figure 39: Mobile penetration rates in Thailand and Asia Pacific region



Source: Wireless Intelligence. Figures from Q4 2007 onwards are forecasts

Intense price competition in the market has seen per minute prices fall by over 70% since 2004. Falling prices increasing affordability, alongside further network rollout into rural areas, have been the key driver of penetration growth.

As the subscriber market begins to reach saturation in covered areas, MNOs are now focussing on increasing their range of product offerings to consumers. Value added services, which have been subject to strong growth during recent years, generate a high proportion of average revenue per user (ARPU) relative to other countries in the region. DTAC, AIS and True Move have expressed their intention to invest in 3G networks if and when the regulator allocates 3G spectrum. This is likely to further increase the range of services offered to consumers.

The mobile communications industry plays a pivotal role in the economic development of the nation:

- Creating employment and contributing to GDP. Our estimates presented below suggest that mobile communications are responsible around 4.9% of Thailand's GDP and in the region of 150,000 jobs;

- Creating an infrastructure that allows the economy to further develop. Our analysis indicates that a 10% increase in mobile penetration may increase long term GDP growth rates by up to 1.2%. On this basis, the 14% increase in penetration expected during 2007 may equate to an increase in the GDP growth rate of 1.68% in the longer-term;
- Acting as a core source of foreign direct investment (FDI), which is responsible for 20% of the GDP of Thailand. A thriving mobile communications sector is internationally seen as one of the key drivers of FDI decisions across all areas of the economy; and
- Increasing access to communications, both in terms of voice and broadband / internet, to citizens underserved by the Thailand's fixed line infrastructure. MNOs have played an important role in providing affordable communications services to underserved parts of the population. As such, consumers in rural areas and lower income groups are provided with employment and business opportunities that did not previously exist. In particular, the prepaid market offers communications services to consumers that have no previous credit history and subscribers are able to recharge their accounts by buying small, affordable amounts of airtime.

In order for the mobile communications industry to continue its strong growth and to continue to contribute to the economic and social success of Thailand, regulatory policy needs to be transparent and based upon international best practice whilst considering the local operating environment.

The Thai Ministry of Information and Communications Technology (MICT) and the National Telecommunications Commission (NTC) both have roles to play in the development of the Thai mobile industry and to the economic growth of the country. Regulatory reform is occurring, including the establishment of per minute interconnection charges as a replacement for concession arrangements. Interviewees noted, however, that a long term regulatory roadmap would increase certainty and facilitate investment planning.

7.1 The economic benefit of mobile communications in Thailand

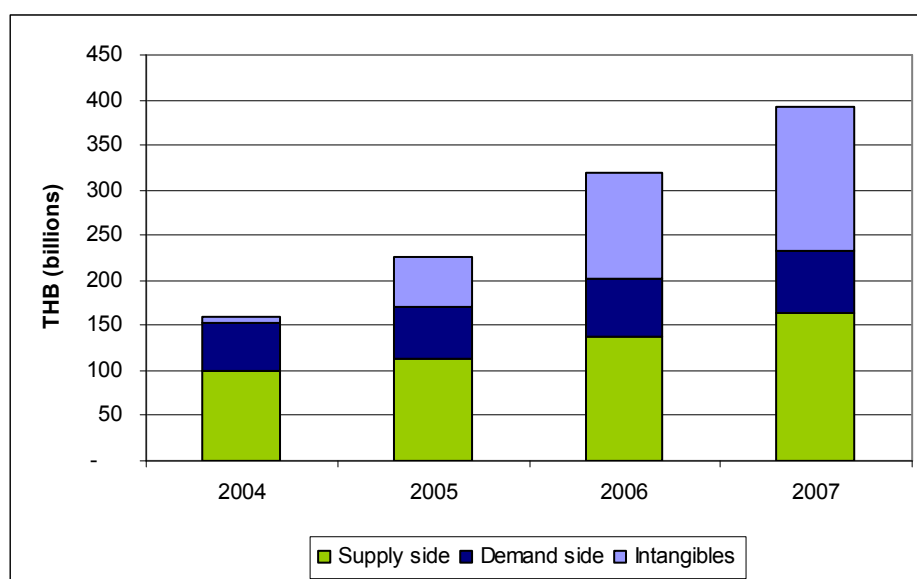
We estimate that the mobile sector in Thailand contributed THB 393 billion to the economy in 2007, representing 4.9% of total GDP. This is almost one a half times more than the contribution of THB 160 billion in 2004.

Figure 40 illustrates the economic impact of the mobile communications industry in terms of:

- Supply-side effects (value-add and employment from MNOs and other firms in the value chain);
- Demand-side effects (productivity increases resulting from people using their mobile phones for business purposes); and

- Intangible benefits (the social welfare benefits enjoyed by consumers).²⁹

Figure 40: Economic impact of the Thai mobile communications industry



Source: Deloitte analysis based on data provided by key industry players in interviews, analysis of company accounts and industry reports and data provided by DTAC.

Figure 41 sets our estimates of domestic employment created by the mobile communications industry. We estimate that the mobile industry employed almost 150,000 Thai full time employees (FTEs) in 2007, both directly and indirectly. This is compared to 124,000 FTEs just three years before. Our employment figure includes direct and indirect employment opportunities within the MNOs, suppliers to the MNOs, distributors of handsets, airtime and SIM cards and retailers of mobile products and services. An economic multiplier of 1.3 is applied to the employment figure to capture the wider employment creation of the mobile industry.

Figure 41: Employment in Thailand (FTEs)

	2004	2005	2006	2007
Direct (MNOs)	10,000	12,000	14,000	15,000
Indirect (related industries)	85,000	85,000	87,000	100,000
Multiplier effect	29,000	29,000	30,000	35,000
Total employment	124,000	126,000	131,000	150,000

Source: Deloitte analysis based on data provided by key industry players in interviews, analysis of company accounts and industry reports and data provided by DTAC.

Supply side impact of mobile communications

The supply side impact of mobile communications consists of:

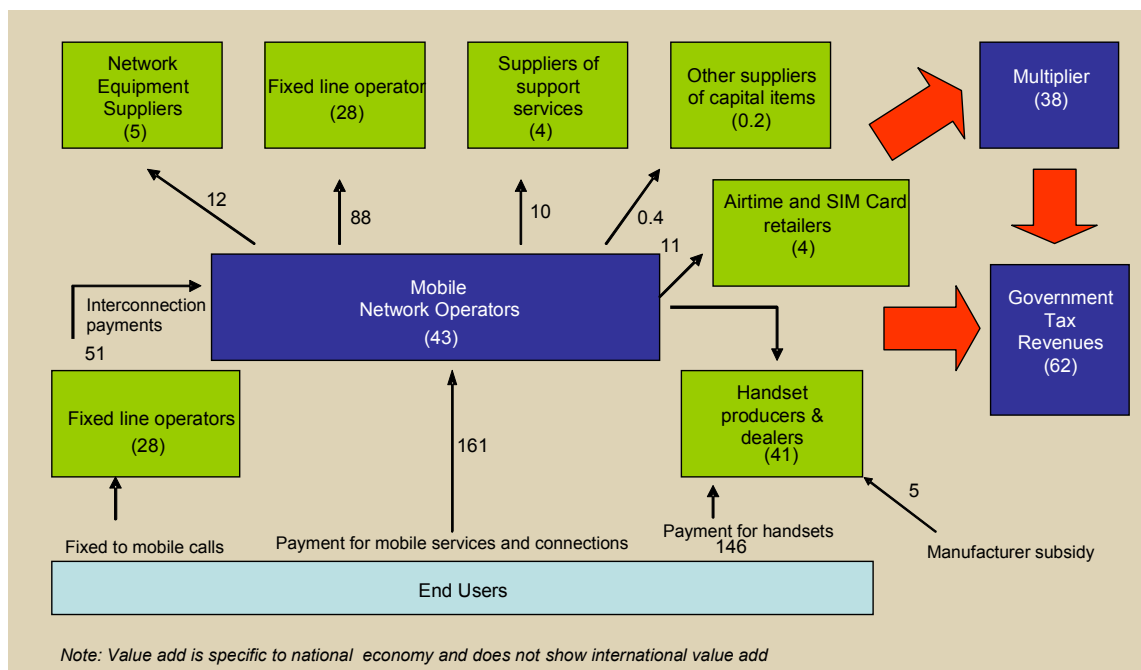
- Direct effects (the value add and employment created by MNOs themselves);

²⁹ We assumed that DTAC was representative of other MNOs in Thailand and grossed up the DTAC figures by market shares to calculate the aggregate impact of the MNOs.

- Indirect effects (the value add and employment created by other parties in the value chain); and
- Multiplier effects (the knock-on impact of the direct and indirect effects on the rest of the economy).

Figure 42 below illustrates the revenue flows between MNOs and other parts of the value chain (figures next arrows) and the value-added by each part of the value chain (figures in brackets).

Figure 42: Mobile value chain in Thailand in 2007 (THB billions)



Source: Deloitte analysis based on data provided by key industry players in interviews, analysis of company accounts and industry reports and data provided by DTAC.

We estimate that the mobile communications industry will contribute THB 125 billion of value-add to the Thai economy in 2007.

Based on literature reviews and interviews with producers in Thailand, we estimate a multiplier effect of 1.3 for Thailand. This takes account of the relatively large proportion of goods and services being produced in Thailand rather than being directly imported.

When multiplier effects are taken into account, the value the mobile industry will contribute in 2007 is estimated to be THB 163 billion. We estimate that 38% of this value-add consists of tax and regulatory fees. The remainder of the value-add includes wages paid to Thai workers, dividends remaining in the country and expenditure on CR activities.

Demand side impact

Mobile communications can be instrumental in increasing the productivity of workers across sectors in both rural and urban areas. In particular, access to mobile communications can:

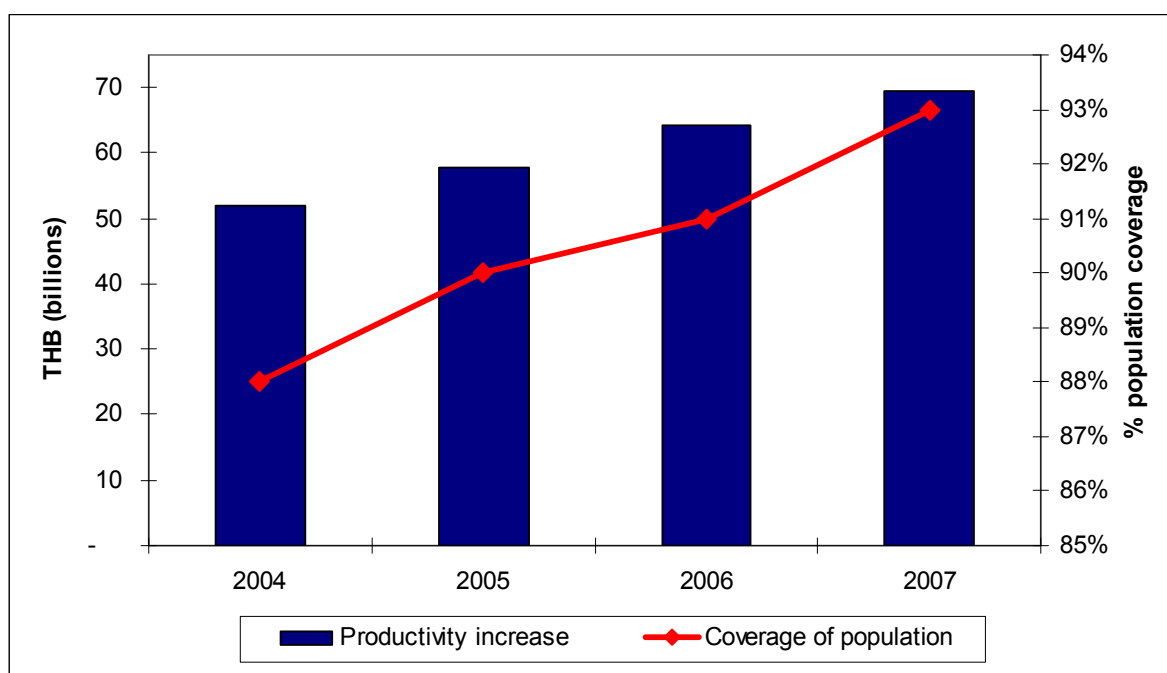
- Improve information flows within companies and between buyers and sellers;

- Increase work flexibility; and
- Promote business in previously underserved rural areas.

Based on interviews and international benchmarks, we estimate that the business use of mobile communications would lead, on average, to a 6% increase in productivity of an individual worker. This is lower than in some developing country studies since the fixed network and e-mail access in Thailand is more developed than in the other countries studied. Therefore the incremental productivity impact of mobile communications is lower.

We estimate that mobile communications will have increased GDP by THB 69 billion in 2007 (around 1% of GDP) via productivity improvements alone. As coverage of the mobile networks increases, more workers will be able to use mobile phones for business purposes and so the productivity impact increases over time.

Figure 43: Productivity impact of mobile communications



Source: Deloitte analysis based on data provided by key industry players in interviews, analysis of company accounts and industry reports and data provided by DTAC.

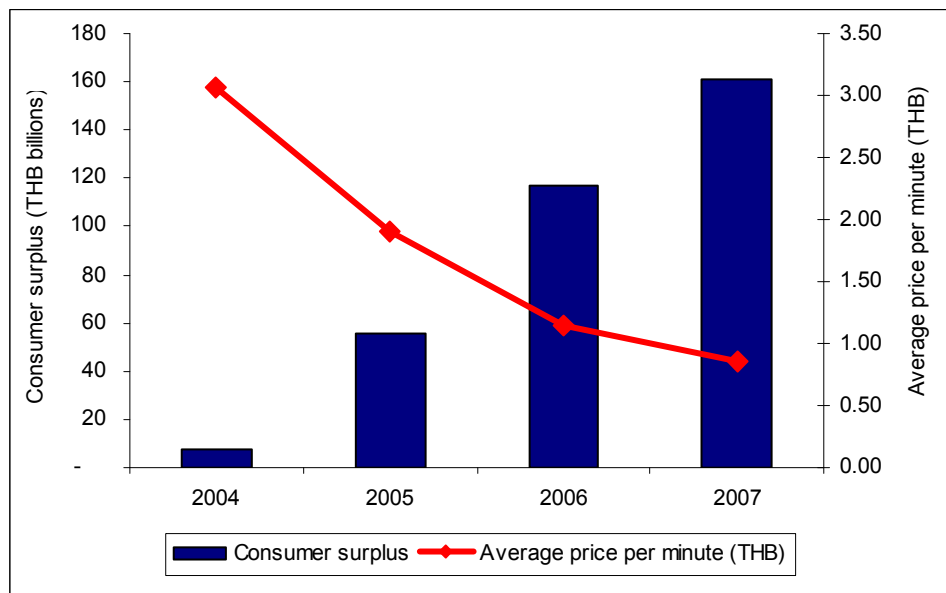
Consumer benefits

Intangible consumer benefits are the benefits of mobile communications enjoyed by subscribers less what they actually pay to buy these services. These benefits include:

- The development of interpersonal and family communications, in particular between urban and rural areas;
- The promotion of social cohesion; and
- The extension of communication to those on low income.

Using a “willingness to pay” analysis, which allows us to quantify how much consumers value mobile communications, combined with data on their usage and price decreases over the years, we estimate that consumers derive increasing net benefits from mobile communications.

Figure 44: Increasing benefits enjoyed by consumers in Thailand as prices fall



Source: Deloitte analysis based on data provided by key industry players in interviews, analysis of company accounts and industry reports and data provided by DTAC.

Other benefits

MNOs also make a significant contribution to corporate responsibility (CR) activities and are actively involved in work in rural areas and helping smaller businesses.

For example, MNOs have been actively involved in providing relief to flood victims around the country by providing survival packs, mobile handsets and SIM cards free of charge to flood victims around the country. MNOs have also helped to building news towers and warning towers.

7.2 Conclusions

The Thai mobile sector has experienced strong subscriber growth rates in recent years, demonstrated by penetration rates above the average for the region. The mobile sector is estimated to have contributed 4.9% to GDP in 2007 and directly and indirectly employed over 150,000 FTEs.

The price of mobile services has fallen in recent years and a mobile phone is an increasingly affordable method of communication for those in both rural and urban areas. By providing the infrastructure necessary for business communications, a strong communications sector contributes to the international competitiveness of Thailand as well as raising the potential for business growth in rural areas.

The mobile communications sector also contributes positively to the economic and social welfare of Thai people. Aggressive competition between MNOs is also increasing the innovative product

offerings in the market. Moreover, for many Thai people, MNOs offers them access to communications that were previously unavailable to them.

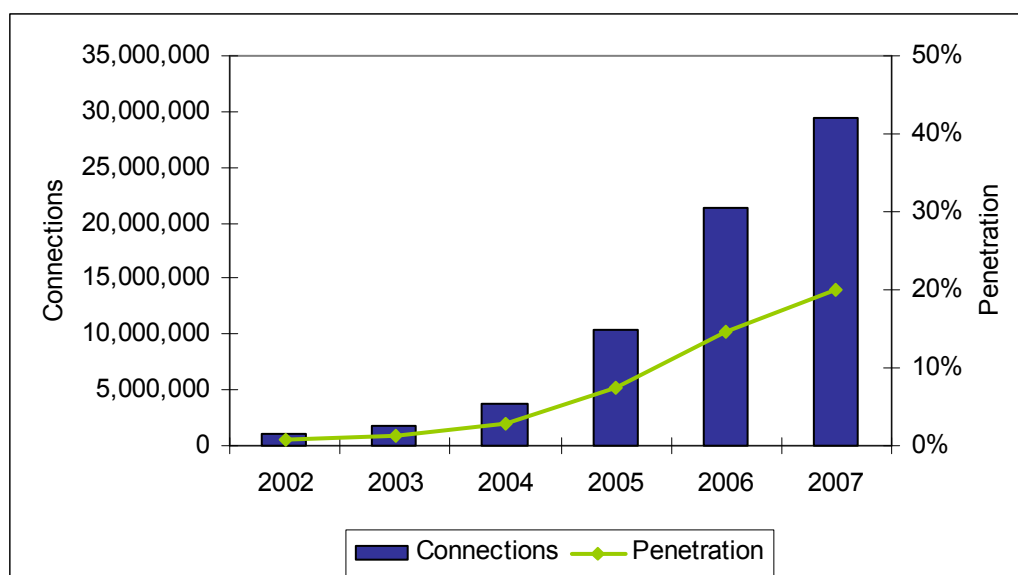
By continuing to grow both its subscriber base and range of products, the mobile sector may be able to increase its contribution of GDP. This will require additional innovation and network investment to be undertaken by the MNOs. The regulator should therefore ensure that it publishes a regulatory road map which will support ongoing long term investment in the sector and hence the economy as a whole.

8 Executive Summary for Bangladesh

Bangladesh is amongst the poorest countries in the world, with 50% of people living in poverty and a gross national income (GNI) per capita of \$470. It is rated 156 out of 163 in Transparency International's Perceived Corruption Index³⁰. However, despite the difficult business environment, the mobile communications sector is growing rapidly. There are six licensed mobile operators and the industry is cited as the fastest growing industry in Bangladesh³¹.

The number of mobile connections has increased from 3.8 m in 2004 to over 29.5m at the end of 2007. Penetration rates are reported to be just below 20%³² and network coverage extends to over 97% of the population. This growth has brought about extensive economic and social benefits for those working in the sector and the wider Bangladeshi population.

Figure 45: Connections and penetration in Bangladesh



Source: *Wireless Intelligence and Deloitte analysis*

Since 2001, the number of mobile subscribers has exceeded the number of fixed line subscribers and the ratio at end 2005 stood at approximately 11:1³³. Mobile operators are providing the types of services that may have traditionally been associated with fixed line technology. Prepaid mobile services represent more than 94% of total mobile connections in Bangladesh and have become the instrument of universal service. The popularity of mobile has been driven by a number of factors, including:

- Increasing affordability: reductions in handset import and SIM taxes, the licensing of an additional operator and the economies of scale available from the global industry have lead to falling retail prices of handsets and services;

³⁰ Transparency International 2006.

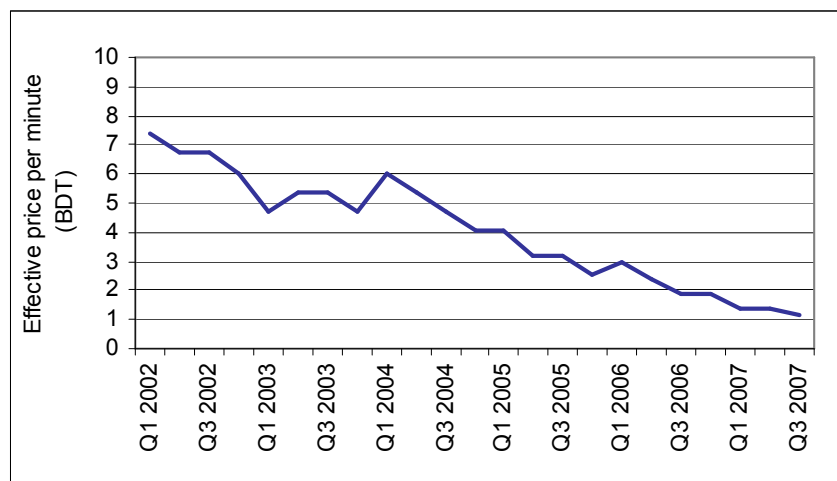
³¹ Noted by the Norwegian Institute of Management studies.

³² Source: Wireless Intelligence and operator data.

³³ Fixed line connection data taken from BTTB 2005 Annual Report.

- Greater population coverage: mobile coverage is estimated to reach 97% of the population, increased from 52% in 2004, and extends into areas beyond the fixed network; and
- Ease of sharing handsets: despite falling prices, affordability remains one of the greatest barriers to growth in the poorer countries. Handset sharing, for example in the form of Village Phone or Community Information Centres, is therefore an important contributor to providing universal telecoms access.

Figure 46: Effective price per minute³⁴



Source: *Wireless Intelligence*

In addition to voice, the mobile sector has also boosted the availability of data services across Bangladesh. Grameenphone first launched EDGE services in September 2005 and technology has been installed across its national network. Subsequently all the operators have launched similar services utilising EDGE, GPRS and CDMA technologies. Together these networks provide over 97% of the population with the opportunity to access the Internet. It is estimated that there were over five million mobile internet users in 2007, of which four million were Grameenphone subscribers. At present, individual EDGE enabled devices are more frequently purchased in urban areas by business users due to the relatively high price of the data devices. However, the mobile network operators (MNOs) have recently been granted permission by the regulator to introduce Blackberries and other brands of Smart-phones in Bangladesh. It is anticipated that the increase in the range of devices alongside declining prices will raise internet penetration levels.

EDGE is the key enabler of Community Information Centres (CICs) which are bringing Internet services to rural communities. This is particularly important in a country where internet penetration is estimated to stand at 0.3%³⁵.

³⁴ Effective price per minute is the average revenue per user divided by the minutes of use.

³⁵ From Internet World Stats 2007.

Community Information Centres (CICs)

Grameenphone has established CICs to provide access to the Internet and other communications and information based services to a broad range of the rural population. These centres provide self-employment opportunities and produce business through self-sustained economic activities.

CICs are set up with technical assistance from the GSM Association and services are provided through Grameenphone's EDGE connectivity. A CIC is equipped with the minimum of a computer, a printer, a scanner, a webcam and an EDGE enabled modem to access the Internet. These services include:

- Internet and e-mail;
- Printing, scanning and e-fax;
- Mobile voice calls and directory enquiry services;
- Content on health, agriculture and education alongside e-governance services; and
- Webchat with voice and pictures.

First launched in February 2006, there are currently 560 CICs operating in 447 Upazilas (sub-districts). Grameenphone works with partner organisations, including Grameen Telecom Corporation and the Society for Economic and Basic Advancement to select and train entrepreneurs to run these centres as well as to distribute information.

CICs are started up and run by local entrepreneurs who are selected in a competitive process. Establishment requires \$1000 of start-up capital which may be acquired from micro financing institutions. The average income is \$150 per month and with this level of revenue the investment is paid back within 1 year. Grameenphone offers discounts on the internet service and training, however it is estimated that only half of CICs are currently sustainable. This is an issue which Grameenphone is addressing by re-evaluating its entrepreneur selection criteria.

Source: Deloitte analysis based upon Grameenphone information³⁶

Mobile services have contributed to overall telephony penetration and have helped to bridge the communication gap between rural and urban areas. In addition, by providing a universal and reliable telephony services, mobile services have promoted economic development and direct investment in the country.

However, the growth rate of mobile subscribers slowed in the last four months of 2007 and was lower than predicted by the MNOs and external parties due to the cyclone affecting the southern coast in November 2007 and the impact of the Government mandated registration and re-registration programme³⁷.

The MNOs have suggested that the growth in mobile penetration may also be hampered by the levying of two mobile specific taxes on the industry³⁸:

- A SIM activation tax of BDT 800 that is paid on the sale of each new SIM card; and

³⁶Grameenphone information at <http://www.gpcic.org/index.php?main=1>

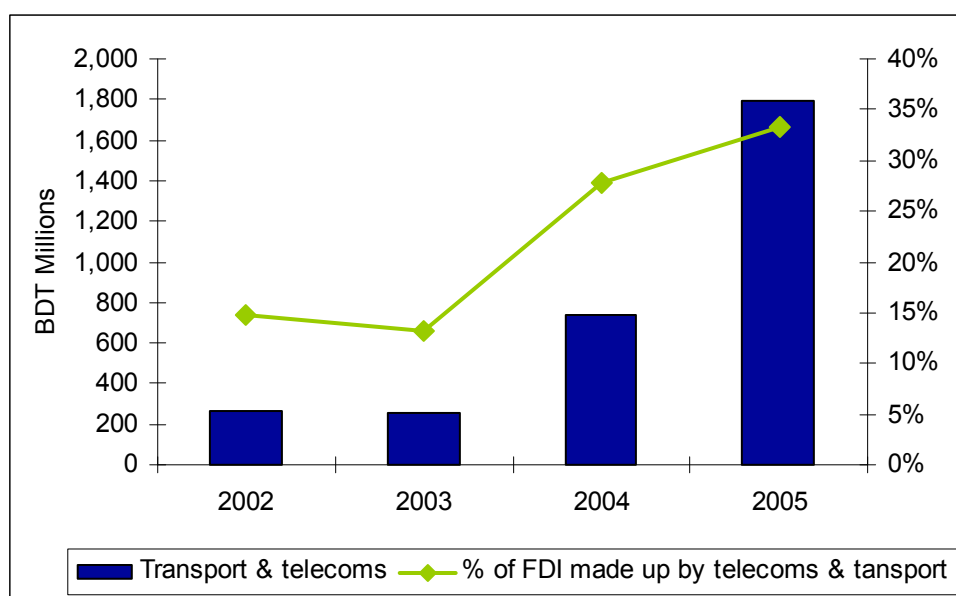
³⁷ This requires mobile operators to formally register details of all mobile phone subscribers, both new and old, which is particularly difficult for subscribers on low income or in rural areas who frequently do not possess the necessary forms of identification.

- A handset import tax of BDT 300 on each imported handset. This was reduced from BDT 4000 to BDT 1000 in 2005 and to BDT 300 in 2006.

Despite decreases in these tax rates over the period, tax revenues from the mobile industry have been growing and Grameenphone is reported to be the largest single income tax payer in Bangladesh³⁹. To the extent that these taxes are passed through to consumers they may create a barrier to further subscriber growth and lower the affordability of mobile phones to those with lower incomes.

The Bangladeshi communications market has largely benefited from foreign investors taking a long term interest in Bangladesh's market and developing significant links with the local community. In addition, foreign mobile operators have contributed to raise the quality of services allowing investors to rely on optimal coverage in a country with low fixed lines penetration. The mobile sector attracts large inflows of Foreign Direct Investment (FDI) making up a sizable proportion of aggregate flows.

Figure 47: FDI in Telecom and transport sector in Bangladesh and contribution to total FDI.



Source: Enterprise survey, Bangladesh Bank statistics department.

From 2003 telecoms has become an increasingly major constituent of FDI relative to other FDI flows. Flows rose from 2004 levels by 140% to 2005 representing, in aggregate with transport, 33% of total FDI flows.

However, Grameenphone indicated during interviews, that it is closely watching the regulatory, economic and political environment which is likely to affect its investment decisions. This has been highlighted in other reports into the Bangladeshi telecoms sector⁴⁰. It is possible that this is a factor

³⁸ Taxation and Mobile Telecommunications in Bangladesh 2006, Frontier / GSMA

³⁹ Reported in The Financial Express, 7th, August

⁴⁰ These include Pride and Prejudice, Grameenphone and Telenor affecting Bangladeshi Socio-Cultural Development, A Welle-Strand and L.Molden, published in Studies in Development Management, No 1, 2007

behind the 30% decline in registration of investment proposals with the Board of Investments⁴¹. Particularly areas of concern noted by the MNOs include⁴²:

- A lack of public, transparent consultations prior to determinations from the BTRC. This leads both to a lack of predictability and transparency.
- The liberalisation of the international gateway and adjustments to the interconnection regime: BTRB is opening up the international gateway for competition with up to 4 licences to be issued. All national inter-operator traffic has to be routed through “interconnection operators” and bilateral interconnection arrangements have to be closed down⁴³. Only Bangladeshi residents who have not been allocated other licences, i.e. only “new” operators, may be granted a licence for international gateways or national interconnect exchanges; this has created concern over a lack of efficiency considerations in the regulatory regime, which in turn may lead to rising prices, falling quality of service and temporary loss of connectivity between networks. This is a prominent issue since a considerable number of Bangladeshis frequently opt to work and live overseas and well functioning, affordable, telephony services are essential for maintaining family contact;
- Spectrum allocation: Grameenphone has indicated that it requires more spectrum for expansion. The absence of spectrum is limiting the number of additional sites that can be installed to increase capacity in major cities and increasing the cost of network roll-out; and
- Pricing regulation: There are currently six mobile operators licensed to provide services. This level of competition makes requirements for pricing regulation at the retail level unnecessary. BTRC has recently introduced a Directive relaxing the requirement of every tariff, if it falls between the approved upper and lower limits⁴⁴. However, the MNOs are subject to price regulations at both the wholesale and retail level.

8.1 The economic benefit of mobile communications in Bangladesh

The mobile sector in Bangladesh contributed a total of BDT 260 billion to the economy in 2007, representing 6.2% of total GDP. This is an increase of over 250% since 2004 and represents 2.1% of total GDP.

Figure 48 illustrates the three different components of the mobile industry’s economic impact:

- Supply side effects (value-add and employment from direct and indirect firms in the value chain);

⁴¹ Figure refers to first 9 months of 2007 relative to 2006. Information provided by Grameenphone and source from Financial Express, October 18th.

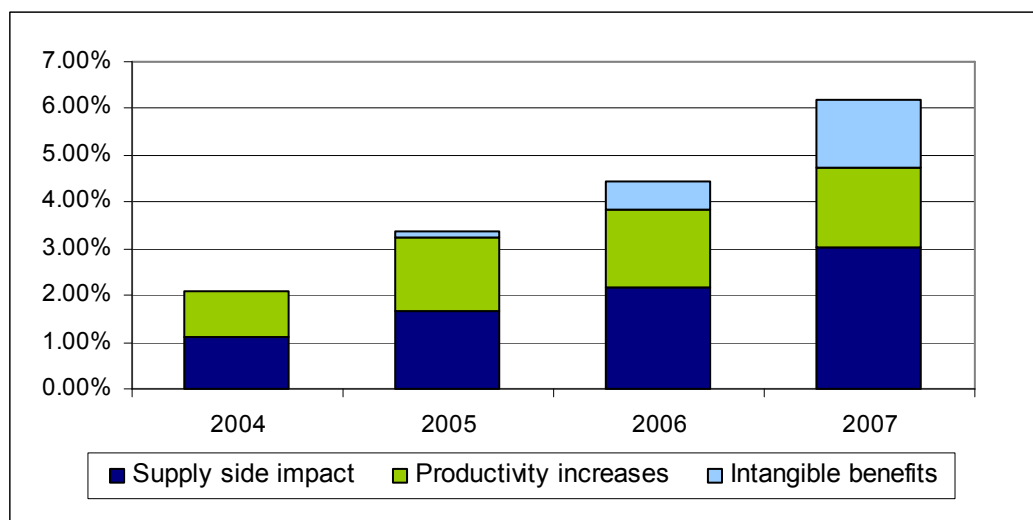
⁴² Noted during interviews with Grameenphone and interest in press statements.

⁴³ We have not reviewed the ILDTS policy (http://www.btrc.gov.bd/newsandevents/ILDTS_Policy_2007.pdf) and our discussion is based on information provided by Grameenphone. We note that the introduction of an operator purely to provide interconnection switches may introduce an additional inefficiency into the market since it requires additional investment by the interconnection operator and the MNOs and potential stranding of assets.

⁴⁴ http://www.btrc.gov.bd/newsandevents/Interim_Tariff_Order_to_All_Mobile_Operators_July_2007.pdf

- Demand side effects (productivity increases resulting from people using their phones for business purposes); and
- Intangible benefits (the benefits enjoyed by consumers).

Figure 48: Economic impact of mobile communications industry as a percentage of GDP



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

Supply side impact of mobile communications

The supply side impact of mobile communications is comprised of three parts:

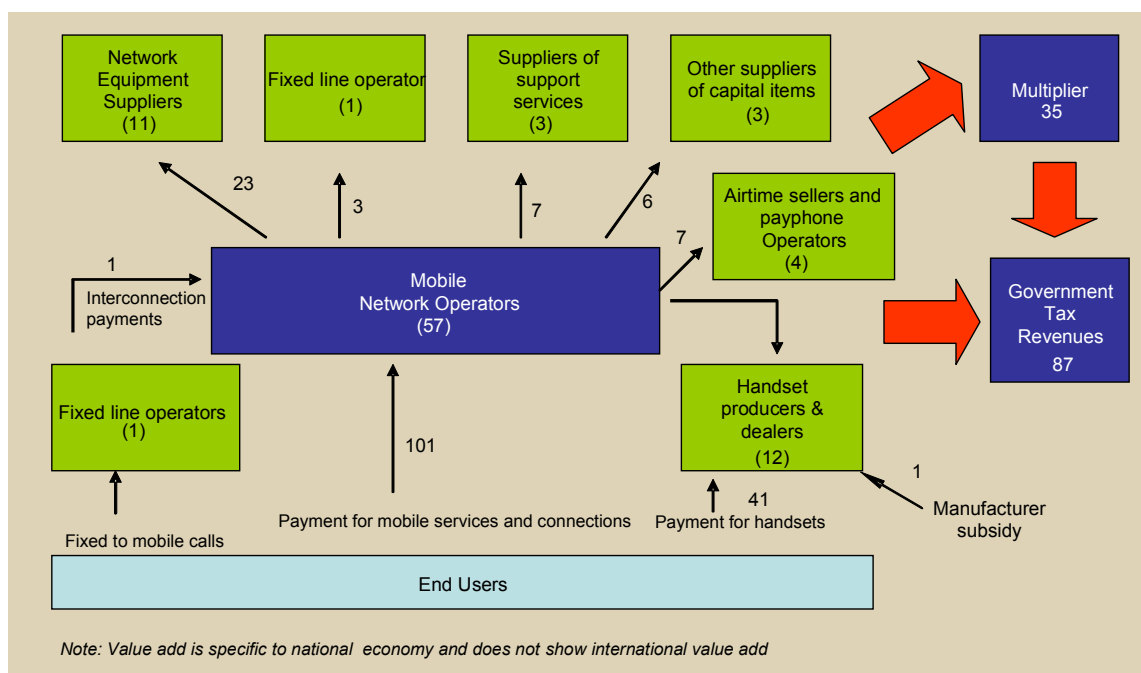
- Direct effects (the value add and employment created by the MNOs themselves);
- Indirect effects (the value add and employment created by other parties in the value chain); and
- Multiplier effects (the knock-on impact on the rest of the economy of the direct and indirect effects).

Our estimates are based on data from Grameenphone and interviews with other parties in the supply chain including Nokia Siemens Networks, Ericsson, local equipment vendors, handset and airtime distributors and retailers and handset manufacturers.

We consider only the domestic impact of mobile communications and subtract international revenue flows from our analysis. We chose to use a value for the economic multiplier of 1.4. This was assumed following a literature review and interviews with producers in Bangladesh and is reflective of the relatively high proportion of goods and services produced within Bangladesh rather than being imported.

Figure 49 below illustrates the revenue flows between MNOs and other parts of the value chain (arrows) and the value-add (values in brackets).

Figure 49: Mobile value chain in Bangladesh in 2007 (BDT billions)



Source: Deloitte analysis based on information provided by operators, interviews and analysis of company accounts and industry reports. (Note: Values in brackets represent value-add whilst arrows represent flow of funds)

We estimated that the mobile communications industry contributed over BDT 91 billion of value add to the domestic economy in 2007, up from BDT 28 billion in 2004. When the impact of the economy wide multiplier is included, the value contribution in 2007 was BDT 128 billion up from BDT 39 billion in 2004. Of this value-add, the largest contributors are taxes and regulatory fees (68%). The rest is made up of wages, dividends and expenditures on corporate responsibility (CR). In terms of CR, the company focuses on long term investments in four core areas related to the Millennium Development Goals of Bangladesh namely, poverty alleviation, healthcare, empowerment and education. Examples of CR programmes include ensuring free healthcare to around 8,00,000 mothers and infants annually, assistance during the recent cyclone in Southern Bangladesh and using SMS to aware subscribers to take their children for immunization.

We have not included the value add contribution of Villages Phones and CICs in our analysis. However, we note that there are currently estimated to be 560 CICs, with an average wage per CIC operator of BDT 10,000 per month⁴⁵.

Figure 50 sets out the MNOs direct and indirect contribution to employment in terms of full time employees (FTEs) in 2007. We estimated that in aggregate, including direct and indirect employment, more than 111,790 jobs have been created by the industry to date⁴⁶.

⁴⁵ Source: Grameenphone.

⁴⁶ This excludes employment from Village Phone as employment is not full-time.

Figure 50: Contribution to employment from the mobile value chain

Employment Impact	Number of employees (FTE)	Number of employees including multiplier
Mobile network operators	9,380	9,380 ⁴⁷
Fixed operator	1,120	1,570
Network equipment suppliers	13,180	18,450
Other suppliers of capital items	4,450	6,230
Handset distributors and retailers ⁴⁸	10,360	14,500
Support services	3,100	3,700
Airtime and SIM distributors and retailers	39,930	55,900
CICs	950	1,320
Total FTE	82,460	111,700

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). We apply a conservative multiplier of 1 to MNO employment as we assume that much of the employment effect was captured in the first round revenue flows.

It can be seen that employment in related industries (indirect employment) constitutes a large proportion of the employment created by the mobile industry. This is due to the large number of parties who act as either suppliers to the MNOs or retailers or distributors of mobile services. The largest contributors are airtime and SIM distributors and retailers making up 50% of total FTE. Based on interviews with MNOs and other parties we have estimated that:

- There are over 81,000 points of sale for reload, these include dedicated telecoms outlets and mixed retail shops (CICs also provide reload facilities);
- 9,000 points of sale sell SIM, handsets and reload whilst the remainder are reload only;
- Over 300 handset repair outlets have opened throughout the country, employing 2000 staff; and
- Handset, airtime and SIM distributors account for 96% of FTEs in this category.

The proportion of employment from network equipment suppliers is higher in Bangladesh than in other countries due to the high level of equipment that is manufactured within the country.

As the mobile sector continues to expand and develop new services, its contribution to GDP is likely to further increase. Our analysis suggests that the dynamic effects of a 10% increase in mobile penetration would increase the long term GDP growth rate of a developing country by 1.2% (in comparison to 0.6% in developed countries)⁴⁹. This means that the rapid increase in penetration experienced within Bangladesh may have contributed to long term economic welfare and raised growth rates by 0.6% % during the last two years.

Demand side impact of mobile communications

⁴⁷ We apply a conservative multiplier of 1 to MNO employment as we assume that much of the employment effect was captured in the first round revenue flows.

⁴⁸ This includes in addition employment from mobile repairers but not employment in the retail of second-hand handsets.

⁴⁹ Tax and the digital divide 2006, Deloitte / GSMA

Mobile communications can be instrumental in increasing the productivity of workers across sectors in both rural and urban areas. In particular, access to mobile communications can

- Improve information flows within companies and between buyers and sellers;
- Increase work flexibility; and
- Promote business in previously underserved rural areas.

Cellbazaar⁵⁰

Cellbazaar allows users to buy or sell goods and services using their mobile phones either by SMS, WAP or web. It acts as a platform for buyers and seller to locate each other and technology allows users to post information such that it can be edited, searched and explored over cumulative databases by any type of handset.

Cellbazaar provides regular, reliable, market information on the price, availability and supplier options of essential goods. Information is provided on a pay-as-you-use service. As such, it may be used by private individuals or small and medium sized enterprises.

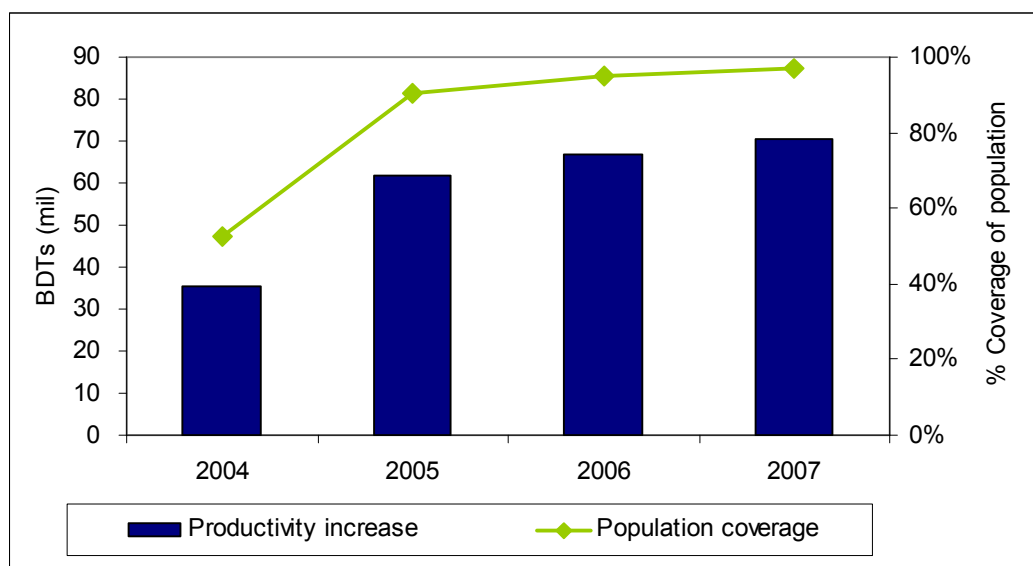
Over one million users have accessed this service since its launch in July 2006. There are on average 210 new postings and 34,000 hits on the site per day. It has been particularly credited with socio-economic development in rural areas by network people from various parts of the country and improving the volume of trading of basic goods (e.g. rice, sugar, used goods) in previously unconnected rural populations.

We estimate the impact on the productivity improvements on the overall economy by assuming that the productivity improvement will be experienced by workers whom use mobile phones for business purposes

We estimate the proportion of workers that use their mobile phones for business purposes (MBUs). This includes workers who undertake a moderate to high degree of travel in the course of their employment, e.g. example, taxi drivers, logistics workers, agricultural workers selling produce in markets and sales people. We assume a productivity gain of 10% annually has been experienced by MBU over the period 2004-2007, chosen as there is relatively low fixed line and internet penetration. We estimate that productivity gains of MBUs have increased GDP output by BDT 71 billion in 2007.

⁵⁰ Cellbazaar in not GP owned.

Figure 51: Productivity impact of mobile communications



Source: Deloitte analysis based upon interviews with industry players, benchmarks and calculations

Consumer benefits

As well as supply side and demand benefits mobile communications provide a number of benefits to consumers that are difficult to assess in terms of contribution to GDP. During interviews with those in different parts of the value chain, several sources of such intangible benefits of mobile communications in Bangladesh were identified:

- Promotion of social cohesion: through enabling contact with non resident Bangladeshi family members or friends move away. This is particularly important in a country which has a high incidence of economic migration but a culture of close family ties;
- Promotion of economic welfare: through mobile phones being used to receive remittances sent from non resident Bangladeshis.
- Economic empowerment in low income, rural areas: as of Q3 2007 there were over 200,000 Village Phone operators and through the sharing of handsets, social cohesion is increased⁵¹. However, the Village Phone programme also empowers women in rural areas, allowing them to move into other forms of employment and to use their income to improve access to health and education. CIC centres also provide direct employment activities as well as providing communications infrastructure to rural areas, increasing the potential for entrepreneurialism and raising rural living standards;
- Extension of communications to users with low education. Health programmes are provided over mobile communications. However, those with low education are particularly using voice calls to keep in touch with family and seek employment opportunities. The launch of handsets and network packages that allow text messaging in Bengali, as opposed to English, are also extending the reach of text based services;

⁵¹ Source: Grameenphone

- Extension of communications to those on low incomes: decreasing mobile handset prices and the introduction of reload cards of low denominations are raising the affordability of mobile technologies. However, subscriber penetration in Bangladesh is c.19% of individuals and citizens with lower income levels are often unable to afford a handset or even the lowest value prepaid cards. Through the use of formal and informal payphones the poorest in society are able to enjoy the benefits of mobile communications;
- Stimulation of local content: this can be particularly useful for allowing users to learn about local services such as healthcare or education. Mobile phones are also used for sharing news informally and formally via data services;
- Dissemination of educational and health information: a medical helpline has been established increasing access to healthcare for those in rural areas, this has been supplemented by additional information on the internet and accessible at CICs; and
- Assistance in disaster relief: mobile services allow families and friends to stay in touch in the event of a natural disaster, further helping to effectively manage relief operations.

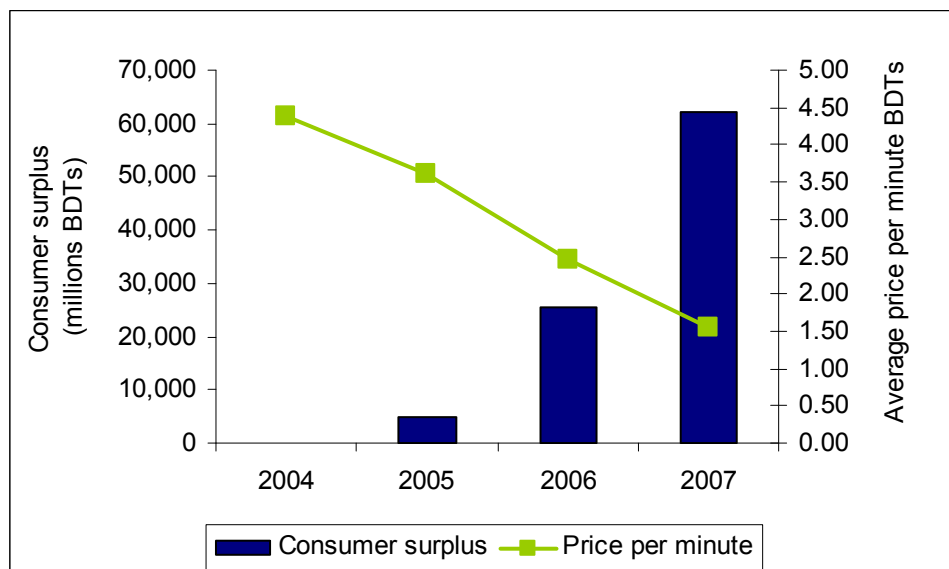
Diversification in the range of services provided by the MNOs may also be expected to increase the intangible benefits of mobile telephony. Based on interviews with Grameenphone they are conducting a number of initiatives that include:

- Billpay: this is a pilot project which gives people easier access to paying their utility bills by using Grameenphone's network of retailers to reduce transaction costs for consumers, in terms of time and monetary values; and
- Extending customer service points of presence: Grameenphone is building out a network of service centres and call centres that provide national reach. A report by the Norwegian school of management estimated that travel time for after sales service has fallen from eight hours to one hour as a result of this initiative and this may fall further as more centres are established⁵².

We use the "willingness to pay" concept to quantify the value of intangible benefits. This calculates the increase in consumer surplus that has resulted from a change in the price of a good. The price of mobile telephony has been falling steadily in Bangladesh. At the same time, consumers have benefited from an increasing range of services and an increase in quality of service. Using this information, we estimated that consumer surplus has increased by BDT 62,212 million between 2004 and 2007.

⁵² Op cit

Figure 52: Increasing Consumer Surplus



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

8.2 Conclusion

Bangladesh's mobile sector is estimated to have contributed BDT 260,000 million to the economy in 2007, representing 6.2% of GDP. This was an increase of 4.1% on 2004. Additionally, the sector is estimated to have directly and indirectly employed over 110,000 FTEs in 2007.

Mobile telephony has become more affordable as reductions in handset import and SIM taxes, alongside the licensing of an additional operator have lead to falling retail prices of handsets and services. MNOs have been investing for capacity and coverage purposes and network coverage is estimated to have reached 97% of the population. The combination of affordability and coverage has resulted in a 680% growth in the number of mobile subscribers during the last 4 years. However, with mobile coverage at 19% there is clearly scope for further expansion of the sector.

This growth in mobile telecommunications has occurred in both urban and rural areas and has become the instrument of universal service. Mobiles are used for social, education and business purposes. Whilst voice calls remain the most popular service, text messaging, music services and data applications are gaining in popularity.

The GPRS / EDGE networks are providing data and internet services on a national basis, to individual subscribers via Smart-phones and on a mass level through the build of CICs. By providing the infrastructure necessary for business communications, a strong communications sector contributes to the international competitiveness of Bangladesh as well as raising the potential for business growth in rural areas.

For penetration levels to continue to rise and for Bangladesh to further close the digital divide, then mobile services need to become more affordable. Schemes such as the sale of top-up vouchers in small denominations and the launch of low-cost handsets by handset manufacturers assist in this. However other initiatives including further reductions in handset import and SIM activation taxes alongside operator driven pricing initiatives could also stimulate further growth in the market.

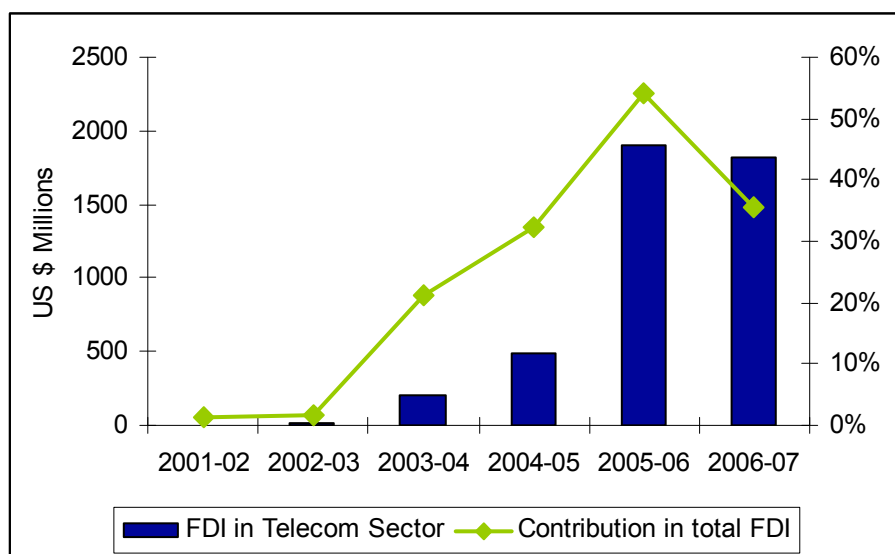
9 Executive Summary for Pakistan

The mobile communications sector has brought significant fiscal, social and economic benefits to Pakistan. Six mobile licenses have been awarded and operators have undertaken large levels of investment. The market has experienced exponential growth in penetration over recent years and population coverage has also increased considerably to over 70%. As of October 2007, there were in excess of 65 million mobile subscribers, equating to a penetration rate of 40%.⁵³ The number of mobile subscribers now outnumbers fixed lines subscribers by 13 to 1⁵⁴.

Mobile networks are also reaching into rural areas of Pakistan, extending business opportunities 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, due to the high level of competition in the domestic market, from six licensed operators, and the economies of scale available from the global industry.

The mobile sector attracts large inflows of Foreign Direct Investment (FDI) making up a sizable proportion of aggregate flows:

Figure 53: FDI in Telecom sector in Pakistan and contribution to total FDI.



Source: Pakistan Telecommunication Authority (PTA)

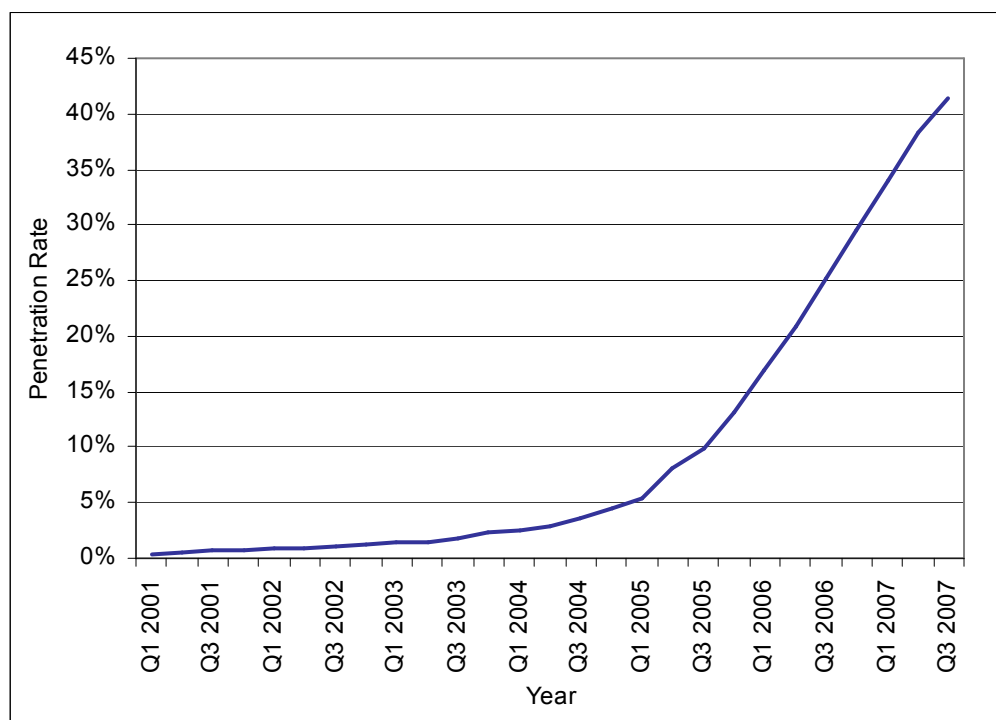
After a vast rise in flows from 2004 levels, FDI to the mobile sector over the last two years has been stable, at over RPK90 billion/yr. Considerable investment has further been committed to in the next few years on top of investment to date⁵⁵. The Pakistan Telecommunication Authority (PTA) for example, estimates investment in GSM technology to reach RPK\$180 billion by 2009. The focus of this fresh wave of investment will be directed to expanding services into under-served areas and launching new services.

⁵³ Source: Wireless Intelligence.

⁵⁴ Based on September 2007 PTA subscriber data

The government has played an active role in the expansion of this industry through deregulation and enhancement of competitive forces. Specifically, deregulation has included reductions in mobile termination rates as well as a switch to 'Calling Party Pays'. Competition on the other hand has been raised through the issue of new licenses effective from 2005⁵⁶. These moves have expanded penetration considerably, reducing the cost associated with mobile phone ownership. In recognition of these positive moves the GSMA awarded Pakistan the 'Government Leadership Award' in 2006.

Figure 54: Historical and forecast mobile penetration in Pakistan



Source: *Wireless Intelligence*

However, additional benefits to the mobile industry and the wider economy could be derived from a further reduction of the fiscal burden imposed on mobile services. The mobile industry is subject to sector specific taxes on SIM cards and usage. A separate Deloitte / GSMA study on mobile taxation, noted that Pakistan was one of only 16 countries in our sample of 104 to impose sector specific taxes⁵⁷. Our subsequent analysis of these taxes indicated that the removal of the SIM activation tax would lower the subscriber acquisition costs (SACs) and make further roll-out into rural areas financially viable for the MNOs.

⁵⁵ Telenor, for example, has already invested around PKR 60 billion since inauguration and has built a high quality network that expands beyond the urban centres into rural areas and now connects over 12 million subscribers

⁵⁶ Other enhancements to competition include the introduction of 'Mobile Number Portability' which reduces the switching costs associated with changing operators.

⁵⁷ Deloitte / GSMA "Global mobile tax review 2006-2007".

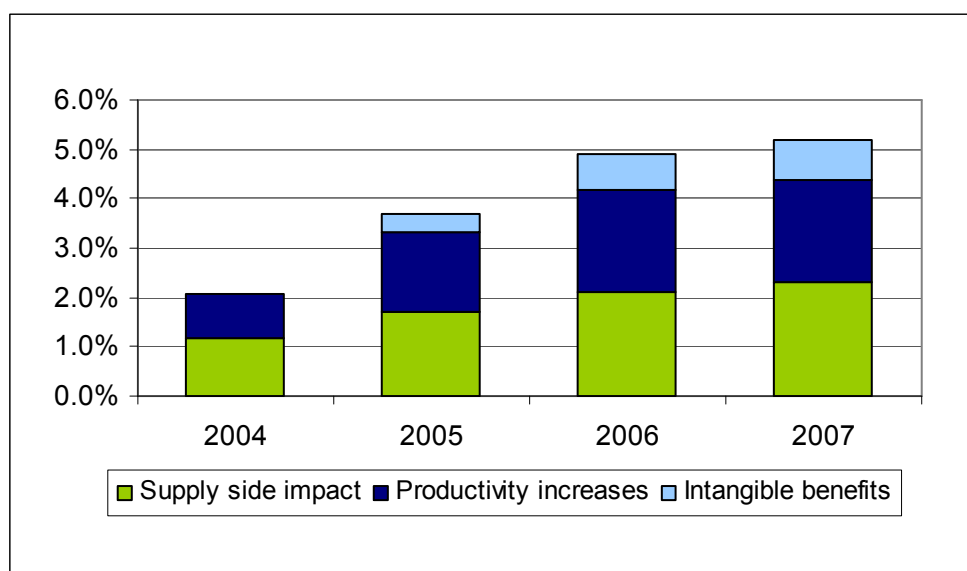
9.1 The economic benefit of mobile communications in Pakistan

The mobile sector in Pakistan contributed a total of PKR 35 billion to the economy in 2007, representing 5.2% of total GDP. This represents an increase of over 200% of the total contribution of PKR 112.5 billion in 2004.

In the following figure the estimated impact of the mobile phone industry over time is analysed aggregating the following effects:

- Supply-side effects: value-add and employment from direct and indirect firms in the value chain;
- Demand side effects: productivity increases resulting from people using their phones for business purposes; and
- Intangible benefits the social benefits enjoyed by consumers.

Figure 55: Economic impact of mobile communications industry as a percentage of GDP



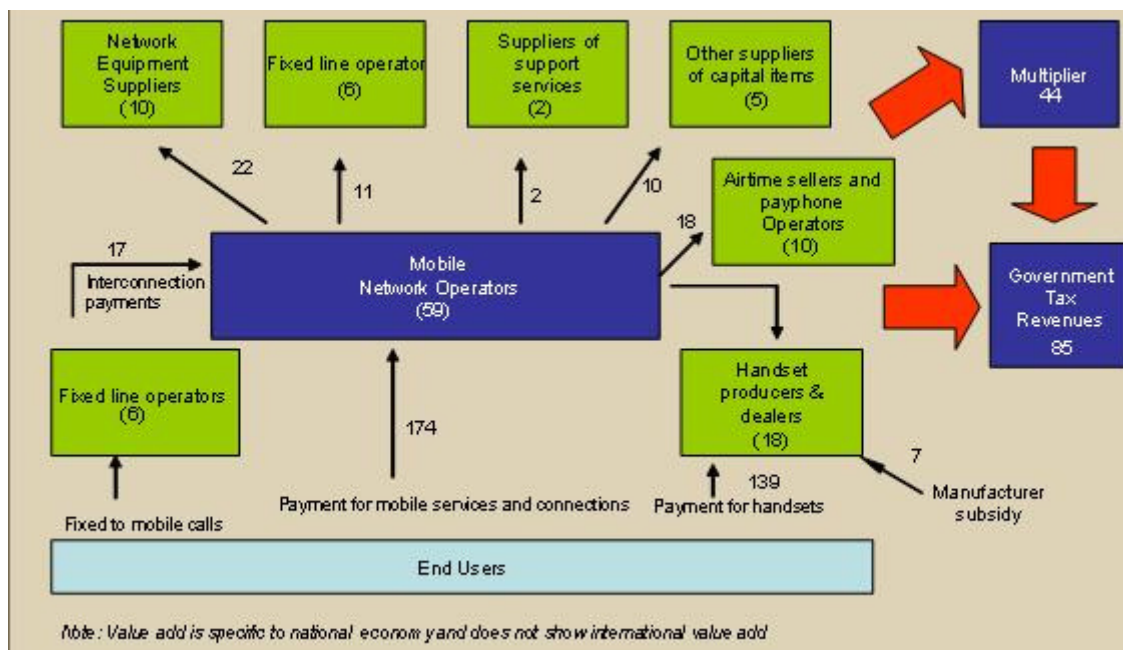
Source: Deloitte analysis based on information provided by operators, interviews and analysis of company accounts and industry reports

The economic contribution of this sector has increased consistently year on year in Pakistan. The contribution is expected to increase further in 2008, as the mobile sector continues to attract new subscribers and encourage usage on new, innovative services.

Supply side impact of mobile communications

The supply side impact of mobile communications is derived from direct, indirect and multiplier impacts. Data to estimate these was taken directly from Telenor and Mobilink. For the other operators publicly available data has been used and where this is insufficient has been uplifted from Telenor and Mobilink data. However, for 2007 data has been limited for Telenor and Mobilink requiring use of public information and/or various assumptions outlined in the appendix. The revenue flows and value add for 2007 are presented in the following figure.

Figure 56: Mobile value chain in Pakistan in 2007 (PKR billions)



Source: Deloitte analysis based on information provided by operators, interviews and analysis of company accounts and industry reports. (Note: Values in brackets represent value-add whilst arrows represent flow of funds)

We estimated that the mobile communications industry contributed over PKR111 billion of value add to the domestic economy in 2007, up from PKR45 billion in 2004. When the impact of the economy wide multiplier is included, the value contribution in 2007 was PKR155 billion up from PKR64 billion in 2004. The largest contributors to value add in 2007 are taxes and regulatory fees. Also of note are corporate and social responsibility projects (CSR). In 2007 CSR value add includes Telenor run ApnaPCO, Rubta and Futures programs which provide public payphone services, vocational training and community information.

The number of mobile subscribers and industry revenues are anticipated to continue rising as the MNOs continue to roll-out their networks and launch innovative new services, including data services on EDGE and 3G networks. This appears likely to further increases in value-add in future years. Assessed Government and regulatory policies are also essential if the full potential of the mobile communications sector is to be realised.

Demand side impact of mobile communications

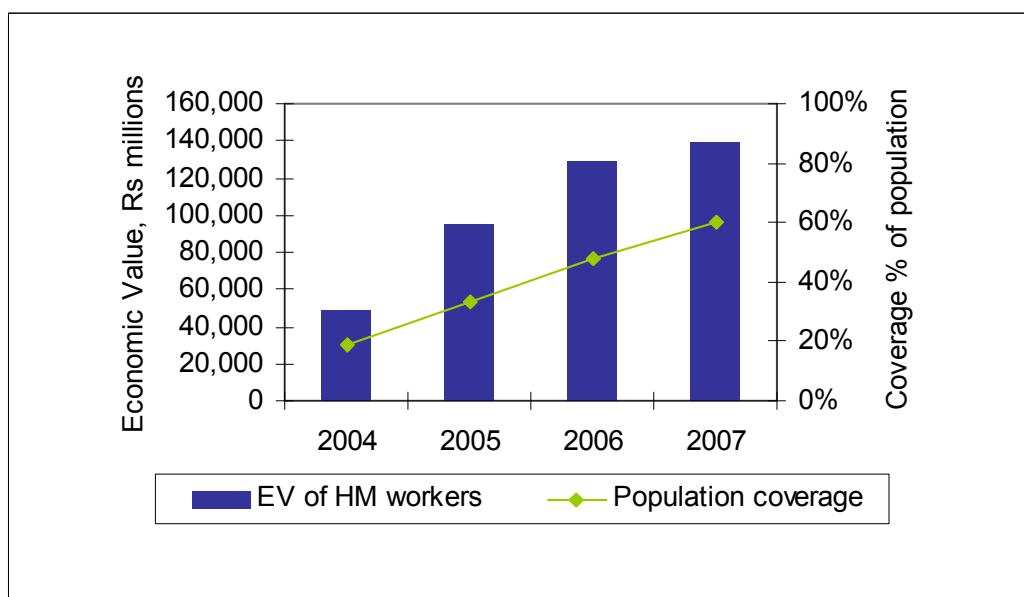
Mobile communications is often linked with an increase in productivity. The following productivity impacts of mobile communications were identified during interviews:

- Encouraging entrepreneurialism and growth in small business enterprises;
- Improved information flows;
- Reduction in travel time and costs;
- More efficient scheduling of resources; and
- Increased working flexibility.

As productivity benefits apply mostly to workers using mobiles for business use, we estimated the proportion of workers that use mobile phones for business purposes and focus the productivity gains on these. Based on interview data and international benchmarks, productivity gains are estimated to be 10% per annum throughout the period 2004-2006, and 9% after 2006. The fall in productivity captures the impact of diminishing incremental value and an increase in substitutes over time.

Using these estimates, productivity in 2007 is estimated to have increased GDP output by PKR139 billion. The figure following illustrates that productivity has increased year on year since 2004 and that the increase has moved with increasing coverage.

Figure 57: Productivity impact of mobile communications



Source: Deloitte analysis based upon interviews with industry players, benchmarks and calculations

Whilst we estimated that 95% of business workers in urban areas have access to a mobile phone, we estimated that this figure falls to 43% in rural areas. This demonstrates the potential for further increases in economic productivity that could arise from the expansion of affordable mobile telephony into more rural areas.

Intangible benefits

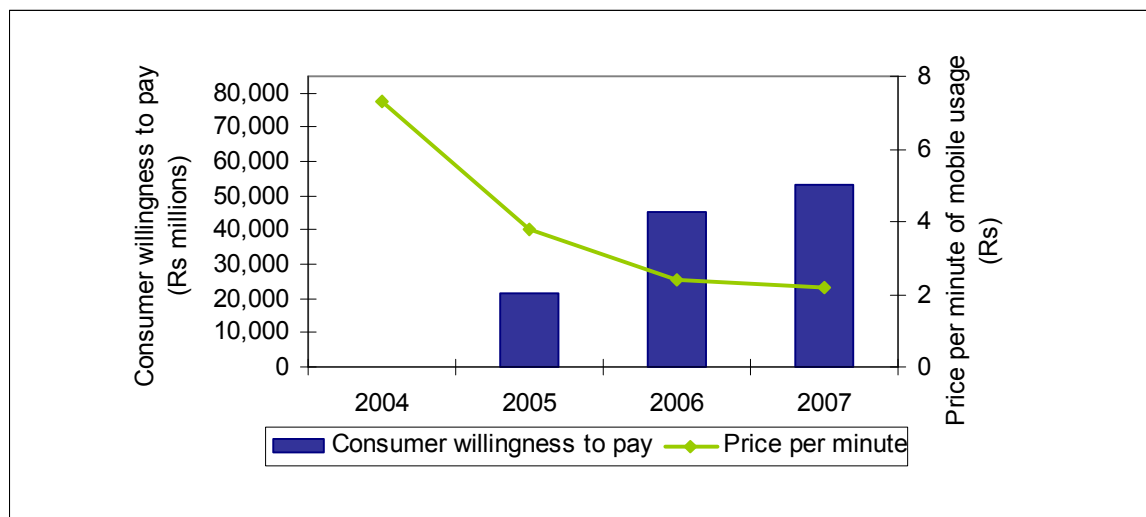
As well as supply side and demand benefits mobile communications provide a number of benefits to consumers that are difficult to assess in terms of contribution to GDP. During interviews, we identified several intangible benefits of mobile communications in Pakistan:

- Improved access to health services;
- Increase in educational facilities;
- Social and family interaction; and
- Disaster relief assistance.

We use the “willingness to pay” concept to quantify the value of intangible benefits. This calculates the increase in consumer surplus that has resulted from a change in the price of a good. The price

of mobile telephony has been falling steadily in Pakistan. At the same time, consumers have benefited from an increasing range of services and an increase in quality of service. Using this information and assuming the market commences in 2002, we estimated that consumer surplus has increased by PKR 53,000 million between 2004 and 2007.

Figure 58: Increasing Consumer Surplus:



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

Employment creation

The mobile sector impacts substantially on employment levels in Pakistan through the following channels:

- 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.

Figure 59: Contribution to employment from the mobile value chain

Employment Impact	Number of employees	Number of employees including multiplier
Mobile network operators	11,000	11,000 ⁵⁸
Fixed operator	11,000	15,000
Network equipment suppliers	4,000	6,000
Other suppliers of capital items	4,000	6,000
Handset designers and producers	2,000	2,000
Support services	2,000	2,000
Airtime and SIM commission	144,000	202,000
Total	173,000	244,000

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). We apply a conservative multiplier of 1 to MNO employment as we assume that much of the employment effect was captured in the first round revenue flows.

We estimated that more than 244,000 jobs have been created by the industry to date with the vast majority arisen from retailers selling handsets, airtime and SIMs.

9.2 Conclusion

Pakistan's mobile sector has experienced exponential growth since 2005. This was fuelled by the licensing of two additional mobile operators and the resulting decrease in prices. The sector is estimated to have contributed 5.2% to GDP and employed over 244,000 FTEs in 2007.

The fall in price of mobile services has led to mobile phones becoming an increasingly affordable method of communication for those in both rural and urban areas. This was recognised by the PTA's award of USO subsidies to MNOs in the recent funding round. By providing the infrastructure necessary for business communications, a strong communications sector contributes to the international competitiveness of Pakistan as well as raising the potential for business growth in rural areas.

By continuing to grow both its subscriber base and range of products, the mobile sector may be able to increase its contribution of GDP. This will occur in urban areas as operators roll-out 3G networks and launch new services. However, the SIM activation tax may be hindering further roll-out into rural areas by raising SACs. The Government may therefore support the development of the sector through fiscal policies consistent with the remainder of the economy.

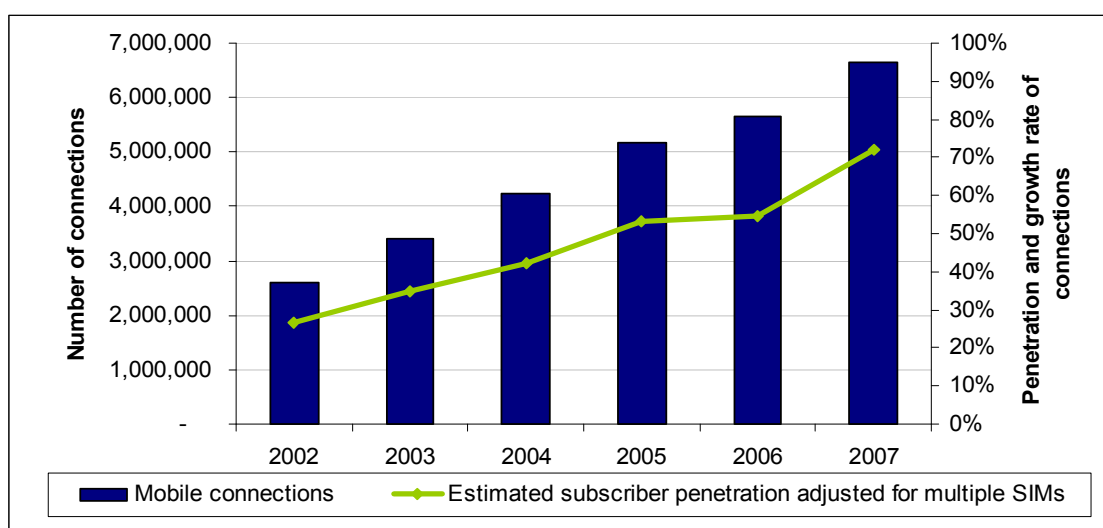
⁵⁸ We apply a conservative multiplier of 1 to MNO employment as we assume that much of the employment effect was captured in the first round revenue flows.

10 The Economic Impact of Mobile Telephony in Serbia

10.1 Overview of Serbia's Mobile Communication Industry

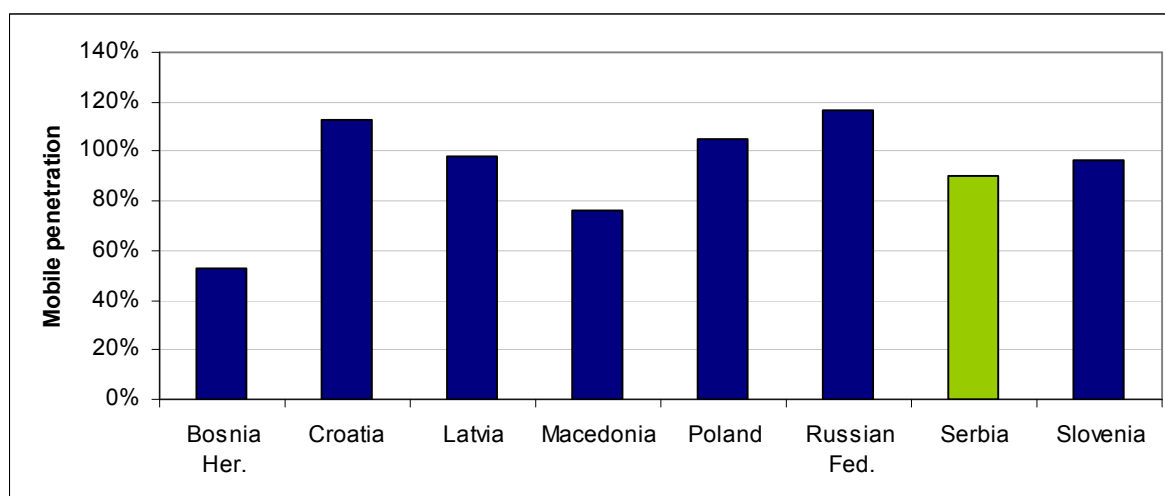
The mobile telephony industry has developed rapidly in recent years, the number of connections being over 6.5 million in 2007. Penetration rates are reported to be 90% of population, standing at approximately 72% when multiple SIM cards are accounted for. Penetration has increased steadily over the last years and is in line with regional levels. Whilst subscriber acquisition rates slowed slightly in 2004 and 2005, they picked up quite sharply in 2006 when Telenor acquired Mobi63 and boosted competition in the market. Coverage reached 93% of the population in 2007, while over 70% of the territory is covered.

Figure 60: Connections and penetration in Serbia



Source: Wireless Intelligence and Deloitte estimates based on Telenor data

Figure 61: Regional levels of mobile penetration



Source: Wireless Intelligence. Selection based on those countries with a similar geographical location / GDP level to Serbia

A liberalisation and a privatisation process started in 2005 and an independent regulator (RATEL) operates in the country. One of the two incumbents (Mobi63) was fully privatised in 2006, when it was acquired by Norwegian mobile operator Telenor. Telekom Serbia, the other incumbent, is still controlled by the Serbian government. Vipmobile, owned by Austrian operator Mobilkom, won the third mobile licence in 2006 and started operations in the second quarter of 2007.

Figure 62: Mobile operators and mobile licences in Serbia

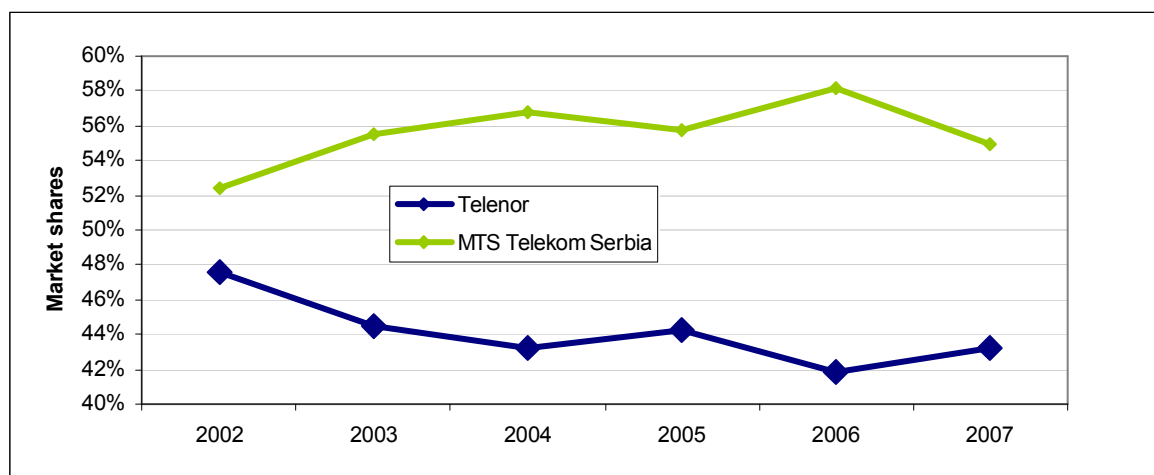
Mobile operator	Licence	Date of issue	Service Launch
Telekom Serbia	GSM900/1800/UMTS	01/08/2006	1998
Telenor*	GSM900/1800/UMTS	01/09/2006	1996
VIP	GSM900/1800/UMTS	01/12/2006	2007

Source: RATEL. * Telenor acquired Mobi63 in September 2006

The market shares of Telekom Serbia and Mobi63 (then Telenor) have remained relatively steady over time. However, the two incumbents display a different distribution of postpaid and prepaid customers. 17% of Telenor customers were postpaid in 2006, while Telekom had only 9% of its customers on a contract in 2005.

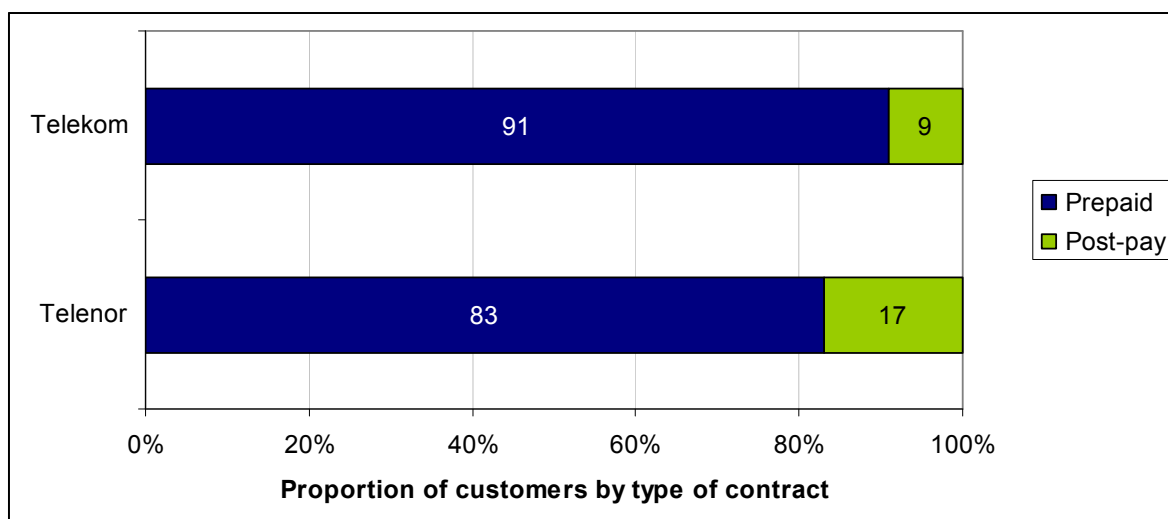
Text messages are used regularly by customers and totalled 3.2 billion in 2006. Both Telenor and Telekom Serbia's networks are equipped to provide GPRS and EDGE services. MTS started offering 3G services in 2006 and Telenor started in first quarter of 2007.

Figure 63: Market shares of the MNOs over time



Source: Wireless Intelligence. Telenor figures are Mobi63 until 2006.

Figure 64: Proportion of prepaid and postpaid customers for each operator



Source: RATEL and Telenor

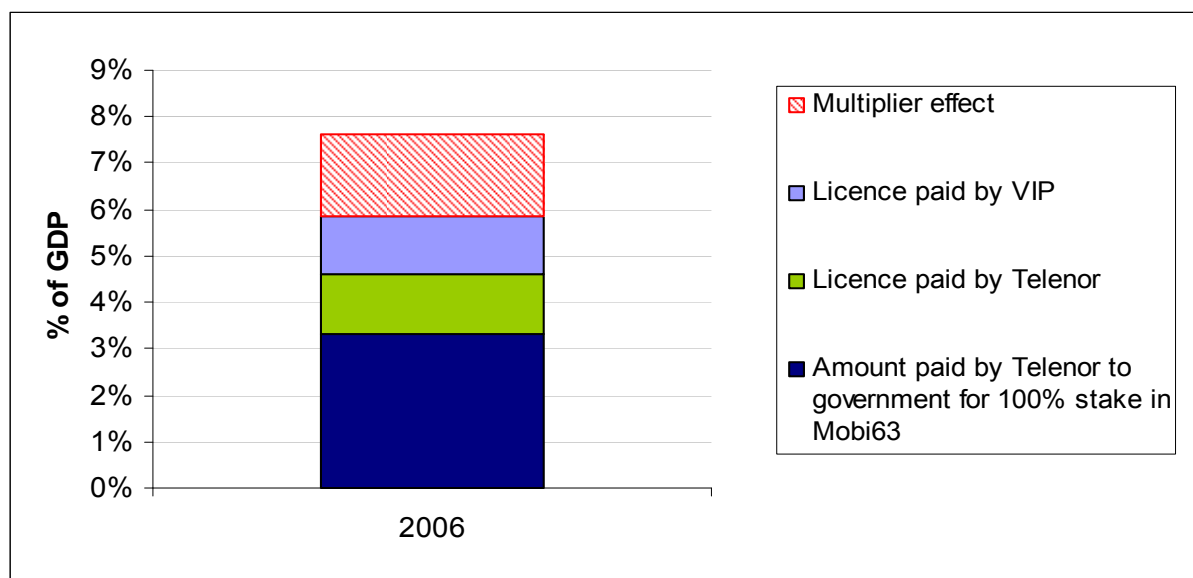
10.1.1 The economic benefits of the liberalisation and privatisation process

Since the introduction of mobile services until May 2007, only two mobile network operators were active in the market. These were the integrated fixed operator, Telekom Serbia, and another company partly controlled by the Serbian government, Mobi63. The latter was completely privatised in 2006, when Telenor acquired it for a sum of €1,513m. This amount included €320m paid to the government for a 10-year GSM/UMTS licence, while the rest was paid to the Government (70%) and to private investors (30%) for a 100% stake in the operator. In addition, at the end of 2006 Austrian mobile operator VIP was awarded a third 10-year licence for €320m.

The economic benefits of the 2006 privatisation and liberalisation policies in the mobile market are numerous. The benefit also extended to outside the industry as the Government used the proceeds of the licence award and privatisation to fund infrastructure development. A national plan was developed to allocate the one-off proceeds: all national infrastructures, from roads and railways to the water supply infrastructure were redeveloped and upgraded⁵⁹. A source within the Serbian Privatisation Agency claimed that the benefits of this one-off payment were not comparable with any other Eastern and Central European countries. The nature of the expenditures carried out within the national plan implies that the economic multiplier associated with the value added by the proceeds is likely to be extremely high. We estimate that the impact of the privatisation and liberalisation policies in the Serbian mobile market in 2006 was over 5.7% of the Serbian GDP. Using a conservative estimate of 1.3 for the economic multiplier, we estimate that the total one-off impact was over 7.5% of GDP in 2006. This excludes the value add generated by the economic activity of MNOs and related industries, which will be analysed later in this report.

⁵⁹ This information was provided during interviews with the Communications Ministry and Regulator

Figure 65: Impact on GDP of the proceeds from the privatisation of Mobi63 and from the award of two mobile communications licences



Source: Deloitte analysis based on data provided by key industry players in interviews, analysis of company accounts and industry reports and data provided by Telenor

Interviewees at the Telecommunications Regulatory Authority and within the Serbia Government provided us with their views on a number of other economic benefits of the 2006 privatisation and liberalisation policies. These include:

- Foreign direct investment: The presence of Telenor, as a long-term foreign investor in Serbia, increases the likelihood of additional investment. This is due to communications infrastructure facilitating business growth⁶⁰ but also due to the “signalling effect” of Telenor generally increasing business confidence;
- Innovation and communication network expansion: Since it started operations, Telenor has installed or upgraded over 200 GSM / 3G sites. New technologies such as GPRS WAP and 3G services were brought to higher standards. 20 retail shops have been opened by Telenor and 25 by VIP. In addition, a number of support services were affected by the new investment flows. MNOs have become the largest advertisers in Serbia in 2007 and have consequently boosted the media industry.
- Change in corporate culture that results from foreign direct investment: These include a transparent and professional corporate culture that exercises a positive influence on domestic businesses and on the government; and
- Consumer benefits from increased competition: Since the entrance in the market of Telenor in 2006 and of VIP in May 2007, Serbian consumers have benefited from a significant increase and diversification in the service offer and a fall in prices of 14%. The range and number of handsets available in the market has also increased during this period.

⁶⁰ The link between communications infrastructure and growth is well documented in the academic literature.
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10.1.2 Regulatory and policy issues

In 2006 the Serbian government prepared a five-year strategy for the development of Telecommunication in Serbia. This strategy is formed by 10 key objectives. Among these are:

- The development of telecommunications infrastructure;
- Widespread availability of the Internet; and
- The promotion of the web economy.

The Serbian communication market has undergone significant policy and regulatory changes in the last 18 months. Interviewees have noted the positive steps that the regulator has begun to take in discussing and implementing some of the regulations that are typically seen in more developed regulatory environments including the EU. This includes a review of interconnection. However, there are a number of regulatory areas in which Serbia lags behind EU countries and the EU Communications Regulatory Framework⁶¹. Interviewees identified the lack of effective regulation in a number of these areas as hindering the development of the mobile communications sector. Areas of concern included:

- Process for rolling out new base stations: Operators identified a number of bureaucratic restrictions to their expansion plans. Interviewees stated that it takes an average 8 months to build a site due to the number of permissions that must be acquired. Operators are in the process of building out a 3G network, but the speed of roll out is being impeded by planning permission requirements;
- Regulation of wholesale leased lines and infrastructure sharing: Leased line prices are high compared to EU averages⁶² and therefore Telenor supplies its services through the radio network, including at backhaul level. These high prices may also contribute to the low internet penetration, currently at 13% of population, while broadband penetration is less than 1%. Encouraging infrastructure competition at the backbone level could relieve this problem⁶³. The Serbian electricity operator has developed a fibre optic network throughout the country and the promotion of a joint usage of the optic fibre network for electricity and communications could be encouraged along with a review of retail and wholesale leased line prices⁶⁴; and

⁶¹ The EU Communications Regulatory Framework for electronic communications networks and services, covering all forms of fixed and wireless telecoms, data transmission and broadcasting (2002). This is a package of 7 legal instruments including Directives on access, interconnection and LLU.

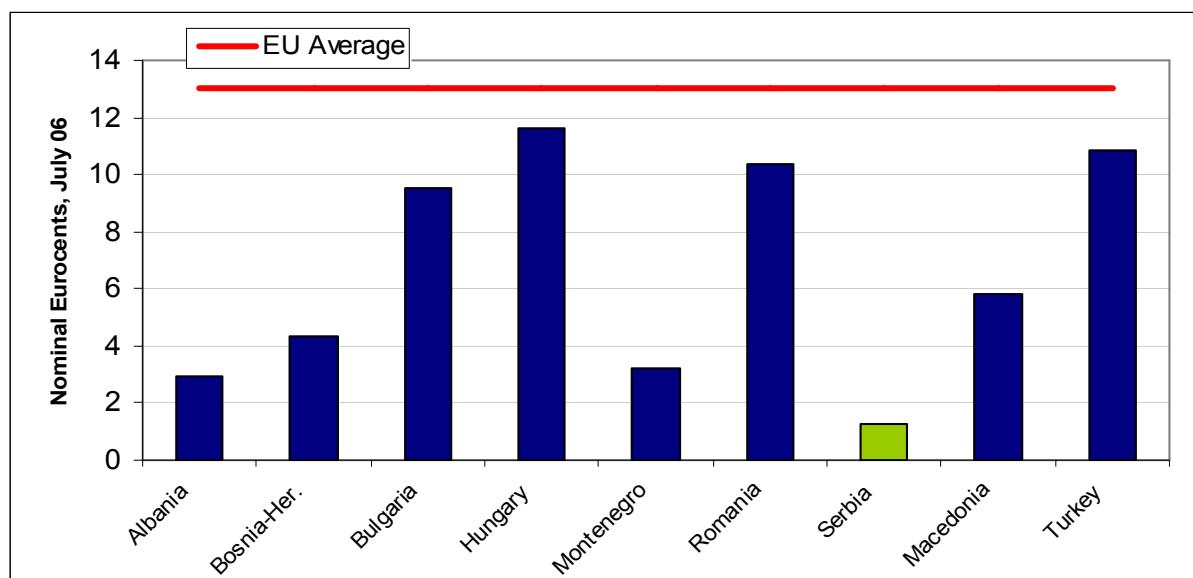
⁶² EU leased line prices obtained from the 12th report on the implementation of the EU telecommunications package, 2006. Available at: http://ec.europa.eu/information_society

⁶³ Promoting competition at the backbone, level is often an aim of EU regulators. Competition may come from other fixed line or mobile operators, utility companies or cable tv operators. Where competition is insufficient then wholesale access and pricing regulations are typically imposed on the dominant operator. It is usually accepted that competition at the access level is harder to promote and therefore wholesale regulation of the access network is usually used to create a level playing field at the retail level.

⁶⁴ A review of the wholesale and retail leased line markets is recommended by the EU as part of its Communications Directive, 2002. Should the market be found to be non-competitive then cost based pricing remedies are usually imposed.

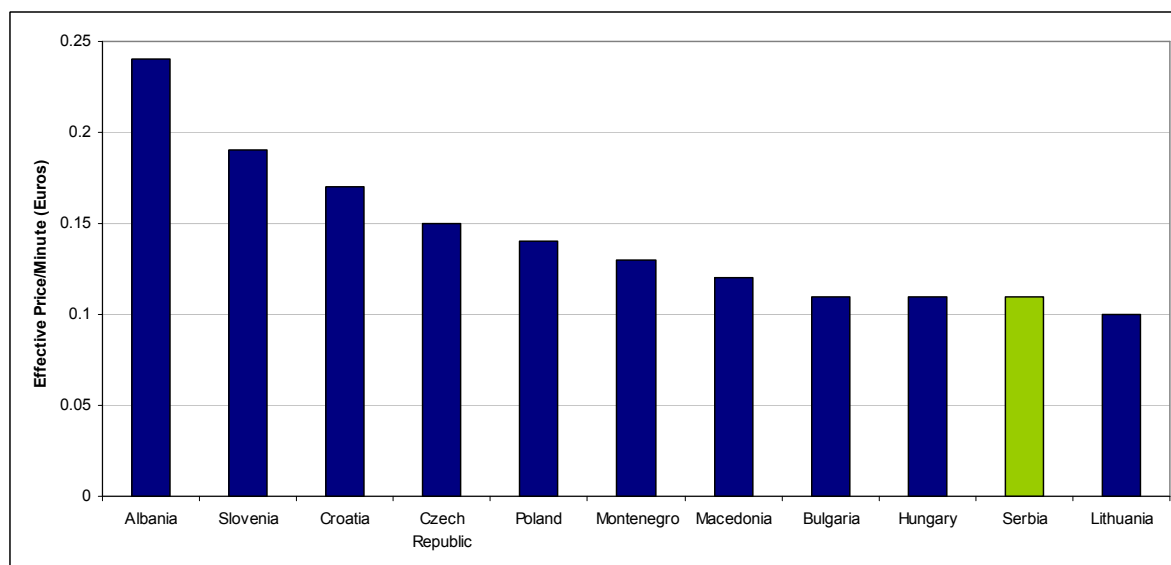
- Regulation of fixed line retail prices: Fixed line subscription and call prices have not been rebalanced and remain among the lowest in Europe. A process for rebalancing prices so that they are reflective of the costs of providing the service is usually undertaken by regulatory authorities who are seeking to encourage entry in the communications market⁶⁵.

Figure 66: Price of a three minute local fixed line call in nominal Eurocent, 2006



Source: Cullen Report, Supply of services in monitoring of South East Europe – Telecommunications services sector and related aspects, March 2007

Figure 67: Effective mobile price per minute in a sample of Eastern and Central European countries



Source: Wireless Intelligence (Price is calculated as ARPU / Minutes of Use per user per month where both ARPU and minutes include incoming, outgoing and roaming minutes)

The MNOs' contribution to meeting the 10 key objectives of the Serbian Government could be significant in areas such as the provision of mobile broadband, in particular in rural areas. Mobile

⁶⁵ This process is typically undertaken within a price cap context, where access and local calls prices are increased above the rate of inflation until the retail price of the service is aligned with its cost of provision.

broadband could boost internet availability and promote the web economy. In order to deliver such services to consumers, a level playing field between fixed and mobile operators would be beneficial in the Serbian mobile communication market. MNOs need to receive support to develop and utilise alternative networks.

10.2 Economic impact

As detailed more fully in the methodology section of this report, we initially calculate the economic impact of the mobile industry between September 2006 and 2007 using static analysis. Our estimates are based on:

- Data collected from directly from Telenor;
- Interviews and data collected from others in the mobile value chain. These include Ericsson Serbia, Nokia Serbia, mobile specific wholesalers and retailers such as DG, Roaming Electronics and Tehnomobile;
- Interviews with members of the Serbian Privatisation Agency and of the Serbian Investment and Promotion Agency (SIEPA);
- Data collected from public sources such as the Serbian Statistics Office, the ITU and Ratel;
- Telecommunications market data from Wireless Intelligence, Cullen reports and Budde report; and
- International benchmarks and studies.

We have estimated the economic impact of mobile communications in Serbia for years 2006 and 2007. However, for 2006, only the four months in from September to December were analysed: these correspond to the period when actual competition in the market developed, following Telenor's acquisition of Mobi63.

We estimate that the mobile communications industry contributes a total of DIN 104 billions to the economy in 2007, representing over 4.1% of total GDP.

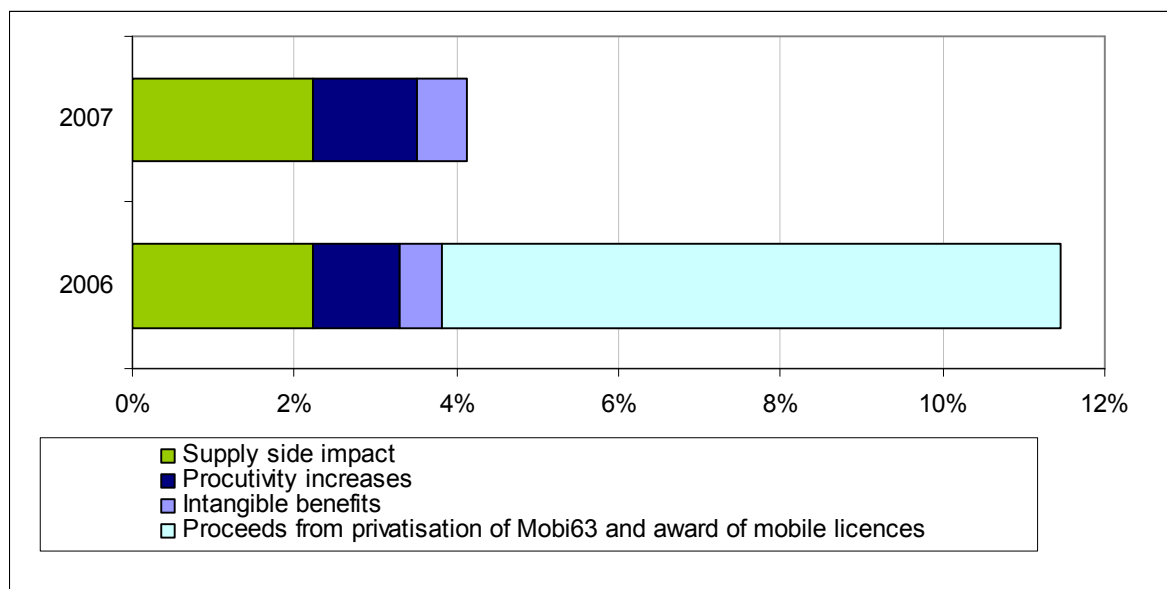
Figure 68 highlights the economic impact of the mobile industry in terms of:

- Supply-side effects: these are the value-add and employment from direct and indirect firms in the value chain;
- Demand side effects: the productivity increases resulting from people using their phones for business purposes; and
- Intangible benefits: the social benefits enjoyed by consumers.

For 2006, this figure includes the impact of the proceeds from the privatisation of Mobi63 and the award of two mobile licences to Telenor and VIP. It can be seen that for 2006 the total impact represents 11.6% of the GDP.

The impact of mobile communications on GDP has been substantial in 2006 and 2007.

Figure 68: Economic impact of the mobile communication industry in Serbia (% of GDP)



Source: Deloitte analysis based on data provided by key industry players in interviews, analysis of company accounts and industry reports and data provided by Telenor

10.2.1 Supply side impact of mobile communications

The supply side impact of mobile communications consists of:

- Direct effects: the value add and employment created by the MNOs themselves;
- Indirect effects: the value add and employment created by other parties in the value chain; and
- Multiplier effects: the knock-on impact of the direct and indirect effects on the rest of the economy.

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

Our estimates illustrate that the value-add impact of the mobile communication industry in Serbia will be DIN 43bn in 2007.

The multiplier effect for the Serbian economy is estimated at 1.3. This estimation is based on reviews of international economic literature and on interviews undertaken in Serbia, in particular with government agencies. Interviews suggest that the industrial structure of Serbia and its

increasing trade exchange lead to a higher value for the economic multiplier. We have therefore opted for a value of 1.3.

When including the economic multiplier effects, the supply-side value add associated to the mobile communication industry is estimated to be DIN 56bn for 2007. We estimate that 67% of this value add consists of taxes and other licence/regulatory fees. The remainder of the value add is formed by wages and dividends paid out in Serbia and by Corporate Responsibility (CR) activities.

Value chain impact

Mobile operators are the largest contributors of value add in the mobile communication sector. We find that they directly contribute DIN 27.7bn in 2007. Of this amount, Telenor directly generates DIN12 bn in 2007.

Figure 69: Value add of mobile network operators (excluding multiplier effect), DIN m

	2006 (Sept-Dec)	2007
Employee and contractors wages and benefits	976	3,052
Taxes and regulatory fees	7,215	24,308
CR	194	345
Total	8,386	27,706

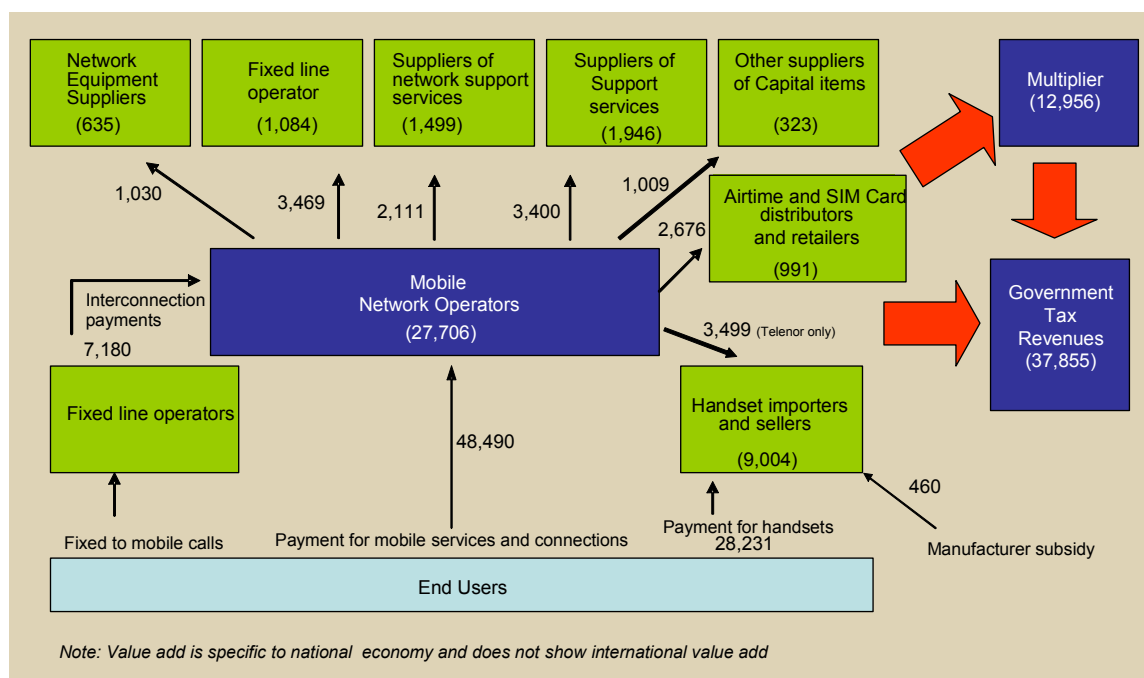
Source: Deloitte analysis based on data provided by key industry players in interviews, analysis of company accounts and industry reports and data provided by Telenor

Taxes and regulatory fees (including spectrum fees) represent 87% of the value add generated by MNOs in 2007. The next largest contributor is employee wages and benefits, followed by CR programmes.

We then analysed the revenue flows from the MNOs to other parties in the industry. We also sought to quantify the share of revenue that translated into value add⁶⁶. Our primary source of information was interviews with operators and other parties along the value chain and analysis of operator accounts. The figure below provides revenue flows between providers and estimates of value add.

⁶⁶ Details on value add margins are contained in the assumptions appendix

Figure 70: Mobile value chain in Serbia in 2007 (DIN millions)



Source: Deloitte analysis based on data provided by key industry players in interviews, analysis of company accounts and industry reports and data provided by Telenor

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. Figure 71 shows the calculation of value add.

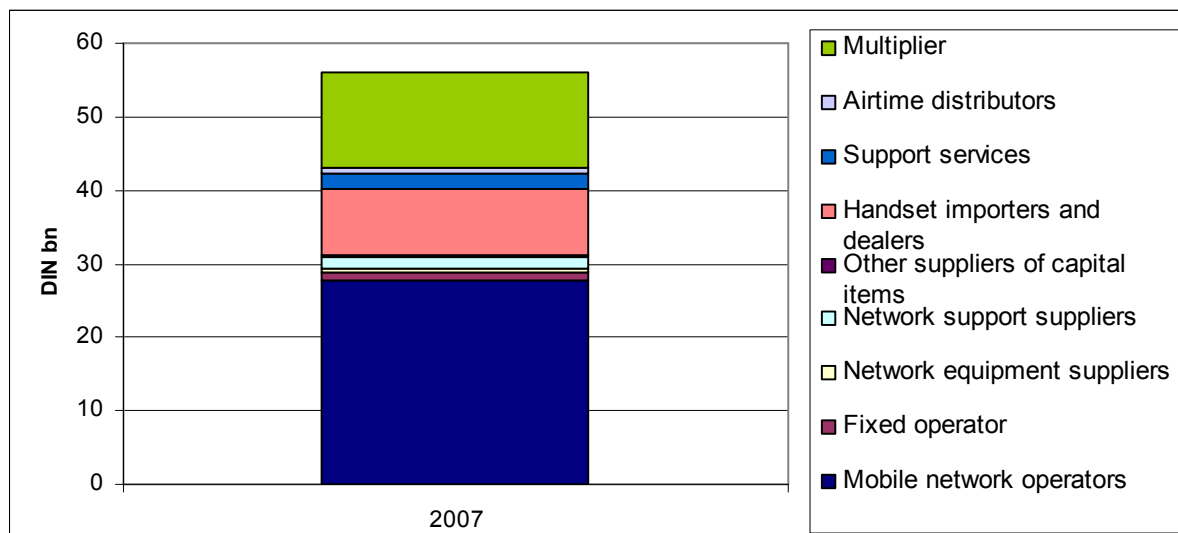
Figure 71: Calculation of value add from mobile communications in Serbia in 2007 (DIN m)

	Total revenue	Total cost	Value add	Value add with multiplier
Mobile network operators	55,670	27,964	27,706	36,017
Fixed operator	3,469	2,385	1,084	1,409
Network equipment suppliers	1,030	396	635	825
Network support services	2,111	612	1,499	1,948
Other suppliers of capital items	1,009	686	323	420
Handset importers and dealers	32,190	23,186	9,004	11,706
Non-network Support services	3,400	1,454	1,946	2,529
Airtime sellers	2,676	1,685	991	1,288
Total	101,555	58,368	43,186	56,142

Source: Deloitte analysis based on data provided by key industry players in interviews, analysis of company accounts and industry reports and data provided by Telenor

The figure below graphically illustrates the breakdown of the supply side value add from the mobile communications value chain in 2007.

Figure 72: Supply side value add by category, 2007, DIN bn



Source: Deloitte analysis based on data provided by key industry players in interviews, analysis of company accounts and industry reports and data provided by Telenor

These categories include:

- Fixed line operator: the value add associated with mobile services is generated by the interconnection payments from the MNOs to Telekom Serbia, on which value add margins are applied;
- Network equipment suppliers: although most of the network equipment is acquired directly from abroad, site preparation and installation is carried out domestically and generates value add;
- Network support suppliers: these are employed by MNOs to maintain network sites;
- Support services acquired by MNOs include tax, legal and regulatory advice, and auditing, advertising and cleaning services;
- Other suppliers of capital items include providers of software, cars, furniture and non-network machinery acquired by the MNOs;
- Handset importers and dealers include here the value add generated across the entire value chain associated with handset trading. Handset revenues in Serbia are generated not only by consumers but also by some MNOs who acquire handsets from importers and sell at subsidised prices to consumers. Handset related value add is generated by revenues from legal handsets as well as from handsets that reach Serbia through parallel channels. Interviews suggest that these are the majority of the new handsets and that one million new handsets entered the country through parallel channels compared to 700,000 legal imports in 2007. The rest of the value add associated with handsets is generated by handsets informally sold through newspapers or through other informal channels; and

- Airtime distributors are formed by the general points of sale for airtime but also by the growing number of mobile-specific retail shops. Value add is generated by the commissions paid directly or indirectly (through wholesalers) by MNOs to them. The commission payments take different forms as each operator has its own specific distribution structure. Commissions retained by wholesalers (on which the relevant margins are applied) are included in the figure.

Taxes and Regulatory fees

Tax revenues to the government are raised through corporation tax, income tax and other social contributions paid on employees' wages, regulatory fees and spectrum fees, and import taxes paid on the network equipment acquired abroad. Figure 73 illustrates a breakdown of taxes paid by operators in 2007.

Figure 73: Tax revenues in Serbia from mobile operators, 2007, DIN m

Tax item	2007
Corporation tax	1,309
Income tax and other social contributions	1,276
VAT	18,261
Import taxes	2,606
Licence fee	440
Spectrum fees	333
Other regulatory fee	83
Total tax and other government fees	24,308

Source: Deloitte analysis based on data provided by key industry players in interviews, analysis of company accounts and industry reports and data provided by Telenor

The largest proportion of tax revenue is raised through VAT and through import taxes paid on imported equipment. At 10%, corporation taxes in Serbia are amongst the lowest in Eastern and Central Europe. We estimate that 37% of MNOs' revenue is paid to the government in the form of taxes and other regulatory fees.

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 VAT, corporation tax and employee income taxes and social contributions in our calculations. Government revenues, including regulatory fees, constitute over 67% of the value add in the mobile communication chain.

Figure 74: Total tax revenues from the mobile value chain, 2007, DIN m

	Tax Revenue	Tax Revenue with multiplier
Mobile network operators	24,308	31,600
Fixed operator	220	286
Network equipment suppliers	164	214
Network support suppliers	374	487
Other suppliers of capital items	65	84
Handset importers and dealers	3,276	4,258
Support services	462	600
Airtime distributors	250	325
Total	29,119	37,855

Source: Deloitte analysis based on data provided by key industry players in interviews, analysis of company accounts and industry reports and data provided by Telenor

Corporate Responsibility

We estimate that CR programmes organised by mobile operators receive over DIN 345mn in 2007.

The concept of CR is relatively new to the Serbian corporate culture and interviewees within the Serbian Privation Agency and within SIEPA highlighted that Telenor introduced the concept of CR in Serbia. Since it started operations in Serbia, Telenor created an independent foundation to deal with CR programmes. This is formed by independent well respected members of the Serbian community, such as the former Norway ambassador in Serbia, the Dean of Belgrade University, and the CEO of media group B92.

The activities of the foundation span a number of different areas and include:

- The provision of broadband connections to students and teachers in schools;
- The creation of the largest digital media documentation library in Serbia;
- The active support of young scientists through the donations of PCs and the sponsorship of international conferences; and
- The support of a number of social programmes including dealing with children in Kosovo and with victims of family violence.

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 following figure sets out the impact of the mobile communications industry on domestic employment. Employment of expatriates has been subtracted from the figures. Our figures include employment opportunities within the complete value chain associated with mobile services, and it is therefore a measure of both direct and indirect employment. For example, it includes handset and airtime sellers and supplier of support services to the MNOs. The number of employees in other sectors is estimated based on interviews undertaken in Serbia and, where data was not available, is calculated as revenue received from the mobile network operators divided by the average wage in a particular sector. In addition, an economic multiplier of 1.3 is applied to the indirect employment to take into account the wider effects on employment generated by the mobile industry. This is consistent with the multiplier value applied to GDP.

Figure 75: Contribution to employment from the mobile value chain, 2007 (FTEs)

	2006	2007
Mobile network operators	2,680	2,860
Fixed telecommunications operators	620	630
Network equipment suppliers	175	180
Network support suppliers	780	785
Handset importers	200	270
Other suppliers of capital items	115	115
Suppliers of non-network support services	930	960
Airtime/SIM sellers and mobile phone sellers	18,500	20,750
Multiplier	6,400	7,110
Total domestic employment	30,400	33,660

Source: Deloitte analysis based on data provided by key industry players in interviews, analysis of company accounts and industry reports and data provided by Telenor

We estimate that the mobile sector created, directly and indirectly, around 33,600 FTE opportunities in Serbia in 2007. However, we regard this figure as conservative since the market is undergoing a significant number of changes. For example new retail shop chains are opening every day both in urban and rural areas, and other points of sale will soon add mobile scratch cards among their services. We estimate that there are over 20,000 non mobile specific points of sale for airtime in Serbia in 2007 including small groceries, kiosks, tobacconists, but also petrol station and bank and post offices. In addition top-up services are available from those locations where Nokia e-load terminals are present. For these points of sale the figure does not include all employees working within each point of sale, but it only includes the FTEs attributable to mobiles services. In addition to non mobile specific points of sale, in September 2007 an estimated 120 mobile dedicated retail shops existed. Since Telenor started operations, the MNOs are developing their own retail shops. Telenor has now around 40 retail shops and VIP around 25 shops. These are forecast to grow significantly in the near future.

Dedicated retail shops have started offering new handsets. However, sources in Serbia confirmed that the market remains the largest source of new handsets. In addition, used handsets are not usually sold in shops in Serbia but are mainly sold informally through specialised newspapers or passed on between family and friends. This trend is now being reversed as operators such as Telenor offer subsidised new handsets in their retail shops.

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

There are numerous ways in which mobile services can improve productivity, particularly in a country like Serbia where the digital divide between urban and rural areas remains significant. The following important effects associated with mobile were highlighted during interviews conducted in Serbia.

- Speeding up business and overcoming pressing situations that can be informed in due time. Business is concluded more quickly, as there is a smaller time lag in communication as both partners are always available (there are likewise more clients for the company); all the people needed for resolving an urgent situation can be informed in due time since they are always available for contact; those who are in need of a quick solution can call instantly wherever they are;
- Improving efficiency of mobile workers and coordinating fieldwork activity. This effect will particularly be felt by workers with unpredictable schedules, for example those involved in repair and maintenance, or collection and delivery. In addition, those working in the private transport sector will benefit as mobile phones will give them greater accessibility and better knowledge of demand. In Serbia many small business are field based and constant accessibility of people who work on the field makes them more productive, while giving them the opportunity of scheduling future engagements. Fieldwork can be constantly coordinated according to arrival of new information wherever fieldworkers or the person informing them happen to be;
- Reducing travel time and costs: similarly, mobile services allow workers to trade and share information without travelling; 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 more easily. This is important in Serbia, where unemployment and informal employment is estimated to be 20% of the labour force⁶⁷.

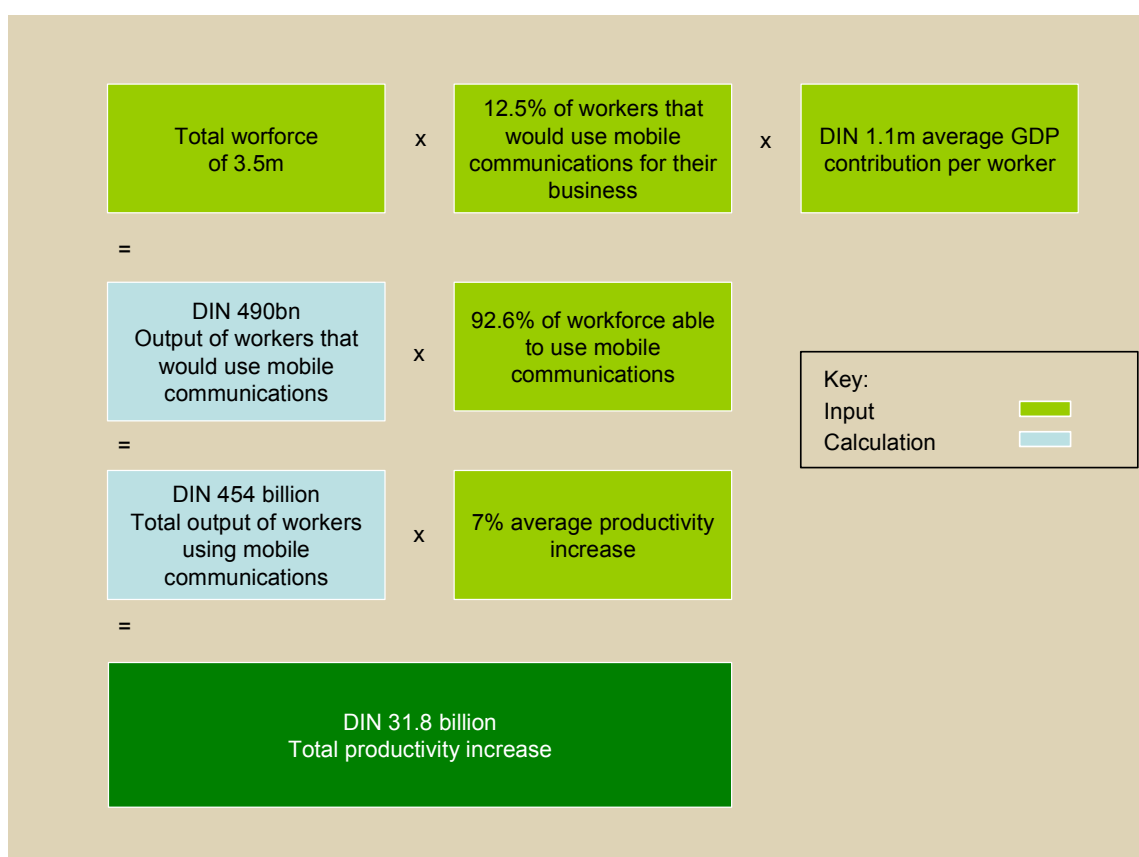
No established economic methodology exists to estimate the GDP and employment effects of such productivity improvements across the economy. Economic surveys have typically quantified productivity improvements to be between 6% and 11%. Based on interviews undertaken in Serbia and on the analysis of the Serbian labour market, productivity benefits are still towards the low end of the spread. We estimate that in 2006 the productivity increase was 6%, while a value of 7% is estimated for 2007. These figures are lower than in other country studies since the fixed network in Serbia offers relatively low prices. These prices act as an incentive for workers to use fixed lines and the impact of communication technology is shared with the fixed technology. The incremental productivity impact of mobile communications is therefore lower. In addition, all respondents noted

⁶⁷ Labour Force Survey, October 2006, Statistical Office of the republic of Serbia
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a marked increase in the offer of mobile services since Telenor entered the Serbian market, and in particular a marked change in the availability of business post-paid contracts was recognised. Business contracts are now available in retail shops to a wider audience. We have therefore used the higher value for 2007.

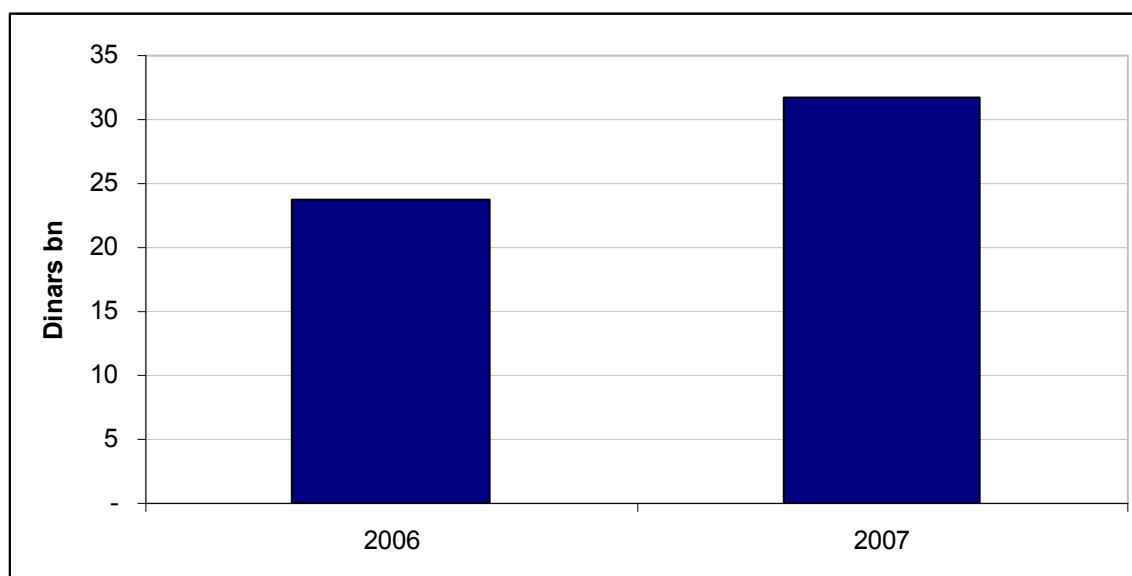
We estimate that mobile communications will increase GDP by DIN 32bn in 2007 as a result of productivity improvements. This represents 1.27% of GDP, up from an estimated 1% in 2006. The following figures show how we estimate the productivity improvements and their value in 2006 and 2007.

Figure 76: Economic impact in 2007 of increased productivity amongst workers who use mobile phones for business purposes



Source: Deloitte analysis based on interviews, data from Serbian Statistics Office and Deloitte assumptions

Figure 77: Economic value from increases in productivity, 2006 and 2007 (DIN bn)



Source: Deloitte analysis based on interviews, data from Serbian Statistics Office and Deloitte assumptions

10.2.3 Intangible impacts

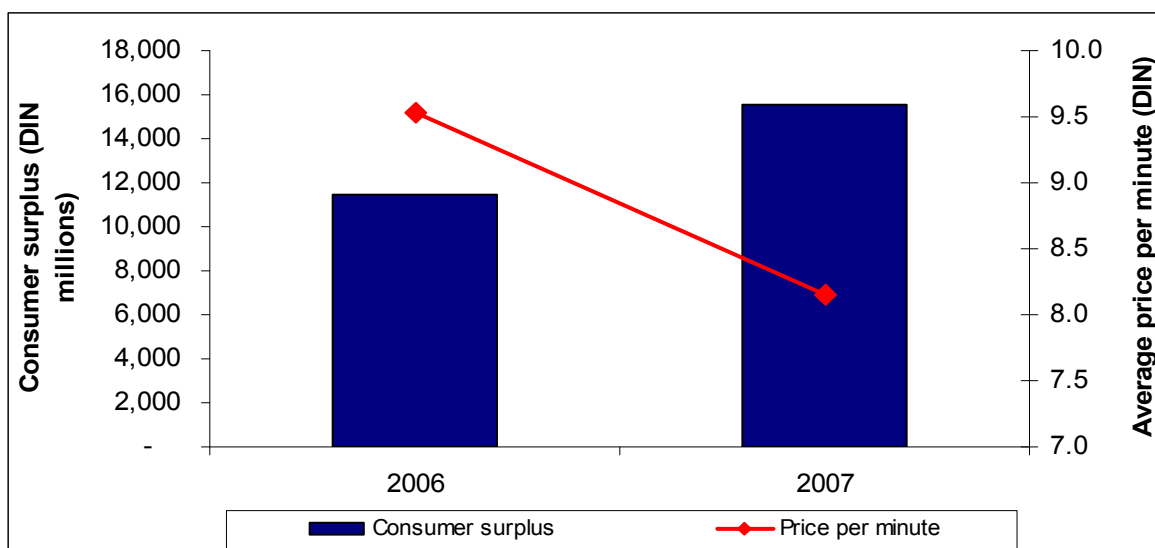
During our interviews, we asked individuals for their views on the consumer benefits of mobile communications in Serbia. Benefits identified include:

- Developing interpersonal and family communications, in particular while away from home;
- Promoting social cohesion by favouring parents' control of children, in particular in rural areas;
- Extension of communications to users with low education and literacy and to those on low income;
- Helping doctors who make house calls in rural areas;
- Consumers having access to a number of services including complete SMS banking services, through which people can constantly check their balance; and
- Mobile phones allowing people to pay for car parks by sending a text to a specified number. This has replaced cash payments for car parks in Serbian cities.

We have estimated the intangible value of mobile communications using the willingness to pay concept. Average prices per outgoing minute 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 prices at the time of subscription, less prices today (which is are lower due to increased

competition and other factors). We have used information on price and usage over the last five years. The total increase in consumer surplus has been estimated as DIN 15.6bn in 2007.

Figure 78: Consumer surplus and price per minute in 2006 and 2007

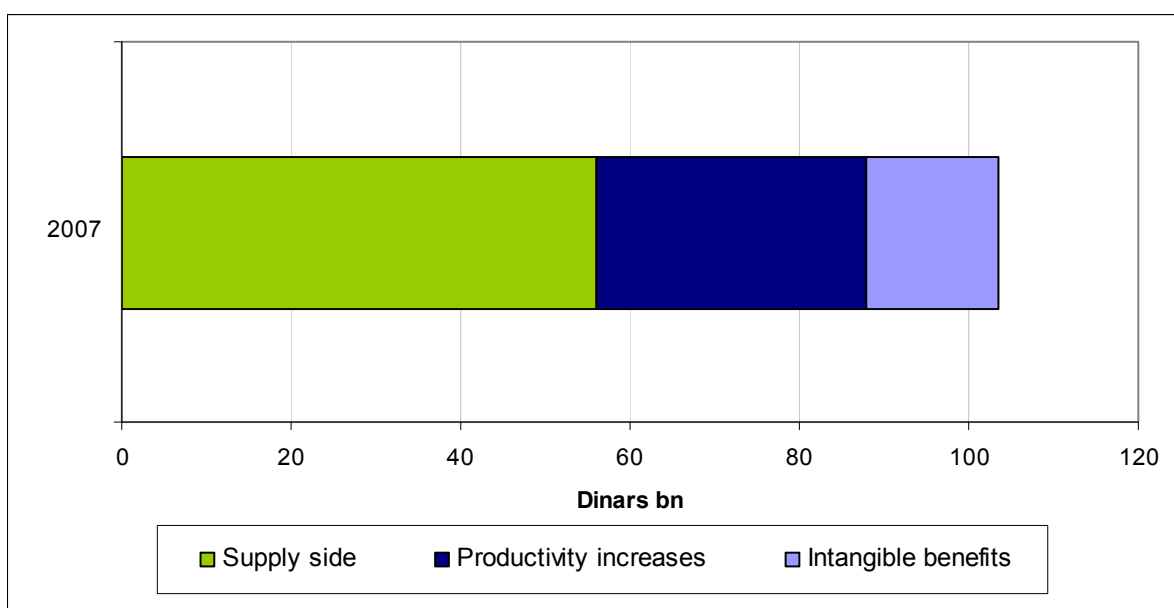


Source: Deloitte calculation based on Telenor's information

10.2.4 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 Serbia. This is estimated to be 104bn in 2007.

Figure 79: Economic impact of mobile communications in Serbia, 2007 (DIN bn)



Source: Deloitte analysis based on data provided by key industry players in interviews, analysis of company accounts and industry reports and data provided by Telenor

10.2.5 Dynamic relationship between mobile communications and growth

We have also 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 in developing and transitional countries⁶⁸. This impact typically falls as access to communications and other infrastructures becomes more widespread. A figure of 0.6% has been estimated for the impact in developing countries⁶⁹.

The mobile market in Serbia is gaining momentum after the wave of liberalisation and privatisation policies in 2006. Competition is growing and is already delivering benefits to consumers. We estimate a subscriber's 4% each year for the next five years in Serbia. This might contribute to an increase in GDP growth rate of between 1.2% and 2.4% over the five year period.

10.2.6 Conclusion and policy implications

The Serbian mobile sector has undergone a number of significant changes in the last two years. This includes the sale of Mobi63 to Telenor, the award of new licences including for 3G and developments in the regulatory regime. Competition is delivering a wider range of services at lower prices to consumers. There is wider accessibility to a diversified tariff structure and easier availability of handsets. Subscriber growth rates have increased since the liberalisation of the market in 2006.

Mobile operators have delivered a range of benefits to the Serbian economy and the mobile sector is now estimated to constitute over 4.1% GDP. The Inclusion of licensing and privatisation proceeds increased the contribution of GDP to 11.6% in 2006. In addition, mobile operators have played a significant role in attracting additional foreign investment in the country and in rolling out communication networks to under-served rural areas, increasing the potential economic activity in these areas.

⁶⁸ Shown in GSMA/Deloitte report 'Global Mobile Tax Review', 2006-2007, available at <http://www.gsmworld.com/TAX/>

⁶⁹ 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.

11 The Economic Impact of Mobile Telephony in the Ukraine

11.1 Background to the mobile market

11.1.1 Demand for mobile services

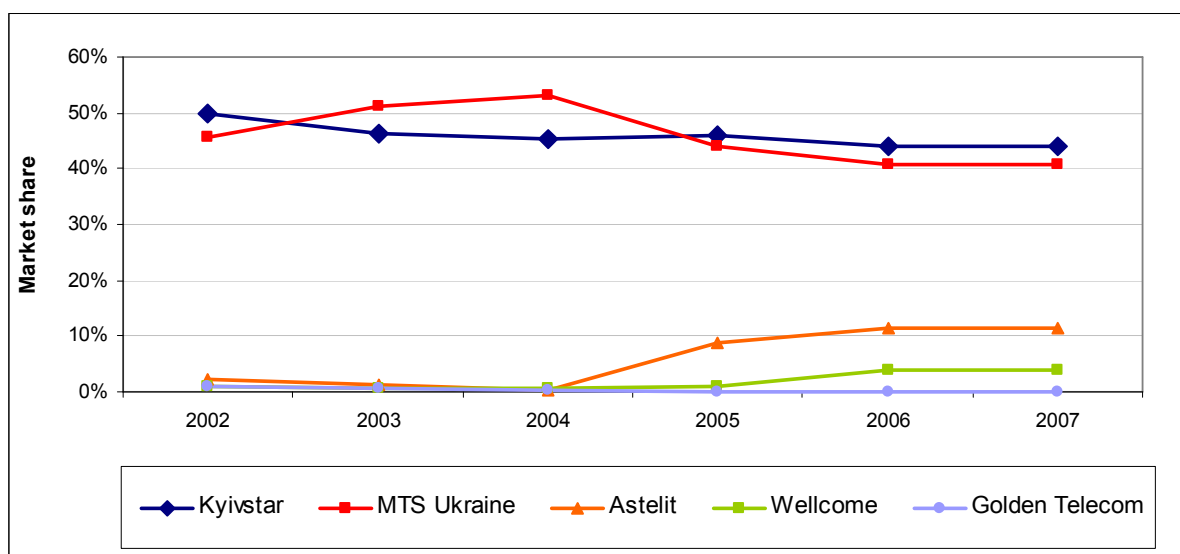
There are currently five mobile operators in Ukraine. These include Kyivstar, owned by Norwegian operator Telenor and by Russian holding group Alfa, and MTS, formerly know as UMC, recently acquired by Russian operator MTS. They control over 80% of the market.

Figure 80: Mobile operators and licences

Mobile Operator	Licence	Launch
Kyivstar	GSM 900/1800	1997
MTS Ukraine	GSM 900/1800	1997
Astelit	GSM 1800 - TDMA 800	2005
Wellcome	GSM 900	1998
Golden Telecom	GSM 1800	1997

Source: Budde report

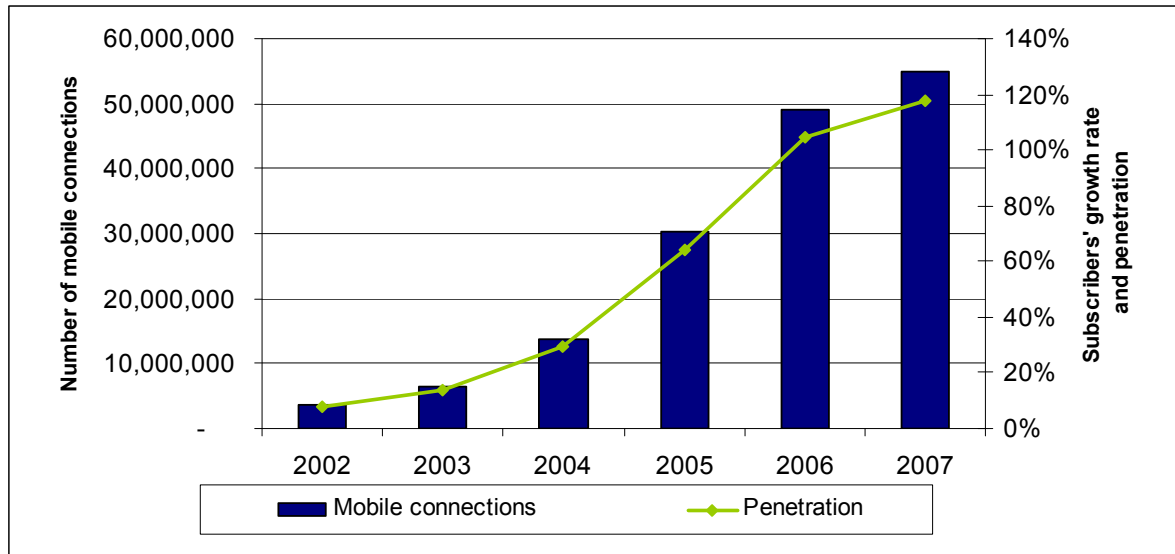
Figure 81: mobile operators' market shares over time



Source: Wireless Intelligence

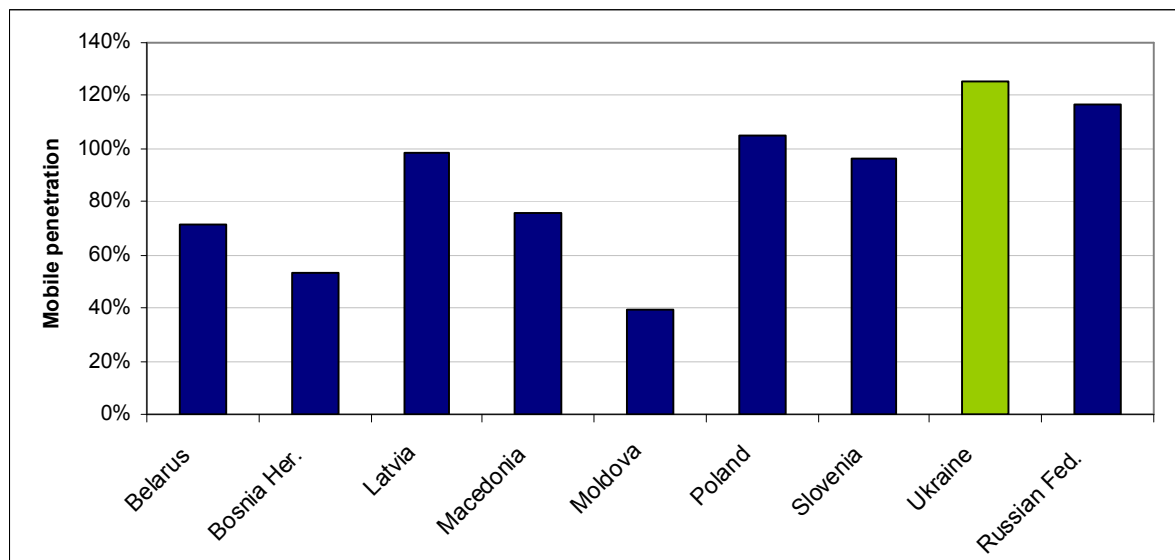
Ukraine's mobile market has experienced exponential growth since 2002. Mobile subscribers increased from 3.7 million in 2002 to over 57 million in 2007, representing an annual growth rate of over 70%. Penetration rates are above the average in the region.

Figure 82: Mobile connections and mobile penetration in Ukraine



Source: Wireless Intelligence

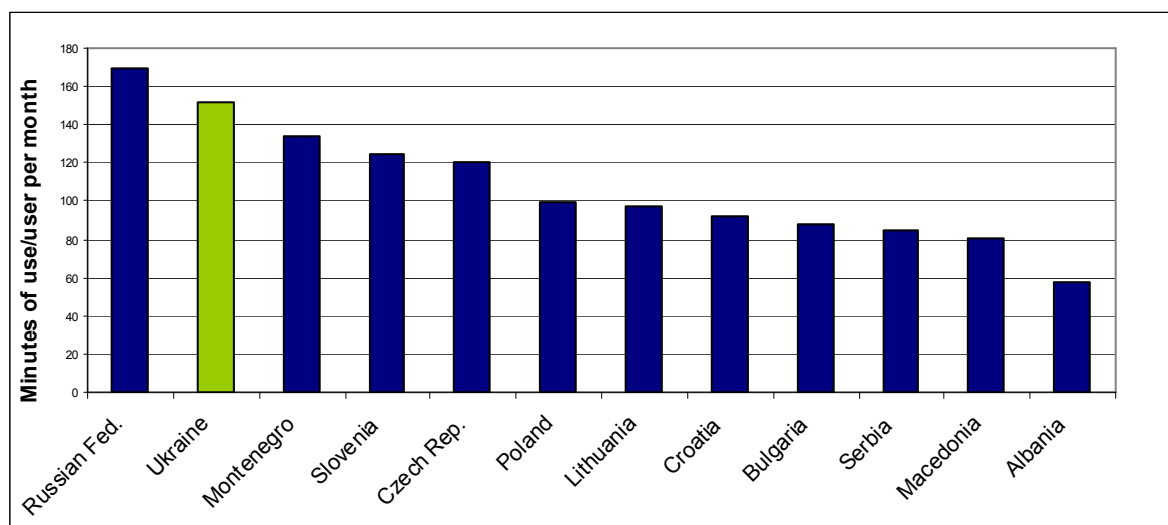
Figure 83: Regional levels of mobile penetration, Q3 2007



Source: Wireless Intelligence. Selection based on those countries with a similar geographical location / GDP level to Ukraine

Mobile services are the preferred method of communication in a country where fixed line penetration has always been low. Fixed line penetration was 23% of population in 2005, when mobile penetration started to increase, and today mobile connections outnumber fixed lines by 5 to 1. Mobile coverage is now effectively universal: 99% of country's territory is served by at least one operator. Usage has increased to over 150 minutes of use per user per month in 2007 and is generally higher than in other countries in the region.

Figure 84: Minutes of use per user per month in a sample of Eastern and Central European countries, 2007

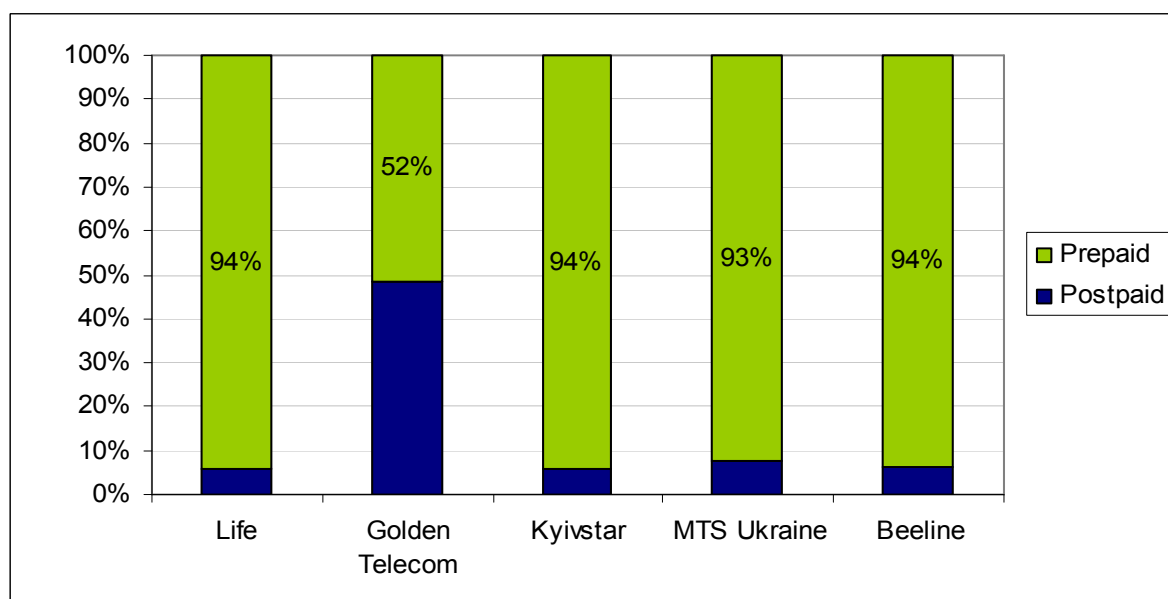


Source: Wireless Intelligence (Minutes of use include incoming, outgoing and roaming minutes)

Aggressive competition in the mobile market has delivered low tariffs and increasing innovation to consumers in a very short time. Mobile prices dropped by around 80% in the last five years. However, the Ukrainian mobile market is maturing and penetration reached 100% in 2006.

Mobile operators began offering prepaid services in 2003 and by 2007 prepaid connections represented 93% of all subscribers. Prepaid SIM cards have proved more popular than fixed line or postpaid subscriptions. They do not require a bank account to receive access and customers can buy low value vouchers once to activate and use a prepaid SIM. This practice is common in Ukraine for most pre-paid customers.

Figure 85: Percentage of prepaid and postpaid customers for each operator (2007)

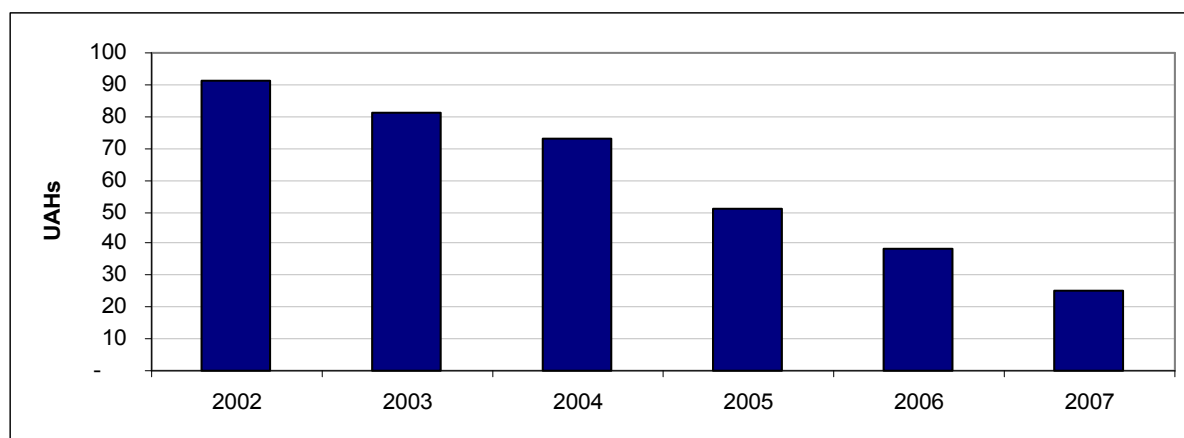


Source: Wireless Intelligence

Falling prices have caused voice average revenue per user to decrease. The figure below shows that ARPU levels have decreased by over 70% in the last four years. The drop in ARPU levels and

the mature voice market has caused operators to shift focus towards the mobile data market, with EDGE-technology services recently introduced and with MMS services launched.

Figure 86: ARPU levels over time, UAHS



Source: Wireless Intelligence (includes revenues from incoming, outgoing and roaming minutes)

11.1.2 Importance of mobile communications and long term objectives for the market and Ukrainian economy

The Ukrainian communication market has benefited from foreign investors taking a long term interest in Ukraine. Their presence increases the likelihood of additional investment as:

- Foreign mobile operators bought technical expertise and attracted business partners, for example network equipment suppliers, to register businesses in Ukraine;
- Mobile operators have contributed to raise the quality of services allowing investors to rely on optimal coverage in a country with low fixed lines penetration. The presence of a reliable communication system is regarded as a factor in attracting foreign investment; and
- Foreign investors have a “signalling effect” of generally increasing investors’ confidence about Ukraine.

3G (third generation) has yet to be launched by the MNOs. Licences were awarded to the fixed line operator UkrTelecom in 2005, which launched 3G services in November 2007 in five cities. Ukraine lags behind most of other countries in Eastern and Central Europe in terms of the development of 3G networks and the take-up of services. However, this situation could be reversed following the issuing of 3G licences and a swift network build out. Issuing additional 3G licences may also speed up the roll out of mobile broadband and could assist the Ukrainian government in achieving higher internet penetration.

11.1.3 Mobile-specific taxation

The mobile sector in Ukraine is subject to heavy sector-specific taxation. Mobile specific taxes in Ukraine include:

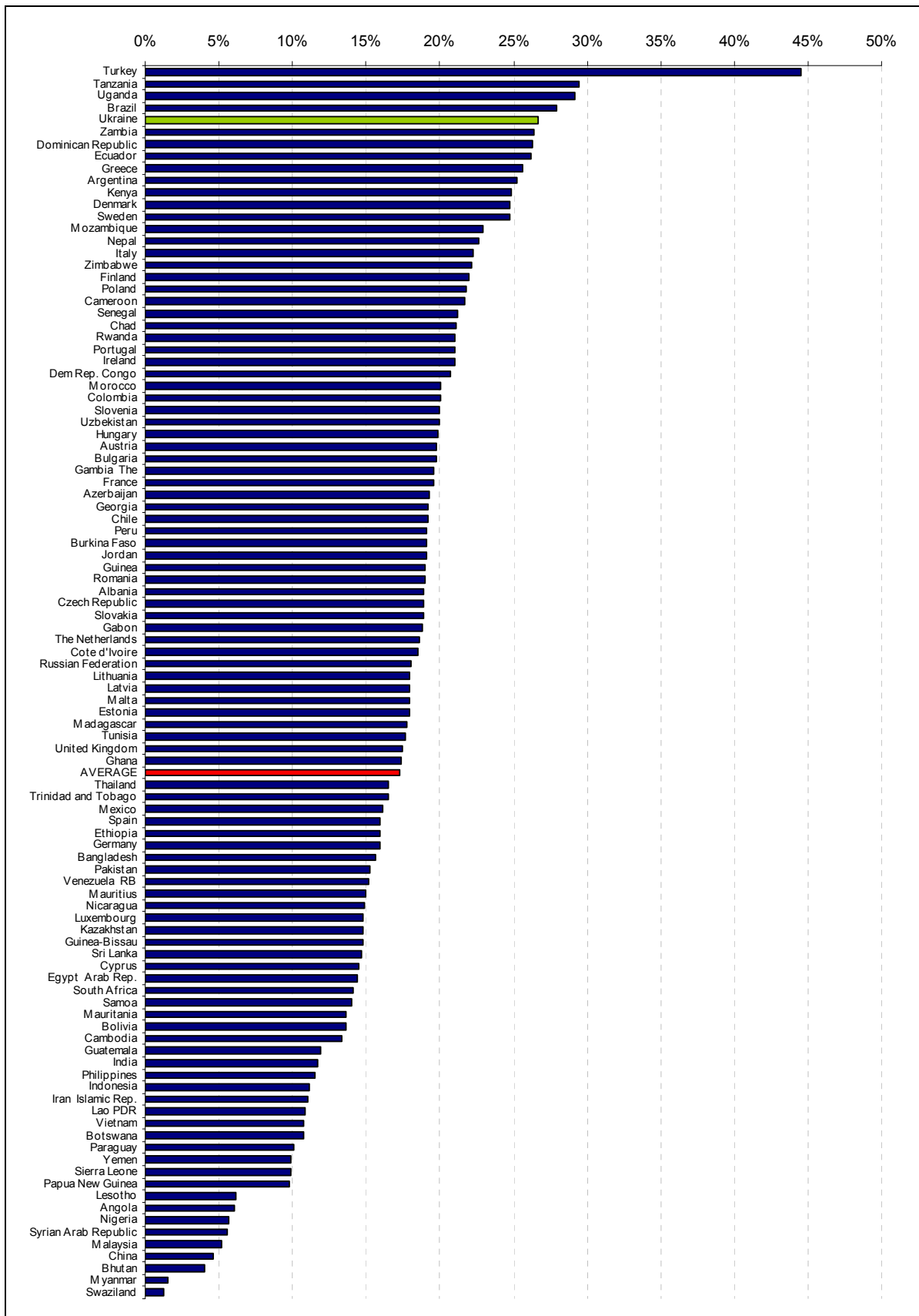
- A pension fund contribution of 7.5% of an operator's subscriber revenues. This contribution acts de facto as a second VAT on mobile revenues. This tax applies across other goods in Ukraine, such as alcohol and tobacco, which have very different features to mobile services. However, a similar contribution does not apply to the fixed operator. As a result this tax distorts competition between fixed and mobile operators, potentially affecting areas of the country where mobile network operators act as universal service providers.
- Handset-specific taxes. These are a pension fund contribution of 1.5% of the value of the handsets imported, paid by handset importers and a \$2 permit paid on each handset imported in the country. These taxes contribute to inflate the price of handsets and cause a large number of handsets to be imported through parallel and unofficial channels. We estimate that in 2007 around 15% of total handsets in circulation had been imported unofficially in the country.

A joint GSMA/Deloitte report prepared in 2007⁷⁰ showed that in Ukraine taxes as a total share of cost of mobile ownership were the fifth highest in a sample of 100 countries worldwide.

That report suggested that taxation systems which levy higher taxes on mobile communications than the economy as a whole increase mobile prices, prevent less well off consumers from connecting to mobile networks and reduce usage of those that do. The report concluded that tax regimes that recognise mobile phones as a need, not a luxury, benefit all stakeholders in the economy.

⁷⁰ GSMA/Deloitte report 'Global Mobile Tax Review', 2006-2007, available at <http://www.gsmworld.com/TAX/2008> Deloitte & Touche LLP. Private and confidential

Figure 87: Tax as a percentage of Total Cost of Mobile Ownership



Source: GSMA/Deloitte 'Global Mobile Tax Review, 2006-2007

11.2 Economic impact

We initially calculate the economic impact of the mobile industry between 2003 and 2007 using static analysis. Our estimates are based on:

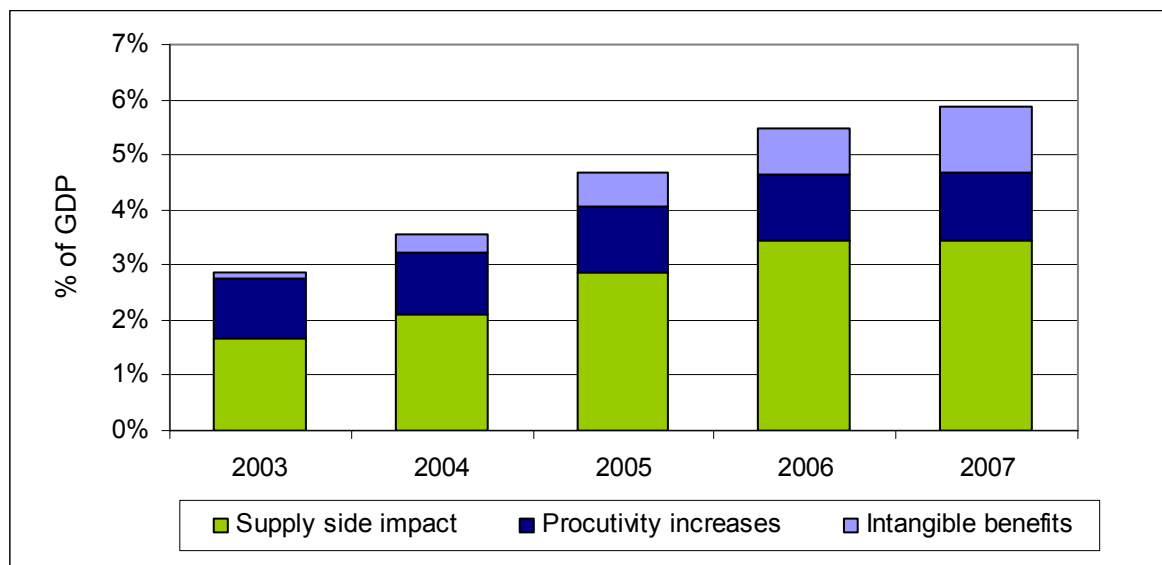
- Data collected from directly from Telenor;
- Interviews and data collected from others in the mobile value chain. These include Ericsson Ukraine, handset importer Comstyle, mobile specific wholesalers and retailers such as Euroset, Unitrade, Best, Startelecom and Mobidick;
- Data collected from public sources such as the Ukrainian Statistics Office, the World Bank and the ITU, and data from Wireless Intelligence and Budde report; and
- International benchmarks and studies.

We estimate that the mobile communications industry contributes a total of UAH 37bn to the economy in 2007, representing 5.9% of total GDP. This represents a significant increase on the 2003 contribution of 2.9% of GDP.

The following figure shows the three different effects of the mobile industry's economic impact:

- Supply-side effects: Value-add and employment from direct and indirect firms in the value chain;
- Demand side effects: Productivity increases resulting from people using their phones for business purposes; and
- Intangible benefits: the social benefits enjoyed by consumers.

Figure 88: Economic impact of the mobile communication industry in Ukraine



Source: Deloitte analysis based on data provided by key industry players in interviews, analysis of company accounts and industry reports and data provided by Telenor

11.2.1 Supply side impact of mobile communications

The supply side impact of mobile communications is formed by three components:

- Direct effects: the value add and employment created by the MNOs themselves;
- Indirect effects: the value add and employment created by other parties in the value chain; and
- Multiplier effects: the knock-on impact of the direct and indirect effects on the rest of the economy.

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

Our estimates illustrate that the value-add impact of the mobile communication industry in Ukraine will be UAHs 18.3bn in 2007. In addition, we estimate a multiplier effect for the Ukrainian economy of 1.2. We base our decision on literature reviews and interviews we undertook in Ukraine. This value reflects both the industrial structure of the country and its increasing exposure to foreign trade in particular with European countries and with the Russian Federation. This higher level of imports reduces the economic multiplier compared to other countries.

Once the multiplier effects have been accounted for, we estimate that the supply-side value add to the Ukrainian economy for 2007 is UAHs 22bn.

Value chain impact

Firstly, we analyse the value add of the mobile network operators in Ukraine. We find that they directly contribute UAH 9.67bn in 2007. Of this amount, Kyivstar directly generates UAH 4.2bn in 2007. A breakdown by category of value add is provided in the figure below.

Figure 89: Value add of mobile network operators (excluding multiplier effect), UAHs millions

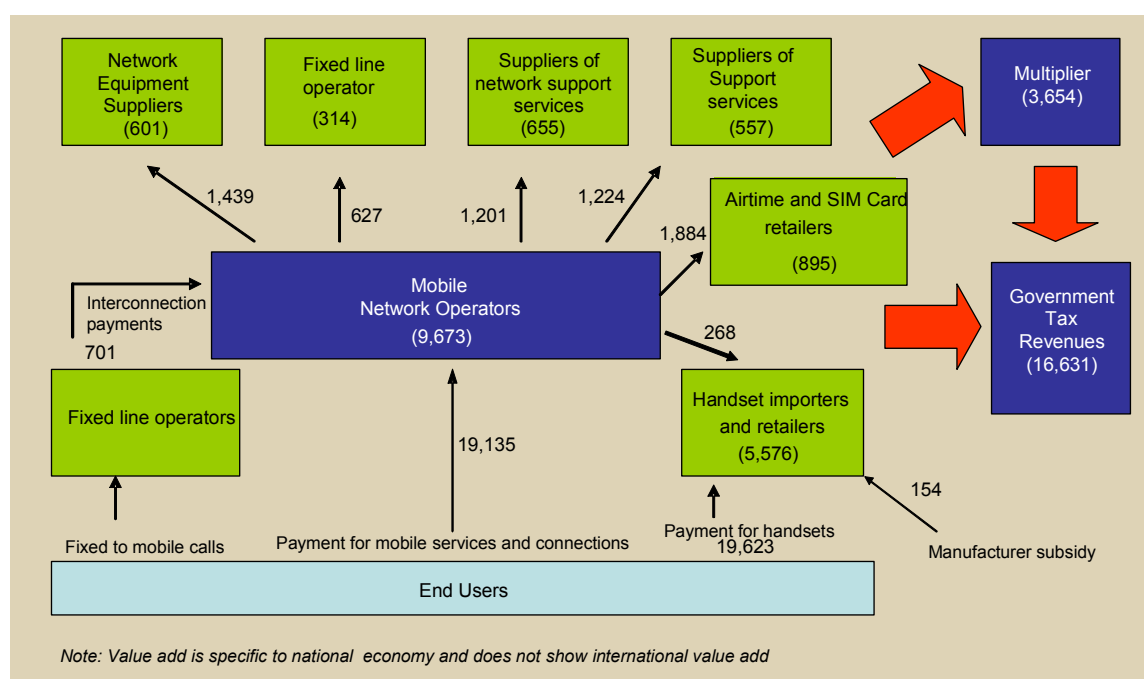
	2003	2004	2005	2006	2007
Employee wages and benefits	63	146	316	474	608
Contractors	36	57	127	106	106
Taxes and regulatory fees	1,874	2,698	4,360	7,021	8,927
CR	26	27	26	30	30
Dividends	-	35	-	-	-
Total	2,000	2,963	4,829	7,632	9,673

Source: Deloitte analysis based on data provided by key industry players in interviews, analysis of company accounts and industry reports and data provided by Telenor

Taxes and regulatory fees (including spectrum fees) constitute the largest proportion, accounting for over 90% of the total in 2006. The next largest contributor is employee wages and benefits, followed by CR programmes.

We then analysed the revenue flows from the MNOs to other parties in the industry. We also sought to quantify the share of revenue that translated into value add⁷¹. Our primary source of information was interviews with operators and other parties along the value chain and analyses of operator accounts. The figure below provides revenue flows between service providers and estimates of the value add.

Figure 90: Mobile value chain in Ukraine in 2007 (UAHs millions)



⁷¹ Details on value add margins are contained in the assumptions appendix

Source: Deloitte analysis based on data provided by key industry players in interviews, analysis of company accounts and industry reports and data provided by Telenor

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.

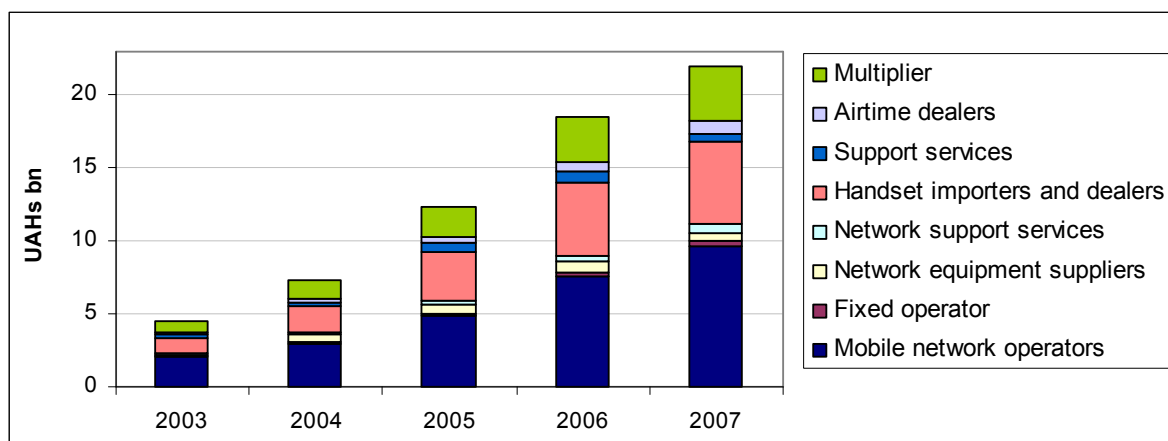
Figure 91: Calculation of value add from mobile communications in Ukraine in 2007, UAHs millions

	Total Revenue	Total Cost	Total Value-add	Value add with multiplier
Mobile network operators	19,836	10,164	9,673	11,607
Fixed operator	627	313	314	376
Network equipment suppliers	1,439	838	601	721
Network Support services (opex)	1,201	546	655	786
Handset importers and dealers	20,046	14,470	5,576	6,692
Support services	1,224	667	557	668
Airtime sellers	1,884	989	895	1,074
Total	46,257	27,987	18,270	21,924

Source: Deloitte analysis based on data provided by key industry players in interviews, analysis of company accounts and industry reports and data provided by Telenor

Figure 92 graphically illustrates shows the supply side value add from mobile communications from 2003 to 2007, divided by the category within the mobile communication value chain. Value add has increased by more than 380% during the five year period.

Figure 92: Supply side value add by category, 2003 to 2007, UAH bn



Source: Deloitte analysis based on data provided by key industry players in interviews, analysis of company accounts and industry reports and data provided by Telenor

The categories identified above include:

- Fixed line operator: the value add associated with mobile services is generated by the interconnection payments from the MNOs to Ukrtelecom, on which value add margins are applied;
- Network equipment suppliers, who sell over 80% of equipment to mobile operators: these are both foreign investors but also local producers who provide items such as antennas, masts and batteries. In addition, site preparation and installation is carried out domestically and generates value add;

- Network support suppliers, who are employed by MNOs to maintain network sites;
- Support services acquired by MNOs include tax, legal and regulatory advice, and auditing, advertising and cleaning services. Expenses on utilities are also included in this category;
- Handset importers and dealers include here the value add generated across the entire value chain associated with handset trading. Handset related value add is generated by revenues from legal handsets as well as from handsets that reach Ukraine through parallel channels. In addition, revenues are generated by the sale of second hand handsets distributed in shops or markets or by informal sales. These are estimated to be over one third of all handsets circulated in Ukraine in 2007. MNOs in Ukraine do not sell handsets directly to customers; and
- Airtime distributors are formed by the general points of sale for airtime but also by mobile-specific retail shops. The majority of airtime and SIM cards are sold through third parties in Ukraine and a commission is paid directly by MNOs to their distributors. Most distributors control a chain of mobile specific retail shops. Value add is generated by the commissions paid by MNOs.

Taxes and Regulatory fees

Tax revenues to the government are raised through taxes specific to mobile services, corporation tax, income tax and other social contributions paid on employees' wages, regulatory fees and spectrum fees. These are estimated to total UAH 8,927m in 2007

Figure 93: Tax revenues in Ukraine from mobile operators, 2007, UAH millions

	2007
Corporation tax	2,819
Social contributions and income taxes	701
VAT	3,827
Pension fund duty	1,269
Total tax paid	8,615
Licence fee	312
Total tax and other government fees	8,927

Source: Deloitte analysis based on data provided by key industry players in interviews, analysis of company accounts and industry reports and data provided by Telenor

The largest proportion of tax revenue is raised through VAT and corporation taxes. The pension fund duty to which operator are subject is the third largest tax item. This represents 14% of tax paid. The high level of taxation to which mobile operators are subject makes Kyivstar the largest tax contributor in the Kyev region.

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 the handset specific taxes described above, VAT, corporation tax and employee income taxes and social contributions in our calculations below.

Figure 94: Total tax revenues from the mobile value chain, 2007, UAHs millions

Tax Revenue	Tax Revenue	Tax Revenue with multiplier
Mobile network operators	8,927	10,713
Fixed operator	125	150
Network equipment suppliers	278	334
Network support services	292	350
Handset importers and dealers	3,620	4,344
Support services	217	260
Airtime dealers	400	480
Total	13,859	16,631

Source: Deloitte analysis based on data provided by key industry players in interviews, analysis of company accounts and industry reports and data provided by Telenor

Government revenues make up over 75% of the value add in the mobile communication chain. This value is high in international comparisons, and is inflated by mobile specific taxes such as the pension fund contributions to which mobile operators and handset importers are subject.

Corporate Responsibility

Interviews with stakeholders suggest that CR programmes organised by mobile operators will receive over UAHs 30mn in 2007.

Interviewees suggested that CR programmes carried out by mobile operators are valuable in Ukraine. These include programmes aimed at extending communications and IT skills in rural areas and for disadvantaged members of society with a long term view of providing them with valuable skills in the labour market. Other social projects aim at reducing the divide between urban and rural areas, and between elderly people and other members of society by providing opportunities of communication. Other charitable projects provide support to orphans, invalids, veterans and elderly people.

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 following figure sets out the impact of the mobile communications industry on domestic employment. Our figures include the whole value-add chain associated with mobile services, and are therefore a measure of both direct and indirect employment. In addition, an economic multiplier of 1.2 is applied to the employment to take into account the wider effects on employment generated by the mobile industry. This is the same as the economic multiplier applied to GDP.

Figure 95: Contribution to employment from the mobile value chain, 2003-2007, FTEs

	2003	2004	2005	2006	2007
Mobile network operators	3,470	4,950	6,900	7,890	12,300
Fixed telecommunications operators	5,000	5,000	6,960	6,970	6,970
Network equipment suppliers	720	760	930	950	1,050
Network support services	3,370	2,890	3,150	3,880	7,090
Handset importers	190	200	230	250	280
Suppliers of support services	1,100	1,220	1,630	1,540	1,450
Airtime and mobile phone sellers	47,800	52,650	58,000	63,700	70,080
Multiplier effect	12,350	13,530	15,560	17,000	19,840
Total employment	74,000	81,200	93,360	102,180	119,060

Source: Deloitte analysis based on data provided by key industry players in interviews, analysis of company accounts and industry reports and data provided by Telenor

Our analysis shows that the contribution of the mobile sector has been significantly increasing since 2003 and that the mobile industry now employs almost 120,000 Ukrainian FTEs. This compares to almost 75,000 in 2003. It is worth noting the increase in the number of workers employed directly by MNOs, estimated at around 9000 FTEs in 4 years. These workers receive work shadowing, apprenticeships and other formal training and receive the opportunity to work in a competitive environment. Kyivstar has been named the best employer in 2006 by business magazine Dilavoi and by an international consultancy firm.

The largest category of employment is airtime and handset sellers. These include shops specialised in selling handsets and mobile services but also food stores, supermarkets, kiosks, street vendors and newsstands that sell mobile airtime. We estimate that currently there are around 8,500 mobile-dedicated shops in Ukraine while the number of non-specialised points of sale is around 25,000. Not all employees of non-specialised shops are included in the figures above, but only those full time employees directly related to the sale of airtime and mobile services.

The number of employees in other sectors is estimated based on interviews undertaken in Ukraine and, where data was not available, is calculated as revenue received from the mobile network operators divided by the average wage in a particular sector. These assumptions are listed in the appendix.

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

There are numerous ways in which mobile services can improve productivity, particularly in a country like Ukraine where fixed telephony penetration has been extremely low and where the Receiving Party Pays system in operation until 2002 generated consumers' resistance to use phones, especially in poorer rural areas.

During our interviews with mobile operators and with third parties involved in the mobile business, a number of specific areas where mobile productivity improved in Ukraine were noted, including:

- Creating market efficiency for large companies, medium and small enterprises and independent traders;

- Substantially improving small trade and import/export business, for example in the Odessa seaport. Mobile communications prove a powerful tool to estimating demand, updating estimates and finding new customers. For instance mobile phones offer real time information on exchange rates, which helps efficiency in trading;
- Significantly improving logistics for large companies, in particular for internal communications and transportation. In addition, Location Base Services are successfully used to track employees who work outside the company's premises, which has reportedly increased productivity;
- Services companies have started advertising via mobile phones and have launched promotions targeted at customers who accept to receive SMS on their handsets. This has proved beneficial for their business and for the media industry;
- Contributing to developing the private transport sector in large cities: in particular a number of cab drivers companies have started coordinating actions through mobile phones, thus offering a more efficient and less congesting services;
- Boosting the informal economy, especially in rural areas. Prepaid scratch cards are often used as a means of transferring money between family units and more importantly when informal business is undertaken. This is particularly relevant for urban informal workers; and
- Data services are starting to gain importance. These services are now confined mostly to urban business workers but their availability is spreading. For example, Kyivstar's EDGE service is widely used for Blackberry devices to exchange emails on the go. Significant increases in productivity are usually associated with widespread use of data services. Mobile operators need access to UMTS licence to further develop the data market.

No established economic methodology exists to estimate the GDP and employment effects of such productivity improvements across the economy. Other surveys have typically quantified productivity improvements to be between 6% and 11%. Based on our interviews, it may be assumed that the productivity increase in Ukraine would be at the high-end of this range since:

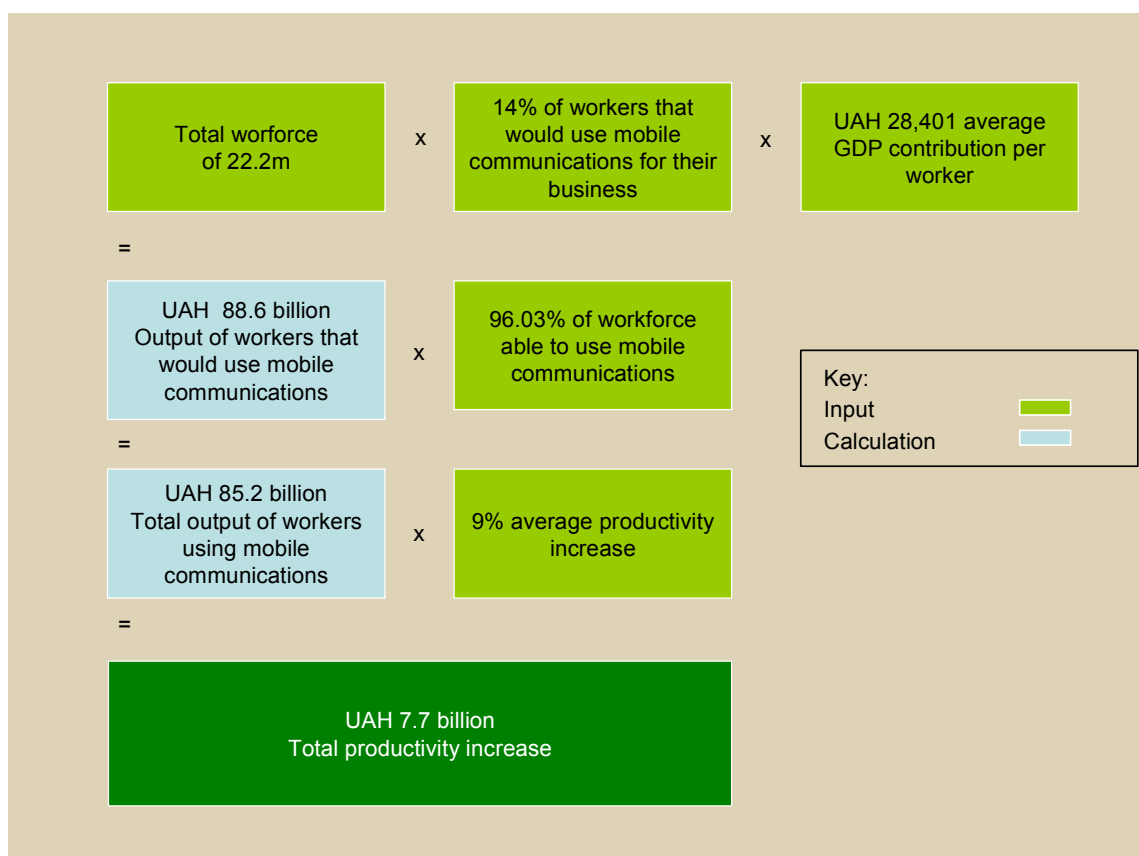
- Mobile coverage in Ukraine is virtually universal. Ukraine. Low fixed line penetration and an internet penetration of only 12% of population implies the incremental productivity associated with mobile services is likely to be higher than in other countries with more developed alternative infrastructures. Mobile phones have provided universal communications for the first time in the Ukrainian history. Productivity levels have therefore benefited more than in other countries;
- Interviewees have all reported on the dramatic impact that mobile telephony has had on the Ukrainian economy. These reports have described changes that appear greater than those documented in other reports;

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

We therefore assume that initially a productivity gain of 9% has been experienced by workers who use a mobile phone for business purposes. Further productivity gains may follow additional UMTS licensing, which could speed up the roll out of mobile broadband and increase internet penetration.

Using the economic value concept that we set-out previously, we estimate the incremental impact on the economy is UAHs 7.7bn in 2007.

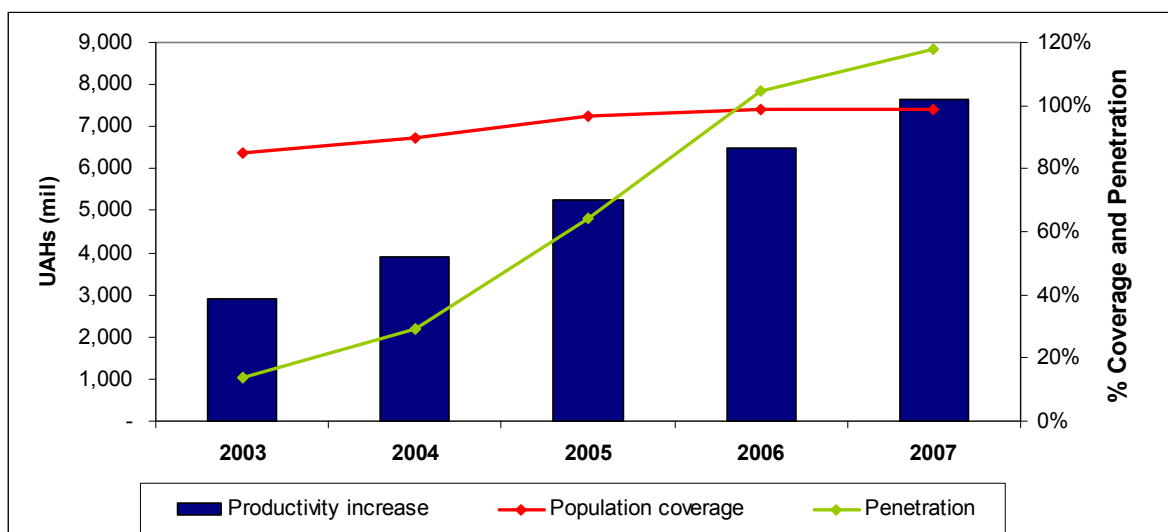
Figure 96: Economic impact in 2007 of increased productivity amongst workers who use mobile phones for business purposes



Source: Deloitte analysis based on Deloitte assumptions, interviews and Ukrainian Statistics Office

Our calculations show large increases in productivity between 2003 and 2007.

Figure 97: Economic value from increases in productivity, 2003 to 2007



Source: Deloitte analysis based on Deloitte assumptions, interviews and Ukraine Statistics Office

11.2.3 Intangible impacts

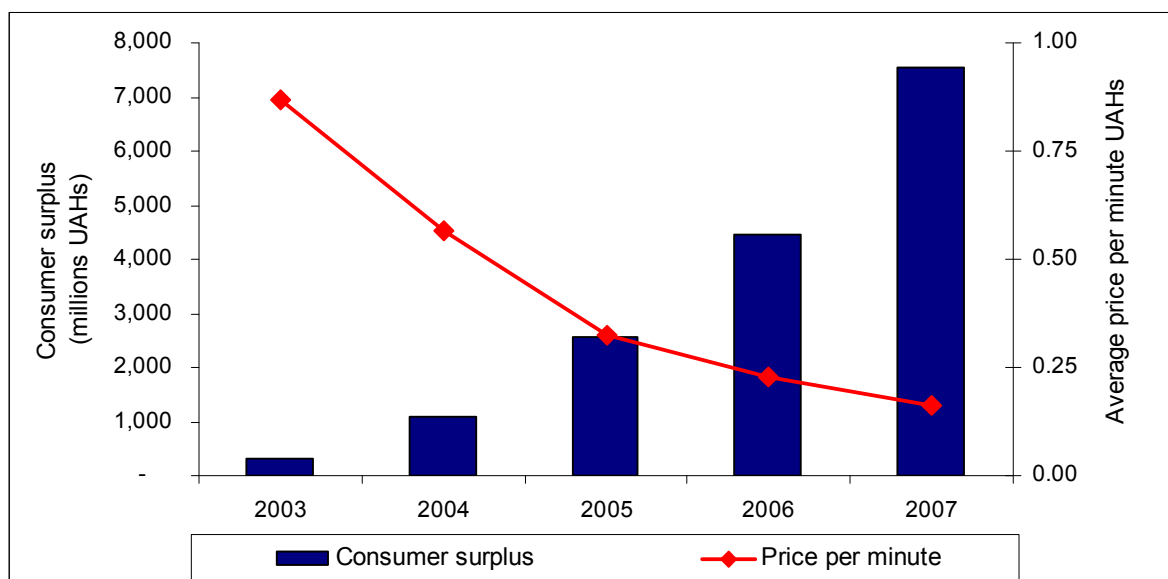
During our interviews, we asked individuals for their views on the intangible benefits of mobile communications in Ukraine. Benefits identified in Ukraine include:

- Contributing to the democracy development and to the openness of society: during the 'orange' revolution in 2004, mobile technologies, and text messaging services in particular, enabled hundreds of thousands of demonstrators to coordinate their activities and take to the streets of Kiev to contest the election results. This has been identified by many as an important step in how mobile communications were perceived in Ukraine;
- Developing interpersonal and family communications: because of the scarcity of fixed lines, people living in urban areas have traditionally found it hard to communicate with family in rural areas, such that a real barrier existed between cities and the countryside. This constituted a worrying social problem for most people in Ukraine. In rural areas mobile phones have replaced fixed lines, which has contributed to the developments of urban/rural communications and to social cohesion within the country;
- Using Location Base Services (LBS) such as those offered by Kyivstar has promoted social cohesion. Child tracking devices are extremely popular and are valued highly by parents. Tracking of elderly people living in rural areas has proved useful to tackle the significant social issues associated with poverty and abandonment of elderly people. In addition, LBS proved useful to police forces;
- Extension of communications to users with low education and literacy, particularly elderly people living in rural areas; and
- Extension of communications to those on low incomes: second hand (or even third hand) handsets are extremely cheap (those interviewed reported that used handsets can be

available for 50UAHs) and readily available, open markets in which handset trading occurs are present in most cities.

We have estimated this value using the willingness to pay concept. Average prices per outgoing minute 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 prices at the time of subscription, less prices today (which is are lower due to increased competition and other factors). The total increase in consumer surplus has been estimated as UAH 7.6bn for 2007.

Figure 98: Consumer surplus and price per minute over time

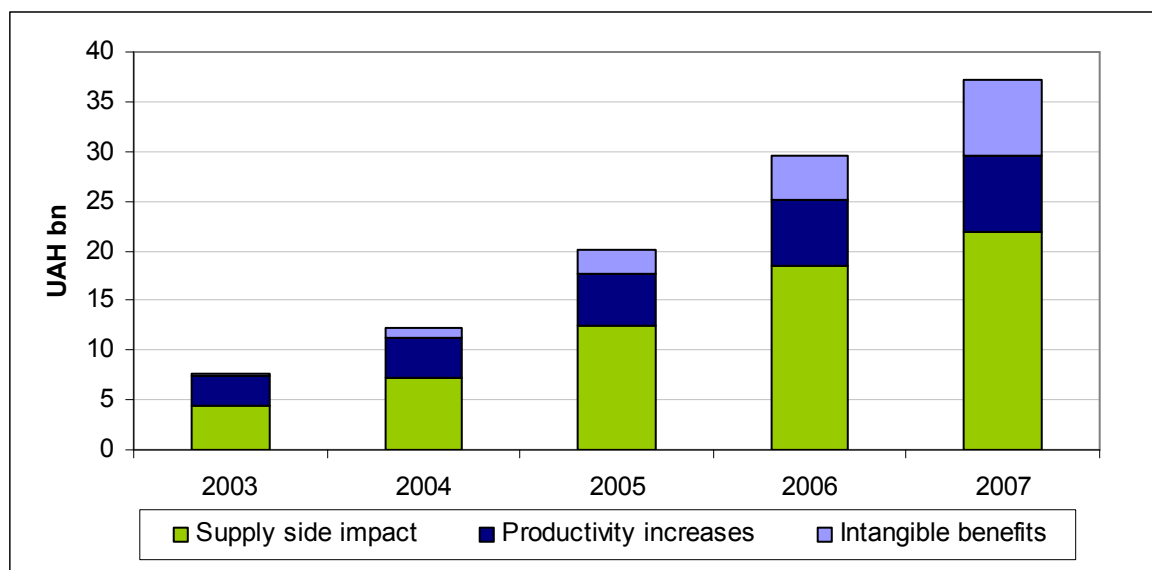


Source: Deloitte calculation based on Telenor's information

11.2.4 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 Ukraine. This is estimated to be UAH 37.1bn in 2007, increasing from UAH 7.7bn in 2003.

Figure 99: Economic impact of mobile communications in Ukraine (UAH millions)



Source: Deloitte analysis based on data provided by key industry players in interviews, analysis of company accounts and industry reports and data provided by Telenor

11.2.5 Dynamic relationship between mobile communications and growth

We have also 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 in developing and transitional countries⁷². This impact typically falls as access to communications and other infrastructures becomes more widespread. A figure of 0.6% has been estimated for the impact in developed countries⁷³.

Although penetration is well above 100% in Ukraine, many commentators suggest a growth rate of penetration of at least another 10% in 2008. This might lead to an increase in the long-term GDP growth rate of between 0.6% and 1.2%.

11.3 Conclusion and policy implications

The Ukrainian mobile sector has experienced exceptional subscriber growth since 2002 and creates a substantial and increasing proportion of the country's economic value. It is estimated to have contributed 4.7% of GDP in 2004, increasing to 5.9% in 2007. In 2007, approximately 119,000 FTEs were employed directly and indirectly by the industry.

The impact of the communications is demonstrated through supply side and productivity impacts. However, consumers have also benefited from an increased range of services and falling prices. The average price per minute⁷⁴ is estimated to have fallen 50% in 3 years. The fall in prices has

⁷² Shown in GSMA/Deloitte report 'Global Mobile Tax Review', 2006-2007, available at <http://www.gsmworld.com/TAX/>

⁷³ 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.

⁷⁴ Based on outgoing calls only.

been accompanied by an increase in coverage levels and this has contributed to the general accessibility of mobile services.

By continuing to grow its subscriber base and provide new services, the mobile sector may be able to increase its GDP contribution. A regulatory and licensing regime that combines international best practice with local considerations would be supportive of this growth opportunity⁷⁵. For example, the issuing of additional 3G licences would allow for further service innovation including the delivery of data connectivity to larger proportion of the Ukrainian population. In addition, the government could further support the sector's development through fiscal policies consistent with the remainder of the economy, notably a review of the current pension funding requirements.

⁷⁵ International regulation of note includes the EU Communications Regulatory Framework for electronic communications networks and services, covering all forms of fixed and wireless telecoms, data transmission and broadcasting (2002). This is a package of 7 legal instruments including Directives on access, interconnection and LLU.

12 The Economic Impact of Mobile Telephony in Malaysia

12.1 Overview

The Malaysian mobile communications market consists of three major players. These are set out in the figure below with information about their year of the network launch and market shares.

Figure 100: Market share of operators

MNO	Year of network launch	Market share
Maxis	1995	41.3%
Celcom	1995	30.3%
DiGi	1995	28.4%

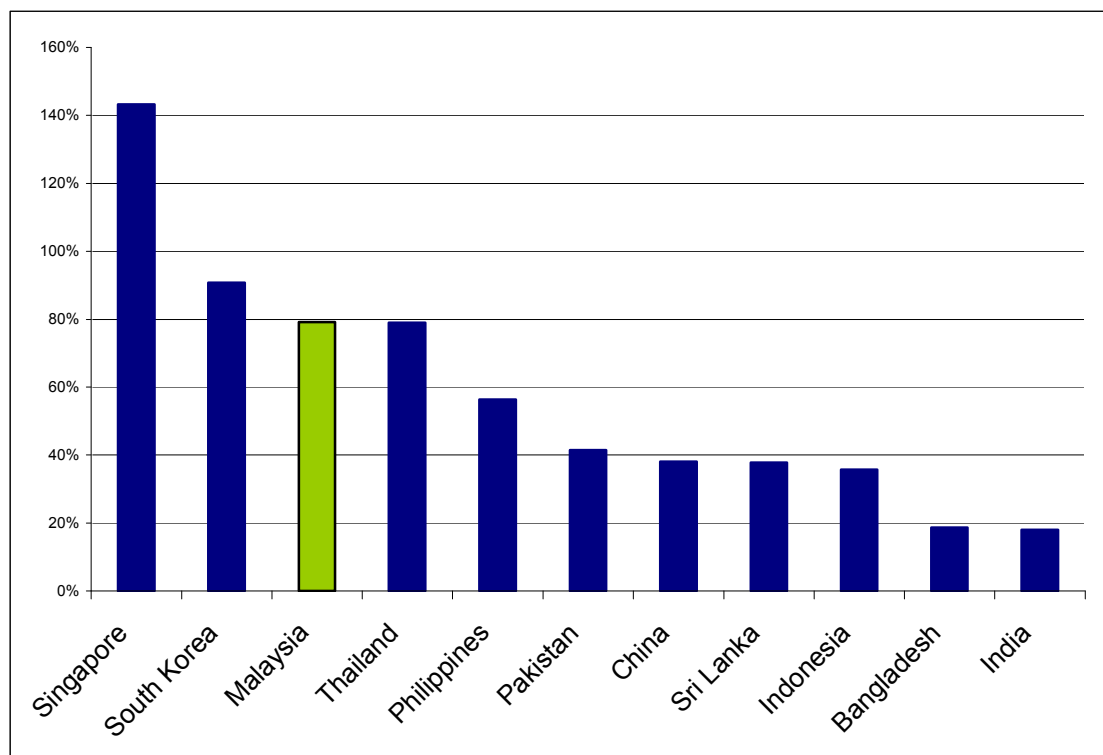
Source: Network launch information from GSMA; market share information for Q3 2007 from Wireless Intelligence

Mobile networks have been rolled out in both rural and urban areas and population coverage is now around 95%. The number of mobile connections now exceeds those of the fixed line operator, Telekom Malaysia, by almost 5 to 1. This has meant that even those in the most rural areas have access to communications which has assisted in the establishment of new businesses in these areas.

In the mid-1990s, the Malaysian mobile industry experiences subscriber growth rates in excess of 50% per year. This growth slowed slightly during the Asian financial crisis in the late 1990s but the industry managed to pick up pace again in 2000/01. Mobile subscribers, which stood at 7.5 million the beginning of 2002, now exceed 21 million implying a population penetration of almost 80% giving Malaysia the third highest penetration in the region. This high level of penetration is likely to be due to the extensive network coverage and also the falling prices of mobile communications.

Figure 101 shows mobile subscribers as a percentage of population in a sample of South East Asian countries. Malaysia is likely to compare more favourably than the graph may suggest since Malaysian MNOs no longer record inactive SIMs while operators in other countries may continue to do so.

Figure 101: Mobile penetration in a sample of South East Asian countries, Q3 2007



Source: *Wireless Intelligence*

Given the high levels of penetration, the possibility for further subscriber growth is likely to be more limited, and future growth may arise from increased usage as new applications and devices are brought to the market. Technological innovation is therefore particularly important for the development of the Malaysian communications industry.

The Malaysian market, along with several others in the region, are generally recognised as leading mobile service innovation in terms of both technology and in adoption. This means that these markets are used to test new product and services before they are launched elsewhere.

Some examples of innovative service offerings in Malaysia include:

- The launch of a mobile-based remittance service by DiGi in partnership with Citibank Berhad. This is specifically targeted at migrant workers so that they can transfer money back to Bangladesh, Indonesia and the Philippines. This mobile service is expected to empower people by giving them access to banking services even if they do not have bank accounts.
- An airtime transfer service which allows subscribers to pass on airtime credit to other subscribers, for example from parents to children and from urban-based subscribers to those in rural areas.
- A service which allows people to locate other mobile subscribers based on the nearest base station. This service is particularly useful to parents.

- A “touch to pay” service currently being trialled which allows people to pay for goods and services using their credit card or prepaid vouchers via specially designed handsets.⁷⁶

The increasing convergence of service offerings, which results from the technological possibility of MNOs to now provide both voice and data services, increases the potential for MNOs to act as universal service providers. This heightens the importance of efficient spectrum management in order to derive the greatest benefits for consumers and Malaysia as a whole. This is discussed further in Section 12.1.1 below.

12.1.1 Importance of mobile communications and long term objectives for the market and Malaysian economy

The benefits of mobile communications extend beyond the value-add and employment created by the industry itself to the productivity improvements achieved by workers and the intangible benefits enjoyed by consumers. Moreover, an advanced communications industry is key to the economic development of a country. Recognising the importance of the communications sector, the Malaysian Ministry of Energy, Water and Communications (MEWC) has set out its eight key objectives for information and communications services in Malaysia (MyICMS 886).⁷⁷ These objectives include:

- Increasing broadband and 3G take-up;
- Promoting mobile television; and
- Providing universal service for voice and data services in rural areas.

These targets have been further developed in the National Broadband Plan by the government's investment holding arm (Khazanah Nasional) which is responsible for developing selected industries in Malaysia in order to pursue the country's long term interests. It is clear that MNOs are fundamental to Malaysia meeting its objectives by 2010. The provision of sufficient and efficient access to spectrum alongside the creation of incentives to invest in uneconomic areas, are important in realising MEWC's objectives. The role of regulatory and government policy towards MNOs will be decisive and a collaborative approach to defining policies and incentives is required between the various parties.

MNOs are already providing voice services in rural areas and, potentially, could become providers of data and broadband services in both urban and rural areas. In some, particularly underserved rural areas, mobile networks are currently the only form of telecommunications network and in others they may be preferable to fixed networks. Even in some urban areas, mobile networks may provide more reliable access. For example, in Johor (south Malaysia) last year's serious floods badly compromised fixed line services, however mobile services were able to continue providing services to both individuals and business whereas fixed line services were only fully recovered

⁷⁶ Source: Maxis press release 5 November 2007

⁷⁷ The Malaysia Information, Communications and Multimedia Strategy (MyICMS) was developed in 2006 and sets out the country's objectives for the industry to be achieved by 2010 (<http://www.myicms.com/index.html>).

after 6 months. Mobile networks in Malaysia appear to be an important complement to fixed line technology.

A high degree of competition between the MNOs has led to falling retail prices and this, combined with the high levels of coverage, has led MNOs to act as universal service providers in many areas. This creates a potential case for MNOs to receive universal service provision (USP) funding particularly where mobile networks are better suited than fixed line networks to providing access to voice and data services.

Increasing convergence between fixed, mobile and media service offerings increases the need for efficient spectrum management so that the greatest value is achieved for Malaysians. One way of achieving this would be for the regulator and stakeholders to work in partnership to determine the most efficient use of spectrum and the way in which licences are awarded (e.g. beauty contest or auction). This could help in supporting a spectrum management process that is open and fair.

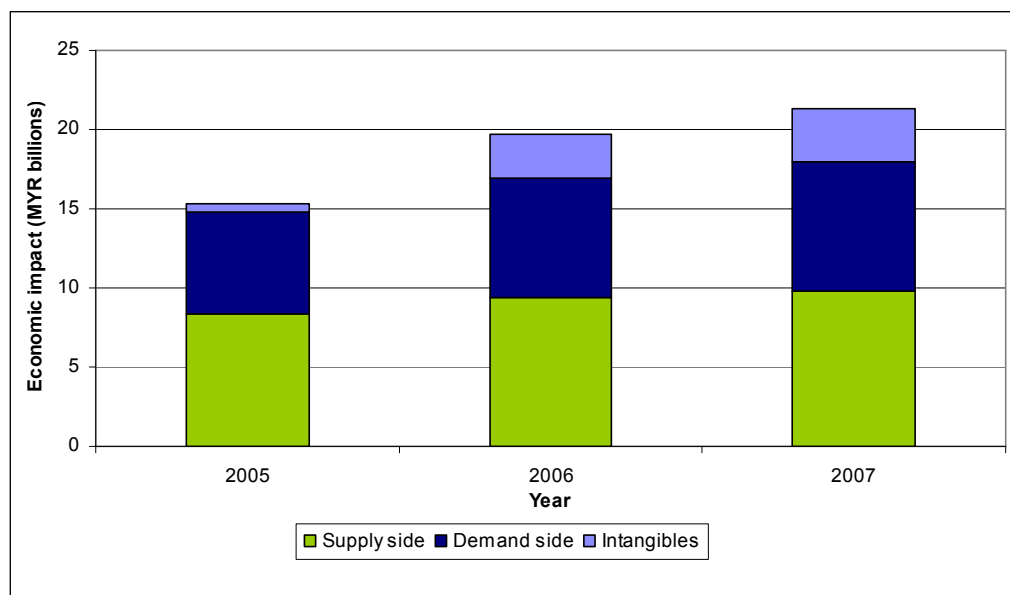
The Malaysian Communications and Multimedia Commission (MCMC) and MEWC have played a positive role in the development of the mobile communications industry. Both the regulator and the government have a proactive approach to balancing the need for regulation and promoting competition. The use of regulatory impact assessments with stakeholder involvement could help Malaysia to achieve affordable communications for all and the greatest benefits for consumers while balancing the long term future of the market. If the government and the regulator were to continue to adopt an open and consultative policy towards the regulation of the mobile communications market, this might help to avoid excessive intervention in the market and to promote the efficient functioning of the market. In this way, MCMC, MEWC and the MNOs can work in partnership to deliver affordable communications for all.

12.2 Economic Impact of Mobile Communications in Malaysia

This section sets out the results of our analysis of the Malaysian mobile communications industry. Figure 102 below summarises the economic impact of the mobile communications industry in Malaysia from 2005 to 2007. It can be seen that the overall economic impact has increased over time. In 2007, the total economic impact was MYR 21.3 billion, compared with just MYR 15.3 billion in 2005. This reflects the growing importance of the industry in terms of:

- Creating value-add and employment as penetration continues to rise; and
- Improving the productivity of workers as mobile network coverage extends and take-up increases; and
- Increasing intangible benefits enjoyed by consumers as the range of services are expanded and prices fall over time.

Figure 102: Economic impact of the mobile communications industry in Malaysia



Source: Deloitte analysis based on data provided by key industry players in interviews, analysis of company accounts and industry reports and data provided by DiGi.

Our findings are based on:

- Interviews and data collected from publicly available sources including Malaysia Statistics, the Malaysian Labour Force Survey, Wireless Intelligence, United Nations and the International Monetary Fund (IMF);
- Interviews and data collected from DiGi;
- Interviews and data collected from others in the mobile value chain including infrastructure providers (Nokia Siemens Networks and Ericsson), handset importers and dealers, and airtime and SIM distributors and retailers; and
- International benchmarks and studies.

12.2.1 Supply-side impact of mobile communications

The supply-side impact is comprised of three parts:

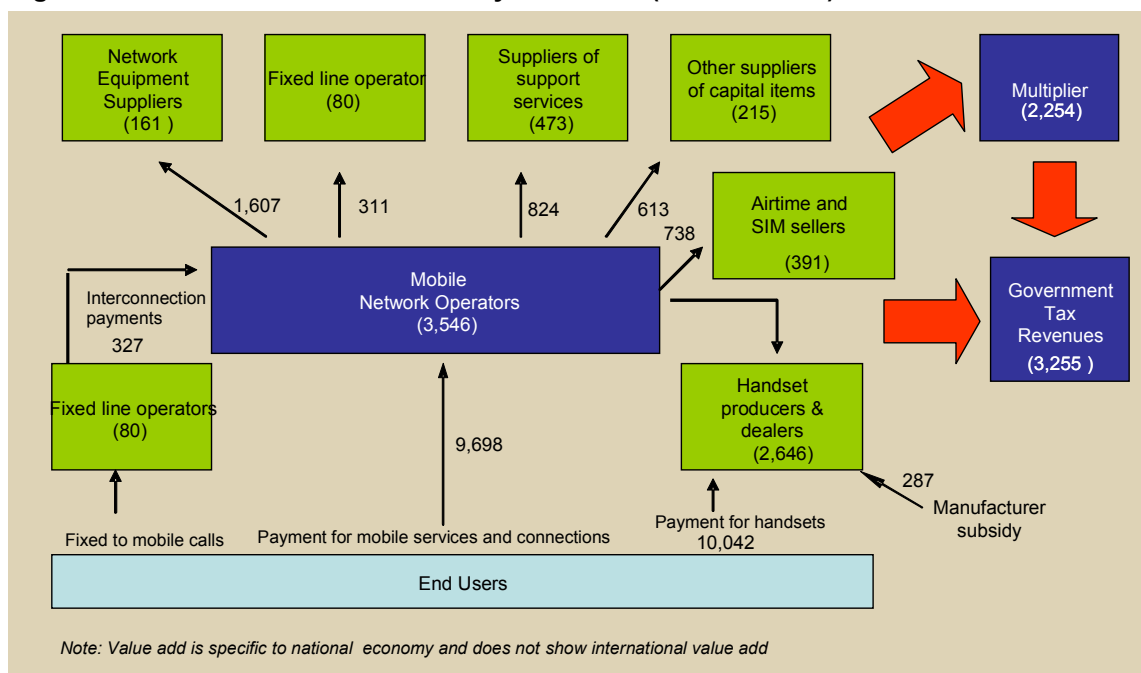
- Direct effects: the value-add and employment created by the MNOs themselves;
- Indirect effects: the value-add and employment created by other parties in the value chain; and
- Multiplier effects: the knock-on impact on the rest of the economy of the direct and indirect effects.

We consider only the domestic impact of mobile communications and subtract international revenue flows from our analysis. Based on literature reviews and interviews with producers in Malaysia, we estimate a multiplier effect of 1.3 for Malaysia. This takes account of the relatively

large proportion of goods and services being produced in Malaysia rather than being directly imported.

Figure 103 below provides a graphical illustration of the mobile communications industry value chain. The numbers next to arrows represent the flows of revenues between MNOs and other parts of the value chain. The numbers in brackets represent the value-add.

Figure 103: Mobile value chain in Malaysia in 2007 (MYR millions)



Source: Deloitte analysis based on data provided by key industry players in interviews, analysis of company accounts and industry reports and data provided by DiGi.

It can be seen from the figure above that MNOs are estimated to be the largest contributors to value-add in the value chain in 2007. MNOs purchase goods and services from network equipment and other capital suppliers, fixed line operators and suppliers of support services.

In Malaysia, airtime and SIM cards are distributed by wholesalers on behalf of the MNOs and then sold in retail outlets. The revenue flows indicate the commission paid to these wholesalers and retailers by the MNOs.

New handsets are imported and then sold to distributors and then retailers. Second hand phones are sold by individuals either directly to end users or via retailers. The payment from end users for handsets takes account of new handsets and second hand handsets bought directly from individuals or from retailers. We also take account of the subsidy paid by manufacturers to handset importers and retailers. The value-add for handset producers and dealers takes account of the margins earned by all those in that part of the value chain (importers, wholesalers and individuals selling second hand phones). It can be seen that handset dealers and producers account for a large proportion of value-add in Malaysia. This is partly because Malaysians replace their handsets frequently (on average every 9 months) relative to other countries resulting in high revenues for these firms.

Figure 104 provides further detail of the revenue flows and value-add. The total revenue column shows:

- The revenue received by MNOs from end-users for airtime and SIMs and from domestic fixed line operators for interconnection;
- The revenue received by fixed network operators, network equipment suppliers, other suppliers of capital items, suppliers of support services, and airtime and SIM sellers and distributors (commission) from Malaysian MNOs; and
- The revenue received by handset importers and sellers from end-users and subsidies from the handset manufacturers.

Tax includes the tax paid by firms on the profits they make, the income tax paid by employees and employers on wages and, in the case of mobile operators, any regulatory and/or licensing fees.

Figure 104: Value add (MYR millions)

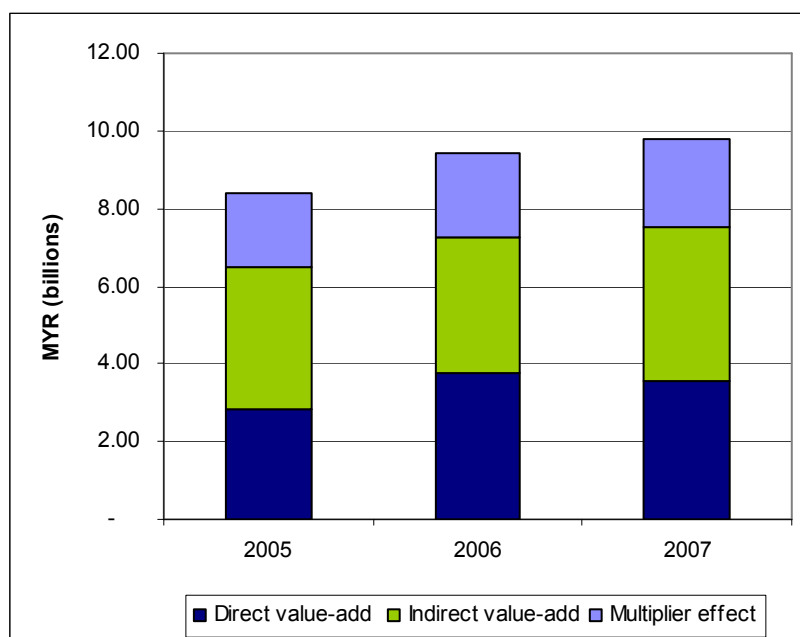
	Total revenue	Total cost	Total value-add	Value-add that is tax	Value-add with multiplier
MNOs	10,025	6,479	3,546	1,839	4,610
Fixed network operators	311	231	80	23	104
Network equipment suppliers	1,607	1,446	161	41	209
Other suppliers of capital items	613	399	215	54	279
Support services	824	351	473	113	615
Handset importers and sellers	10,329	7,683	2,646	379	3,440
Airtime and SIM distributors and sellers	738	347	391	74	508
Total	24,449	16,937	7,512	2,524	9,766

Source: Deloitte analysis based on data provided by key industry players in interviews, analysis of company accounts and industry reports and data provided by DiGi.

The figure above requires the use of value-add and tax margins for indirect firms in the value chain. These represent the value-add and tax of these categories of firms as a percentage of the revenue they receive. The value-add margin for network suppliers appears to be relatively small. This is because a large proportion of the network equipment supplier costs is the equipment itself. This means that wages costs as a proportion of revenue are relatively low and hence the value-add margin is low. Conversely, the value-add margin for network equipment suppliers and airtime and SIM distributors and sellers is relatively high. This is because a large proportion of their costs are wage related.

Figure 105 shows the direct, indirect and multiplier contributions to value-add in Malaysia over time.

Figure 105: Direct, indirect and multiplier contributions to value-add



Source: Deloitte analysis based on data provided by key industry players in interviews, analysis of company accounts and industry reports and data provided by DiGi.

In 2005, the supply side impact was MYR 8.4 billion including multiplier effects, almost 2% of GDP. By 2007, it had increased to almost MYR 10 billion, although this represented a similar percentage of GDP. The value-added by indirect firms in the value chain and the contribution of the multiplier effect are estimated to increase in the time period analysed. However, direct value-add is estimated to fall slightly. This is in part explained by the MNOs having achieved high levels of coverage and the decreasing requirement for further network roll-out for basic voice services. In addition, MNOs are likely to have become more efficient. Whilst lower expenditure by the MNOs reduces the supply side impact of mobile communications, it allows the MNOs to offer lower prices to consumers and this translates into higher consumer surplus (intangible benefits).

Figure 106 shows the direct, indirect and multiplier contributions to value-add in Malaysia over time.

Figure 106: Contribution to employment (2007)

Contribution to employment	FTEs
Direct (MNOs)	7,000
Indirect (related industries)	32,000
Multiplier effect	12,000
Total employment (FTEs)	51,000

Source: Deloitte analysis based on data provided by key industry players in interviews, analysis of company accounts and industry reports and data provided by DiGi.

12.2.2 Productivity impact of mobile communications

Mobile communications can be instrumental in increasing the productivity of workers across sectors in both rural and urban areas. In particular, access to mobile communications can:

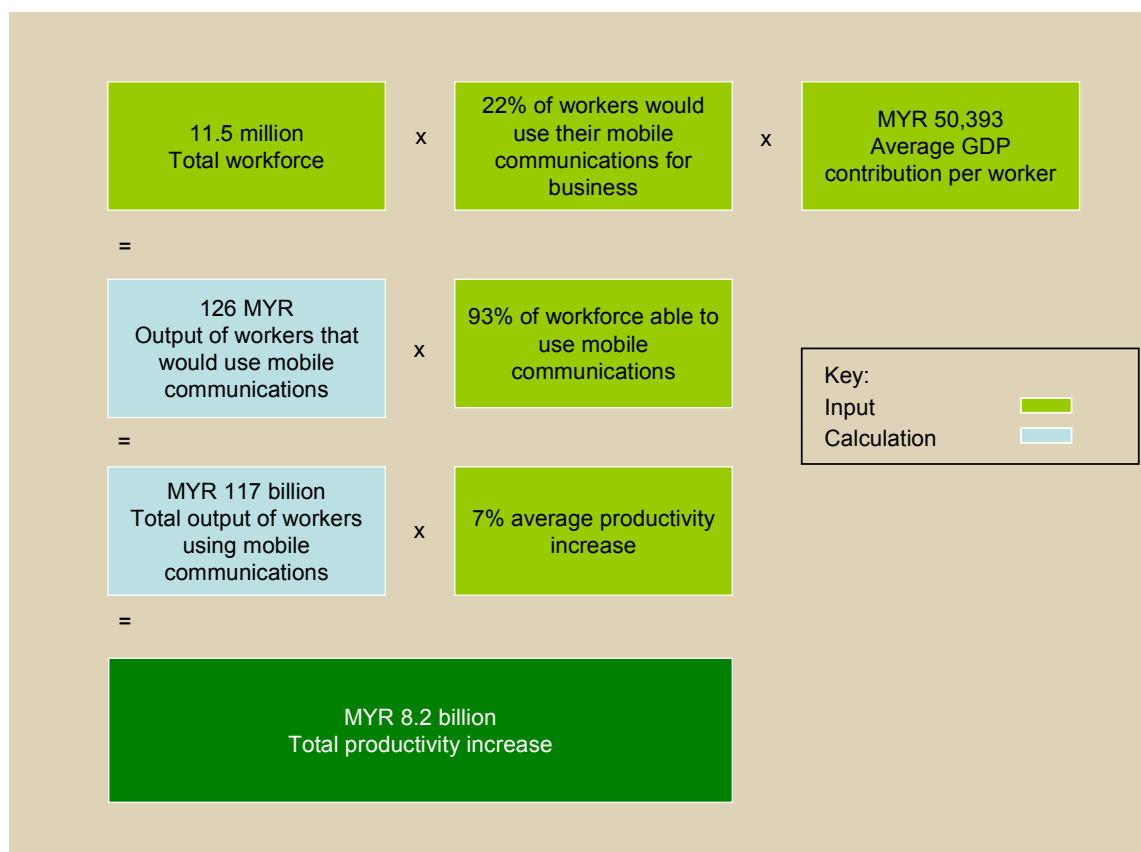
- Create market efficiency by improving information flows within companies and between buyers and sellers;

- Increase work flexibility by reducing travelling time and costs; and
- Promote business and entrepreneurialism in previously underserved rural areas.

Based on interviews and international benchmarks, we estimate that each worker using mobile communications for business purposes would benefit, on average, from a 7% increase in productivity. This is lower than in some international studies, reflecting the fact that Malaysian's have better access to fixed line voice and data services than workers in less developed countries. The use of all communications services increased the productivity of workers and, therefore, where fixed line services are relatively developed, the incremental impact of mobile communications is likely to be lower.

Figure 107 sets out the way in which we have estimated the productivity gains enjoyed by workers using mobile communications for business purposes. The numbers in the diagram relate to 2007.

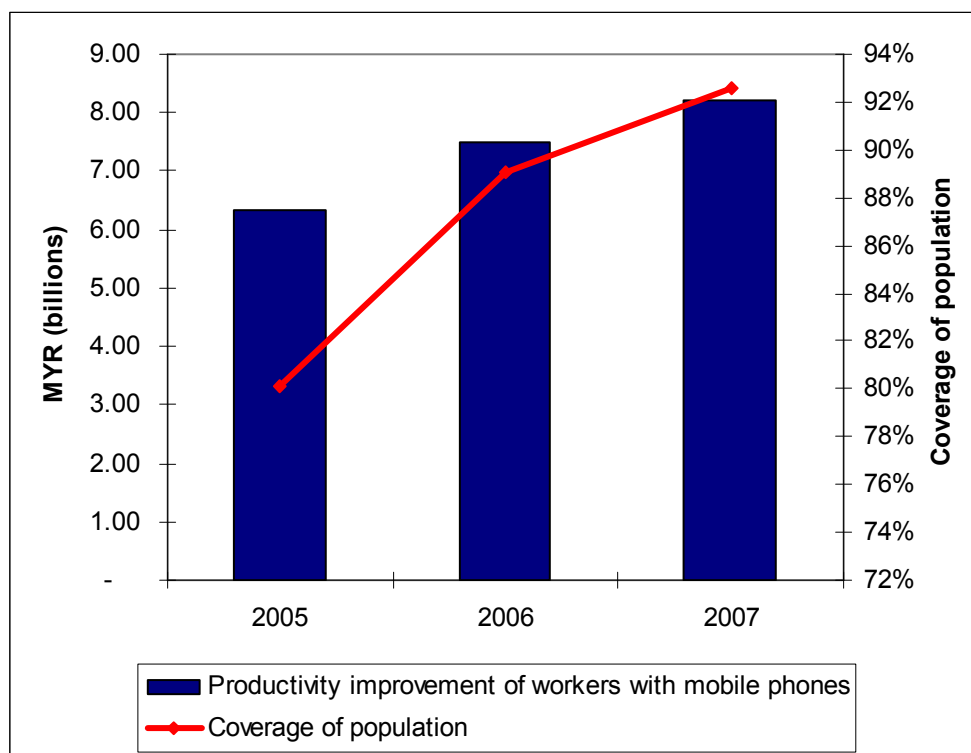
Figure 107: Calculation of productivity gains from mobile communications in 2007



Source: Deloitte analysis based on data provided by key industry players in interviews, analysis of company accounts and industry reports and data provided by DiGi.

We estimate that mobile communications will have increased GDP by MYR 8.2 billion in 2007 (around 1.4 % of GDP) via productivity improvements alone. This does not take account of the productivity impact on low mobility workers. As coverage of the mobile networks increases, more workers will be able to use mobile phones for business purposes and so the productivity impact increases over time (see Figure 108).

Figure 108: Productivity gains resulting from using mobile communications for business purposes



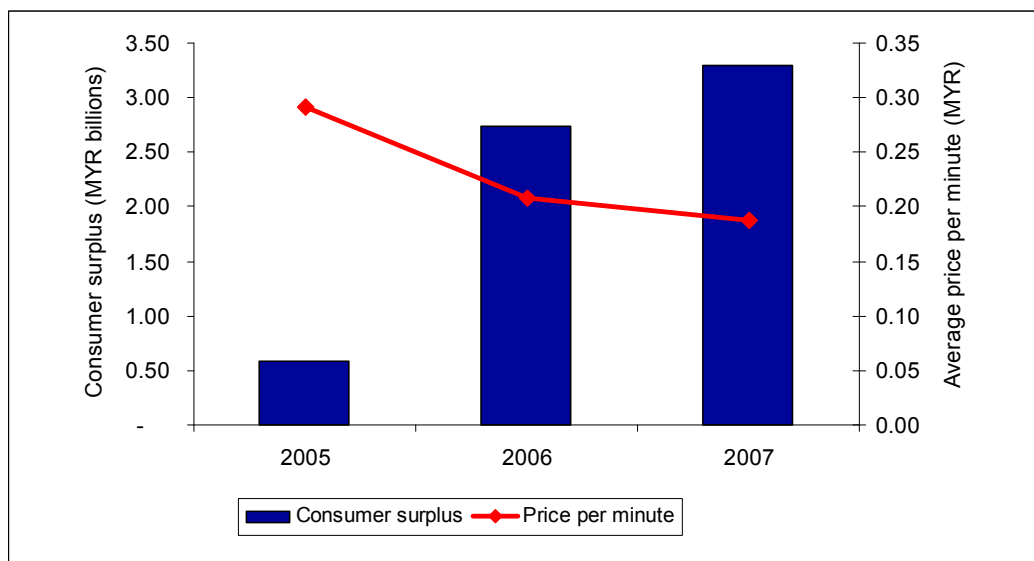
Source: Deloitte analysis based on data provided by key industry players in interviews, analysis of company accounts and industry reports and data provided by DiGi.

12.2.3 Consumer benefits

Intangible consumer benefits are the benefits of mobile communications enjoyed by subscribers less what they actually pay to buy these services. Some of the benefits enjoyed by subscribers include:

- Promotion of social cohesion by facilitating communication between families and friends;
- Extension of communications to those on low incomes who were previously underserved by other forms of communication;
- Easier and quicker access to health and education services;
- Assisting in disaster relief by helping them to gain access to emergency services, this is particularly important in Malaysia which has recently been hit by floods;
- Delivery of “peace of mind” to parents who can keep in touch with their children; and
- Access to value-added services.

Figure 109: Increasing intangible benefits over time



Source: Deloitte analysis based on data provided by key industry players in interviews, analysis of company accounts and industry reports and data provided by DiGi.

The figure above sets out the intangible benefits enjoyed by subscribers depending on the year in which they became subscribers. It can be seen that intangible benefits enjoyed by consumers increase over time as prices fall and new subscribers join.

Figure 110: Calculation of intangible benefits using the willingness to pay concept (MYR billions)

Subscriber group	2005	2006	2007
Subscribers joining in 2003	422	1,336	1,565
Subscribers joining in 2004	162	647	769
Subscribers joining in 2005	-	752	941
Subscribers joining in 2006	-	-	23
Subscribers joining in 2007	-	-	-
Total consumer surplus	585	2,736	3,297

Source: Deloitte analysis based on data provided by key industry players in interviews, analysis of company accounts and industry reports and data provided by DiGi.

These estimates may underestimate the true value of the net benefits enjoyed by consumers due to data limitations which mean that the calculations only take account of subscribers that have joined the network since 2003. Subscribers that joined the network earlier are likely to have higher minutes of use (MOU) and to have a higher willingness to pay than newer subscribers.

12.2.4 Other benefits

In addition to its contribution to economic growth and social benefits via its core activities, MNOs also contribute to improving the quality of life of Malaysians via their CR programmes.

Figure 111: Case study – HEAR Project

DiGi and the Ministry of Health have entered into an agreement to expand radio communications between ambulances and hospitals to areas that are currently not covered. DiGi will install emergency signal repeaters on its existing towers to enable two-way communications between ambulances and hospitals in the surrounding areas. This is intended to improve the efficiency and speed of emergency response by government and non-profit ambulance service providers in areas that were not previously covered. There will be no rental or installation charges for this service.

Source: DiGi

Another example is during the recent floods in Indonesia, DiGi was able to identify all its subscribers in Malaysia that were registered as being immigrants from Indonesia. DiGi then distributed free airtime vouchers so that they could contact their family and friends at home. In this way, MNOs are able made a very real contribution to the value of owning a mobile phone.

12.3 Conclusions

The Malaysian mobile sector is estimated to have contributed 3.7% of GDP in 2007 and to directly and indirectly 51,000 FTEs. Government policies have encouraged mobile operators to locate research and technology centres in Malaysia, supporting the Government's agenda of promoting Malaysia as a regional technology hub.

The rapid development of the mobile communications industry in Malaysia has led to high population coverage and penetration rates that are above the regional average. As the market has matured in terms of the number of subscribers, operators are focussing on developing new product offerings to increase the value of mobile communications to consumers. To the extent that MNOs have become more efficient and have been able to lower their capital and operating expenditure, they have passed on a significant proportion these benefits onto consumers in the form of lower prices.

As Malaysia continues to develop its economy further and the focus of investment shifts towards service-based industries, the need for advanced communications infrastructure becomes increasingly important. Such infrastructure is also necessary to provide universal and affordable coverage to all Malaysians.

The continuation and development of the open and consultative partnership between the MNOs and the MCMC and government is central to ensuring that the mobile networks are rolled out effectively to deliver the substantial economic and social benefits of mobile communications to all Malaysians.

13 The Economic Impact of Mobile Telephony in Thailand

The mobile communications industry in Thailand has experienced rapid growth and development over the last six years. The mobile industry plays a key role in the economic development of Thailand by creating employment, contributing to GDP, creating an infrastructure that allows the economy to further develop and acting as a core source of foreign direct investment (FDI). There are also a large number of social benefits that arise from widespread affordable access to voice and data communications services.

13.1 Overview of the Thai Market

The Thai mobile communications market consists of five major players. These are set out in the figure below with information about their year of the network launch and market shares.

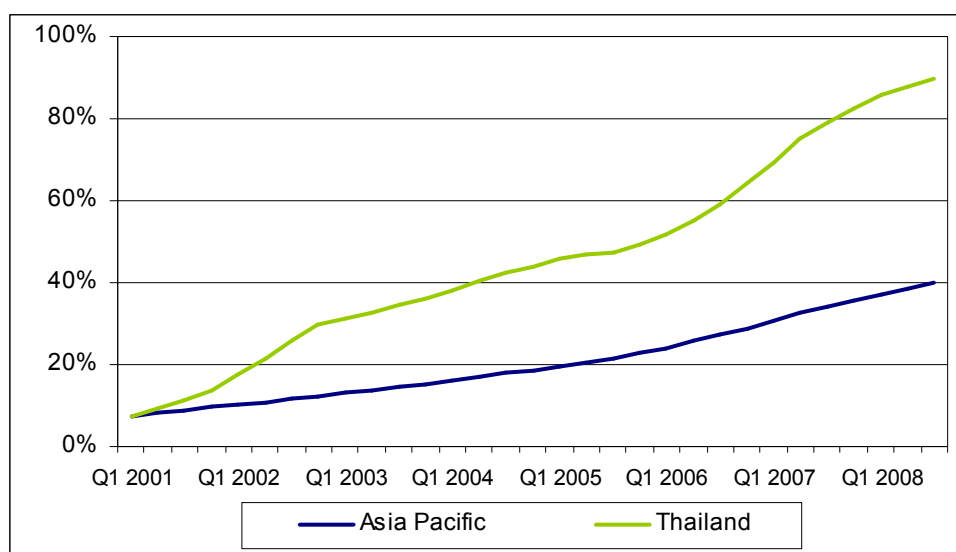
Figure 112: Market share of operators

MNO	Year of network launch	Market share
AIS	1994	49%
DTAC	1994	31%
True Move (previously TA Orange)	2001	20%
Hutchison Thailand	2000	2%
ACT Thailand	2001	1%

Source: Network launch information from GSMA; market share information for Q3 2007 from Wireless Intelligence

Thailand's mobile communications industry has experience substantial growth since 2001. The number of subscribers has increased from 3.6 million in 2001 to over 49 million mobile subscribers in 2007. This equates to a population penetration rate of 75%. Figure 113 shows how mobile penetration has increase in Thailand and the Asia-Pacific region over time. It can be seen that by 2008, penetration in Thailand is forecast to be more than twice the average for the region.

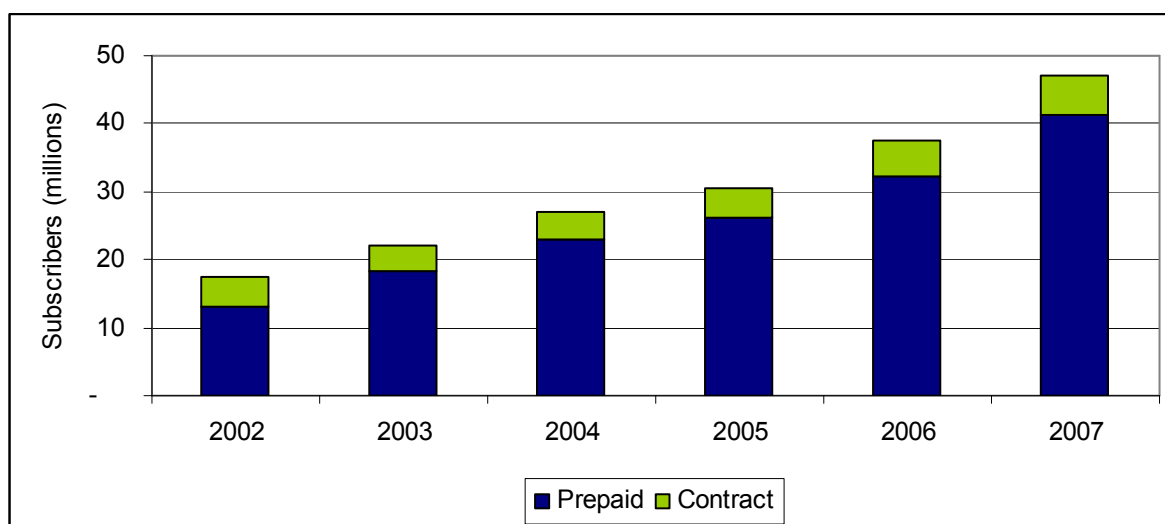
Figure 113: Mobile penetration rates in Thailand and Asia Pacific region



Source: Wireless Intelligence. Figures from Q4 2007 onwards are forecasts

The number of mobile connections in Thailand outnumbers fixed line connections by 7 to 1 as the MNOs have effectively taken on the role of universal service providers allowing consumers in rural areas and lower income groups access to employment and business opportunities that did not exist previously. In particular the prepaid market, which represents over 87% of subscribers,⁷⁸ offers communications services to consumers that have no previous credit history and subscribers are able to recharge their accounts by buying small, affordable amounts of airtime.

Figure 114: Prepaid and postpaid subscribers



Source: Wireless Intelligence

Intense price competition in the market has seen per minute prices fall by over 70% since 2003. Falling prices, combined with further network rollout into rural areas where around two thirds of the population live, have been the key drivers of penetration growth.

The low prices in the market and extensive network rollout mean that MNOs are now focussing on innovating to improve their product offerings to consumers. Value added services (VAS), which have been subject to strong growth during recent years, generate a high proportion of average revenue per user (ARPU) relative to other countries in the region. In particular, DTAC's revenue from VAS has increased in recent years (see figure below) due to a significant increase in the usage of SMS, MMS, content provider applications and ringtone downloads.

Figure 115: VAS revenue

	2004	2005	2006
% of service revenue from VAS	4%	7%	8%
% growth year on year	-	64%	43%

Source: DTAC Annual Report 2005 and 2006

⁷⁸ Source: Wireless Intelligence

One example is the e-payment service “True Money” introduced by True Move in 2006. This allows subscribers to pay for mobile services, water supply, electricity and taxi fares using their mobile phone SIM card as an electronic wallet.⁷⁹

Better mobile communications infrastructure can help to promote business development, particularly in rural areas where alternative communications are limited. This allows businesses to locate in rural areas which promotes local economic development and can help to reduce urban-rural migration. Such economic development can help to empower people.

Moreover, investment in telecommunications can also help to increase investor confidence in other areas of the economy and therefore help to attract foreign direct investment (FDI), which is responsible for 20% of the GDP of Thailand.

Our analysis indicates that a 10% increase in mobile penetration may increase long term GDP growth rates by up to 1.2%. On this basis, the 14% increase in penetration expected during 2007 may equate to an increase in the GDP growth rate of 1.68% in the longer-term.

The communications industry has been a focus of the Thai government’s structural reform of the economy following the Asia economic crisis of the late 1990s. The mobile communications industry is seen as playing an important role in providing the infrastructure necessary for business creation and development. Similarly the Government recognises that there are also many social benefits arising from rural inclusion and universal affordable access to voice and data services.

In order for the mobile communications industry to continue its strong growth and to continue to contribute to the economic and social success of Thailand, regulatory policy needs to be transparent and a level-playing field between operators should be established. The Thai Ministry of Information and Communications Technology (MICT) and the National Telecommunications Commission (NTC) both have pivotal roles to play in the development of the Thai mobile industry and to the economic growth of the country. A long term regulatory strategy and roadmap based on international best practices that is transparent and clearly communicated to all stakeholders could help to create a more certain environment for future investment in the industry.

13.2 Economic Impact of Mobile Communications in Thailand

This section sets out the results of our analysis of the Thai mobile communications industry. Our economic impact assessment is based on:

- Publicly available sources including the Thai Census, Wireless Intelligence, the United Nations and the International Monetary Fund;
- Interviews and data collected from DTAC;

⁷⁹ Source: True Move press release, 1 February 2007

- Interviews and data collected from others in the mobile value chain including infrastructure providers (such as Nokia Siemens Networks), UD, handset importer and dealers, and airtime and SIM distributors and retailers; and
- International benchmarks and studies.

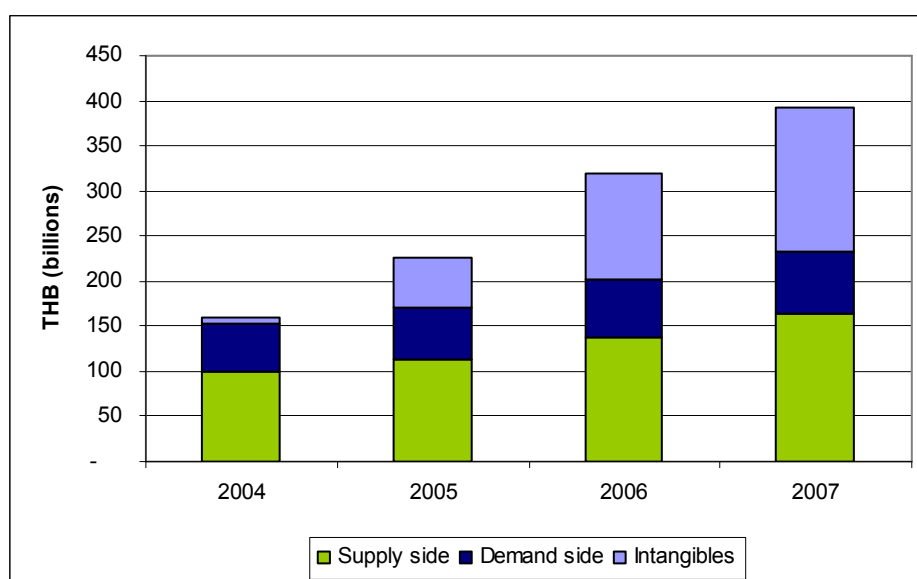
Figure 116 summarises the economic impact of the mobile communications industry in Thailand from 2004 to 2007.

It can be seen that the economic impact has steadily increased over time. In 2007, the total economic impact was THB 393 billion, compared with just THB 160 billion in 2004 (an average increase of 35% per year). This reflects the growing importance of the industry in:

- Creating value-add as penetration continues to rise,;
- Improving the productivity of workers as mobile network coverage extends and take-up increases; and
- Increasing intangible benefits enjoyed by consumers as prices fall over time.

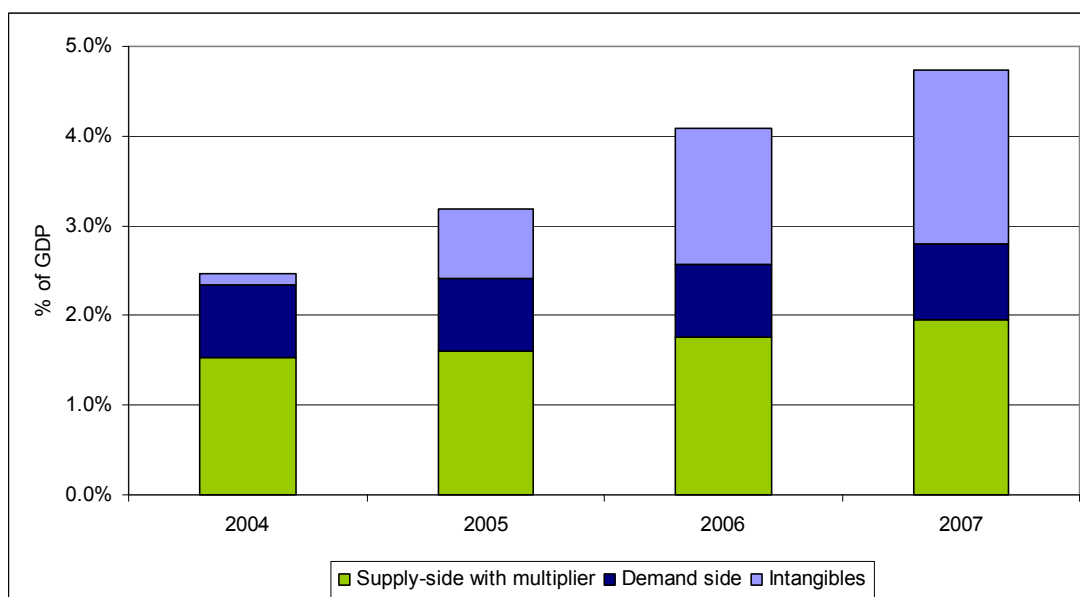
There are also a significant number of positive externalities, that is, benefits enjoyed by people who do not directly use mobile communications or firms that are not part of the value chain. Examples include businesses that are more able to attract investment because of better communications infrastructure.

Figure 116: Economic impact of the mobile communications industry in Thailand (THB billions)



Source: Deloitte analysis based on data provided by key industry players in interviews, analysis of company accounts and industry reports and data provided by DTAC.

Figure 117: Economic impact of the mobile communications industry in Thailand, percentage of GDP



Source: Deloitte analysis based on data provided by key industry players in interviews, analysis of company accounts and industry reports and data provided by DTAC.

13.2.1 Supply-side impact of mobile communications

The supply-side impact is comprised of three parts:

- Direct effects: the value-add and employment created by the MNOs themselves;
- Indirect effects: the value-add and employment created by other parties in the value chain); and
- Multiplier effects: the knock-on impact on the rest of the economy of the direct and indirect effects.

We consider only the domestic impact of mobile communications and subtract international revenue flows from our analysis. We include a multiplier effect to capture the knock-on effects of expenditure by firms in the value chain on value add and employment in the rest of the economy. Based on literature reviews and interviews with producers in Thailand, we estimate a multiplier effect of 1.3 for Thailand. This takes account of the relatively large proportion of goods and services being produced in Thailand rather than being directly imported.

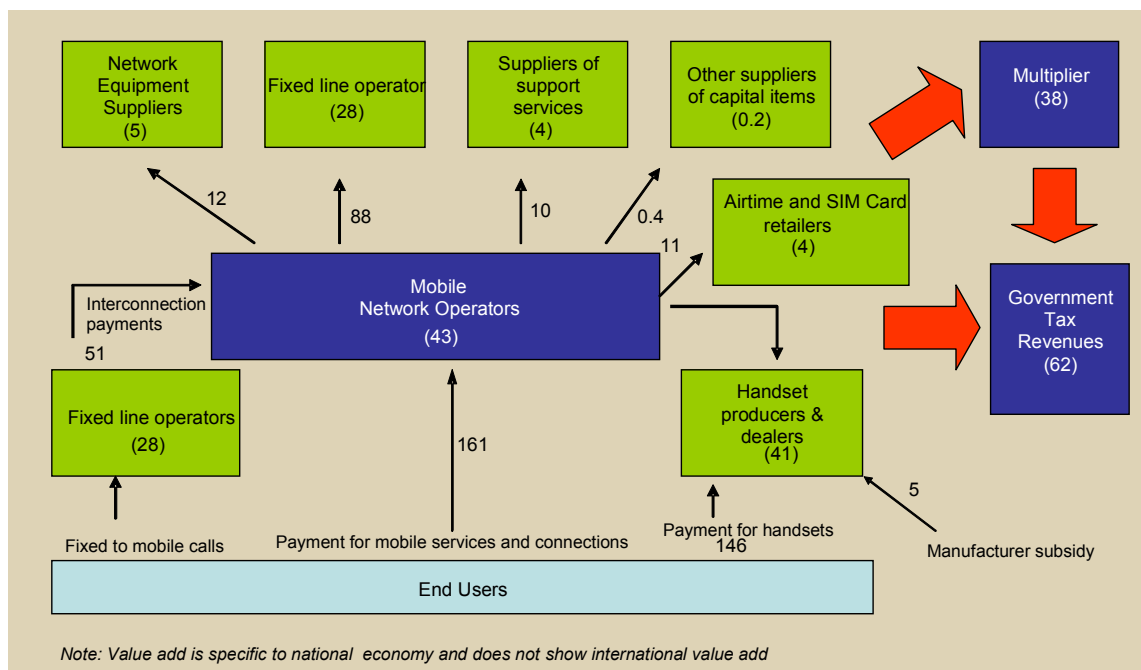
End users purchase airtime and SIM cards from MNOs and handsets from handset retailers. MNOs and handset retailers purchase goods and services from other firms in the value chain and these firms in turn create value add. Particular issues of note are that:

- End users buy airtime and SIM cards from MNOs and in turn, the MNOs pay commission to the airtime and SIM distributors and retailers for these sales. The MNOs are the largest contributors to value-add in the mobile communications value chain;

- End users buy handsets from retailers of though unofficial channels, for example from friends selling their phones second hand to each other. Retailers buy handsets from distributors who buy from importers. Importers buy directly from foreign firms and therefore these firms are not included in the domestic value add calculations. The figure below shows that handset producers and dealers contribute a large share of the industry value add even though their margins are relatively low end users have a significant expenditure on both new and second hand phones from retailers and through unofficial channels. In addition, handset importers and retailers receive subsidies from handset manufacturers and this is included in the definition of value add;
- MNOs buy network equipment, support services, interconnection services and other capital items from other firms in the value chain. In turn, these firms create value-add. The monies paid to other MNOs for interconnection have been netted out of the model. It can be seen that the value added by network equipment suppliers is relatively low due to the large proportion of imported equipment from the MNOs' suppliers, implying that and labour costs make up a relatively small percentage of costs;
- The multiplier effect captures the knock-on effect on the rest of the Thai economy of the value-add produced by the direct and indirect firms in the value chain; and
- The government and tax revenues are paid by the direct and indirect firms in the value chain and takes account of the multiplier effect.

The figure below provides a graphical illustration of the mobile communications industry value chain. All numbers are THB billions and are for 2007. Numbers by arrows represent revenue flows and numbers in brackets represent value add.

Figure 118: Mobile value chain in Thailand in 2007 (THB billions)



Source: Deloitte analysis based on data provided by key industry players in interviews, analysis of company accounts and industry reports and data provided by DTAC.

Figure 119 provides further detail of the revenue flows and value-add: The total revenue column shows:

- The revenue received by MNOs from end-users for airtime and SIMs and from domestic fixed line operators for interconnection;
- The revenue received by fixed network operators, network equipment suppliers, other suppliers of capital items, suppliers of support services, and airtime and SIM sellers and distributors (commission) from Thai MNOs; and
- The revenue received by handset importers and sellers from end-users and subsidies from the handset manufacturers.

Tax includes the tax paid by firms on the profits they make, the income tax paid by employees and employers on wages and, in the case of mobile operators, any regulatory and/or licensing fees.

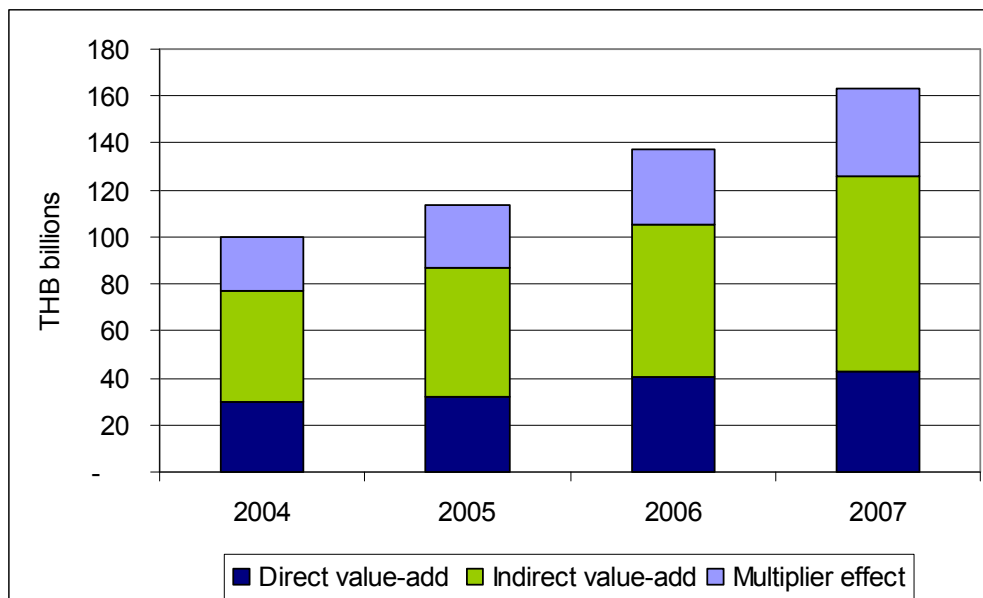
Figure 119: Value add (2007)

	Total revenue	Total cost	Total value-add	Value-add that is tax	Value-add with multiplier
MNOs	211,700	168,600	43,100	24,500	56,000
Fixed network operators	88,200	60,600	27,600	8,000	35,900
Network equipment suppliers	11,700	6,800	5,000	1,400	6,500
Other suppliers of capital items	400	200	200	100	300
Suppliers of support services	10,500	6,200	4,300	1,200	5,600
Handset importers and sellers	150,900	110,100	40,800	11,600	53,100
Airtime and SIM distributors and sellers	11,000	6,600	4,500	1,200	5,800
Total	484,400	359,100	125,500	48,000	163,200

Source: Deloitte analysis based on data provided by key industry players in interviews, analysis of company accounts and industry reports and data provided by DTAC.

The direct, indirect and multiplier contributions to value-add in Thailand over time are shown below.

Figure 120: Direct, indirect and multiplier contributions to value-add in Thailand, THB billions



Source: Deloitte analysis based on data provided by key industry players in interviews, analysis of company accounts and industry reports and data provided by DTAC.

Figure 121 shows the direct, indirect and multiplier contributions to domestic employment in Thailand over time in terms of FTEs⁸⁰. These were estimated by looking at each category of firm in the value chain. For MNOs we used DTAC data on the number of its FTEs in order to estimate the total employment by all MNOs. For other firms we used different approaches depending on data availability. These are described in further detail in the annex. We found that a large amount of employment is created by the sale of airtime, SIM cards and handsets at both the distribution and retail level. Airtime can be bought in a wide range of outlets including specialised shops, convenience stores, from ATMs and online. For firms that operate in industries outside of the mobile industry, we take account of the employees relating to the mobile industry by pro-rating using the proportion of revenue from the mobile industry.

Figure 121: Contribution to employment in Thailand (FTEs)

	2004	2005	2006	2007
Direct (MNOs)	10,000	12,000	14,000	15,000
Indirect (related industries)	85,000	85,000	87,000	100,000
Multiplier effect	29,000	29,000	30,000	35,000
Total employment	124,000	126,000	131,000	150,000

Source: Deloitte analysis based on data provided by key industry players in interviews, analysis of company accounts and industry reports and data provided by DTAC.

In summary, it can be seen that the supply-side impact of mobile communications in terms of value-add and employment is increasing over time. This reflects the increasing take up of mobile communications as prices fall, coverage extends and MNOs offer improved mobile products and services. When the multiplier effect is taken into consideration, the economic impact increases further.

13.2.2 Productivity impact of mobile communications

Mobile communications can be instrumental in increasing the productivity of workers across sectors in both rural and urban areas. In particular, access to mobile communications can:

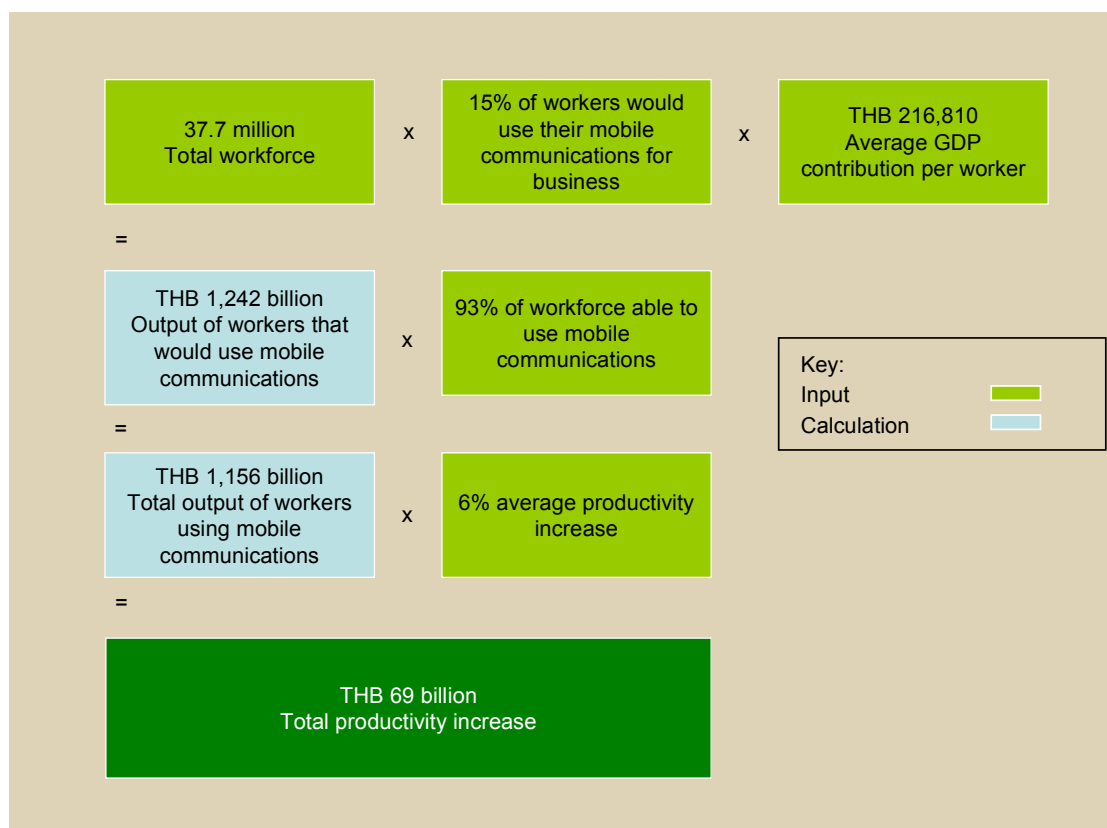
- Create market efficiency by improving information flows within companies and between buyers and sellers;
- Increase work flexibility by reducing travelling time and costs; and
- Promote business and entrepreneurialism in previously underserved rural areas.

Based on interviews and international benchmarks, we estimate that the business use of mobile communications would lead, on average, to a 6% increase in productivity of an individual worker. This is lower than in some developing country studies since the fixed network and e-mail access in Thailand is more developed than in the other countries studied. In addition, mobile phones in Thailand are primarily used for social interaction rather than business purposes. Therefore, the incremental productivity impact of mobile communications is lower than in countries with few substitutes to mobile and the intangible benefits enjoyed by consumers are likely to be larger (see Section 13.2.3).

Figure 122 sets out the way in which we have estimated the productivity gains enjoyed by workers that use mobile communications. The numbers in the diagram relate to 2007. We identify workers in Thailand that are likely to use mobile communications for business purposes. This is calculated by looking at the proportion of workers in different industries that would use mobile communications for business purposes. We then estimate the number of employees that would use mobile communications if they were covered by the network. Using estimates of network coverage in urban and rural areas we then estimate the number of workers that actually use mobile communications and their GDP output. We then multiply this by 6% to calculate the total productivity increase resulting from mobile communications.

⁸⁰ Estimates therefore exclude expatriate workers

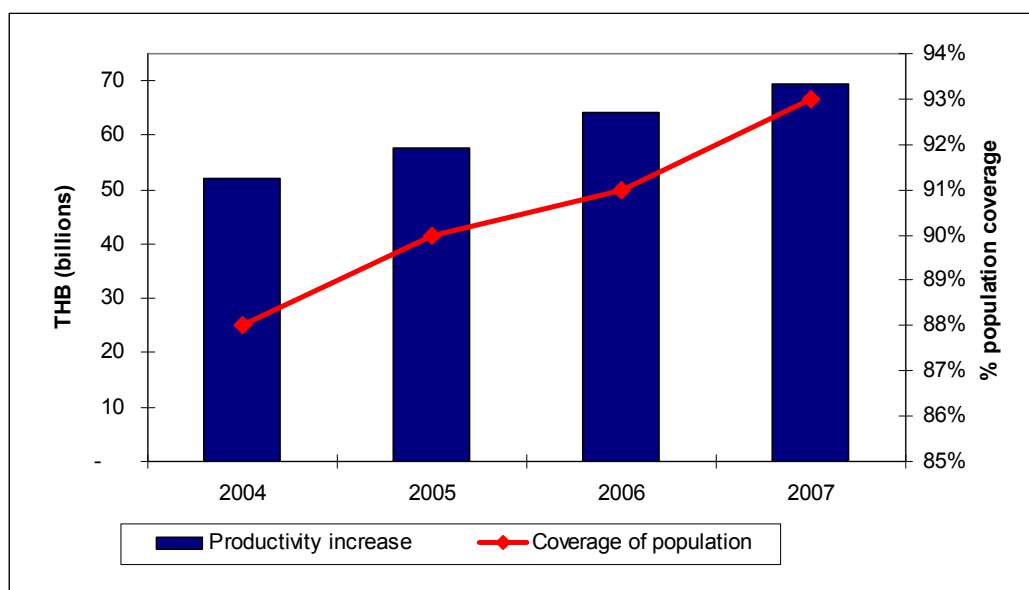
Figure 122: Calculation of productivity gains from mobile communications



Source: Deloitte analysis based on data provided by key industry players in interviews, analysis of company accounts and industry reports and data provided by DTAC.

We estimate that mobile communications will have increased GDP by THB 69 billion in 2007, around 1% of GDP, via productivity improvements alone. As coverage of the mobile networks increases, more workers will be able to use mobile phones for business purposes and so the productivity impact increases over time (see Figure 123).

Figure 123: Increase in GDP resulting from productivity gains



Source: Deloitte analysis based on data provided by key industry players in interviews, analysis of company accounts and industry reports and data provided by DTAC.

13.2.3 Consumer benefits

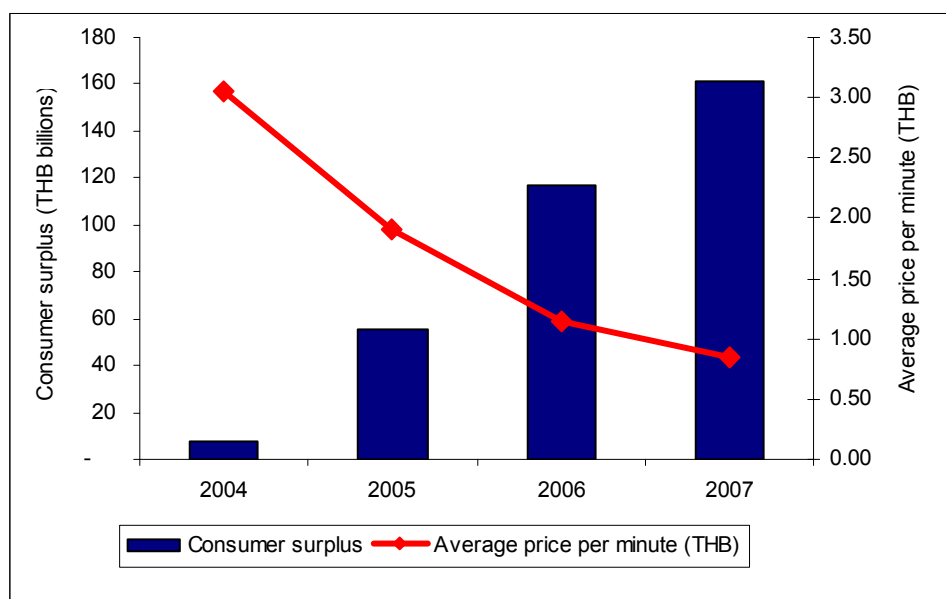
Intangible consumer benefits are the benefits of mobile communications enjoyed by subscribers less what they actually pay to buy these services. Some of the benefits enjoyed by subscribers include:

- Promotion of social cohesion by facilitating communication between families and friends;
- Extension of communications to those on low incomes who were previously underserved by other forms of communication;
- Assisting in disaster relief by helping them to gain access to emergency services;
- Delivery of “peace of mind” to parents who can keep in touch with their children; and
- Value-added services.

We estimate consumer benefits using the willingness to pay concept. The ARPU in the year that a subscriber joins the network indicates how much that consumer is willing to pay for mobile services. . If the willingness to pay and usage of each subscriber does not change over time, the net benefit of owning a mobile phone is, therefore, the difference between expenditure on mobile services at the time of joining less the expenditure in the year of analysis (which is are lower due to lower prices as a increased competition and other factors).

In 2007, the intangible benefits were THB 161 billion compared with THB 8 billion in 2004. The figure below shows how intangible benefits have increased over time as the price per minute of mobile communications has fallen.

Figure 124: Increasing intangible benefits over time



Source: Deloitte analysis based on data provided by key industry players in interviews, analysis of company accounts and industry reports and data provided by DTAC.

Figure 125 sets out the intangible benefits enjoyed by different groups of subscribers. It can be seen that subscribers that join the network earlier enjoy greater intangible benefits than those that subscribe later. This is because early joiners have higher minutes of use (MOU) and a higher willingness to pay than newer subscribers. Therefore, our estimates may underestimate the true value of the intangible consumer benefits due to data limitations which mean that the calculations only take account of subscribers that have joined the network since 2003.

Figure 125: Calculation of intangible benefits (THB billions)

Subscriber group	2003	2004	2005	2006	2007
Subscribers joining in 2003	-	8	49	76	86
Subscribers joining in 2004	-	-	7	11	13
Subscribers joining in 2005	-	-	-	30	41
Subscribers joining in 2006	-	-	-	-	20
Subscribers joining in 2007	-	-	-	-	-
Total consumer surplus	-	8	55	117	161

Source: Deloitte analysis based on data provided by key industry players in interviews, analysis of company accounts and industry reports and data provided by DTAC.

13.2.4 Other benefits

Thai people also benefit from a number of other benefits that have not been quantified in this study. In particular, MNOs make a significant contribution to corporate responsibility (CR) activities and are actively involved in work in rural areas and helping smaller businesses. Such benefits extend beyond those captured by the expenditure on CR included in the value-add estimates because of the greater social benefits created.

One example is how MNOs have been actively involved in providing relief to flood victims around the country by providing survival packs, mobile handsets and SIM cards free of charge to flood victims around the country. MNOs have also helped to building news towers and warning towers.

13.3 Conclusions

The Thai mobile sector has experienced strong subscriber growth rates in recent years, demonstrated by penetration rates above the average for the region. The mobile sector is estimated to have contributed 4.9% to GDP in 2007 and directly and indirectly employed over 150,000 FTEs.

The price of mobile services has fallen in recent years and a mobile phone is an increasingly affordable method of communication for those in both rural and urban areas. By providing the infrastructure necessary for business communications, a strong communications sector contributes to the international competitiveness of Thailand as well as raising the potential for business growth in rural areas.

The mobile communications sector also contributes positively to the economic and social welfare of Thai people. Aggressive competition between MNOs is also increasing the innovative product offerings in the market. Moreover, for many Thai people, MNOs offers them access to communications that were previously unavailable to them.

By continuing to grow both its subscriber base and range of products, the mobile sector may be able to increase its contribution of GDP. This will require additional innovation and network investment to be undertaken by the MNOs. The regulator should therefore ensure that it publishes a regulatory road map which will support ongoing long term investment in the sector and hence the economy as a whole.

14 The Economic Impact of Mobile Telephony in Bangladesh

14.1 Overview of the Bangladesh mobile market

Bangladesh is amongst the poorest countries in the world, with 50% of people living in poverty and a gross national income (GNI) per capita of \$470. It is rated 156 out of 163 in Transparency International's Perceived Corruption Index⁸¹. However, despite the difficult business environment, the mobile communications sector is growing rapidly and is cited as the fastest growing industry in Bangladesh⁸². The sector currently has six licensed operators and is continuing to increase the number network of subscribers and the range of services that are offered.

14.1.1 Operators, coverage and penetration

The mobile communications sector began in Bangladesh with the licensing of a single company, Pacific Bangladesh Telecom Ltd (PTBL) in 1991. In 1996, three national GSM licences were granted and this opened upon the mobile communications sector to a wider subscriber base. Currently, six mobile network operators are currently licensed to operate in Bangladesh. The most recent licensee is Warid Telecom who launched in May 2007. Grameenphone was the first entrant to roll-out a national and remains the largest operator with a market share of 49%.

Figure 126: Mobile operators and market shares (end-2007)

Mobile Operator	Brand Name	Majority owner	Launched	Market Share
Grameenphone	Grameenphone	Telenor AS	1997	48%
TMI Bangladesh	Aktel	Telekom Malaysia and A. K. Khan & Co. Ltd.	1997	20%
TeleTalk Bangladesh	TeleTalk	BTTB	1997/Mar 2005 (relaunch)	2%
Orascom Bangladesh	Bangalink	Orascom Telecom (Weather Investments SPA)	1998/Feb 2005	20%
Pacific Bangladesh	Citycell	SingTel Asia Pacific Investments Pte Ltd	1999	4%
Warid Telecom	Warid	Abu Dhabi Group	May 2007 (licensed 2005)	6%

Source: Market intelligence reports and market shares from BTRC.

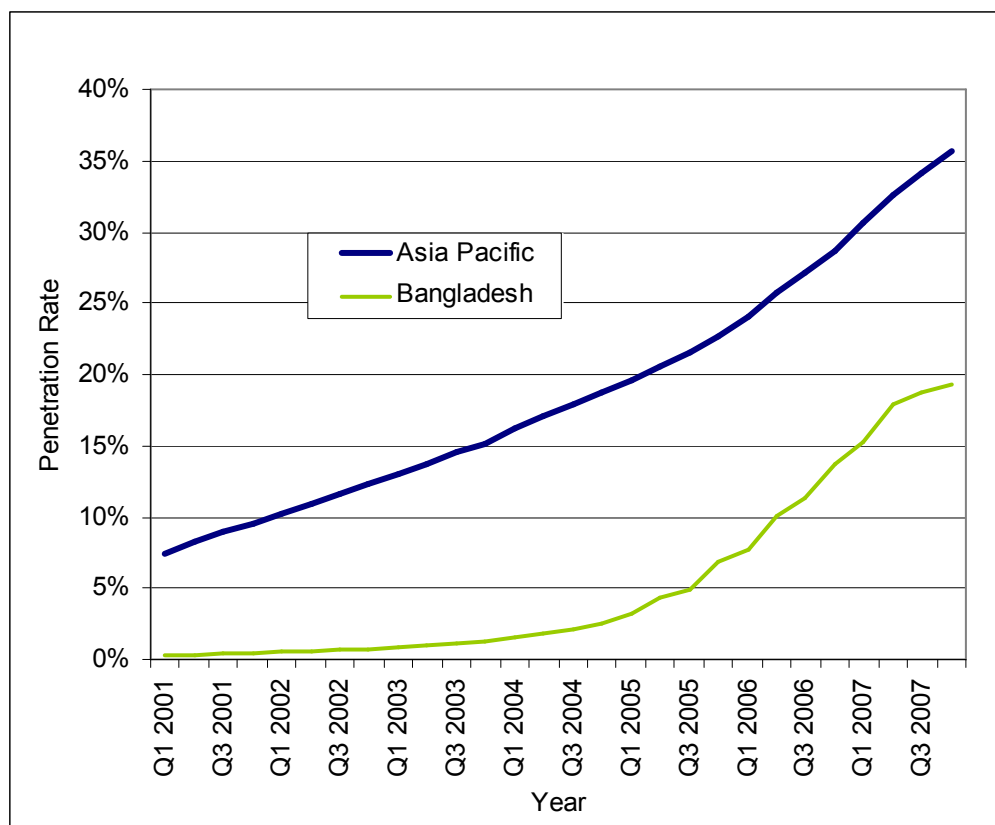
Since 2003, mobile penetration growth exceeded 100% per annum. The growth rate slowed in the last four months of 2007 and was lower than predicted by the MNOs and external parties due to the cyclone affecting the southern coast in November 2007 and the impact of the Government registration programme. This requires mobile operators to formally register details of all mobile

⁸¹ Transparency International 2006.

⁸² Noted by the Norwegian Institute of Management studies.

phone subscribers, which is particularly difficult for subscribers on low income or in rural areas who frequently do not possess the necessary forms of identification. Current penetration rates are estimated to be around 20%, equating to 29.5m subscribers.

Figure 127: Historical penetration in Bangladesh and the Asia Pacific region



Source: Wireless Intelligence

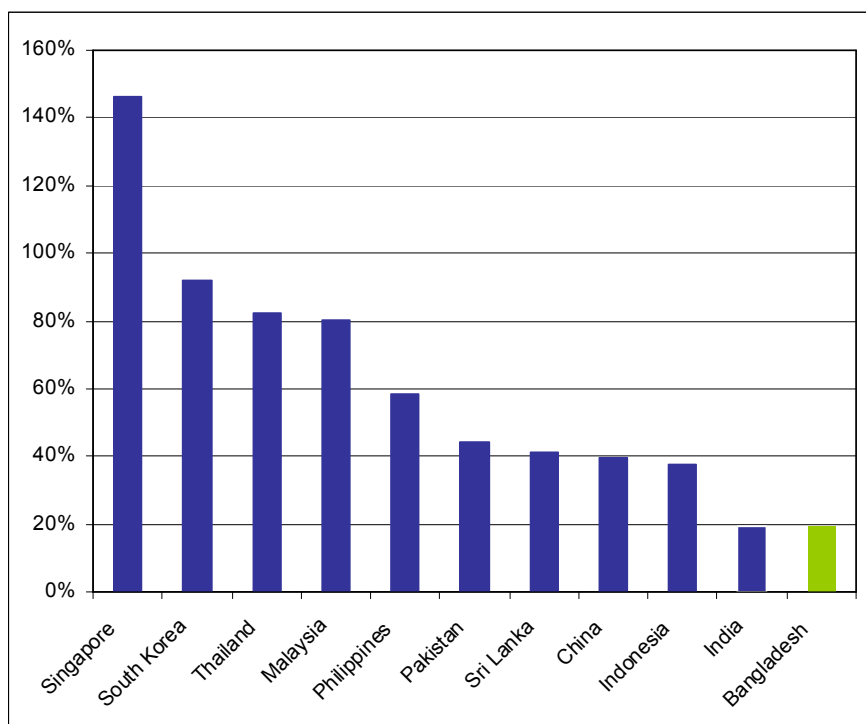
Geographic and population coverage have increased considerably over the past few years following substantial investment by the MNOs. Geographic coverage increased from 48% in December 2004 to over 85% in December 2007. Over the same period, population coverage has increased from 50% to 97%. At the same time, the MNOs began to introduce a range of enabling services, including GPRS / Edge. This network expansion required large levels of capital investment by all MNOs since the limited reach of the fixed line network requires the MNOs to build out a significant proportion of their own backbones⁸³.

The majority of Bangladeshis now have the physical opportunity to connect to the mobile network. The fall in prices of handsets, SIMs and calling services, primarily due to reductions in handset import duties and the SIM activation tax alongside the impact of competition, has increased the affordability of mobile telephony and led to the observed increase in penetration rates. Whilst there has been a rapid increase in population coverage and subscriber numbers, penetration rates remain below the average of the region. Despite falling prices, affordability is likely to be the greatest barrier to growth. Therefore handset sharing, for example in the form of Village Phone or

⁸³ Grameenphone's backbone network is facilitated by leasing capacity from Bangladesh railways and by installing its own transmission infrastructure.

Community Investment Centres, is likely to continue to be an important contributor to providing universal telecoms access.

Figure 128: Mobile penetration rate in Bangladesh and Asia



Source: *Wireless Intelligence and Deloitte analysis*

Since 2001, the number of mobile subscribers has exceeded the number of fixed line subscribers and the ratio at end 2005 stood at approximately 11:1⁸⁴. Mobile operators are providing the types of services that may have traditionally been associated with fixed line technology. Prepaid mobile services represent more than 94% of total mobile connections in Bangladesh and have become the instrument of universal service. The popularity of mobile has been driven by a number of factors, predominantly the lower relative price of mobile ownership compared to fixed line ownership, greater population coverage by the mobile network operators, ease of sharing handsets and shorter waiting times.

For penetration levels to continue to rise and for Bangladesh to further close the digital divide, then mobile services need to become more affordable. Schemes such as the sale of top-up vouchers in small denominations and the launch of low-cost handsets by handset manufacturers assist in this. However, other initiatives including further reductions in handset import and SIM activation taxes alongside operator driven pricing initiatives could also stimulate further growth in the market.

Grameenphone first launched EDGE services in September 2005. It has now enabled its entire national network with EDGE capability, providing 97% of the population with the opportunity to access the internet. All the existing operators now offer internet browsing services utilising EDGE, GPRS and CDMA technologies. It is estimated that in 2007 there were over five million internet users of which around four million were Grameenphone subscribers. Individual EDGE enabled devices are more frequently purchased in urban areas, principally by business users due to the

relatively high price of the data devices. However, the mobile phone operators have recently been granted permission by the regulator to introduce Blackberries and other brands of Smartphones in Bangladesh. It is anticipated that the increase in the range of devices alongside declining prices will raise EDGE penetration levels.

EDGE is the key enabler of Community Information Centres (CICs) which are bringing Internet services to rural communities. This is particularly important in a country where internet penetration is estimated to stand at 0.3%⁸⁵.

Community Information Centres (CICs)

Grameenphone has established CICs to provide access to the Internet and other communications and information based services to a broad range of the rural population. These centres provide self-employment opportunities and produce business through self-sustained economic activities.

CICs are set up with technical assistance from the GSM Association and services are provided through Grameenphone's EDGE connectivity. A CIC is equipped with the minimum of a computer, a printer, a scanner, a web cam and an EDGE enabled modem to access the Internet. These services include:

- Internet and e-mail
- Printing, scanning and fax
- Mobile voice calls
- Content on health, agriculture and education alongside e-governance services
- Webchat with voice and pictures

First launched in February 2006, there are currently 560 CICs operating in 447 Upazillas. Grameenphone works with partner organisations, including Grameen Telecom Corporation and the Society for Economic and Basic Advancement to select and train entrepreneurs to run these centres as well as to distribute information.

CICs are started up and run by local entrepreneurs who are selected in a competitive process. Establishment requires \$1000 of start-up capital which may be acquired from micro financing institutions. The average income is \$150 per month and with this level of revenue the investment is paid back within 1 year. Grameenphone offers discounts on the internet service and training, however it is estimated that only half of CICs are currently sustainable. This is an issue which Grameenphone is addressing by re-evaluating its entrepreneur selection criteria.

Source: Deloitte analysis based upon Grameenphone information⁸⁶

14.1.2 Foreign Direct Investment and Domestic Investment

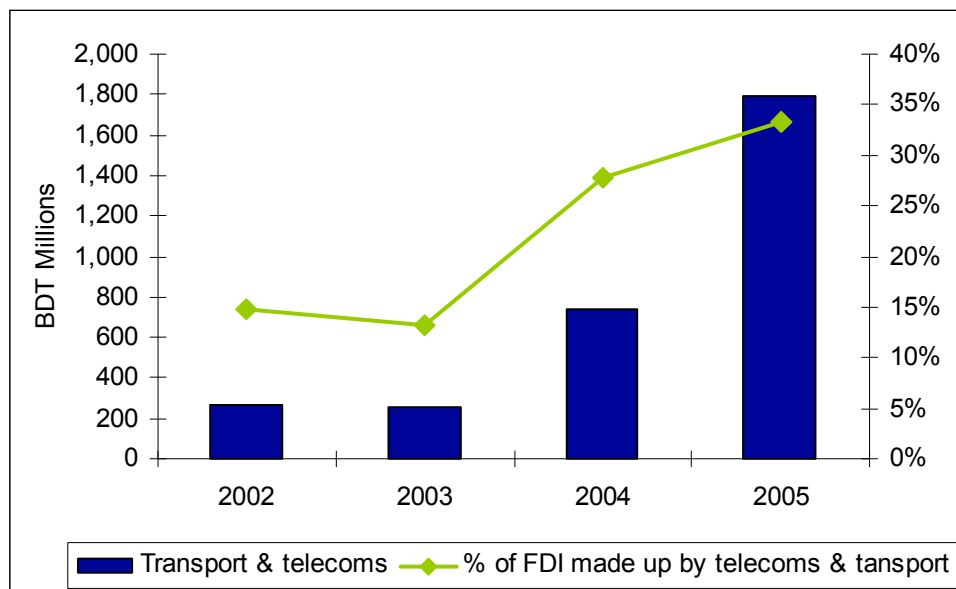
The mobile sector attracts large inflows of Foreign Direct Investment (FDI) making up a sizable proportion of aggregate flows to Bangladesh.

⁸⁴ Fixed line connection data taken from BTTB 2005 Annual Report.

⁸⁵ From Internet World Stats 2007.

⁸⁶ <http://www.gpcic.org/index.php?main=1>

Figure 129: FDI in Telecom & transport sector and contribution to total FDI in Bangladesh.



Source: Enterprise survey, Bangladesh Bank statistics department

From 2003 telecoms has become an increasingly major constituent of FDI relative to other FDI flows. Flows rose from 2004 levels by 180% to 2005 representing, in aggregate with transport, 33% of total FDI flows. However in the first nine months of 2007, there has been a 30% decline in registration of investment proposals with the Board of Investments⁸⁷.

14.1.3 The regulatory environment

The Bangladesh Telecommunication Regulatory Commission (BTRC) was established in 2002 transferring functions from the Ministry of Post and Telecommunications in order to secure “development and efficient regulation of telecommunications⁸⁸” and has worked with the government to make considerable efforts to promote the development of the mobile industry. The licensing of new companies for the provision of mobile services alongside reductions in handset import duties and SIM activation taxes has supported the rapid increase in competition and expansion of mobile usage in the country. The strong competition between the operators in recent years has also resulted in a variety of new services made available to consumers including Billpay, ringtone and screensaver downloads, Bengali text message capability and Cellbazaar.

However, Grameenphone indicated during interviews that it is closely watching regulatory, economic and political environments, which is likely to affect its investment decisions. This has been highlighted in other reports into the Bangladeshi telecoms sector⁸⁹.

Particularly areas of concern noted by the MNOs include⁹⁰:

⁸⁷ Figure refers to first 9 months of 2007 relative to 2006. Information provided by Grameenphone and source from Financial Express, October 18th.

⁸⁸ President of Bangladesh, 2001. Quote provided by Grameenphone.

⁸⁹ These include: Pride and Prejudice, Grameenphone and Telenor affecting Bangladeshi Socio-Cultural Development, A Welle-Strand and L.Molden, published in Studies in Development Management, No 1, 2007

⁹⁰ Noted during interviews with Grameenphone and press statements.

- There is a lack of public, transparent consultations prior to most decisions from the BTRC. This leads both to a lack of predictability and transparency.
- The liberalisation of the international gateway: BTTB is the sole owner of the gateway with the mobile operators being charged for its use. BTRC is opening up the international gateway for competition between up to 4 licensees. Only Bangladeshi residents who have not been allocated other licences, i.e. only “new” operators, may be granted a licence for international gateways. This has created concern over a lack of efficiency considerations in the regulatory regime, which in turn may lead to degradation in access, quality and price. This is a particularly prominent issue since Bangladeshi’s frequently opt to work and live overseas and well functioning, affordable, telephony services are essential for maintaining family contact; and
- Adjustments to the interconnection regime: currently BTTB does not pay for terminating calls on the mobile networks and does not provide reliable traffic forecasts. The BTRC is also proposing that and bilateral interconnection arrangements be closed down⁹¹ and “interconnection operators”, whose sole function will be to provide interconnection switches between operators, be introduced⁹². This might increase the cost of interconnection services and require additional network build by the MNOs. This could be passed through to consumers in the form of higher retail prices. There is also concern surrounding quality of service and temporary loss of connectivity between networks whilst this process is initiated. Only Bangladeshi residents who have not been allocated other licences, i.e. only “new” operators, may be granted a licence for national interconnect exchanges;
- Spectrum allocation: Grameenphone has indicated that lack of access to spectrum is hindering its expansion efforts, both limiting the number of additional sites that can be installed to increase capacity in major cities and increasing the cost of network roll-out. The BTRC has indicated that it will review this issue, but no further timeline or details have been published; and
- Pricing regulation: there are currently six mobile operators licensed to provide services. This level of competition may be expected to negate requirements for pricing regulation at the retail level⁹³. BTRC has recently introduced a Directive relaxing the requirement of every retail tariff,

⁹¹ We have not reviewed the ILDTS policy (http://www.btrc.gov.bd/newsandevents/ILDTS_Policy_2007.pdf) and our discussion is based on information provided by Grameenphone. However, we note that the introduction of an operator purely to provide interconnection switches may introduce an additional inefficiency into the market since it requires additional investment by the interconnection operator and the MNOs and potential stranding of assets. Regulatory remedies more commonly used in other markets to counter the monopolistic characteristics of interconnection typically include an obligation to provide interconnection, quality of service targets and a price cap.

⁹² We have not reviewed these plans and our discussion is based on information provided by Grameenphone. However, we note that the introduction of an operator purely to provide interconnection switches may introduce an additional inefficiency into the market since it requires additional investment by the interconnection operator and the MNOs and potential stranding of assets. Regulatory remedies more commonly used in other markets to counter the monopolistic characteristics of interconnection typically include an obligation to provide interconnection, quality of service targets and a price cap.

⁹³ A market review is typically undertaken to assess the level of competition in the market place and the need for regulatory remedies. In Europe, the EU defined a guideline set of regulated markets, these included mobile termination but did not include mobile retail rates as it was decided that the issuing of multiple mobile licences typically created sufficient competition to remove the requirement for retail regulations

if it falls between the approved upper and lower limits⁹⁴. However, the MNOs are subject to price regulations at both the wholesale and retail level. Also, the fixed link operator is not required to pay the MNOs a termination rate, this places the BTTB at a competitive advantage.

14.1.4 Taxation rates

The Bangladeshi mobile operators are subject to a number of different taxes, levied on imports, sales and profits. The tax revenue from the mobile telecoms industry has increased rapidly during the period, despite decreases in the SIM activation tax and handset import duties over the period. Grameenphone is reported to be the largest single tax payer in Bangladesh and the other telecoms operator also rank highly⁹⁵. A variety of taxes are applied to mobile handsets and services including VAT or similar taxes. Bangladesh currently levies additional mobile specific taxes:

- A SIM activation tax of BDT 800 that is paid on the sale of each new SIM card; and
- A handset import tax of BDT 300 on each imported handset. This was reduced from BDT 4000 to BDT 1000 in 2005 and to BDT 300 in 2006.

A joint GSMA / Deloitte report prepared in 2007⁹⁶ showed that in Bangladesh the proportion of taxation in the Total Cost of Mobile Ownership (TCMO⁹⁷) is 19%. Significantly, amongst other jurisdictions in the region this burden is second only to Nepal and around 8 percentage points higher than the regional average.

Whilst mobile specific tax rates have been decreasing, to the extent that these taxes are passed through to consumers they may create a barrier to entry and lower the affordability of mobile phones to those with lower incomes. A GSMA / Frontier Economics report⁹⁸ suggested that removing the SIM activation tax may increase penetration levels and be tax neutral for the Government. Similar Deloitte reports for other countries have drawn similar conclusions⁹⁹. Further, a removal of this tax would reduce the switching cost for subscribers and hence enhance competitive forces.

In addition to consumer related taxes, the telecommunications regulator and Government levy a number of other taxes and charges on the MNOs in addition to economy wide taxes. The largest of these is the 5.5% revenue share collected on line rental and call charges. These costs are ultimately passed onto end-users and impact take-up. In interviews the MNOs stressed the need for the Government to consider these costs when considering the overall tax structure.

⁹⁴ http://www.btrc.gov.bd/newsandevents/Interim_Tariff_Order_to_All_Mobile_Operators_July_2007.pdf

⁹⁵ Pride and Prejudice, Grameenphone and Telenor affecting Bangladeshi Socio-Cultural Development, A Welle-Strand and L.Molden, published in Studies in Development Management, No 1, 2007

⁹⁶ GSMA/Deloitte report 'Global Mobile Tax Review', 2006-2007, available at <http://www.gsmworld.com/TAX/>

⁹⁷ The TCMO is calculated as: $TCMO = \text{cost of handset} \div \text{handset replacement period} + \text{connection fee} \div \text{SIM replacement period} + \text{total annual cost of usage (monthly minutes} \times \text{rate per minute} \times 12 + \text{monthly texts} \times \text{rate per text} \times 12)$.

⁹⁸ Taxation and Mobile Telecommunications in Bangladesh 2006, Frontier / GSMA

⁹⁹ Deloitte for GSMA, 2007, Economic Impact of mobile telephony in Pakistan and Deloitte for GSMA, 2006

Other significant taxes include customs duties levied on network equipment which are estimated to around 35-52% hence representing a barrier to investment in the network¹⁰⁰.

14.1.5 Retail prices

Mobile retail prices are low in Bangladesh compared to regional neighbours and other countries.

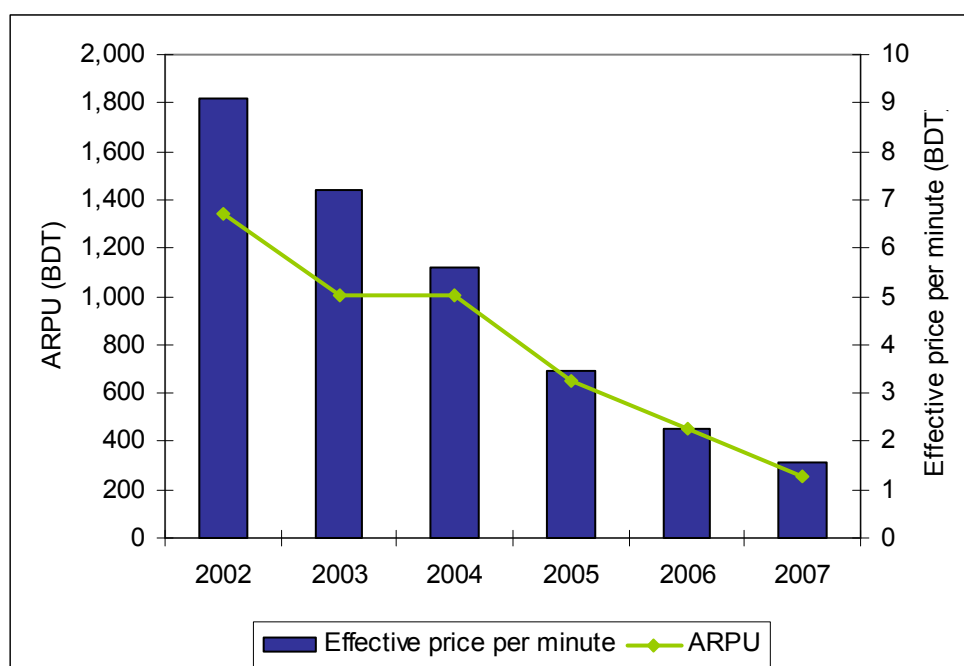
Figure 130: Effective price per minute¹⁰¹

Country	Average retail price (US\$)
Pakistan	0.200
China	0.021
Sri Lanka	0.020
Thailand	0.019
Bangladesh	0.017
India	0.008

Source: Wireless Intelligence

Increasing competition between the MNOs has resulted in a reduction of the retail price of mobile calls. These decreases were particularly significant following the operational re-launch of Bangalink and Teletalk in 2005 and the launch of Warid 2007. Falling prices per minute have further translated into consistently diminishing ARPUs.

Figure 131: ARPU of average subscriber



Source: Wireless intelligence

¹⁰⁰ CRA "Bangladesh's telecommunications sector – a regulatory roadmap", 2007.

¹⁰¹ Effective price for minute is the average revenue per user divided by the minutes used.

The provision of communications in rural areas is necessary for promoting long-term economic growth. On the back of falling prices, MNOs have been more successful than fixed line operators in providing access and the both number of subscribers and population coverage far exceeds fixed line operators¹⁰².

14.2 Economic impact of mobile industry in Bangladesh

We initially calculate the economic impact of the mobile industry between 2004 and 2007 using static analysis. Our estimates are based on:

- Interviews and data collected from public sources including the BTRC, BTTB and National Statistics Bureau;
- Interviews and data collected from Grameenphone and Telenor;
- Interviews and data collected from others in the mobile value chain including infrastructure providers, handset dealers, airtime wholesalers and retailers;
- Data published in the Deloitte report for GSMA; and
- International benchmarks and studies.

For the other five mobile operators where we have not had direct access to data we have primarily used publicly available data. Where this data has been insufficient we have utilised Grameenphone data, and uplifted individual company data to reflect the market by market share. We have not verified the accuracy or robustness of the information provided to us and where there have been discrepancies between data sources then we opt to use information provided to us by the MNOs. We use this information to calculate three static impacts:

- Supply side impact: estimated from analysis of the mobile value chain;
- Demand side productivity impact: calculated via estimates of productivity benefits enjoyed by workers using mobile phones for business; and
- Demand side intangible impact: evaluated on the basis of estimated willingness to pay.

14.2.1 Value chain impact

We determined five categories of economic value which are directly created by the MNOs in Bangladesh:

- Wages and employee benefits;
- Contractor costs;
- Taxes and regulatory fees;
- Corporate social responsibility; and
- Dividends.

¹⁰² From operators and GSMA (March 2006) data 88% of connections are from mobiles whilst mobiles provide 97% of population coverage.

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.

We estimate that MNOs will directly contribute in excess of BDT 57 billion in 2007.

Figure 132: Value add of mobile network operators (excluding multiplier effect)

Value add (BDT millions)	2004	2005	2006	2007
Employee wages and benefits	892	1,665	3,407	5,338
Contractors	98	163	1,063	1,806
Taxes and regulatory fees	10,747	19,697	30,503	47,685
CSR	18	34	55	60
Dividends	2,590	1,423	1,766	2,217
Total	14,346	22,982	36,795	57,107

Source: Deloitte analysis based on information provided by MNOs, interviews with players in related industries and publicly available information.

Taxes and regulatory fees (including spectrum fees) make up the largest proportion in the above table, accounting for over 83% of the total in 2007. These taxes are largely made up of VAT and SIM activation taxes.

The next largest contributor to direct value add is employee wages and benefits. The MNOs have a high percentage of skilled labour, this raises the average wage paid by the MNOs above the 3,767 BDT average monthly national wage¹⁰³. Grameenphone, for example, have implemented a minimum wage of 28,000 BDT per month. As a technology driven industry there is a necessity for the MNOs to maintain continuous investment in training and skills transfer. Grameenphone undertook 1018 days of training in 2007, at a cost million. Further costs met by MNOs in this area are the benefits that provided to employees including pension contributions and financial support to employees children.

The importance of the MNOs, and Grameenphone in particular, in raising the profile of corporate responsibility (CR) as a common business practice in Bangladesh has been noted in several studies¹⁰⁴. Grameenphone centres its activities around four areas: poverty alleviation, healthcare, empowerment, education and seeks to link its programmes to Bangladesh's commitment to the Millennium Development goals. The company takes a partnership approach to CR and provides long term assistance to relevant development agencies working in each of these areas and seeks to draw synergies with its core competency i.e. empowering people through connectivity where possible. Grameenphone is currently running projects in partnership with Pathfinder International, UNAIDS, Sightsavers international, Grameen Telecom and a number of reputed local NGOs. It is estimated that the MNOs contributed over BDT 60 million in CR programmes in 2006 and 2007. Examples of these programmes include:

- Safe motherhood and infant care project: Launched a nationwide healthcare project in partnership with Pathfinder International. Grameenphone is providing assistance to ensure free yet comprehensive primary healthcare services annually to **800,000** poorest of the

¹⁰³ Taken from the 2007 Bangladesh Bureau of Statistics 2007 wage survey for formal workers.

¹⁰⁴ For example, Pride and Prejudice, Grameenphone and Telenor affecting Bangladeshi Socio-Cultural Development, A Welle-Strand and L.Molden, published in Studies in Development Management, No 1, 2007

poor (income below US\$1 per day) pregnant mothers and infants and will also assist in infrastructure development and service quality improvement in **320 clinics**. From August to October 2007, around **291,476** poor mothers and infants have received free healthcare services under this project.

- Partnership with Sightsavers International: The objective of the partnership is to provide free eye-care services to the poorest of the poor population in rural Bangladesh, where majority of the population do not have access to primary healthcare services.
- Supporting the Government's immunisation programmes: this includes providing funding for mass media campaign on National Immunization Day in partnership with World Health Organization (WHO) and Ministry of Health as well as launching an SMS based campaign to raise awareness on the need to immunize children
- Employment opportunities to Acid victims: Grameenphone has recruited six acid survivors within the company to enable their economic and social empowerment.
- Partnership with Special Olympics Bangladesh: The Company assisted the training and participation of Bangladesh Team in Special Olympics 2007 held in China, World's Largest Sporting event for intellectually challenged athletes.
- Financial assistance to students: In partnership with Grameen Shikhhkha, an organization of the Grameen Bank family, Grameenphone provides scholarship opportunities to underprivileged but bright students at various academic levels. Sixty percent of the scholarship will be targeted towards female students.
- The development of disaster alert systems: these are being developed to centre around geographic areas which have limited access to television and newspapers and are difficult to target through standard communication means; and
- Disaster relief: targeted assistance during national disasters including the cyclone of November 2007. This includes financial assistance, enlisting employees to distribute and co-ordinate relief and a joint MNO SMS campaign.

We analysed the revenue flows from the MNOs to others in the industry, isolating domestic revenue flows from those made to foreign suppliers. Based on interviews across the supply chain we estimate that:

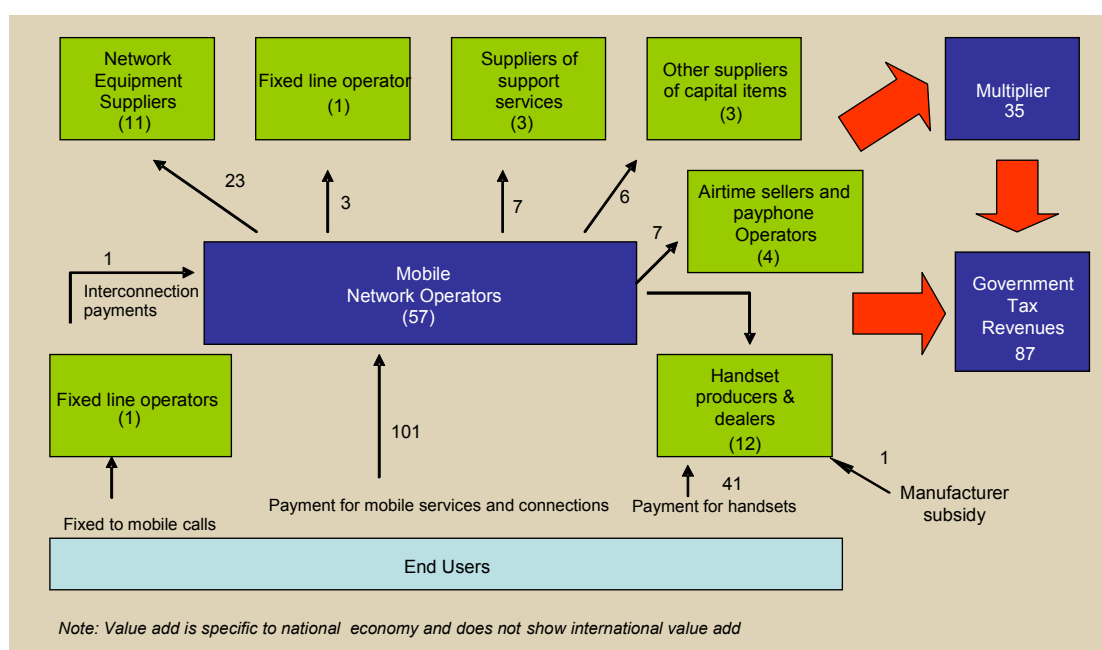
- 55% of total analysed MNO expenditure was to Bangladeshi suppliers and partners;
- The proportion of network capex that remained in Bangladesh was found to be higher than in other similar studies we have undertaken. This principally results from local businesses being established to manufacture towers, shelters and other supporting infrastructure within Bangladesh rather than relying on overseas imports. This has the double benefit of both increasing economic activity within Bangladesh and allowing the MNOs to purchase this equipment at up to a 30% lower price; and
- The MNOs increased their capital expenditure in 2007 due to further investment in EDGE/ GPRS. This expenditure was made with both foreign and local vendors with all installation.

Following the identification of the revenue flows, we quantified the share of revenue that translated into value add¹⁰⁵ for the same categories as above. Based upon interviews with industry players, a review of annual reports of similar companies and similar studies, we calculated the percentages of revenue which formed indirect value add.

Following the identification of these revenue flows, we estimated the proportion of these flows that remain within the domestic economy and are translated into a positive economic benefit.

The estimates of value add include a multiplier effect on the wider-economy which is assumed to be 1.4 representing various stakeholders views on the relative openness of the Bangladeshi economy. Further details on the multiplier are provided in 14.2.3. The figure below provides revenue flows between providers and estimates of value add.

Figure 133: Mobile value chain in Bangladesh in 2007 (BDT billions)



Source: Deloitte analysis based on information provided by MNOs and industry players, 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.

¹⁰⁵ Details on value add margins are contained in the assumptions appendix

Figure 134: Calculation of value add from mobile communications in Bangladesh in 2007

Domestic value add (BDT billion)	Total revenue	Domestic revenue	Domestic cost	Domestic value add	Value add with multiplier
Mobile network operators	111	111	54	57	80
Fixed operator	3	3	2	1	2
Network equipment suppliers	67	23	13	11	15
Handset distributors and retailers	42	42	30	12	16
Other suppliers of capital items	7	6	4	3	4
Support services	7	7	4	3	4
Airtime and SIM distributors and retailers	7	7	3	4	6
Total	244	200	108	91	128

Source: Deloitte analysis based on information provided by MNO and other industry players, interviews and analysis of company accounts and industry reports

MNOs contribute the largest amount to value-add making up 62% of the total. This is consistent to other countries, such as for Pakistan, where we have also found that MNOs make up the majority of value-add.¹⁰⁶

The value-add created by network equipment suppliers based in the country, both international vendors and local firms, is proportionately larger than in other similar studies. This represents the larger proportion of flows from the MNOs that remain in the country for the production of shelters and towers. These revenues are used to manufacture equipment and to hire contractors to undertake civil works and site preparation and installation. In addition, the major international telecommunications equipment suppliers, including NSN, Ericsson and NEC, have established country offices in Dhaka and employ local staff directly and through contracting agencies.

Value-add related created by those in the handset value chain contributes 13% of total supply side value-add. Handsets are sold when a new subscriber joins a network and when a subscriber replaces their handsets. The incidence of double SIMs is accounted for and it is assumed each subscriber has 1.6 SIMs, an increase from 1.2 SIMs in 2005¹⁰⁷. Handsets are assumed to be replaced every 24 months¹⁰⁸. Value-add is from three key sources:

- New handsets imported through legal channels: it is estimated that these accounted for 16% of total handset sales¹⁰⁹ in 2005 rising to 60% in 2007, primarily due to decreases in handset import taxes. Based on interviews, we estimate that around 30% of the retail price paid for a new handset remains within Bangladesh¹¹⁰. For an average priced handset, this is calculated to be BDT 1,130. This is shared between the handset distributor / importer and the retailer and around 60% is translated into value-add;

¹⁰⁶ Deloitte report for the GSMA on the impact of mobile taxation in Pakistan, May 2006

¹⁰⁷ Based on interviews with Grameenphone and SIM retailers and distributors

¹⁰⁸ Based on interviews with Nokia and handset retailers

¹⁰⁹ This includes illegal and second-hand sales.

¹¹⁰ This includes 1.5% sales taxes and import duty of BDT 300 per handset. The remainder of the retail price is paid to the handset manufacturer and distributors based outside of Bangladesh.

- New handsets imported through grey channels: it is estimated that these currently account for 20% of total handset sales or 25% of total new handset sales in 2007¹¹¹. The percentage of the retail price remaining within Bangladesh is lower for these types of handsets as import duties are not paid on all handsets¹¹². The margin is shared between the handset distributor / importer and the retailer; and
- Second-hand handsets: these are assumed to be sold informally and to be a private transaction between individuals.

Value-add from airtime and SIM distributors and retailers represent a significant proportion of value-add. Retailers and distributors share an average commission of 4-4.2% paid by the MNOs on these products.

Of less significance in the value chain are fixed operators and support services which combined account for only 3% of total value-add. This proportion is a little lower than found in other studies and can be attributed to the insignificant presence, and therefore low interconnection, to fixed operators.

We have not included the revenue flows between Grameenphone and Village Phone / CIC operators or the value add contribution of these parties in our analysis. However, we note that there are currently estimated to be 560 CICs, with an average wage per CIC operator of BDT 10,000 per month. As of Q3 2007 there were over 200,000 Village Phone ladies who provide “payphone” services to others within their rural community¹¹³. Assuming an average revenue per year of \$1000¹¹⁴, which is all translated into value-add then the supply side impact of mobile telephony may increase by 15%.

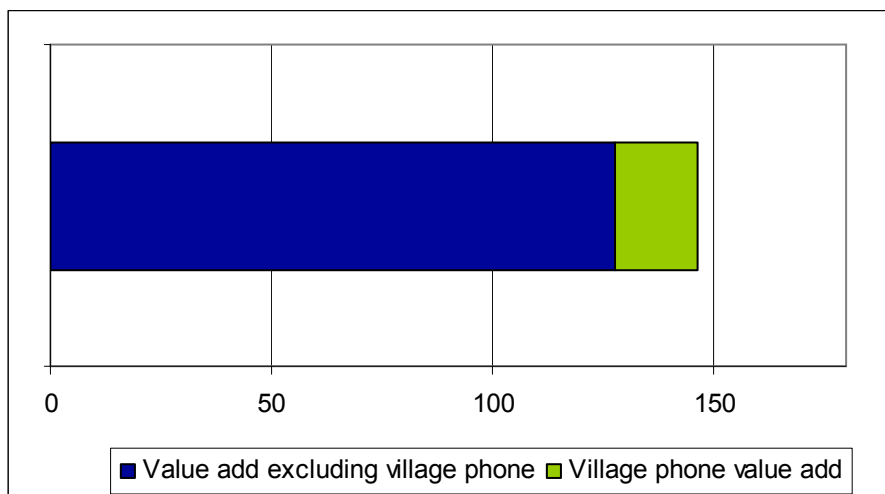
¹¹¹ These estimates were made on the basis of discussions with handset importers including Ericsson.

¹¹² Our interviews suggest that importers may under-declare the number of handsets being imported and thus reduce the overall level of import duties paid.

¹¹³ Source: Grameenphone

¹¹⁴ Figure of \$1000 per year is reported in: Expanding possibilities at the base of the pyramid, Innovations Case Discussion: Kick Start, E Simanis and Stuart Hart published in Innovations / winter 2006.

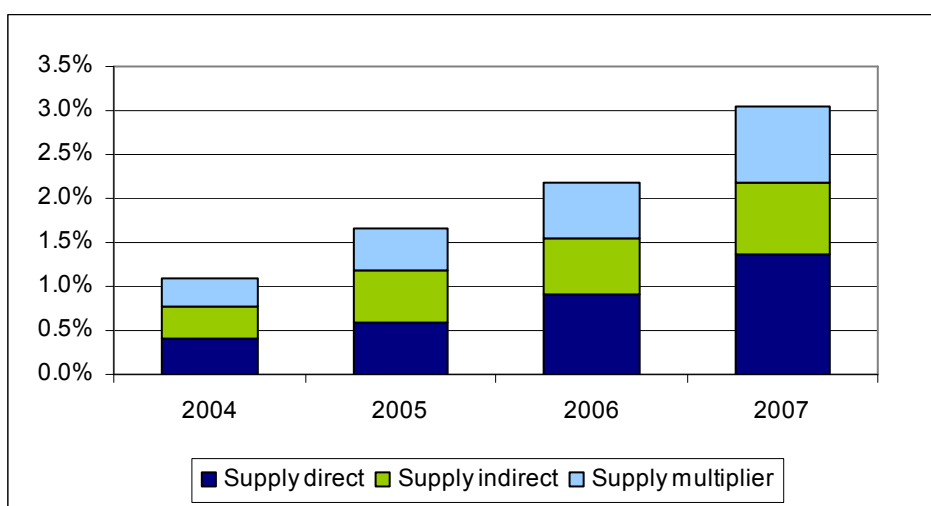
Figure 135: Value add including Village Phone (billions BDT)



Source: Deloitte analysis

Using the same process as above, we estimated the value-add on an annual basis from 2004 excluding Village Phone’s impact. Our estimates suggest that overall, value add has increased persistently year on year, and by over 230% overall during the four year period. The relative constituents making up value add have changed slightly over time with a shift towards direct value-add from indirect value-add. This shift can be, in part, attributed to a slight shift in network capital expenditure abroad and effects on handset purchases from the recent cyclone.

Figure 136: Supply side value add from mobile communications 2004 to 2007 (BDT million)



Source: Deloitte analysis, calculated as in previous tables

14.2.2 Contribution to Government revenue

Calculating tax revenues and regulatory fees

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, although we assume a degree of leakage from the informal

sector¹¹⁵.

We have collected information on revenues for the following types of taxes:

- Economy wide taxes¹¹⁶: value added (sales) taxes, import 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 and regulatory payments directly from the mobile operators. In 2007, these are estimated to be BDT 47,685 million. We do not include handset import taxes at this stage of the analysis since these are paid by the handset importers.

The largest proportion of tax revenue is raised through VAT and SIM activation taxes making up around 53% of total tax paid. Through direct tax payments we estimate that the mobile operators contribute 13% of total government taxation revenues. This increases to 14% if handset import taxes are also considered.

The proportion of tax that is accounted for by import duties rose during 2007 and is expected to rise further due to revised classifications of H.S import codes. Prior to July 2007, telecoms equipment was branded as capital machinery and a 6% import duty was levied. However the classification changed post 2007 and telecoms equipment is now subject to a 39% import tax.

Corporate taxes rose between 2006 and 2007 as a result of increasing absolute profit levels but also due to a change in corporate tax rates effective from July 2007. Whilst the average corporate tax rate in Bangladesh is estimated to be 30%¹¹⁷, this was increased to 35% for MNOs listed on the local stock exchange and 45% for those that are privately owned. This is also likely to increase 2008 corporate tax payments above those in 2007, when the impact of the change in tax rates will be seen for a complete year.

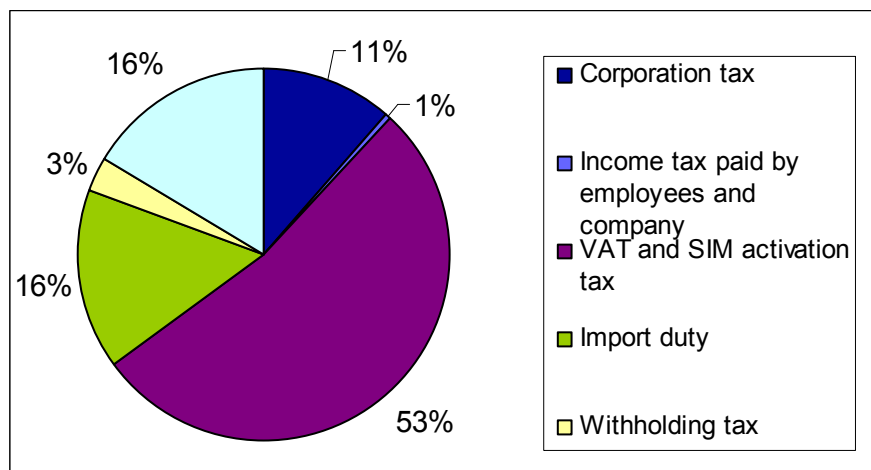
The remaining 16% of payments in this category are for regulatory fees, these primarily relate to the 5.5% revenue share with the BTRC, licence and spectrum fee payments.

¹¹⁵ 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.

¹¹⁶ As will be discussed below, some of the economy wide taxes have specific and higher levels for the MNO's.

¹¹⁷ Differential corporate tax rates are changed based on the nature of ownership and the size of the business. The average effective rate is estimated to be 30% by Grameenphone and those we interviewed whilst privately owned non-MNOs pay 40%.

Figure 137: Breakdown of 2007 tax revenues from mobile operators by source



Source: Deloitte analysis based on operator data

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.

Figure 138: Total tax revenues from the mobile value chain in 2007

Tax Revenue (BDT million)	Tax revenue	Tax revenue with multiplier
Mobile network operators	47,685	66,760
Fixed operator	381	533
Network equipment suppliers	4,754	6,656
Support Services	1,040	1,457
Other suppliers of capital items	913	1,278
Handset importers and dealers	7,343	10,280
Airtime and SIM dealers Commission	736	1,030
Total	62,117	86,963

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, or from consumers for mobile handsets, and not total tax revenues from the sector.)

Taxes on handsets represent a significant proportion of tax revenues. A fixed import tax of 300 BDT is levied on each imported handset. Sales taxes of 15% are applied to the retail price and those within the handset value chain pay taxes on profits and employee wages.

The taxes paid by the fixed operators represent the proportion of tax paid for terminating MNO traffic and for providing leased line services and not total taxes paid¹¹⁸. This category includes Bangladesh Telegraph and Telephone Board, Bangladesh Railways and the regional telecoms operators. Similarly, the taxes paid by the infrastructure providers represent only a proportion of total taxes paid by these entities.

¹¹⁸ This was calculated as total tax paid by the fixed operator (as reported in the audited financial statements) multiplied by the share of the fixed operator revenues that come from the MNOs as payment for terminating mobile originating calls and providing leased lines on the national backbone.

14.2.3 Impact on employment numbers

Mobile services contribute to employment via several avenues¹¹⁹:

- 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 MNOs and, for the related industries, dividing the proportion of revenue spent on wages by the average wage rate in each sector. Typically, support and induced employment is estimated using a multiplier and other studies have used a ratio of 1.1 to 1.7 for induced employment. The use of such multipliers can often be criticised for the lack of consideration to the economic basis of the industry and country under consideration. Following a review of the available international evidence and discussions with stakeholders, we have applied a multiplier of 1.4 on all value add (including employment), representing our view of the relative openness of the Bangladeshi economy. For example, many technological capital goods are imported from overseas but a lot of skilled and unskilled labour is provided domestically and there is a relatively low level of expatriate employment. There has also been insourcing of manufacturing capability in recent years, for example towers and other mobile infrastructure is manufactured within Bangladesh, although a proportion of the raw materials are imported. The following compiles our estimates for employment generated via the three avenues to 2007. These estimates are calculated using a variety of approaches and checked where feasible against interview and other sources. Broadly, with the notable exception of the MNOs, employment was calculated using an 'average wage' methodology¹²⁰. Direct employment was calculated using employment data from Grameenphone uplifted.

¹¹⁹ Employment from CICs are also included. Employment generated from Village Phone is excluded as it is not full time.

¹²⁰ This involves identifying total wage spends attributable to MNO related activity and dividing by an estimated average wage. Average wages are generally gleaned from a variety of sources including interviews and the 2007 wage survey from the Bangladesh Bureau of Statistics.

Figure 139: Contribution to employment from the mobile value chain

Employment Impact	Number of employees (FTE)	Number of employees including multiplier
Mobile network operators	9,380	9,380 ¹²¹
Fixed operator	1,120	1,570
Network equipment suppliers	13,180	18,450
Other suppliers of capital items	4,450	6,230
Handset distributors and retailers ¹²²	10,360	14,500
Support services	3,100	3,700
Airtime and SIM distributors and retailers	39,930	55,900
CICs	950	1,320
Total FTE	82,460	111,700

Source: Operator data, interviews, industry reports 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).

We estimated that in aggregate, including direct and indirect employment, more than 111,790 jobs have been created by the industry to date. The largest category of employment relates to retailers who sell airtime, SIMs and handsets. It is estimated that:

- There are over 81,000 points of sale for reload, these include dedicated telecoms outlets and mixed retail shops;
- 9,000 points of sale sell SIM, handsets and reload whilst the remainder are reload only;
- Over 300 handset repair outlets have opened throughout the country, employing 2000 staff; and
- Handset, airtime and SIM distributors account for 96% of FTEs in this category.

Employment levels for this category of employee were unclear and were estimated by a number of different approaches, utilising information provided during interviews with MNOs, handset dealers and franchisees, which provided similar level of overall results.

Mobile related employment from network capital expenditure provides the second largest employment category and is greater than total MNO employment. The significance of this category in overall employment comes from the rolling out of network and focus on domestic spend on capital.

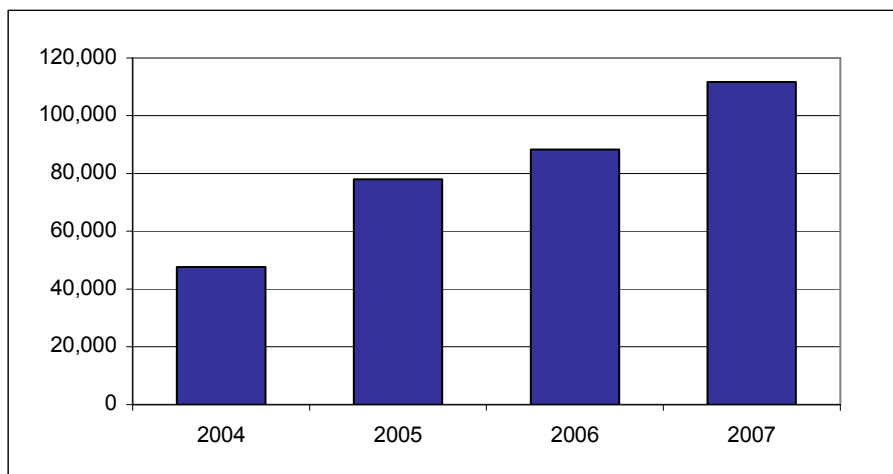
The employment generated by CICs is increasing as new centres are built out. It is estimated that each CIC employs approximately 1.7 staff members and provides an average income of \$3-\$5 per day per centre¹²³.

¹²¹ We apply a conservative multiplier of 1 to MNO employment as we assume that much of the employment effect was captured in the first round revenue flows.

¹²² This includes in addition employment from mobile repairers but not employment in the retail of second-hand handsets.

¹²³ Reported in Grameenphone annual report 2006.

Figure 140: Employment overtime from mobile value chain (millions BDT)



Source: Deloitte analysis, calculated as in previous tables

Over the four year of analysis employment has consistently risen as subscribers and penetration has also increased.

14.3 Demand-side impact: increases in productivity

There are numerous ways in which mobile services can improve productivity, particularly in developing countries where mobile services have “leap-frogged” fixed line services and are the provider of universal service. These include:

- 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 time¹²⁴;
- 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.

The impact of mobile telephony, including internet access provided over mobile technology, is likely to be particularly significant in Bangladesh. This is due to the low level of fixed line and internet

¹²⁴ “Africa: The Impact of Mobile Phones”, Vodafone Policy Paper Series, No.3, March 2005.

access which increases the potential impact from the introduction of mobile as subscribers are moving from a situation of no communication access to mobile access as opposed to fixed line access supplemented with mobile access.

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

- Substantially reducing travel times and costs: particularly in rural areas where previously traders would have needed to travel to the urban areas to check for demand and agree prices, this business is now conducted on the telephone via telephone calls, text messages or interactive services including Cellbazaar. Traders are able to ensure demand exists for their products before setting out on a journey and are able to ensure they achieve the best price for their products rather than taking prices set by middlemen;
- 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; and
- Encouraging entrepreneurialism: mobile has encouraged the growth of small business and has increased its efficiency. For example, Villagephone ladies are cited as moving into other small enterprise ventures and CIC centres provide opportunities for entrepreneurialism. Individuals are able to use services such as Cellbazaar to engage in informal trading and to set-up as taxi drivers being contactable by a mobile phone.

Cellbazaar

Cellbazaar allows users to buy or sell goods and services using their mobile phones either by SMS, WAP or web. It acts as a platform for buyers and seller to locate each other and technology allows users to post information such that it can be edited, searched and explored over cumulative databases by any type of handset.

Cellbazaar provides regular, reliable, market information on the price, availability and supplier options of essential goods. Information is provided on a pay-as-you-use service. As such, it may be used by private individuals or small and medium sized enterprises.

Over one million users have accessed this service since its launch in July 2006. There are on average 210 new postings and 34,000 hits on the site per day. It has been particularly credited with socio-economic development in rural areas by network people from various parts of the country and improving the volume of trading of basic goods (e.g. rice, sugar, used goods) in previously unconnected rural populations.

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 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 have not been able to obtain any studies that place a quantitative value on productivity gains arising from the use of mobile telephony in Bangladesh. However, all the reports we have reviewed discuss the economic benefit created by mobile phones and provide positive examples of their positive stimulation of economic growth and social welfare¹²⁵. All those we

¹²⁵ Further quantification would require consumer and business surveys to be undertaken

questioned in government and at the regulator agreed that mobile communications had transformed the way in which business was conducted.

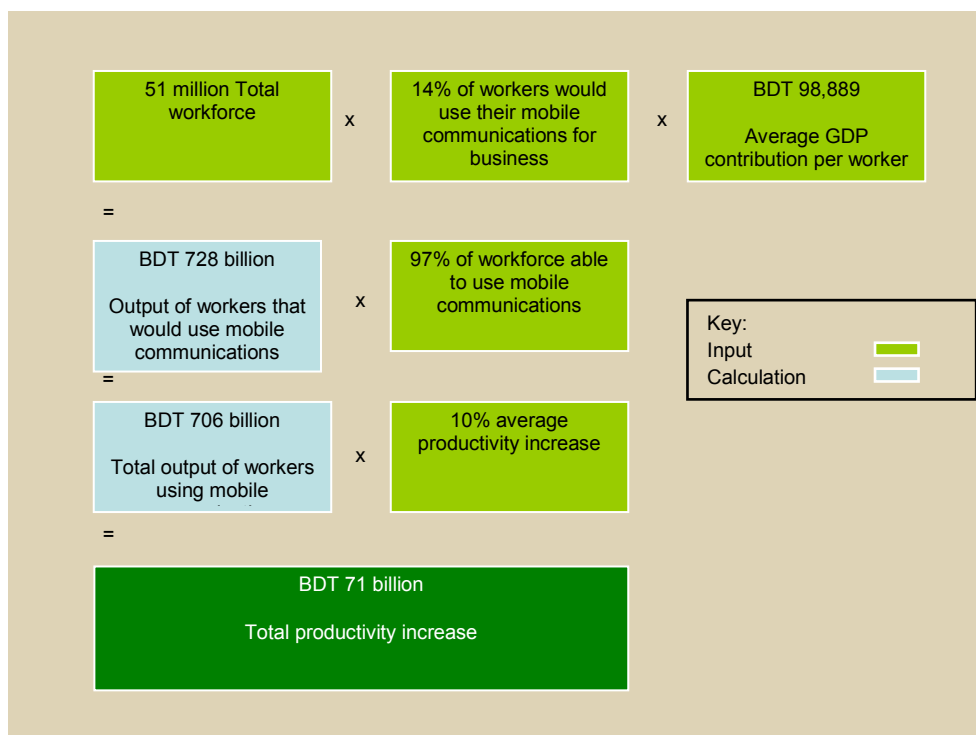
Other surveys have typically quantified productivity improvements to be between 6% and 11%. For example, McKinsey quantified the impact to be 10% in China, whilst the impact in the UK has been estimated to be both 6% and 11%. In our previous studies we estimated the impact for Pakistan to be 9% - 10%. Based on our interviews, we have estimated that productivity increases in Bangladesh would be at the high-end of this range at 10% as:

- Relevant literature and Interviewees all reported the dramatic impact that mobile telephony has had on the Bangladeshi economy;
- The limited fixed line roll out and low internet penetration 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
- Bangladesh is more rural than the UK so the travel-time savings are likely to be greater.

We estimate the impact on the productivity improvements on the overall economy by assuming that the productivity improvement will be experienced by workers whom use mobile phones for business purposes. We define these as mobile business users (MBUs). We calculate the proportion of MBUs by reference to data from the national bureau of statistics and international labour databases.

Using the economic value concept set out above, we estimate the incremental impact on the economy to be BDT 70 billion for 2007.

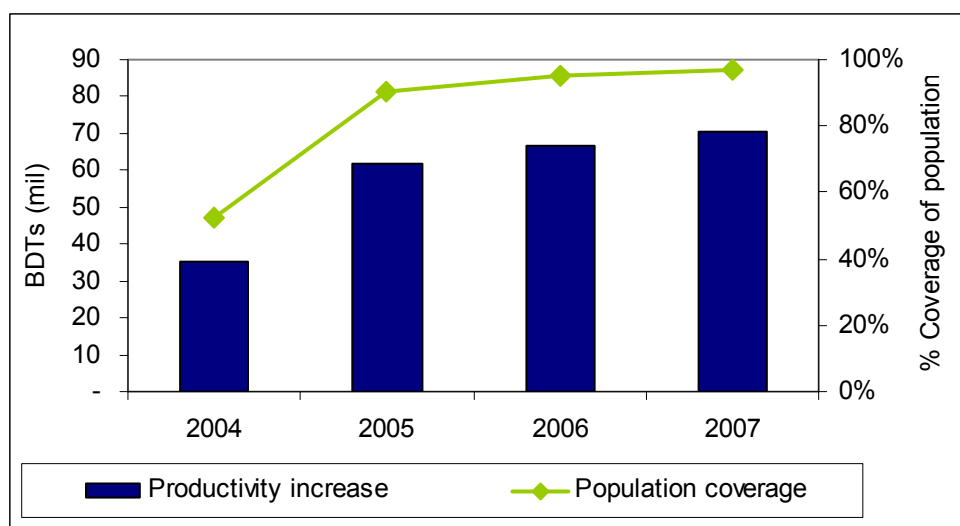
Figure 141: Economic impact in 2007 of increased productivity amongst workers who use mobile phones for business purposes



Source: Deloitte analysis based on Deloitte assumptions, interviews and information from Bangladesh national statistics office

Our analysis shows consistent increases in productivity between 2004 and 2007. This is consistent with the mobile network roll-out, which has provided a greater proportion of the population access to mobile technology.

Figure 142: Economic value from increases in productivity, 2004 to 2007



Source: Deloitte analysis. Population coverage calculated by GSMA

14.4 Demand side impact: Intangible benefits

Finally, we seek to identify the intangible impact of the mobile industry in Bangladesh. We utilise information provided to us during interviews in Bangladesh and additionally we draw upon and

extend findings from the Vodafone report (March 2005)¹²⁶ relating to Tanzania, studies into the social impact of telephony in Bangladesh¹²⁷ and evidence of gains from similar studies that we have undertaken in other regions to aid our estimates¹²⁸.

Mobile phones are empowering people from all economic and social groups and in all areas of Bangladesh. Intangible benefits of mobile telephony identified by stakeholders as being relevant to Bangladesh include:

- Promotion of social cohesion: through enabling contact when family members or friends who have moved away. This is particularly important in a country which has a high incidence of economic migration but a culture of close family ties;
- Economic empowerment in low income, rural areas: for example, As of Q3 2007 there were over 200,000 Village Phone operators¹²⁹. Through the sharing of handsets, social cohesion is increased. However, the Village Phone programme also empowers women in rural areas, allowing them to move into other forms of employment and to use their income to improve access to health and education. CIC centres also provide direct employment activities as well as providing communications infrastructure to rural areas, increasing the potential for entrepreneurialism and raising rural living standards;
- Extension of communications to users with low education and literacy. Education and health programmes are provided over mobile communications. However, those with low education are particularly using voice calls to keep in touch with family and seek employment opportunities. The launch of handsets and network packages that allow text messaging in Bengali, as opposed to English, are also extending the reach of text based services;
- Extension of communications to those on low incomes: decreasing mobile handset prices and the introduction of reload cards of low denominations are raising the affordability of mobile technologies. However subscriber penetration in Bangladesh is 20% 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 the poorest in society are able to enjoy the benefits of mobile communications;
- Stimulation of local content: this can be particularly useful for allowing users to learn about local services such as healthcare or education. Mobile phones are also used for sharing news informally and formally via data services;
- Dissemination of educational and health information: a medical helpline has been established increasing access to healthcare for those in rural areas, this has been supplemented by additional information on the internet and accessible at CICs;

¹²⁶ The specific article referenced is "Linking mobile phone ownership and use to social capital in rural South Africa and Tanzania"

¹²⁷ Africa: The Impact of Mobile Phones 2005, Vodafone policy paper series.

¹²⁸ For example, Deloitte report for the GSMA on the Economic Impact of Mobile Telephony in Pakistan, May 2007.

¹²⁹ Source: Grameenphone

- Assistance 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
- Social value of value added services: expenditure on value-added services is increasing, particularly amongst the young. Text messaging is a common form of communication and often used as an entry method for competition. Ring tone downloads are increasing in popularity. Those replacing handsets are reported to be interested in higher-end models which include cameras and MP3 capabilities.

Diversification in the range of services provided by the MNOs may also be expected to increase the intangible benefits of mobile telephony. Initiatives identified in interviews with Grameenphone included:

- Billpay: this is a pilot project which gives people easier access to paying their utility bills by using Grameenphone's extended network of retailers. This reduces transaction costs for consumers, in terms of time and monetary values, as well as increasing the security of the transaction for the Power Development Board (PDB); and
- Extending customer service points of presence: Grameenphone is building out a network of service centres and call centres that provide national reach. These are 80 "one-stop-shop" Grameenphone Centres and 600 Grameenphone Customer Service desks. These are supplemented by the establishment of two 24 hour customer service help lines: Grameenphone Call Centre and the internet based Grahak Katha Online. A report by the Norwegian school of management estimated that travel time for after sales service has fallen from eight hours to one hour as a result of this initiative and this may fall further as more centres are established

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. We have estimated value using the willingness to pay concept¹³⁰. This seeks to calculate the increase in consumer surplus that has resulted from a change in the price of a good. 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 BDT 62,212 million as follows.

¹³⁰ For example, see McKinsey in "Wireless Unbound", 2006 and described in section 3 above.

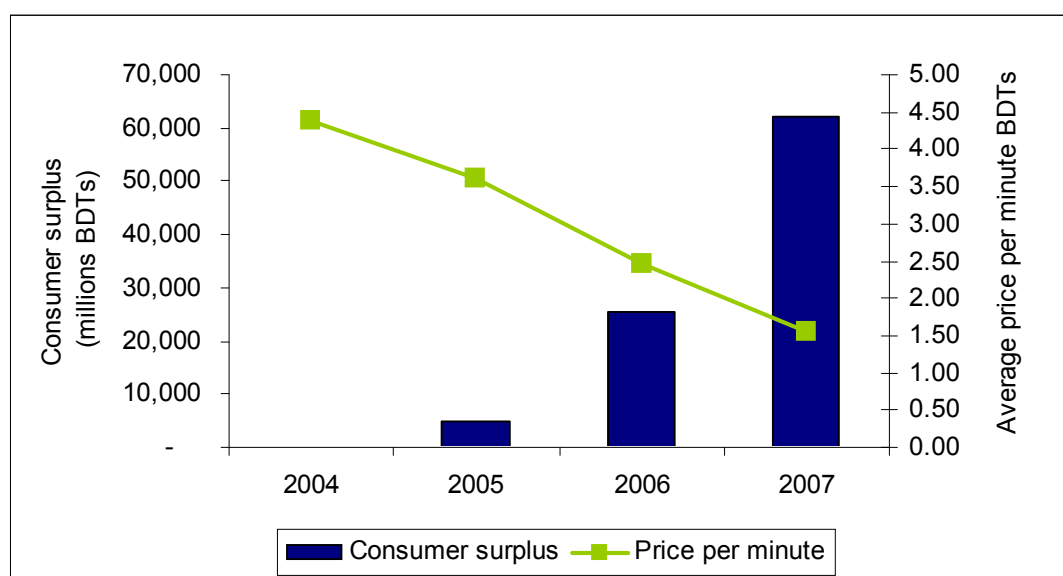
Figure 143: Calculation of consumer surplus

Increase in consumer surplus (BDT million)	2004	2005	2006	2007
2004 subs	-	4,757	11,964	17,572
2005 subs	-	-	13,443	23,902
2006 subs	-	-	-	20,738
2007 subs	-	-	-	-
Total consumer surplus	-	4,757	25,406	62,212

Source: Deloitte calculation based on operator information

The relation of this surplus to reduction in price per minute is as follows.

Figure 144: Increasing Consumer Surplus:



Source: Deloitte analysis based on information provided by operators and industry reports.

Intangible benefits in 2005 are low because of a relatively small decrease in prices from 2005 levels.

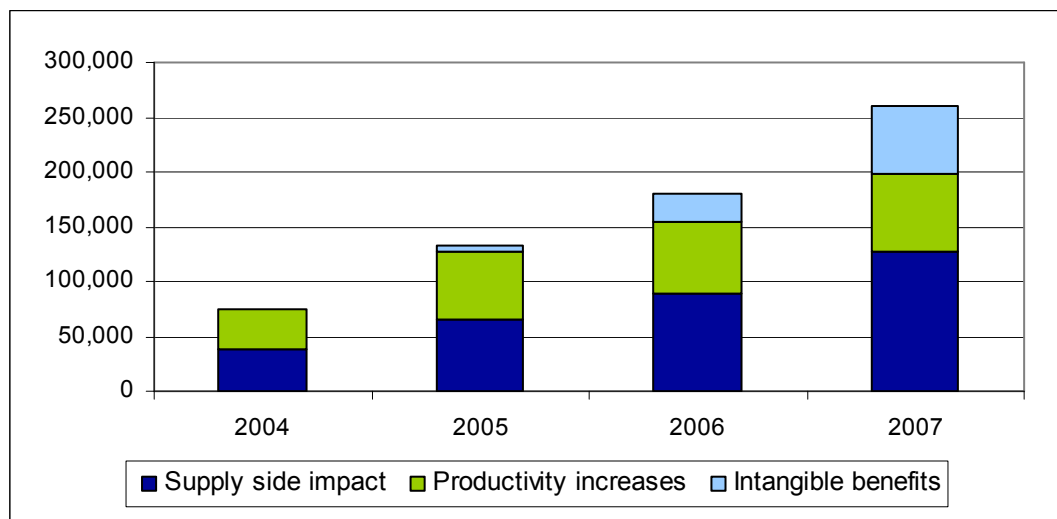
The estimates of consumer surplus may underestimate the true value of intangible benefits due to:

- Data limitations, it assumes that all subscribers up to 2004 joined the network in 2004 and does not account for the increased willingness to pay that would have resulted from the higher ARPUs in early years. These limitations restrict calculation of intangible benefits in 2004; and
- Assumption 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.

14.5 Total static impact on economic welfare

The aggregation of the supply-side, demand side and intangible benefits provide an indication of the total economic impact of mobile communications in Bangladesh.

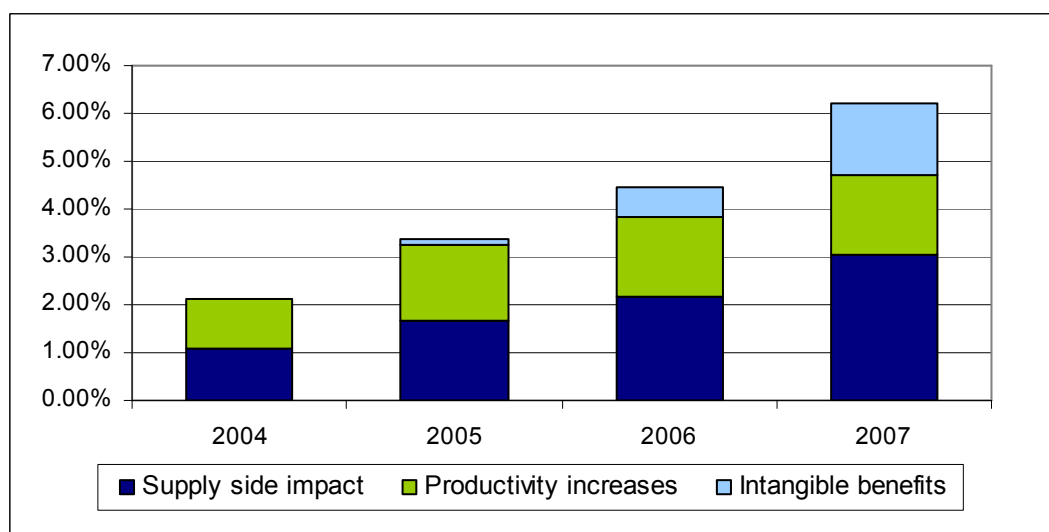
Figure 145: Economic impact of mobile communications in Bangladesh (BDT millions)



Source: Deloitte estimates

The total impact of mobile communications on GDP has been, and continues to be, substantial. Moreover, in 2007 we estimate the sector will have contributed BDT 260 billion by the end of year. In terms of percentage of total GDP the mobile communications accounted for 2.1% of GDP in 2004 increasing to 6.2% of GDP in 2007.

Figure 146: Economic impact as a percentage of GDP



Source: Deloitte estimates

14.6 The dynamic impact of mobile telephony on growth rates

Academic research suggests that in the longer term mobile communications have a significant impact on economic growth rates. It has been suggested that this effect is particularly strong in developing countries. Our research is consistent with this and we estimate that mobile communications has raised GDP growth rates in Bangladesh by 0.12% for each 1% increase in

penetration¹³¹. As such, the increase in number of subscribers between 2006 and 2007 may have contributed around 0.6% to the Bangladeshi GDP growth rate.

14.7 Conclusion

Bangladesh's mobile sector is estimated to have contributed BDT 260,000 million to the economy in 2007, representing 6.2% of GDP. This was an increase of 250% on 2004. Additionally, the sector is estimated to have directly and indirectly employed over 110,000 FTEs in 2007.

Mobile telephony has become more affordable as reductions in handset import and SIM taxes, alongside the licensing of an additional operator have led to falling retail prices of handsets and services. MNOs have been investing for capacity and coverage purposes and network coverage is estimated to be 97% of the population. The combination of affordability and coverage has resulted in a 680% growth in the number of mobile subscribers during the four year period of this study.

This growth in mobile telecommunications has occurred in both urban and rural areas and has become the instrument of universal service. Mobiles are used for social, educational and business purposes. Whilst voice calls remain the most popular service, text messaging, music services and data applications are gaining in popularity.

The GPRS / EDGE networks are providing data and internet services on a national basis, to individual subscribers via Smart-phones and on a mass level through the build of CICs. By providing the infrastructure necessary for business communications, a strong communications sector contributes to the international competitiveness of Bangladesh as well as raising the potential for business growth in rural areas.

¹³¹ Tax and the digital divide 2006, Deloitte / GSMA

15 The Economic Impact of Mobile Telephony in Pakistan

15.1 Overview of the Pakistani mobile market

15.1.1 Operators, coverage and penetration

Six mobile network operators are currently licensed to operate in Pakistan. The most recent licensees are Telenor and Warid who launched in 2005. China Mobile has recently entered the market through the purchase of Paktel.

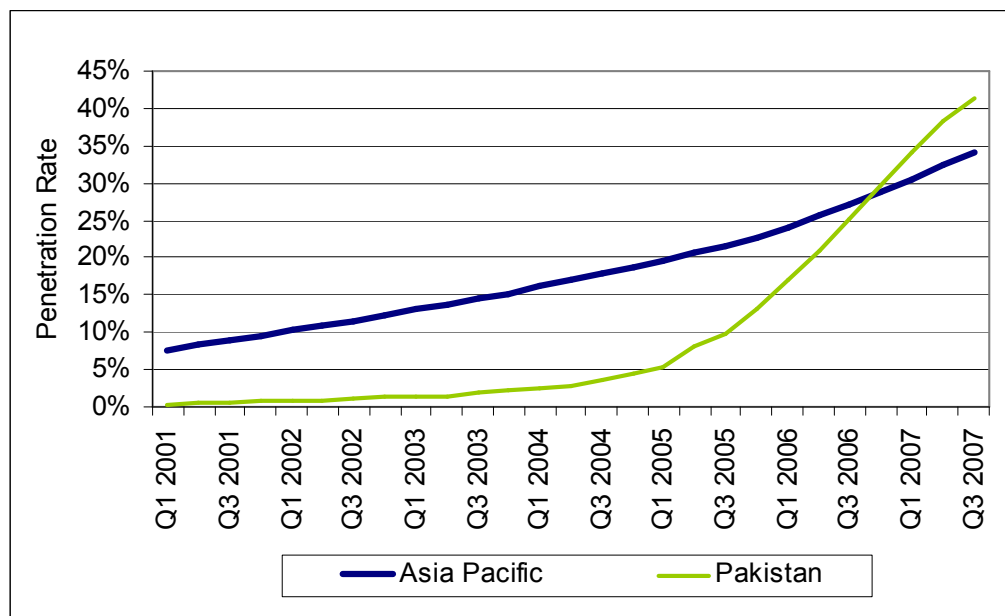
Figure 147: Mobile operators and market shares (end-2007)

Mobile operator	Brand name	Majority owner	Launched	Market
Pakistan Mobile Company Limited (PMCL)	Mobilink	Orascom	1994	40.88 %
Pakistan Telecom Mobile Limited (PTML)	Ufone	Pakistan state, Etisalat	2001	22.03 %
Telenor Pakistan Limited	Telenor	Telenor ASA	March 2005	16.89 %
Warid Telecom Limited	Warid	Abu Dhabi Group	May 2005	16.52 %
Paktel Limited	Paktel	China Mobile Communications Corporation	1990	3.17 %
Pakcom Limited	Instaphone	Sanbao	1990	0.51

Source: Market intelligence reports

Since 2003, mobile penetration growth has exceeded 75% per annum, peaking at 125% in 2006. The rate of growth of penetration in Pakistan in recent years has allowed this country to catch up and exceed average penetration rates in the Asia Pacific region. As presented below, mobile penetration is currently estimated at over 40%, having passed the regional average early in 2007.

Figure 148: Historical penetration in Pakistan and the Asia Pacific region



Source: *Wireless Intelligence*

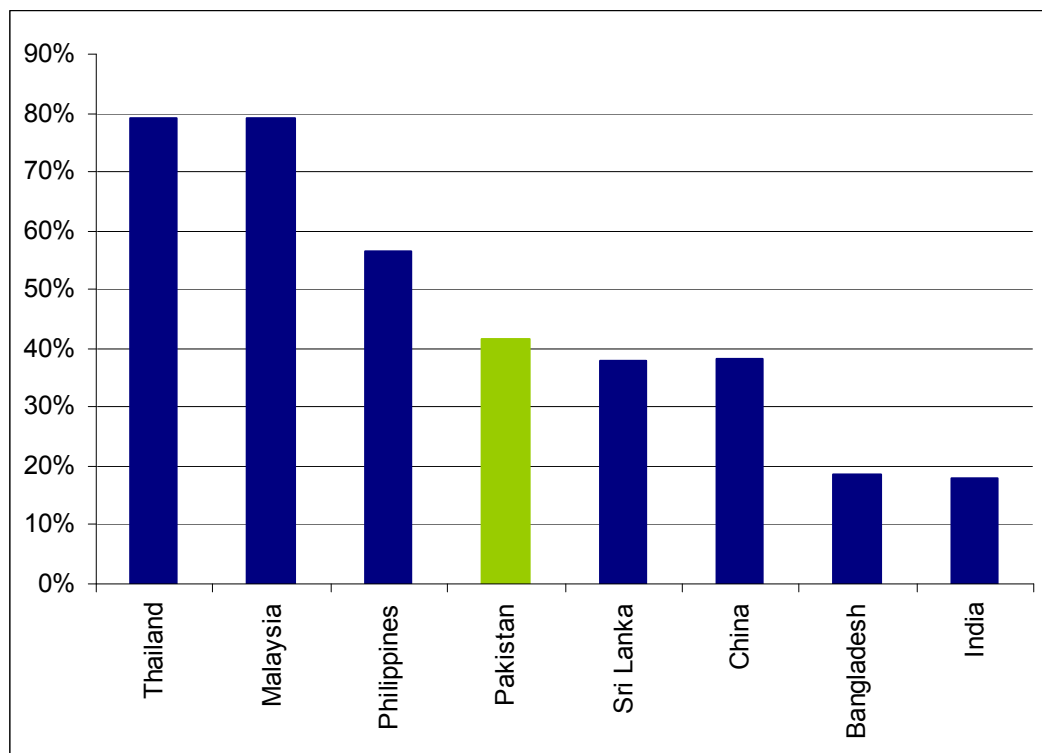
Since early 2004, the number of mobile subscribers has exceeded the number of fixed line subscribers and the ratio at end 2007 stood at approximately 13:1.

Geographic and population coverage have increased considerably over the past few years following substantial investment by the MNOs. Geographic coverage increased from 8.8% in December 2004 to over 29% in December 2006. Over the same period, population coverage has increased from 23% to 70%.

Mobile operators are providing the types of services that may have traditionally been associated with fixed line technology. Prepaid mobile services represent almost 98% of total mobile connections in Pakistan and have become the instrument of universal service. This has been recognised by the Pakistan Telecommunications Authority (PTA) who encouraged mobile operators to bid for a share of the universal service fund in the recent funding round.

However despite this growth there is clearly potential for considerable increases in penetration in Pakistan, particularly in rural areas which are only partially covered by mobile networks. The following figures show penetration in Pakistan compared to its immediate neighbours and other countries in the region.

Figure 149: Mobile penetration rate in Pakistan and Asia



Source: *Wireless Intelligence (2007 Q3 Data)*

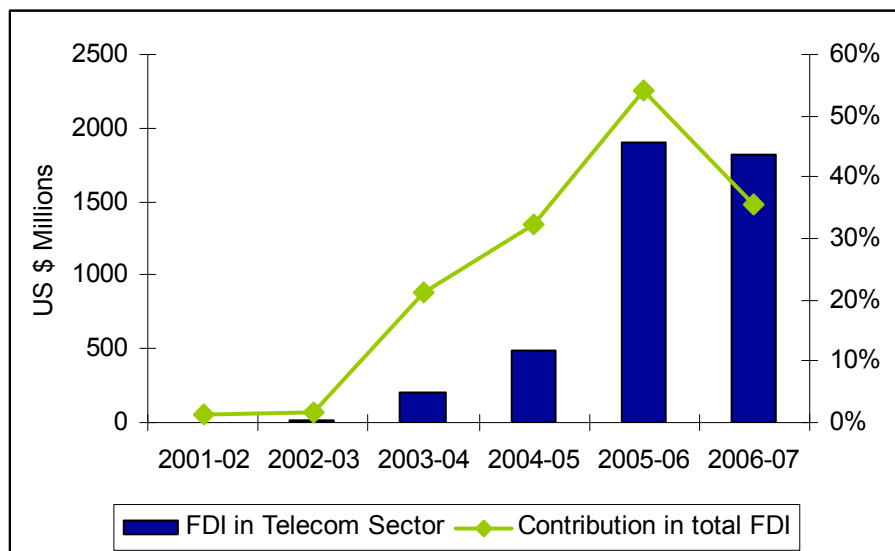
The government has made considerable efforts to deregulate and promote the development of the mobile industry. Furthermore, the licensing of new companies for the provision of mobile services has supported the rapid increase in competition and expansion of mobile usage in the country and, mobile number portability was enabled from March 2007.

The strong competition between the operators in recent years has resulted in a variety of new services made available to consumers including 'Intelligent Network', personal numbering and satellite services. Further, operators are increasingly offering enhanced email facilities.

15.1.2 Foreign Direct Investment and Domestic Investment

The mobile sector attracts large inflows of Foreign Direct Investment (FDI) making up a sizable proportion of aggregate flows.

Figure 150: FDI in Telecom sector in Pakistan and contribution to total FDI.



Source: Pakistan Telecommunication Authority (PTA) published economic indicators

After a significant rise in flows from 2004 levels, FDI to the mobile sector over the last two years has been stable at PKR\$90 billion/yr.

Operators have further committed to additional investment in the next few years. The PTA for example, estimates investment in GSM technology to reach around PKR180 billion by 2009¹³². The focus of this fresh wave of investment will be directed to expanding services into under-served areas and launching new services.

15.1.3 Taxation rates

The Pakistani mobile operators are subject to a number of different taxes, levied on imports, sales and profits. The tax revenue from the mobile telecoms industry has increased rapidly during the period, despite decreases in the SIM activation tax over the period. A variety of taxes are applied to mobile handsets and services including VAT or similar taxes (of around 15%) and fixed taxes (8.3%). Pakistan currently levies additional mobile specific taxes:

- A SIM activation tax of PKR 500 (around US\$ 8.3) that is paid on the sale of each new SIM card and is not payable on connection to the fixed line telephony¹³³; and
- A 10% withholding tax on the price of usage. In theory, this tax can be reclaimed by individual consumers at the end of each fiscal year. However, operator records indicate that less than 2% of its subscribers ask for tax certificate at the end of the fiscal year¹³⁴ and therefore this represents an additional barrier to growth

¹³² At an operator level, Telenor to date has invested around USD60 billion in infrastructure and plans to invest a further PKR45 billion by the end of 2009 (Budde 2007).

¹³³ Subsidisation of SIM cards raises subscriber acquisition costs and given the relatively lower levels of ARPUs in rural areas may make roll out into rural areas unprofitable

¹³⁴ Individuals seeking to reclaim the tax are required to request details of expenditure from the operators. The operators estimate that forms are requested for less than 2% of the value of usage.

A joint GSMA/Deloitte report prepared in 2007¹³⁵ showed that in Pakistan the proportion of taxation in the Total Cost of Mobile Ownership (TCMO¹³⁶) is around 17% (without considering the SIM activation tax). This figure compares to a regional average of 11%. However, the SIM activation tax is subsidised by the operators, it is a tax on connection and therefore is part of the TCMO. Once account is made for this, Pakistan ranks top out of Asia Pacific countries with tax accounting for over 30% of the TCMO.

The GSMA/Deloitte report then looks at the potential impact of removing the SIM activation tax. The report argues that a removal in this tax would lower the subscriber acquisition costs (SACs) and make roll-out into rural areas financially viable for the MNOs.

15.1.4 Other payments to government

In addition to consumer related taxes, the Central Revenue Board (CBR) and the Telecommunications Authority (PTA) levy a number of other taxes and charges on the MNOs. These costs are ultimately passed onto end-users which may hence hinder the emergence of the economic and social benefits that are generated by mobile telephony.

15.1.5 Retail prices

Increasing competition between the MNOs has resulted in a reduction of the retail price of mobile calls. These decreases were particularly significant following the operational launch of Telenor and Warid in 2005. Mobile retail prices are low in Pakistan compared to regional neighbours and other countries.

In terms of relative size, mobile retail prices are low in Pakistan compared to regional neighbours and other countries:

¹³⁵ GSMA/Deloitte report 'Global Mobile Tax Review', 2006-2007, available at <http://www.gsmworld.com/TAX/>

¹³⁶ The TCMO is calculated as: $TCMO = \text{cost of handset} \div \text{handset replacement period} + \text{connection fee} \div \text{SIM replacement period} + \text{total annual cost of usage (monthly minutes} \times \text{rate per minute} \times 12 + \text{monthly texts} \times \text{rate per text} \times 12)$.

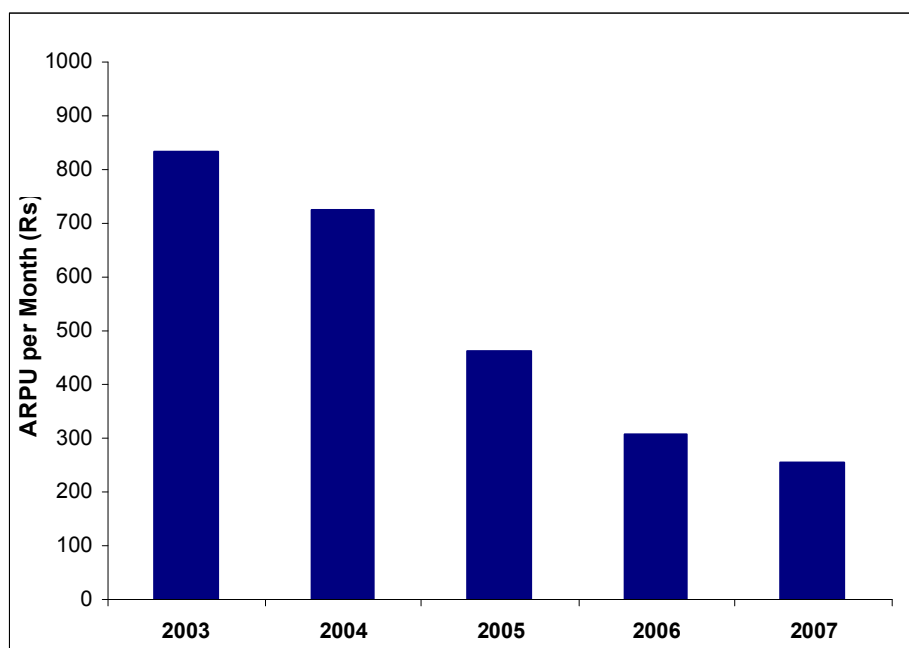
Figure 151: Average retail price per minute¹³⁷

Country	Average retail price (US\$)
Pakistan	0.03
India	0.06
Bangladesh	0.07
China	0.09
UK	0.41
Sweden	0.17
Czech Republic	0.31

Source: Tarifica and MNOs

Falling prices per minute have further translated into diminishing ARPUs. This combined with high SACs has created barriers to further roll-out in rural areas by MNOs.

Figure 152: ARPU of average subscriber



Source: Wireless intelligence

The provision of communications in rural areas is necessary for promoting long-term economic growth. Mobile communications has so far been more successful than fixed line in providing this access with both number of subscribers and population coverage far exceeding the fixed line operators¹³⁸.

¹³⁷ Prices calculated from Tarifica data as the weighted average of price of call per minute to on-net, off-net, fixed and international, weighted by estimates of destination.

¹³⁸ From operators and GSMA (March 2006) data 88% of connections are from mobiles whilst mobiles provide 70% of population coverage.

15.2 Economic impact of mobile industry in Pakistan

We initially calculate the economic impact of the mobile industry between 2004 and 2007 using static analysis. Our estimates are based on:

- Interviews and data collected from public sources including the PTA, CBR, MOIT and National Statistics Bureau;
- Interviews and data collected from two of the six mobile network operators (MNOs). These are Telenor and Mobilink;
- Interviews and data collected from others in the mobile value chain including infrastructure providers, handset dealers, airtime wholesalers and retailers;
- Data published in the Deloitte report for GSMA; and
- International benchmarks and studies.

For the other four mobile operators where we have not had direct access to data we have primarily used publicly available data. Where this data has been insufficient we have uplifted, based on market shares, Telenor and Mobilink's data. However, for 2007 data has been limited for Telenor and Mobilink requiring use of public information and/or various assumptions¹³⁹. We have not verified the accuracy or robustness of the information provided to us and where there have been discrepancies between data sources then we opt to use information provided to us by the MNOs. We use this information to calculate 3 static impacts:

- Supply side impact: Estimated from analysis of the mobile value chain;
- Demand side productivity impact: Calculated via estimates of productivity benefits enjoyed by workers using mobile phones for business; and
- Demand side intangible impact: Evaluated on the basis of estimated willingness to pay.

15.2.1 Value chain impact

We determined five categories of economic value which are directly created by the MNOs in Pakistan:

- 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.

¹³⁹ All key assumptions are outlined in the appendix.

We estimate that MNOs will directly contribute in excess of PKR 59 billion in 2007.

Figure 153: Value add of mobile network operators (excluding multiplier effect)

Value add (Rupee millions)	2004	2005	2006	2007
Employee wages and benefits	1,556	3,495	5,253	7,059
Contractors	17	159	13	15
Taxes and regulatory fees	16,900	27,827	44,499	50,089
CSR	54	231	28	29
Dividends	2,609	1,230	1,975	1,641
Total	21,136	32,941	51,768	58,833

Source: Deloitte analysis based on information provided by MNOs, interviews with players in related industries and publicly available information.

Taxes and regulatory fees (including spectrum fees) make up the largest proportion in the above table, accounting for over 85% of the total in 2007. The next largest contributor is employee wages and benefits. Corporate social responsibility (CSR) programmes received over PKR 29m in 2007. The equivalent figure for 2005 was PKR 231m representing the donations from the MNOs towards the Kashmiri earthquake fund.

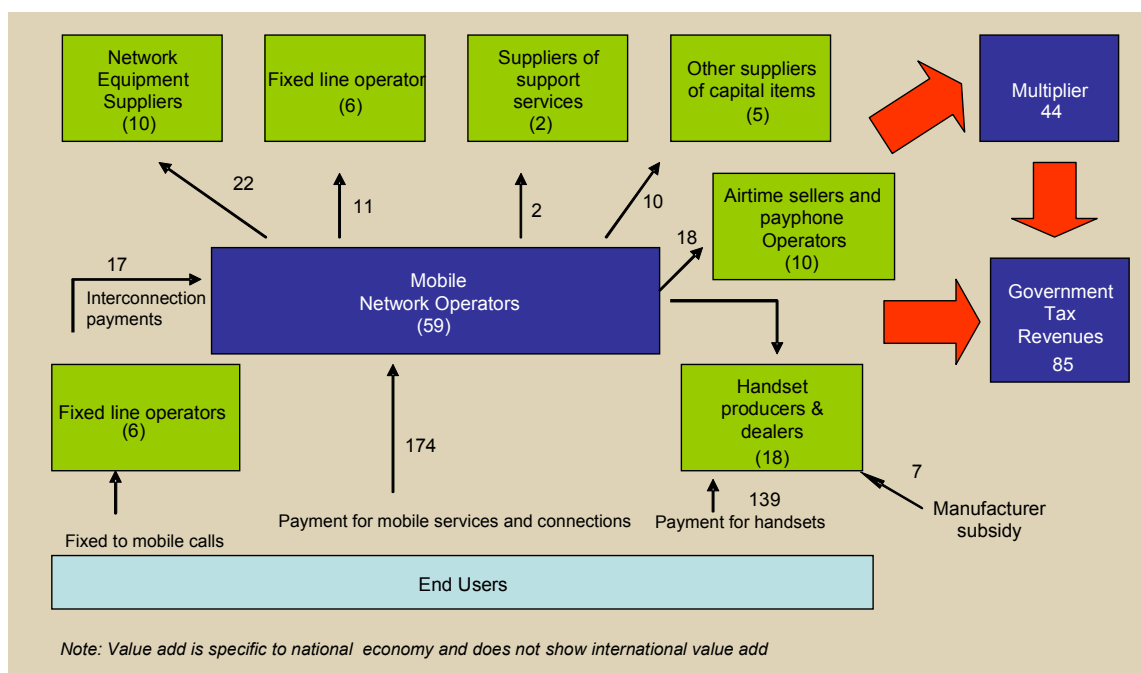
We analysed the revenue flows from the MNOs to others in the industry, quantifying the share of revenue that translated into value add¹⁴⁰ for the same categories as above. Based upon interviews with industry players, a review of annual reports of similar companies and similar studies, we calculated the percentages of revenue which formed indirect value add.

Following the identification of these revenue flows, we estimate the proportion of these flows that remain within the domestic economy and are translated into a positive economic benefit.

The estimates of value add include a multiplier effect on the wider-economy which is assumed to be 1.4 representing various stakeholders views on the relative openness of the Pakistani economy. Further details on the multiplier are provided in 15.2.3. The figure below provides revenue flows between providers and estimates of value add.

¹⁴⁰ Details on value add margins are contained in the assumptions appendix

Figure 154: Mobile value chain in Pakistan in 2007 (PKR billions)



Source: Deloitte analysis based on information provided by MNOs and industry players, 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 155: Calculation of value add from mobile communications in Pakistan in 2007

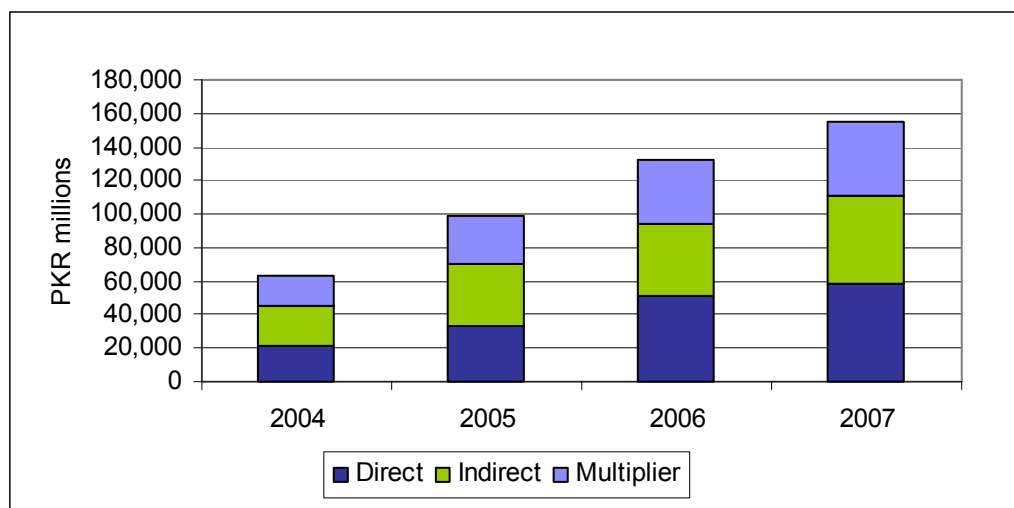
Domestic value add (Rupee billion)	Total revenue	Domestic revenue	Domestic cost	Domestic value add	Value add with multiplier
Mobile network operators	191	191	133	59	82
Fixed operator	12	11	5	6	9
Network equipment suppliers	103	22	12	10	14
Other suppliers of capital items	13	10	6	5	7
Handset designers and producers	146	146	128	18	26
Support services	2	2	0	2	3
Airtime and SIM commission	18	18	8	10	15
Total	487	402	291	111	155

Source: Deloitte analysis based on information provided by MNO and other industry players, interviews and analysis of company accounts and industry reports

From the estimates of value add, 71% of the revenue flows from the MNOs are estimated to remain in Pakistan. These are primarily made up of interconnection payments, airtime commissions and payphone commissions.

Using the same process as above, we estimated the value-add on an annual basis from 2004.

Figure 156: Supply side value add from mobile communications 2004 to 2007



Source: Deloitte analysis, calculated as in previous tables

Our estimates suggest that overall, value add has increased persistently year on year, and by just under 150% overall during the four year period.

15.2.2 Contribution to Government revenue

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, although we assume a degree of leakage from the informal sector¹⁴¹.

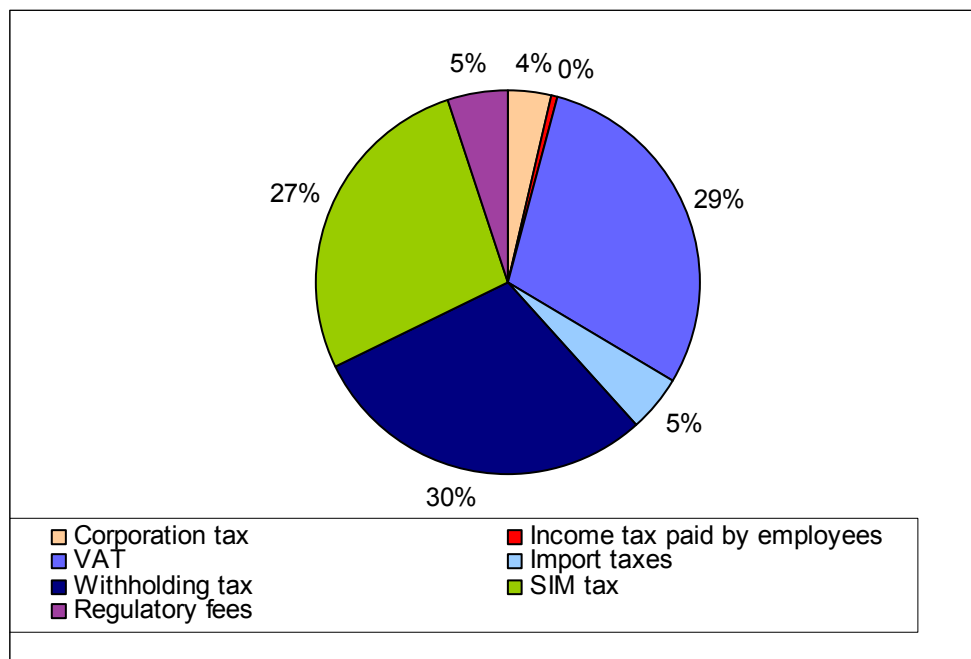
We have collected information on revenues for the following types of taxes:

- 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. The largest proportion of tax revenue is raised through consumer taxes (mobile specific and sales taxes) which will account for 86% of tax paid in 2007. Of these, the SIM activation tax makes up around 31% of total tax paid.

¹⁴¹ 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.

Figure 157: Breakdown of 2007 tax revenues from mobile operators by source



Source: Deloitte analysis based on operator data

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.

Figure 158: Total tax revenues from the mobile value chain in 2007

Tax Revenue (Rupee million)	Tax revenue	Tax revenue with multiplier
Mobile network operators	50,089	70,124
Fixed operator	2,039	2,854
Network equipment suppliers	2,363	3,308
Other suppliers of capital items	1,094	1,532
Handset designers and producers	3,905	5,467
Support services	245	343
Airtime and SIM commission	704	986
Total	60,439	84,614

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, or from consumers for mobile handsets, and not total tax revenues from the sector.)

In relation to handset dealers, mobile handsets are exempt from import and sales taxes and therefore the handset dealers are estimated to pay less than 3% of total revenues in taxes¹⁴². The taxes paid by the fixed operator represents the proportion of tax paid for terminating MNO traffic and for providing limited leased line services and not total taxes paid¹⁴³. Similarly, the taxes paid by the infrastructure providers represent only a proportion of total taxes paid by these entities.

¹⁴² Although handsets are exempted from sales tax and import duties, the handset dealerships are required to pay employee and corporation taxes.

¹⁴³ This was calculated as total tax paid by the fixed operator (as reported in the audited financial statements) multiplied by the share of the fixed operator revenues that come from the MNOs as payment for terminating mobile originating calls and providing leased lines on the national backbone.

15.2.3 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 impact is calculated directly by collecting data from MNOs and, for the related industries, dividing the proportion of revenue spent on wages by the average wage rate in each sector. Typically, support and induced employment is estimated using a multiplier and other studies have used a ratio of 1.1 to 1.7 for induced employment. The use of such multipliers can often be criticised for the lack of consideration to the economic basis of the industry and country under consideration. Following a review of the available international evidence and discussions with stakeholders, we have applied a multiplier of 1.4 on all value add (including employment), representing our view of the relative openness of the Pakistani economy. For example, many technological capital goods are imported from overseas but a lot of skilled and unskilled labour is provided domestically and there is a relatively low level of ex-patriot employment. The following compiles our estimates for employment generated via the three avenues to 2007:

Figure 159: Contribution to employment from the mobile value chain

Employment Impact	Number of employees	Number of employees including multiplier
Mobile network operators	11,000	11,000 ¹⁴⁴
Fixed operator	11,000	15,000
Network equipment suppliers	4,000	6,000
Other suppliers of capital items	4,000	6,000
Handset designers and producers	2,000	2,000
Support services	2,000	2,000
Airtime and SIM commission	144,000	202,000
Total	173,000	244,000

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 relates to retailers who sell airtime, SIMs and handsets. Employment levels for this category of employee were unclear and were estimated by a number of different approaches, utilising information provided during interviews with MNOs, handset dealers and franchisees, which provided similar level of overall results.

Mobile related employment from the fixed line operator provides the second largest employment category and is greater than total MNO employment¹⁴⁵. Employment from network equipment

¹⁴⁴ We apply a conservative multiplier of 1 to MNO employment as we assume that much of the employment effect was captured in the first round revenue flows.

¹⁴⁵ Fixed network operator employment is estimated by dividing the payments from the MNOs to the fixed network operator by the revenue per employee of the fixed operator. Revenue per employee calculated directly from the audited financial statements

suppliers has increased as the number of MNOs has increased and there are 5 major network equipment suppliers with substantial operations in Pakistan.

15.3 Demand-side impact: Increases in productivity

There are numerous ways in which mobile services can improve productivity, particularly in developing countries where mobile services have “leap-frogged” fixed line services and are the provider of universal service. The following important effects have been identified during interviews conducted as part of this project¹⁴⁶:

- 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 time¹⁴⁷;
- 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 productivity has been improved were noted.

- Substantially reducing travel times and costs: particularly in rural areas where previously traders would have needed to travel to the urban areas to check for demand and agree prices, this business is now conducted on the telephone. Traders are able to ensure demand exists for their products before setting out on a journey;
- Creating market efficiency: particularly in the agriculture sector, workers are now quickly notified about changes in demand or prices so that they can amend their growing and harvest plans accordingly;
- Encouraging entrepreneurialism: mobile has encouraged the growth of small business and has increased its efficiency. For example, by being constantly reachable on their mobiles, many women in Pakistan have been able to start small businesses for the provision of

¹⁴⁶ See also “Africa: The Impact of Mobile Phones”, Vodafone Policy Paper Series, No.3, March 2005.

¹⁴⁷ “Africa: The Impact of Mobile Phones”, Vodafone Policy Paper Series, No.3, March 2005.

beauty and hairstyle services, without the need to incur the initial costs of setting up beauty salons; and

- Mobile banking: 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. As such, we have considered available evidence 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 have not been able to obtain any reports or studies that particularly focus on Pakistan and, in the time available to us, we have not been able to quantify the impact of these gains¹⁴⁸. 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 stakeholder stating that “mobile has revolutionised the way people do business”.

Other surveys have typically quantified productivity improvements to be between 6% and 11%. For example, McKinsey quantified the impact to be 10% in China, whilst the impact in the UK has been estimated to be both 6% and 11%. Based on our interviews, we have estimated that productivity increases in Pakistan would be at the high-end of this range as:

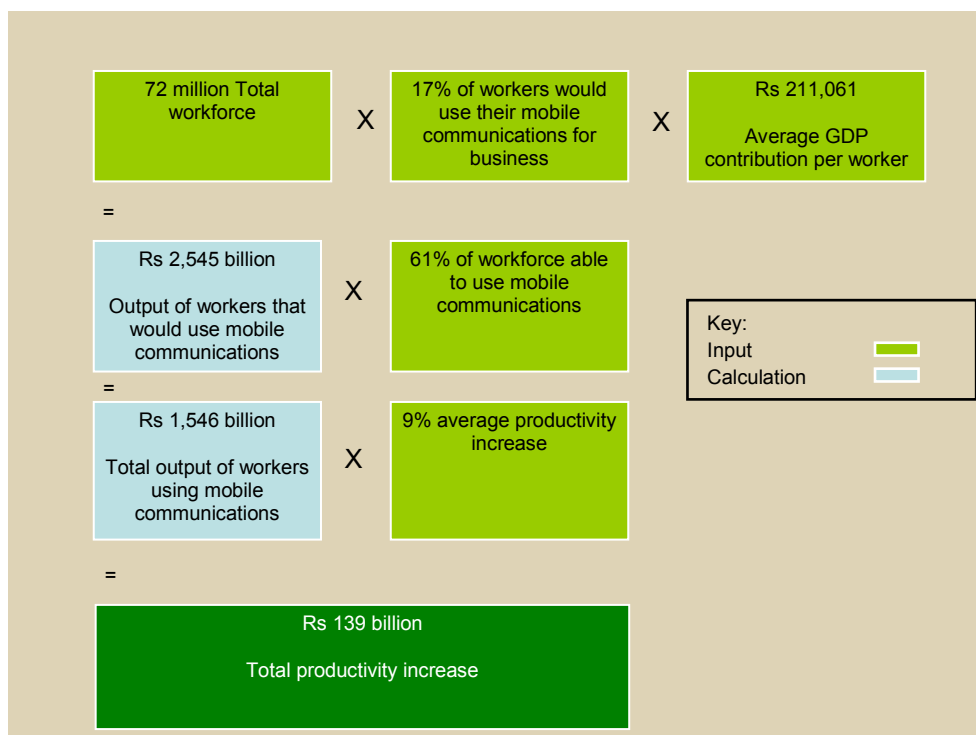
- Interviewees all reported the dramatic impact that mobile telephony has had on the Pakistan economy.
- The limited fixed line roll out implies the impact of mobile should be compared to a base-line of limited connectivity rather than higher fixed line penetration rates of the UK and China;
- Higher levels of informal activity imply greater need for co-ordination between individuals since there is less formal communication at the company level; and
- Pakistan is more rural than the UK so the travel-time savings are likely to be greater.

We estimate the impact on the productivity improvements on the overall economy by assuming that the productivity improvement will be experienced by workers whom use mobile phones for business purposes within the economy; so called MBUs (mobile business users). We calculate the proportion of MBUs by reference to data from the national bureau of statistics and international labour databases. We assume a productivity gain of 10% annually has been experienced by MBU over the period 2004-2006, chosen as there relatively low fixed line and internet penetration. Post 2006 though we assume a productivity gain of 9% to MBUs, decreased to capture a rise in substitutes and diminishing incremental value.

Using the economic value concept set out in section 3 of this report, we estimate the incremental impact on the economy to be PKR 139 billion for 2007.

¹⁴⁸ Quantification would require consumer and business surveys to be undertaken

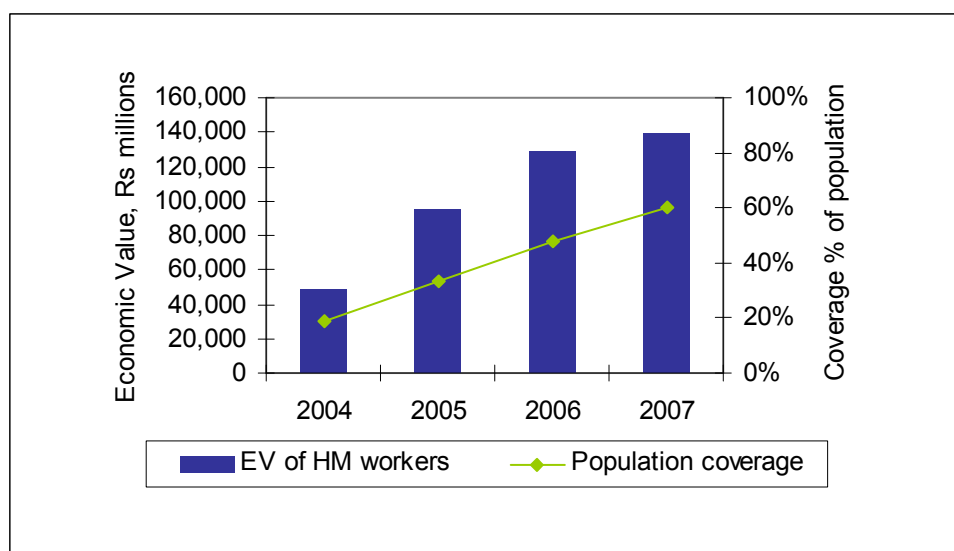
Figure 160: Economic impact in 2007 of increased productivity amongst workers who use mobile phones for business purposes



Source: Deloitte analysis based on Deloitte assumptions, interviews and information from Pakistan national statistics office

Our analysis shows consistent increases in productivity between 2004 and 2007. This is consistent with the Pakistani been driven by mobile network roll-out, which has provided a greater proportion of the population access to mobile technology.

Figure 161: Economic value from increases in productivity, 2004 to 2007



Source: Deloitte analysis. Population coverage calculated by GSMA

15.4 Demand side impact: Intangible benefits

Finally, we seek to identify the intangible impact of the mobile industry in Pakistan. We utilise information provided to us during interviews in Pakistan and additionally we draw upon and extend

findings from the Vodafone report (March 2005) ¹⁴⁹ relating to Tanzania and evidence of gains from similar studies that we have undertaken in other regions to aid our estimates. Intangible benefits of mobile telephony identified by stakeholders as being relevant to Pakistan include:

- Promotion of social cohesion: through enabling contact when family members or friends who have moved away, and building trust through sharing of handsets;
- 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;
- Stimulation of local content: this can be particularly useful for allowing users to learn about local services such as healthcare or education; and
- Assistance 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. We have estimated value using the willingness to pay concept¹⁵⁰. This seeks to calculate the increase in consumer surplus that has resulted from a change in the price of a good. 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 PKR 53,000 million as follows.

Figure 162: Calculation of consumer surplus

Increase in consumer surplus (PKR million)	2004	2005	2006	2007
2002 subs	-151	8,511	12,028	12,520
2003 subs	105	1,856	2,556	2,653
2004 subs	-	10,935	15,307	15,918
2005 subs	-	-	15,440	17,599
2006 subs	-	-	-	4,680
2007 subs	-	-	-	-
Total consumer surplus	105	21,302	45,331	53,370

Source: Deloitte calculation based on operator information

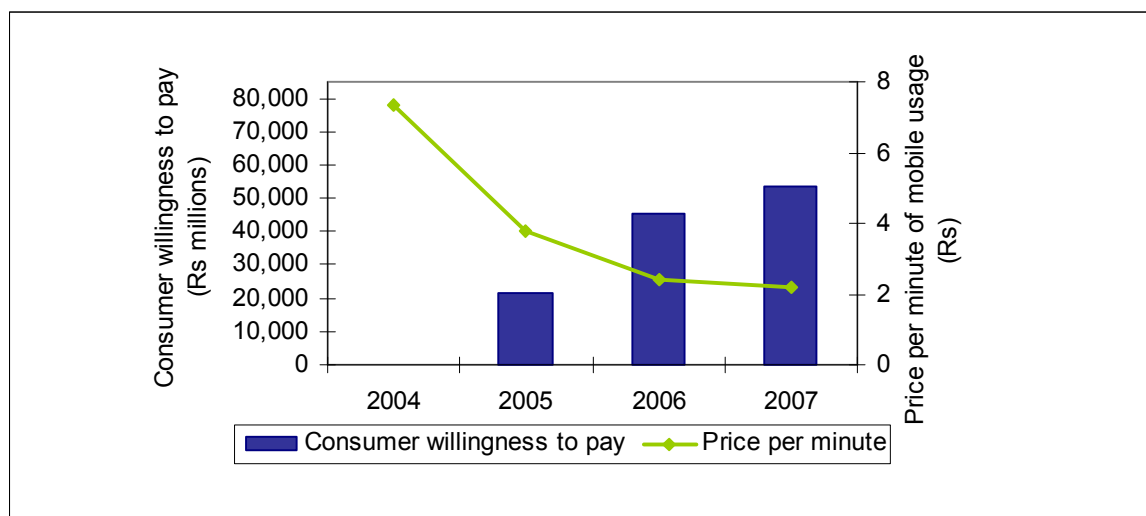
¹⁴⁹ The specific article referenced is "Linking mobile phone ownership and use to social capital in rural South Africa and Tanzania"

¹⁵⁰ For example, see McKinsey in "Wireless Unbound", 2006 and described in section 3 above.

¹⁵¹ Capped at zero given price per minute rise.

The relation of this surplus to reduction in price per minute is as follows.

Figure 163: Increasing Consumer Surplus:



Source: Deloitte analysis based on information provided by operators, interviews and analysis of company accounts and industry reports. 2007 prices are assumed to be equal to 2006 prices. This will be updated following provision of information from Telenor.

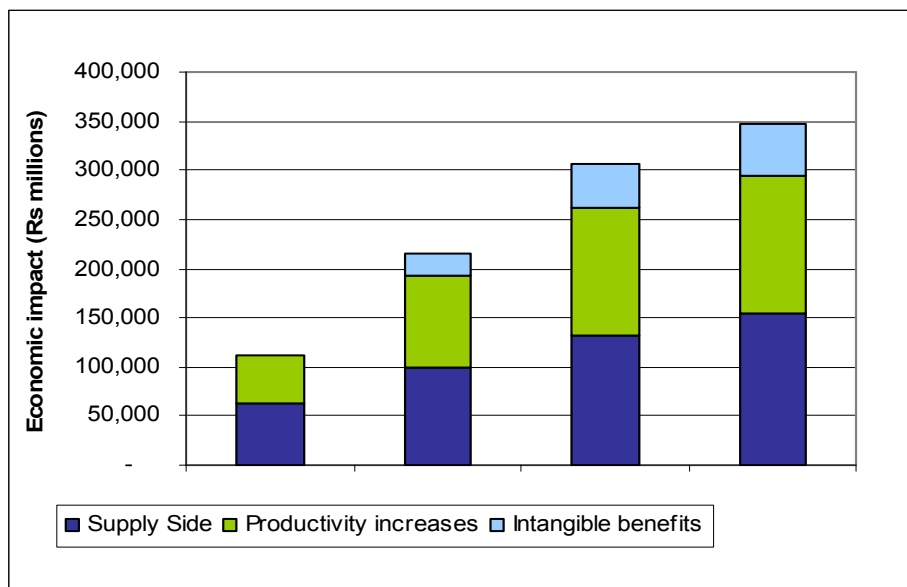
The estimates of consumer surplus may underestimate the true value of intangible benefits due to:

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

15.5 Total static impact on economic welfare

The aggregation of the supply-side, demand side and intangible benefits provide an indication of the total economic impact of mobile communications in Pakistan.

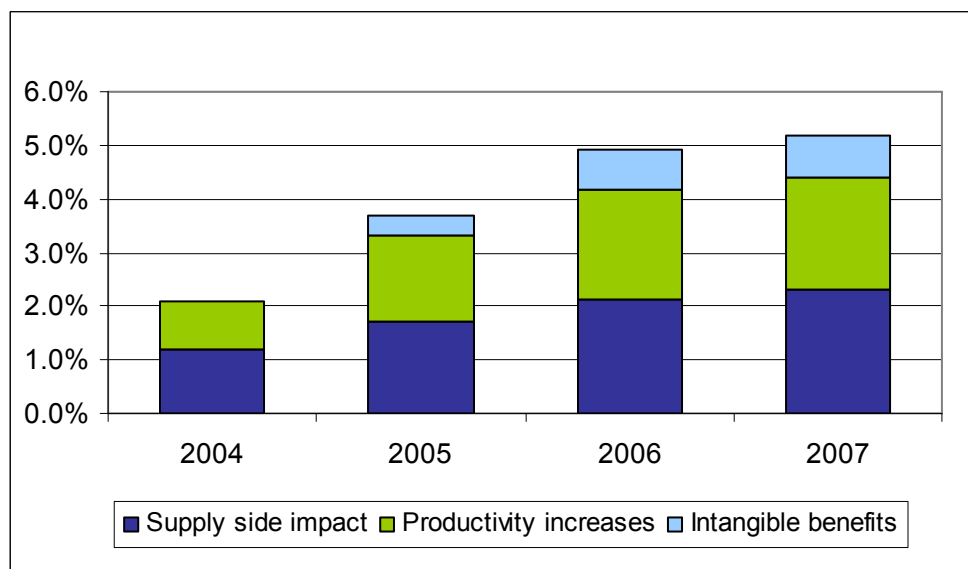
Figure 164: Economic impact of mobile communications in Pakistan (PKR millions)



Source: Deloitte estimates

The total impact of mobile communications on GDP has been, and continues to be, substantial. Moreover, in 2007 we estimate the sector will have contributed PKR 347.5 billion by the end of year. In terms of percentage of total GDP the mobile communications accounted for 2.1% of GDP in 2004 increasing to 5.2% of GDP in 2007.

Figure 165: Economic impact as a percentage of GDP



Source: Deloitte estimates

15.6 The dynamic impact of mobile telephony on growth rates

Academic research suggests that in the longer term mobile communications have a significant impact on economic growth rates. 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 Pakistan by 0.12% for each 1% increase in penetration. As such, the

increase in number of subscribers between 2006 and 2007 may have contributed as much as 1.8% to the Pakistani GDP growth rate.

15.7 Conclusion

Pakistan's mobile sector has experienced exponential growth since 2005. This was fuelled by the licensing of two additional mobile operators and the resulting decrease in prices. The sector is estimated to have contributed 5.2% to GDP and employed over 244,000 FTEs in 2007.

The fall in price of mobile services has led to mobile phones becoming an increasingly affordable method of communication for those in both rural and urban areas. This was recognised by the PTA's award of USO subsidies to MNOs in the recent funding round. By providing the infrastructure necessary for business communications, a strong communications sector contributes to the international competitiveness of Pakistan as well as raising the potential for business growth in rural areas.

By continuing to grow both its subscriber base and range of products, the mobile sector may be able to increase its contribution of GDP. This will occur in urban areas as operators roll-out 3G networks and launch new services. However, the SIM activation tax may be hindering further roll-out into rural areas by raising SACs. Further evaluation of the impact of mobile specific taxes by the government could lead to rebalancing fiscal burden and to the benefit of the sector and the wider economy.

Annex 1: Serbia Model Assumptions

Key assumptions in the calculation of the economic impact for Serbia

Assumption	Value
Employment levels	<p><u>Direct employment by MNOs</u></p> <p>Data was obtained directly from Telenor Serbia. Estimates for the market were calculated on the basis of Telenor's market share.</p> <p><u>Indirect employment</u></p> <p>Fixed line operator: The number of people working for Telekom Serbia was available in the company's annual report 2006. Since Telekom Serbia is both a fixed and mobile operator, we have estimated the number of employees that were directly associated with each of Telekom's fixed and mobile business. The calculation was based on the percentage of revenues that come from fixed and mobile services for Telekom. Of the employees attributed to the fixed portion of the company, we then determined what proportion can be indirectly linked to mobile services. Using estimates of the total revenue received by Telekom Serbia from MNOs (calculated using the total expenditure of Telenor on domestic fixed network services grossed up for the market), we estimated the proportion of Telekom Serbia's revenue received from MNOs. We used this proportion to estimate the number of Telekom's employees that relate to the mobile communications industry.</p> <p>Network equipment suppliers: Employment levels were calculated based on information provided by two network equipment suppliers and grossed up based on their market share.</p> <p>Other suppliers of capital items: Employment levels were calculated as: total revenue from MNOs x % of revenue spent on wages ÷ average wage rate. Figures were obtained from benchmarks. The average Telenor wage was used as benchmark.</p> <p>Suppliers of network support services: Employment levels were calculated as: total revenue from MNOs x % of revenue spent on wages ÷ average wage rate. Figures were obtained from benchmarks. The average Telenor wage was used as benchmark.</p> <p>Supplier of non-network support services: Employment levels were calculated as: total revenue from MNOs x % of revenue spent on wages ÷ average wage rate. Figures were obtained from benchmarks. The average Telenor wage was used as benchmark.</p> <p>Handset importers: Based on interviews with handset importers and with Telenor Handset sale department we determined the employment levels.</p> <p>Airtime/SIM sellers and mobile phone sellers: Based on interviews with retailers and distributors and with Telenor Sales department we were able to estimate the number of retailers and distributors and the average number of full time employees (FTEs) attributable to mobile services working in each of them.</p> <p><u>Multiplier effect</u></p> <p>A multiplier of 1.3 was applied to indirect employment levels to gauge the total employment in the economy created by the mobile communications industry. A multiplier of 1 was applied to direct employment reflecting that most employment was captured in the first round revenue flows.</p>
Value-add	Value-add margins are the total percentage of revenue spent domestically on taxes and other

margins for payments to the government; wages; CR; and profit.

each segment
of the value
chain

Direct value-add of MNOs

All data was collected directly from Telenor Serbia. The same margins are applied to other MNOs in the market.

Indirect value-add

These percentages are estimated based on interviews and similar companies internationally. Firstly, we collected information to allow us to estimate the percentage of revenue which was spent on third parties in Serbia (rather than overseas). Secondly, in relation to this domestic expenditure, we collected information from a sample of third parties in the value chain to determine the proportion of value-add. This allowed us to calculate weighted average value-add margins for the categories in the table below. For reasons of confidentiality, we are not able to provide source data.

Category in the value chain	
Fixed telecommunications operators	31.24%
Network equipment suppliers	61.60%
Network equipment support	71.00%
Other suppliers of capital items	32.00%
Handset importers and dealers	
<i>Legally imported handsets</i>	32.62%
<i>Second hand handsets sold</i>	45.00%
<i>Second hand handsets passed on</i>	50.00%
<i>Parallel imports</i>	11.34%
Suppliers of support services	57.22%
Airtime distributors	37.03%

Airtime and
SIM cards

Total commission paid to retailers and wholesalers was provided by Telenor Serbia and estimated for the rest market using Telenor data grossed up by market shares.

Data on outgoing minutes and SMS were provided by Telenor Serbia and estimated for the rest of the market by grossing up the Telenor data using market shares.

Handsets

Estimates of the total number of handsets bought were derived using subscriber figures from Telenor and Wireless Intelligence; data from Telenor on the number of SIMs per handset; and data from handset retailers on the average handset life.

The proportion of handsets bought new, bought second hand informally mostly through newspapers ads, passed on free of charge to friends/relatives as well the number of new handsets that entered the country through parallel channels were estimated following interviews with Telenor, handset importers and handset retailers. (Data in the table refers to 2007)

% of new handsets legally imported	18%
% of second hand handsets, of which:	58%
<i>Sold informally</i>	70%
<i>Passed on</i>	30%
% of new handsets imported through parallel channels	24%

Data on the retail prices, wholesale prices and margins were estimated following interviews with Telenor and handset importers.

Data on the commission that handset importers and retailers receive from manufacturers was

based on data from comparable countries.

Productivity improvement An annual average productivity improvement of 7% per worker using their phone for business purposes was assumed in 2007 following interviews and a review of similar studies.

The proportion of workers using their phone for business purposes was estimated as 12.47% of total workers for 2007 based on data from the October 2006 Labour Force Survey published by Serbian Statistical Office and a review of similar studies. Using the number of workers who undertake particular types of employment, and assigning a percentage of workers who use mobile phones for business (Mobile Business Users, MBU) to each category, we estimated the total number of MBU workers. The data below relates to 2007.

Employees by category	Total	% MBU
Agriculture, hunting, forestry and water industry	533,563	5%
Fishing	1,650	5%
Mining and quarrying	30,820	2%
Manufacturing	513,707	5%
Electricity, gas and water supply	61,351	30%
Construction	157,700	10%
Wholesale and retail trade, repairs	403,078	25%
Hotels and restaurants	83,745	5.0%
Transport, storage and communications	149,960	50%
Real estate and renting activities and financial intermediation	111,844	20%
Health and social work	442,246	20%
Other community, social and personal service activities	116,283	15%
Unemployed/informal workers	944,459	5%

The GDP contribution of these workers is estimated by calculating the total GDP relating to each of the sectors.

The 7% productivity improvement, the number of workers who use mobile phones for business purposes and the GDP per MBU worker were combined to estimate the total incremental productivity improvement.

	2007
Total workforce (employed and unemployed), m	3.55
% of MBU workers	12.47%
Number of MBU workers, m	0.44
GDP contribution per MBU worker, DIN m	1.1
Output of MBU workers, DIN m	490,000
Mobile phone penetration of MBU worker	92.60%
Output of MBU workers with mobile phones	454,000
Average productivity improvement	7%
Economic Value of MBU workers	31,780
Proportion of GDP	1.27%

Multiplier A multiplier of 1.3 was applied to supply-side direct and indirect value-add in order to capture the full impact on the Serbian economy.

This was assumed following a literature review and using the data provided by key players in the industry on the proportion of their expenditure remaining in Serbia and being spent overseas.

Population data Population data was taken from the Serbian Statistical Office website.

Subscribers Data on the number of Telenor subscribers was supplied by Telenor. Data on the market shares

of other MNOs was taken from Wireless Intelligence.

	2006	2007
Telenor	2,364,875	2,876,570
Market	5,659,465	6,657,726
Telenor market share	31.88%	38.89%

Annex 2: Ukraine Model Assumptions

Key assumptions in the calculation of the economic impact for Ukraine

Assumption	Value
Employment levels	<p><u>Direct employment by MNOs</u></p> <p>Data was obtained from Telenor. Estimates for the market were calculated on the basis of Kyivstar's market share.</p> <p><u>Indirect employment</u></p> <p>Fixed line operator: The number of people working for UkrTelekom was made public by UkrTelekom's CEO in 2006. Using estimates of the total revenue received by UkrTelekom from MNOs (calculated using the total expenditure of Kyivstar on domestic fixed network services grossed up for the market), we estimated the proportion of UkrTelekom's revenue received from MNOs. We used this proportion to estimate the number of UkrTelekom's employees that related to the mobile communications industry.</p> <p>Network equipment suppliers: Employment levels were calculated based on information provided by network equipment suppliers on number of employees, number of contractors employed and market shares.</p> <p>Network support services and non-network support services: For both categories employment levels were estimated by benchmarking of the proportion of revenue spent on wages. These were then divided by average wage rates set equal to the average wage rates of Kyivstar.</p> <p>Handset importers: Based on interviews with handset importers and distributors, we were able to estimate the number of FTEs working in the handset import market.</p> <p>Airtime handset sellers: Based on interviews with retailers, distributors and with Kyivstar sales department we were able to estimate the number of airtime and handset retailers and distributors and the average number of full time employees (FTEs) working in each of them.</p> <p><u>Multiplier effect</u></p> <p>A multiplier of 1.2 was applied to indirect employment levels to gauge the total employment in the economy created by the mobile communications industry. A multiplier of 1 was applied to direct employment reflecting that most employment was captured in the first round revenue flows.</p>
Value-add margins for each segment of the value chain	<p>Value-add margins are the total percentage of revenue spent domestically on taxes and other payments to the government; wages; CR; and profit.</p> <p><u>Direct value-add of MNOs</u></p> <p>All data was collected from Telenor. The same margins are applied to other MNOs in the market.</p> <p><u>Indirect value-add</u></p> <p>These percentages are estimated based on interviews in Ukraine and similar companies internationally. Firstly, we collected information to allow us to estimate the percentage of revenue which was spent on third parties in Ukraine (rather than overseas). Secondly, in relation to this domestic expenditure, we collected information from a sample of third parties in the value chain to determine the proportion of value-add. This allowed us to calculate weighted average</p>

value-add margins for the categories in the table below. For reasons of confidentiality, we are not able to provide source data.

Value add margins	
Fixed telecommunications operators	50.01%
Network equipment suppliers	41.75%
Network support services	54.56%
Other suppliers of capital items	
Handset importers and dealers	
<i>New handsets imported legally</i>	24.54%
<i>Second hand handsets sold in shops</i>	69.28%
<i>Second hand handsets sold informally</i>	50.00%
<i>Parallel-import handsets</i>	9.39%
Suppliers of support services	45.47%
Airtime dealers	47.50%

Airtime All airtime and SIMs are assumed to be sold through third parties. Total commission paid was provided by Telenor and estimated for the rest market using data referring to Kyivstar grossed up by market shares.

Data on outgoing minutes and SMS were provided by Telenor and estimated for the rest of the market by grossing up the data relating to Kyivstar using market shares.

Handsets Estimates of the total number of handsets bought were derived using subscriber figures obtained from Telenor and Wireless Intelligence; data from Telenor on the number of SIMs per handset; and data from handset retailers on the average handset life.

The proportion of handsets bought new, bought second hand in shops, bought second hand informally and acquired free of charge from friends/relatives as well as the number of handsets who entered Ukraine through parallel imports were estimated following interviews with Kyivstar, handset importers and handset retailers. (Data in the table refers to 2007)

% of new handsets (imported legally)	52%
% of second hand handsets, of which:	33%
<i> sold through market and shops</i>	75%
<i> sold informally or passed on</i>	25%
% of new handsets (imported through parallel channels)	15%

Data on the retail prices, wholesale prices and margins were estimated following interviews with Kyivstar, handset dealers and handset retailers.

Data on the commission that handset importers and retailers receive from manufacturers was based on interviews with those parties.

Productivity improvement An annual average productivity improvement of 9% per worker using their phone for business purposes was assumed following interviews and a review of similar studies.

The proportion of workers using their phone for business purposes (Mobile Business Users, MBU) was estimated as 14.6% of total workers for 2007 based on data from the Ukrainian 2001 Census and a review of similar studies. Using the number of urban and rural workers who undertake particular types of employment, and assigning a percentage of MBU workers to each category, we estimated the total number of MBU workers split into urban and rural. The data below relates to 2007.

Employment categories	Total	Urban	Rural	% of MBU workers
Agriculture, forestry, fishing	3,887,567	508,442	3,379,125	2%
Mining and quarrying	612,748	547,633	65,114	2%
Manufacturing	3,125,172	2,734,706	390,467	5%
Electricity, gas, water	567,901	490,987	76,914	30%
Construction	772,705	648,422	124,283	10%
Wholesale, retail trade and restaurants and hotels	2,283,184	1,986,547	296,637	15%
Transport, storage and communications	1,206,589	987,533	219,056	50%
Financing, insurance, real estate and business services	769,949	705,127	64,822	50.0%
Community, social and personal services	4,472,630	3,458,292	1,014,338	20%
Other (activities of households)	77,326	44,758	32,568	13%
<i>Informal</i>	3,005,153	2,047,717	957,435	13%

The GDP contribution of these workers is estimated by calculating the total GDP relating to each of the sectors. This comes from an analysis of data published by the Ukrainian Statistics Office. The GDP for MBU workers was then weighted according to mobile network coverage in these areas. (Data in the table refers to 2007 and is expressed in UAHs)

GDP per MBU - urban	28,832
GDP per MBU mobility - rural	26,820
GDP per MBU - weighted by coverage area	28,401

The 9% productivity improvement, the number of workers who use mobile phones for business purposes and the GDP per MBU worker were combined to estimate the total incremental productivity improvement.

	2003	2004	2005	2006	2007
Total workforce (formal and informal)	22,171,300	22,202,400	22,280,800	22,245,400	22,210,056
% of MBU workers	13.67%	13.74%	13.95%	14.00%	14.06%
Number of MBU workers	3,029,716	3,049,611	3,107,355	3,114,928	3,122,520
GDP contribution per MBU worker	12,041	15,501	19,516	24,168	28,401
Output of MBU workers	36,480,692,706	47,270,740,107	60,642,691,934	75,282,257,545	88,682,499,389
Mobile phone penetration of MBU workers	88.18%	91.53%	95.97%	96.03%	96.03%
Output of MBU workers	32,167,432,934	43,265,436,994	58,199,699,442	72,292,967,619	85,161,115,856
Average productivity improvement	9%	9%	9%	9%	9%
Economic Value of MBU workers	2,895,068,964	3,893,889,329	5,237,972,950	6,506,367,086	7,664,500,427

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 Ukrainian economy.

This was assumed following a literature review and using the data provided by key players in the industry on the proportion of their expenditure remaining in Ukraine and being spent overseas.

Population data Population data was taken from the Ukrainian Statistics Office census.

Subscribers Data on the number of Kyivstar subscribers was supplied by Telenor. Data on the market shares of other MNOs was taken from Wireless Intelligence.

Number	2003	2004	2005	2006	2007
Kyivstar	3,037,000	6,252,000	13,925,000	21,510,000	24,100,000
Market	6,563,027	13,831,291	30,219,618	49,034,548	54,938,754
Kyivstar market share	46%	45%	46%	44%	44%

Annex 3: Malaysia Model Assumptions

Key assumptions in the calculation of the economic impact for Malaysia

We have not verified the accuracy or the robustness of the information provided to us and where there have been discrepancies between data sources we used the information provided to us by DiGi.

Assumption	Value
Employment levels	<p><u>Direct employment by MNOs</u></p> <p>Data was obtained directly from DiGi. Estimates for the market were calculated on the basis of DiGi's market share.</p> <p><u>Indirect employment</u></p> <p>Fixed line operator: The number of people working for Telekom Malaysia was available from its annual report. Using estimates of the total revenue received by Telekom Malaysia from Malaysian MNOs (calculated using the total expenditure of DiGi on domestic fixed network services grossed up for the market), we estimated the proportion of Telekom Malaysia's revenue received from MNOs. We used this proportion to estimate the number of Telekom Malaysia's employees that related to the mobile communications industry.</p> <p>Network equipment suppliers: Employment levels were obtained from a number of suppliers including Nokia Siemens Networks and Ericsson Malaysia alongside the percentage of revenue that was spent on wages and the average wage per employee. Total employment for network equipment suppliers was then calculated as: total revenue from MNOs x % of revenue spent on wages ÷ average wage rate. The average wage rate is specific to network equipment suppliers. This was checked against total employment figures and revenue per employee figures provided by the network equipment suppliers.</p> <p>Other suppliers of capital items: Employment levels were calculated as: total revenue from MNOs x % of revenue spent on wages ÷ average wage rate. Figures were obtained from benchmarks. The average wage rate was set equal to the average wage rate of fixed operator employees to reflect the comparable levels of skill.</p> <p>Suppliers of support services: Employment levels were calculated separately for network support, non-network support and utilities. For network support, we used an estimate of the number of people working on sites which was provided to use by DiGi. We then grossed this up to account for all MNOs using market share. For non-network support, we used estimates of the proportion of revenue spent on wages based on benchmarks. This was divided by the average wage of an MNO employee to reflect the comparable levels of skill required. For utilities, we used estimates of the proportion of revenue spent on wages based on benchmarks. This was divided by the average wage of a fixed network employee to reflect the comparable levels of skill required.</p> <p>Airtime and SIM distributors and retailers: Based on interviews with retailers and distributors we were able to estimate the number of retailers and distributors and the average number of full time employees (FTEs) working in each of them. As some retailers also sold handsets, we estimated the number of FTEs allocated to airtime and SIM sales and to handset sales based on the proportion of revenues coming from these different products.</p> <p>Handset importers and retailers: Based on interviews with handset importers and distributors, we were able to estimate the number of FTEs working in wholesale part of the handset market. We then</p>

added the FTEs working in retail outlets that were allocated to handset sales (see above).

Multiplier effect

A multiplier of 1.3 was applied to direct employment levels to gauge the total employment in the economy created by the mobile communications industry. A multiplier of 1 was applied to direct employment reflecting that most employment was captured in the first round revenue flows.

Value-add margins for each segment of the value chain

Value-add margins are the total percentage of revenue spent domestically on taxes and other payments to the government; wages; CR; and profit.

Direct value-add of MNOs

All data was collected directly from DiGi. The same margins are applied to other MNOs in the market.

Indirect value-add

These percentages are estimated based on interviews and a review of accounts of companies in Malaysia and similar companies internationally. Firstly, we collected information to allow us to estimate the percentage of revenue which was spent on third parties in Malaysia. Secondly, in relation to this domestic expenditure, we collected information from a sample of third parties in the value chain to determine the proportion of value-add. This allowed us to calculate weighted average value-add margins for the categories in the table below. For reasons of confidentiality, we are not able to provide source data.

Category of firm in the value chain	Value-add margin
MNO	35%
Fixed network operators	26%
Network equipment suppliers	10%
Other suppliers of capex	35%
Support services	57%
Handset importers and sellers	26%

Airtime and SIM cards

All airtime and SIMs are assumed to be sold through third parties. Total commission paid was provided by DiGi and estimated for the rest market using DiGi data grossed up by market shares. The average commission for SIMs and airtime sold via different channels is based on a weighted average of figures provided by these third parties and by DiGi.

Data on outgoing minutes and SMS were provided by DiGi and estimated for the rest of the market by grossing up the DiGi data using market shares.

Handsets

Estimates of the total number of handsets bought were derived using subscriber figures from DiGi and Wireless Intelligence; data from DiGi on the number of SIMs per handset; and data from handset retailers on the average handset life.

The proportion of handsets bought new, bought second hand in shops, bought second hand informally and acquired free of charge from friends/relatives were estimated following interviews with DiGi, handset dealers and handset retailers.

% handsets bought new	80%
% handsets bought second hand in shops	15%
% of handsets bought second hand informally	5%

Data on the retail prices, wholesale prices and margins were estimated following interviews with DiGi, handset dealers and handset retailers.

Data on the commission that handset importers and retailers receive from manufacturers was based

on interviews with those parties and data from comparable countries.

Productivity improvement An annual average productivity improvement of 7% per worker using their phone for business purposes was assumed following interviews and a review of similar studies.

The proportion of workers that would use their phone for business purposes was estimated as 21-22% (depending on the year) of the total workforce based on data from the Malaysia Labour Force Survey and a review of similar studies. Using the number of urban and rural workers who undertake particular types of employment, and assigning a percentage of mobile business users (MBU) to each category (i.e. the percentage of workers who would use mobile communications for business purposes), we estimated the total number of MBUs split into urban and rural. MBUs are not necessarily those that are on specific business contracts for their mobile subscriptions. The data below relates to 2007.

Employment categories: Industry	Total number of workers	Urban workers	Rural workers	% of MBU
Agriculture, forestry and fishing	11,136,760	7,507,300	3,629,460	15%
Mining and quarrying	1,630,148	228,063	1,402,085	5%
Manufacturing	40,022	28,460	11,562	5%
Construction	2,205,423	1,609,749	595,674	15%
Finance, insurance, real estate and business services	1,002,657	745,562	257,094	35%
Transport, Storage and Communication	783,145	697,780	85,365	40%
Government Services1	603,878	474,832	129,046	25%
Other Services2	1,716,401	1,239,050	477,351	30%
Informal	3,155,086	2,483,803	671,283	20%
% of workforce that are HM	22%			

The GDP contribution of these workers is estimated by calculating the total GDP relating to each of the sectors. Since there is a large disparity between urban and rural GDP, we used total GDP data from the IMF and the split between different industries from the Malaysian Labour Force Survey, to calculate the average GDP separately for these areas. The GDP for MBUs was then weighted according to mobile network coverage in these areas.

GDP per MBU (MYR)	2007
Urban areas	53,553
Rural areas	41,797
Weighted by coverage area	50,393

The 7% productivity improvement, number of MBU and GDP per MBU were combined to estimate the total incremental productivity improvement.

	2005	2006	2007
Total workforce (formal and informal) - millions	10.93	11.21	11.53
% of total workforce that are MBU	21%	22%	22%
Number of MBU workers (millions)	2.26	2.44	2.51
GDP contribution per MBU (MYR)	48,791	49,002	50,393
Output of MBUs (MYR millions)	110,457	119,587	126,477
Mobile phone penetration of MBUs	82%	90%	93%
Output of MBUs with mobile phones (MYR millions)	90,439	107,225	117,332
Average productivity improvement	7%	7%	7%
Increase in GDP as result of mobile communications (MYR millions)	6,331	7,506	8,213

Multiplier A multiplier of 1.3 was applied to supply-side direct and indirect value-add in order to capture the full impact on the Malaysian economy.

This was assumed following a literature review and using the data provided by key players in the industry on the proportion of their expenditure remaining in Malaysia and being spent overseas.

Population data Population data was taken from Malaysia Statistics.

Data on the percentage of people living in urban areas was taken from the UN for 2005 and 2010 and interpolated for the years in between using an average increase per year.

Subscribers Data on the number of DiGi subscribers was supplied by DiGi. Data on the market shares of other MNOs was taken from Wireless Intelligence. Prior to legislation which came into force in 2007

requiring prepaid users to register, there was over-reporting of the number of subscribers since figures included inactive subscribers. Subscriber levels prior to 2007 have therefore been downwardly adjusted to reflect this.

	2004	2005	2006	2007
DiGi	2,915,512	4,315,115	4,780,445	6,112,102
Market	13,126,999	17,558,333	17,507,301	21,509,270
DiGi market share	22%	25%	27%	28%

Annex 4: Thailand Model Assumptions

Key assumptions in the calculation of the economic impact for Thailand

We have not verified the accuracy or the robustness of the information provided to us and where there have been discrepancies between data sources we used the information provided to us by DTAC.

Assumption	Value
Employment levels	<p><u>Direct employment by MNOs</u></p> <p>Data was obtained directly from DTAC. Estimates for the market were calculated on the basis of DTAC's market share.</p> <p><u>Indirect employment</u></p> <p>Fixed line operator: The number of people working for CAT and TOT were available from their respective annual reports. Using estimates of the total revenue received by TOT and CAT from MNOs (calculated using the total expenditure of DTAC on domestic fixed network services grossed up for the market) we estimated the proportion of CAT and TOT's revenue received from MNOs. We used this proportion to estimate the number of CAT and TOT's employees that related to the mobile communications industry.</p> <p>Network equipment suppliers: Employment levels were calculated separately for different categories of network equipment. For base station equipment, we used the data provided to us by Nokia Siemens Networks and estimated employment for other base station equipment suppliers in Malaysia based on market share. For other categories of network equipment, we used estimates based on benchmarks of the proportion of revenue spent on wages. These were then divided by average wage rates set equal to the average wage rates of base station equipment suppliers.</p> <p>Other suppliers of capital items: Employment levels were calculated as: total revenue from MNOs x % of revenue spent on wages ÷ average wage rate. Figures were obtained from benchmarks. For suppliers of land and non-network buildings, the average wage rate was set equal to the average wage rate of fixed operator employees to reflect the comparable levels of skill. For suppliers of vehicles, the average wage rate was set equal to that of an MNO employee.</p> <p>Suppliers of support services: Employment levels were calculated separately for non-network support and utilities. Both were calculated using estimates of the percentage of total revenue spent on wages. Average wage rates for non-network support staff were set equal to average wage rates for base station equipment suppliers. Average wage rates for utility suppliers were set equal to average wage rates for fixed network operators.</p> <p>Airtime and SIM distributors and retailers: Based on interviews with retailers and distributors we were able to estimate the number of retailers and distributors and the average number of full time employees (FTEs) working in each of them. As some retailers also sold handsets, we estimated the number of FTEs allocated to airtime and SIM sales and to handset sales based on the proportion of revenues coming from these different products.</p> <p>Handset importers and retailers: Based on interviews with handset importers and distributors, we were able to estimate the number of FTEs working in wholesale part of the handset market. We then added the FTEs working in retail outlets that were allocated to</p>

handset sales (see above).

Multiplier effect

A multiplier of 1.3 was applied to indirect employment levels to gauge the total employment in the economy created by the mobile communications industry. A multiplier of 1 was applied to direct employment reflecting that most employment was captured in the first round revenue flows.

Value-add margins for each segment of the value chain

Value-add margins are the total percentage of revenue spent domestically on taxes and other payments to the government; wages; CR; and profit.

Direct value-add of MNOs

All data was collected directly from DTAC. The same margins are applied to other MNOs in the market.

Indirect value-add

These percentages are estimated based on interviews and a review of accounts of companies in Thailand and similar companies internationally. Firstly, we collected information to allow us to estimate the percentage of revenue which was spent on third parties in Thailand (rather than overseas). Secondly, in relation to this domestic expenditure, we collected information from a sample of third parties in the value chain to determine the proportion of value-add. This allowed us to calculate weighted average value-add margins for the categories in the table below. For reasons of confidentiality, we are not able to provide source data.

Category of firm in the value chain	Value-add margin
MNO	20%
Fixed network operators	31%
Network equipment suppliers	42%
Other suppliers of capex	48%
Support services	41%
Handset importers and sellers	27%
Airtime and SIM distributors and sellers	41%

Airtime and SIM cards

All airtime and SIMs are assumed to be sold through third parties. Total commission paid was provided by DTAC and estimated for the rest market using DTAC data grossed up by market shares. The average commission for SIMs and airtime sold via different channels is based on a weighted average of figures provided by these third parties and by DTAC.

Data on outgoing minutes and SMS were provided by DTAC and estimated for the rest of the market by grossing up the DTAC data using market shares.

Handsets

Estimates of the total number of handsets bought were derived using subscriber figures from DTAC and Wireless Intelligence; data from DTAC on the number of SIMs per handset; and data from handset retailers on the average handset life.

The proportion of handsets bought new, bought second hand in shops, bought second hand informally and acquired free of charge from friends/relatives were estimated following interviews with DTAC, handset dealers and handset retailers.

% handsets bought new	70%
% handsets bought second hand in shops	10%
% of handsets bought or acquired second hand inform	20%

Data on the retail prices, wholesale prices and margins were estimated following interviews

with DTAC, handset dealers and handset retailers.

Data on the commission that handset importers and retailers receive from manufacturers was based on interviews with those parties and data from comparable countries.

Productivity improvement

An annual average productivity improvement of 6% per worker using their phone for business purposes was assumed following interviews and a review of similar studies.

The proportion of workers that would use their phone for business purposes was estimated as 15% of the total workforce based on data from the Thai Census and a review of similar studies. Using the number of urban and rural workers who undertake particular types of employment, and assigning a percentage of mobile business users (MBU) to each category (i.e. the percentage of workers who would use mobile communications for business purposes), we estimated the total number of MBUs split into urban and rural. MBUs are not necessarily those that are on specific business contracts for their mobile subscriptions. The data below relates to 2007.

Employment categories: industry	Total number of workers	Urban workers	Rural workers	% of MBU
Agriculture, hunting and forestry	2,298,753	11,732,609	25,391,598	15%
Fishing	75,724	1,033,482	14,291,538	15%
Mining and quarrying	2,512	110,704	394,121	5%
Manufacturing	276,828	12,394	37,846	5%
Electricity, gas and water supply	10,650	2,801,098	2,735,459	10%
Construction	279,159	60,544	45,955	15%
Wholesale and retail trade, repair of motor vehicles, motor cycles and personal and household goods	1,396,225	716,627	1,144,431	25%
Hotel and restaurants	116,319	3,253,395	2,331,506	5%
Transport, storage and communication	450,964	1,635,102	691,269	40%
Financial intermediation	112,303	689,412	437,998	35%
Real estate, renting and business activities	222,584	257,207	63,659	35%
Public administration and defence, compulsory social security	109,737	182,416	453,539	10%
Education	52,645	74,004	1,023,368	5%
Health and social work	115,547	230,890	822,002	20%
Other community, social and personal service activity	181,216	142,523	435,213	25%
Private households with employed persons	24,929	366,729	358,135	10%
Extra-territorial organizations and bodies	312	141,717	107,569	20%
Unknown	4,080	600	958	10%
% of workforce that are HM		15%		

The GDP contribution of these workers is estimated by calculating the total GDP relating to each of the sectors. Since there is a large disparity between urban and rural GDP, we used total GDP data from the IMF and the split between different industries from Thai Statistics, to calculate the average GDP separately for these areas. The GDP for MBUs was then weighted according to mobile network coverage in these areas.

GDP per HM worker (THB 000)	2007
Urban areas	317
Rural areas	165
Weighted by coverage area	217

The 6% productivity improvement, number of MBU and GDP per MBU were combined to estimate the total incremental productivity improvement.

	2004	2005	2006	2007
Total workforce (millions)	36.25	36.60	36.83	37.70
% of total workforce that are MBU	15%	15%	15%	15%
Number of MBU (millions)	5.52	5.54	5.60	5.73
GDP contribution per MBU (THB thousands)	178	193	210	217
Output of MBUs (THB billions)	982	1,068	1,174	1,242
Mobile phone penetration of MBUs	88%	90%	91%	93%
Output of MBUs with mobile phones (THB billions)	867	962	1,069	1,156
Average productivity improvement	6%	6%	6%	6%
Increase in GDP as result of mobile communications (THB billions)	52	58	64	69

Multiplier

A multiplier of 1.3 was applied to supply-side direct and indirect value-add in order to capture the full impact on the Thai economy.

This was assumed following a literature review and using the data provided by key players in the industry on the proportion of their expenditure remaining in Thailand and being spent overseas.

Population data Population data was taken from the Thai census.

Data on the percentage of people living in urban areas was taken from the UN for 2005 and 2010 and interpolated for the years in between using an average increase per year.

Subscribers Data on the number of DTAC subscribers was supplied by DTAC. Data on the market shares of other MNOs was taken from Wireless Intelligence.

	2004	2005	2006	2007
DTAC	7,800,000	9,823,000	12,225,498	15,339,042
Market	26,540,063	30,961,457	39,675,542	49,165,174
DTAC market share	29%	32%	31%	31%

Annex 5: Bangladesh Model Assumptions

Key assumptions in the calculation of the economic impact for Bangladesh

We have not verified the accuracy or the robustness of the information provided to us and where there have been discrepancies between data sources we used the information provided to us by Grameenphone.

Assumption	Value
Employment levels	<p><u>Direct employment by MNOs</u></p> <p>Data was obtained directly from Grameenphone. Estimates for the market were calculated on the basis of Grameenphone's market share.</p> <p><u>Indirect employment</u></p> <p>Fixed line operator: The number of full time employees working for the fixed line operators was calculated using an 'average wage' basis: total revenue from MNOs x % of revenue spent on wages ÷ average wage rate. Percentage spent on wages was calculated using an average percentage across fixed operators in comparable countries. Average wages were based on average international equipment vendor wages reflecting comparable skill levels. Total revenues were based on uplifting revenue data from Grameenphone on a subscriber basis.</p> <p>Network equipment suppliers: Based on interviews, with both local and international network equipment vendors employment calculated using the 'average wage' methodology described above. Where information for more than one vendor was available a weighted average was used.</p> <p>Other suppliers of support services: Support services provided were split into those network related and those not.</p> <p>Five services were found to make up network services; maintenance contracts, insurance, utility bills, base station rent and maintenance fees. Non-network services were found to be made up of; leasing, consulting, outsourced utility/cleaning, office equipment/supplies, other operational and maintenance services.</p> <p>FTE in each support service was calculated using the 'average wage' basis with interview data on percentage of revenue spent on wages and average wage rates used where possible. Where interview data was not available appropriate benchmark percentages and average wages were used.</p> <p>Suppliers of capital items: Capital equipment suppliers broadly fall into suppliers of network capital equipment and non-network equipment suppliers.</p> <p>Network capital suppliers include suppliers of radio network, core network, transmission, service network, operation/maintenance and preparation/installation.</p> <p>Suppliers of non-network capital items include buildings/transport, software and other capex suppliers.</p> <p>FTE was calculated by the 'average wage'. Data came from interviews and appropriate benchmark selection.</p>

Airtime and SIM distributors and retailers: FTE was calculated by using the 'average wage' method. Average wage and the percentage spend on wages was taken from interviews with distributors and retailers. For retailers interview data was available for several sources hence an average was taken to represent a 'typical retailer'.

Handset importers and retailers: For handset distributors and retailers, the 'average wage' method was deployed using revenues identified from new handset sales. In order to calculate these revenues a conservative replacement period of two years was assumed based on interview evidence. Further, a correction for multiple SIMs was also made. Percentage spend on wages and average wage rates were based on interviews with distributors and retailers.

Total FTE also includes employment by handset repairers calculated on an 'average wage' basis using revenues and percentage spend on wages from interviews. Average wages in this sector were taken from the Bangladesh Bureau of Statistics 2007 wage survey.

As employment from second-hand sales is principally part-time, the retail of second-hand handsets does not contribute to the employment calculation here.

Multiplier effect

A multiplier of 1.4 was applied to indirect employment levels to gauge the total employment in the economy created by the mobile communications industry. A multiplier of 1 was applied to direct MNO employment to capture the fact that most employment was captured in the first round revenue flows.

Value-add margins for each segment of the value chain

Value-add margins are the total percentage of revenue spent domestically on taxes and other payments to the government; wages; CR; and profit.

Direct value-add of MNOs

All data was collected directly from Grameenphone. The same margins are applied to other MNOs in the market.

Indirect value-add

These percentages are estimated based on interviews and a review of similar companies internationally. Firstly, we collected information to allow us to estimate the percentage of revenue which was spent on third parties in Bangladesh (rather than overseas). Secondly, in relation to this domestic expenditure, we collected information from a sample of third parties in the value chain to determine the proportion of value-add. This allowed us to calculate weighted average value-add margins for the categories in the table below. For reasons of confidentiality, we are not able to provide source data.

Category of firm in the value chain	Value-add margin
Mobile network operators	52%
Fixed operator	37%
Network equipment suppliers	16%
Handset distributors and retailers	28%
Other suppliers of capital items	39%
Support services	45%
Airtime and SIM distributors and retailers	62%

Airtime and SIM Total commission paid to distributors and retailers of Airtime and SIM cards was

cards provided by Grameenphone and estimated for the rest market using Grameenphone data grossed up by market shares.

Data on outgoing minutes and SMS were provided by Grameenphone and estimated for the rest of the market by grossing up the data relating to Grameenphone using market shares.

Handsets Estimates of the total number of handsets bought were derived using subscriber figures from Grameenphone and Wireless Intelligence, data from Grameenphone on the number of SIMs per handset, and data from handset retailers on the average handset life.

The proportion of handsets bought new, bought second hand in shops and bought new illegally were estimated following interviews with Grameenphone, handset dealers and handset retailers.

	2007
Bought new legally	60%
Bought second hand	20%
Bound illegally	20%

Data on the retail prices, wholesale prices and margins were estimated following interviews with Grameenphone, handset dealers and handset retailers.

Productivity improvement An annual average productivity improvement of 10% per worker using their phone for business purposes was assumed for reasons discussed above.

The proportion of workers that would use their phone for business purposes was estimated as 14% of the total workforce. This was calculated using data from the Bangladesh Bureau of Statistics Labour Force Survey 2002-03 and a review of similar studies. Using the number of urban and rural workers who undertake particular types of employment, and assigning a percentage of mobile business users (MBU) to each category (i.e. the percentage of workers who would use mobile communications for business purposes), we estimated the total number of MBUs split into urban and rural. MBUs are not necessarily those that are on specific business contracts for their mobile subscriptions. The data below relates to 2007 and uses estimates of the total workforce for 2007 disaggregated on the basis of the 2002 Labour Force Survey:

Employment Categories: Industries	Total number of MBUs	Urban	Rural	% of MBUs
Agriculture, Forestry.	2,435,205	308,990	2,126,215	10%
Fisheries	58,082	6,008	52,073	5%
Mining & Quarrying	4,506	445	4,061	5%
Manufacturing	724,853	251,187	473,667	15%
Electricity, Gas, Water	10,904	5,452	5,452	10%
Construction	342,927	124,175	218,752	20%
Trade, Hotel, Restaurant	1,484,534	544,989	939,545	20%
Transport, Storage and Communica	1,174,152	389,437	784,715	35%
Bank, Insurance & Finance	49,625	34,493	15,132	20%
Real Estate, Rent, Business Activit	42,949	23,589	19,361	20%
Public Administration	109,932	58,861	51,072	10%
Education Service	131,852	48,290	83,562	10%
Health & Social Work	112,158	48,290	63,868	20%
Community Personal Service, Household sector and others	567,243	184,037	383,206	20%
Informal	218,484	56,714	56,714	10%

The GDP contribution of these workers is estimated by calculating the total GDP

relating to each of the sectors. Since there is a large disparity between urban and rural GDP, we used total GDP data from the IMF/World Bank and then split between different industries using the split from the Bangladesh Bureau of Statistics GDP data sheet, to calculate the average GDP separately for these areas. The GDP for MBUs was then weighted according to mobile network coverage in these areas.

GDP per MBU worker (BDT '000)	2007
Urban Areas	124,303
Rural Areas	88,849
Weighted by coverage area	98,889

The 14% productivity improvement, number of MBU and GDP per MBU were combined to estimate the total incremental productivity improvement.

	2004	2005	2006	2007
Total Workforce (millions)	48.41	49.50	50.49	51.50
% of MBU workers	14%	14%	14%	14%
Number of MBU (millions)	6.92	7.08	7.22	7.36
GDP contribution per MBU worker	94,218	96,585	97,678	98,889
Output of MBU workers (billions)	652	683	705	728
Mobile phone penetration of MBU worker	54%	91%	95%	97%
Output of MBU workers with mobile phones (billions)	355	620	669	706
Average productivity improvement	0.1	0.1	0.1	0.1
EV of MBU workers (billions)	35.50	61.99	66.91	70.62

Multiplier A multiplier of 1.4 was applied to supply-side direct and indirect value-add in order to capture the full impact on the Bangladesh economy.

This was assumed following a literature review and using the data provided by key players in the industry on the proportion of their expenditure remaining in Bangladesh and being spent overseas.

Population data Population data was taken from the World Bank database. Data for 2006 and 2007 was unavailable. The population for these years was projected to grow at historic rates.

GDP data GDP data was taken as an average of World Bank and IMF data. GDP for 2007 was unavailable so historic growth rates were applied to 2006 data.

Subscribers Data on the number of Grameenphone subscribers was supplied by Grameenphone. Data for the other MNOs was taken from Wireless Intelligence but adjusted for the impact of the cyclone. Specifically the subscriber growth rate is reduced in the final quarter of 2007 to quantify the anticipated negative effect of the cyclone.

	2004	2005	2006	2007
Grameen Phone	2,388,158	5,542,362	10,758,708	14,562,500
Orascom Bangladesh (Banglalink)	25,709	1,221,610	3,276,313	5,589,421
Pacific Bangladesh (City Cell)	275,000	463,000	1,100,000	1,295,000
Teletalk Bangladesh	-	210,000	416,984	637,802
TMI Bangladesh (Aktel)	1,100,000	3,055,000	5,762,000	6,864,500
Warid Telecom	-	-	-	550,340
TOTAL	3,788,867	10,491,972	21,314,005	29,499,563

Annex 6: Pakistan Model Assumptions

Key assumptions in the calculation of the economic impact for Pakistan

We have not verified the accuracy or the robustness of the information provided to us and where there have been discrepancies between data sources we used the information provided to us by Telenor and Mobilink.

Assumption	Value
Employment levels	<p><u>Direct employment by MNOs</u></p> <p>Data was obtained directly from two operators and grossed up based on subscribers for remaining MNOs. Employment data for Telenor and Mobilink was not available for 2007 and is estimated based on the historic relationship between subscriber growth and employment growth. Contractor employment data is also not available for 2007 and assumed to remain at 2006 levels.</p> <p><u>Indirect employment</u></p> <p>Fixed line operator: Revenue per employee was calculated from audited annual reports. Revenue from MNOs to fixed line was divided by the revenue per employee to generate total level of MNO related fixed line employment.</p> <p>Network equipment suppliers: Employment levels were obtained from a number of suppliers alongside the percentage of revenue that was spent of wages and the average wage per employee. Total employment for the industry was then calculated as: total revenue from MNOs x % of revenue spent on wages / average wage rate. This was checked against total employment figures and revenue per employee figures provided by the network equipment suppliers.</p> <p>Handset dealers: Figures provided during interviews and grossed up for the industry based on handset sales. As no data was available for 2007 conservatively, employment is assumed to remain at 2006 levels.</p> <p>Other suppliers of capital items: Calculated as total revenue received from MNOs x % of revenue spent on wages / average wage. The % spent on wages was set at 18% whilst the average wage was assumed to be 50% of that paid by network equipment suppliers. This information was obtained during interviews.</p> <p>Suppliers of support services: Calculated as total revenue received from MNOs x % of revenue spent on wages / average wage. Figures were obtained from benchmarks.</p> <p>Airtime commission, handset and SIM retailers: Employment levels for this category of employee were calculated by taking an average of two approaches.</p> <ul style="list-style-type: none">• Approach 1: Following Interviews with mobile operators, franchises and handset dealers we estimated there were: 920 franchises with an average of 8 employees each, 17,500 retail outlets specialising in mobile products with an average of 3 employees each and 157,500 retail outlets selling mobile products in addition to other products with an average of 0.5 incremental employees. This produced an estimate

of 138,000 employees excluding the multiplier effect

- Approach 2: We multiplied the total airtime, SIM and handset commission received by retailers by the percentage of revenue that was estimated to be spent on wages. We then divided wage revenue by average wage in this sector to estimate a total number of employees of 113,000 excluding the multiplier effect. (Wage estimates were provided during interviews).

Original interview data used in approach 1 refers to 2006 and is assumed unchanged for 2007. Average wages from interviews used in approach 2 also refer to 2006 data and are assumed unchanged for 2007.

A multiplier of 1.4 was applied to indirect levels to gauge the total employment effect in the economy. A multiplier of 1 was applied to direct MNO employment to capture the fact that most employment was captured in the first round revenue flows.

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

Data was obtained directly from Telenor and Mobilink with the exception of 2007 where save tax data for Telenor no direct data was available. Where no data was available directly, public quarterly and bi-annual reports have been utilized. Data not in these reports has been estimated using appropriate and available drivers as follows:

- Dividends have been assumed to remain at 2006 levels.
- Operating expenditure has been increased at half the increase in 2007 capex for Telenor and Mobilink.
- Corporate responsibility expenditure was assumed to remain at 2006 levels.
- Total wage expenditures were assumed to increase based on the wage per employee in 2006 and the additional employment in 2007.
- Mobilink corporation tax, withholding tax, SIM activation tax and other taxes paid have been increased at the rate of increase in revenues from 2006 to 2007. Income tax paid by Mobilink was increased at the change in total wages paid and import taxes at the change in capital expenditure.
- Government fees have been increased on the basis of the historic relation to subscribers.

For the other MNOs publicly available information was used where possible. Where this was not available, data is grossed up by market share.

Indirect value add

These percentages are estimated based on interviews and a review of accounts of companies in Pakistan and similar companies internationally.

Firstly, we collected information to allow us to estimate the percentage of revenue which was retained in Pakistan.

Then, in relation to this domestic share, we collected information for each of the 5 categories of value add and aggregated these to calculate the value add margin as a percentage of revenue received. For confidentiality reasons, we are not able to provide source data.

Margin on domestic revenues	% value add margin
MNO	31%
Fixed telecommunications operators	56%
Network equipment suppliers	46%
Handset designers and dealers	46%
Other suppliers of capital items	13%
Suppliers of support services	79%
Airtime commission, payphone commission	57%

For 2007 estimates of revenue flows have been based on drivers available from public quarterly and bi-annual reports.

Airtime, SIM card and handset commission 99% of airtime revenues are assumed sold through third parties with an average commission based on weighted average of figures provided by operators. The operators also provided average SIM card commission.

Handset dealers provided us with the commission levels provided to handset retailers.

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 handset providers and estimates from operators.

Intangible Average price per minute data for 2007 was unavailable for Mobilink. It was assumed that Mobilink's price fell at the same rate as Telenor's. Minutes of use for 2007 were assumed constant for Telenor whilst increased at the historic trend for Mobilink.

Productivity improvement An annual productivity improvement of 10%, for 2004-2006, and 9%, for 2004-2006, is assumed for workers using business phones.

The proportion of workers that would use their phone for business purposes was estimated as 17% of the total workforce based on data from the Federal Bureau of Statistics. Using the number of urban and rural workers who undertake particular types of employment, and assigning a percentage of mobile business users (MBU) to each category (i.e. the percentage of workers who would use mobile communications for business purposes), we estimated the total number of MBUs split into urban and rural. MBUs are not necessarily those that are on specific business contracts for their mobile subscriptions. The data below relates to 2007:

Employment Categories	Total Workforce	Urban workforce	Rural workforce	% MBU workers
Agriculture, forestry, fishing	17,663,286	945,013	16,718,273	10%
Mining and quarrying	156,744	58,594	98,150	5%
Manufacturing	4,263,912	2,663,764	1,600,148	5%
Electricity, gas, water	323,144	189,303	133,841	30%
Construction	2,774,769	710,638	2,064,131	10%
Wholesale, retail trade and restaurants and hotels	6,905,949	4,068,513	2,837,437	20%
Transport, storage and communications	2,040,485	1,038,162	1,002,323	50%

The GDP contribution of these workers is estimated by calculating the total GDP relating to each of the sectors. Since there is a large disparity between urban and rural GDP, we used data from the federal bureau of statistics to calculate the average GDP separately for these areas. The GDP for MBU workers was then weighed according to mobile network coverage in these areas. The following relates to 2007:

	2007
GDP per MBU – urban	232,437
GDP per MBU - rural	186,072
GDP per MBU - weighted by coverage area	211,061

The productivity improvement, number of MBU and GDP per MBU were combined to estimate the total incremental productivity improvement.

	2004	2005	2006	2007
Total workforce (millions)	67.26	68.94	70.66	72.05
% of MBU workers	17%	17%	17%	17%
Number of MBU workers (millions)	11.26	11.54	11.83	12.06
GDP contribution per MBU worker	190,326	203,719	206,456	211,061
Output of MBU workers	2,143	2,351	2,442	2,545
Mobile phone penetration of MBU worker	23%	40%	53%	61%
Output of MBU workers with mobile phones (Billions)	487	949	1,291	1,547
Average productivity improvement	10%	10%	10%	9%
Increase in GDP as a result of mobile communications (Billions)	49	95	129	139

Multiplier

A multiplier of 1.4 was applied to supply side direct and indirect value add in order to capture the full impact on the Pakistani economy.

This was assumed following a literature review and interviews with Pakistani officials.

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