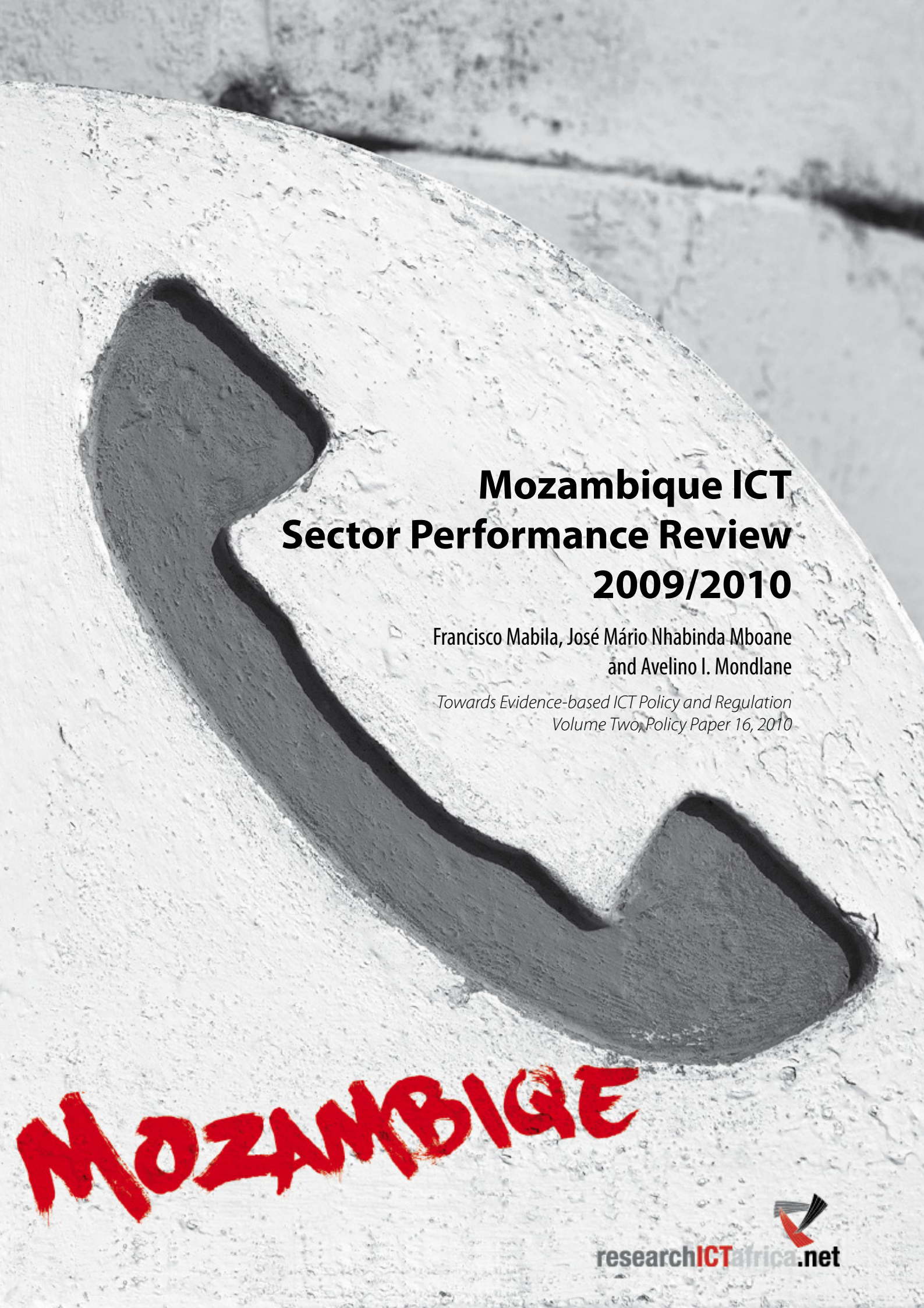

Mozambique ICT Sector Performance Review 2009/2010

Francisco Mabila, José Mário Nhabinda Mboane and Avelino I. Mondlane

Towards Evidence-based ICT Policy and Regulation
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Research ICT Africa

Research ICT Africa fills a strategic gap in the development of a sustainable information society and network knowledge economy by building the ICT policy and regulatory research capacity needed to inform effective ICT governance in Africa. The network was launched with seed funding from the IDRC and seeks to extend its activities through national, regional and continental partnerships. The establishment of the Research ICT Africa (RIA) network emanates from the growing demand for data and analysis necessary for the appropriate and visionary policy required to catapult the continent into the information age. Through network development RIA seeks to build an African knowledge base in support of ICT policy and regulatory design processes, and to monitor and review policy and regulatory developments on the continent. The research arising from a public interest agenda is made available in the public domain, and individuals and entities from the public and private sector and civil society are encouraged to use it for teaching, further research or to enable them to participate more effectively in national, regional and global ICT policy formulation and governance. This research is made possible by the significant funding received from the International Development Research Centre (IDRC) Ottawa, Canada. The network members express their gratitude to the IDRC for its support.

The network is based in Cape Town under the directorship of Dr. Alison Gillwald. RIA members are Dr. Augustin Chabossou (Benin), Dr. Patricia Makepe (Botswana), Dr. Pam Zahonogo (Burkina Faso), Dr. Olivier Nana Nzèpa (Cameroon), Prof. Dr. Arsene Kouadio (Cote d'Ivoire), Dr. Lishan Adam (Ethiopia), Dr. Godfred Frempong (Ghana), Dr. Tim Waema (Kenya), Francisco Mabila (Mozambique), Dr. Christoph Stork (Namibia), Dr. Alison Gillwald (South Africa), Prof. Dr. Ike Mowete (Nigeria), Albert Nsengiyumva (Rwanda), Prof Dr Abdoulaye Diagne (Senegal), Dr. Bitrina Diyamet (Tanzania), Dr. Farouk Kamoun (Tunisia), Dr. Nora Mulira (Uganda), Shuller Habeenzu (Zambia).

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Note on Author

Francisco Mabila is Director of the Eduardo Mondlane University Computing Centre. His professional background is Telecommunications Engineering. He joined the University 1992 after serving 14 years at the Telecommunications Division of the Ministry of Defense. In 1998 he was invited by the Government to join a technical team for designing the National ICT Policy and Implementation Strategy. In 2001 he joined the Research ICT Africa Network and since then he was involved in a number of research studies including, the National Household Survey on e-Access and Usage Index, the SME's e-Access and Usage Study and the Mozambique Telecommunications Sector Performance Review. In 2002 he coordinated the Mozambique Scan ICT Project, which was part of an African initiative. He holds a Certificate in Telecommunication Policy, Regulation and Management from the Witwatersrand University Graduate School of Public and Development Management.

Introduction

The Eduardo Mondlane University Computing Centre is a member of the Research ICT Africa Network (RIA), which consists of 19 African member countries, namely Benin, Botswana, Burkina Faso, Cameroon, Cote d'Ivoire, Egypt, Ethiopia, Ghana, Kenya, Mozambique, Namibia, Nigeria, Rwanda, South Africa, Senegal, Tanzania, Tunisia and Uganda. The general coordination of RIA activities is performed by the South African node, which is based in Cape Town.

RIA defines itself as an ICT policy and regulatory research network, aiming at building public awareness about sustainable ICT policy and regulatory framework in Africa, as well as assisting policy and decision-makers with evidence-based policy formulation and governance strategies.

This report refers to the Mozambique Telecommunications Performance Review study, which was carried out between 2009 and 2010.

The study was based on a common framework for all involved countries, where the same indicators were to be measured and discussed, in order to make a comparative analysis possible across the continent. The results of this research will be made available for the public in general, with special emphasis to those entities with a natural interest on the telecommunications sector, such as telecom operators, ISPs, the regulatory body, the government, researchers and consumers.

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This report has benefited greatly from the valuable inputs from Mr. Shuller Habeenzu, who acted as peer review partner. Many thanks!

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Team leader and report editor: Francisco Mabila

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Executive Summary

the demand for telecoms in the economy has resulted in the establishment of new companies in the market, as well as the availability of more and diversified services

The Telecommunications Sector in Mozambique has registered noticeable growth during the past five years, particularly in the segment of value added services. In fact, the demand for telecoms in the economy has resulted in the establishment of new companies in the market, as well as the availability of more and diversified services. This has presented a number of challenges to the government in adopting an adequate regulatory framework and for the Regulator, who at the moment has to deal with a number of pressing issues.

The awarding of the second mobile licence to Vodacom in 2002, following the opening of the mobile market in 1999, led to the end of six years of Mcel's monopoly. However, poor quality of service, limited geographic network coverage and the need for more competition have influenced the Government decision to launch the third mobile licence in April, 2010.

While the mobile market is showing clear signs of growth, the end of the exclusivity period in December 2007 to the incumbent has not yet caused any visible changes in the market structure, with Telecomunicações de Moçambique (TDM) still the only fixed operator. To encourage investment in fixed telephony infrastructure sharing needs to be effectively regulated, which would likely act as an incentive for newcomers in the sector. TDM has put considerable effort into the development of the national backbone infrastructure, but there is still a big gap in terms of metropolitan fibre optics networks. The few fibre links within the urban areas mainly interconnect TDM's telephone switches and a number of corporate users, such as banks and other large business companies. It is very difficult and expensive to deploy a fibre-based VPN for entities needing to interconnect sites that are geographically far away from each other or located outside the metropolitan areas. The alternative is often to use leased lines, which are still based on copper wires.

The emerging regional and international connectivity projects, namely the SEACOM and EASSy submarine cables, are creating considerable expectation in regard to the capacity and affordability of international bandwidth. However, the business models adopted by the local operators do not help much in dropping the price as expected. Therefore, Internet access continues to be a luxury good for the majority of the potential users (schools, universities, Government institutions, students, lecturers, researchers, professionals, etc.). The EASSy cable is expected to go live during 2010. However, there is as yet no guarantee about any significant price decrease in the local market.

Interconnection termination rates among TDM, Mcel and Vodacom have long been a controversial matter, and were subject to several talks involving the three operators and the Regulator aimed at reaching consensus on the applicable termination rates.

The current interconnection rates are based on a LRIC costing model and are generally perceived by the users as being too high. Therefore, those who can afford to carry two handsets, one for each mobile operator.

Other important topics needing urgent action from the Regulator include creating a converged licensing regime, resolving quality of service issues, the ongoing issue of infrastructure sharing, and tariff regulation, which is responsible for end user prices still being very high.

Universal Access (UA) has been supported by the newly created Universal Access Fund (UAF), but so far very few projects have been implemented. Organisational and administrative issues, including staff limitations at the UAF unit, reflect negatively in the overall performance of the fund.

The Government announced the intention to migrate from analogue to digital broadcasting for both radio and television last year. Currently, there are a number of actions taking place in preparation for the migration process.

Broadband services for Internet access are prohibitively expensive for the majority of the people

Broadband services for Internet access are mainly used by corporate customers, but are prohibitively expensive for the majority of the people. Apart from TDM, there are few ISPs offering broadband services.

Country Overview

Mozambique is located at the Southern East Region of the African continent, being bordered by the Indian Ocean at the East side and sharing borders with Swaziland and South Africa in the South, Zimbabwe and Zambia in the West, and Malawi and Tanzania in the North.

With a territory of 799,390km^2, a population of 21 million inhabitants, a 2,500km long coastline, a number of important rivers and unexploited natural resources, Mozambique can be considered a potentially rich country.

Mozambique became independent in 1975 as the result of a 10-year armed struggle against Portuguese colonialism, which lasted about 500 years. Almost immediately after independence, the young nation was involved in a 16-year civil war, which was fed by the Apartheid regime and devastated the economy completely by destroying social-economic infrastructure and killing more than 500,000 people.

Following the peace agreements, political stability together with new government policies have attracted significant investments, which have determined a phenomenal 2-digit economic growth after the first 10 years, putting Mozambique in the list of the new emerging economies in the region.

Following the peace agreements, political stability, together with new government policies have attracted significant investments

Currently there are a number of internal and external investments directed to some key areas, such as telecommunication infrastructure, industry, mining, commerce and services. Other sectors that contribute significantly to the GDP are the fishing industry, energy, tourism and agriculture.

The following table presents the basic country data:

Figure 1: Basic country data

Indicator	Data
Area	799,390Km2
Population	21,162 million (69% Rural and 31% Urban)
GDP	US$9,7 billion (2009)
GDP per capita	US$456 (2009)
Inflation (% change yoy)	3,5% (2009)
Official Language	Portuguese
Currency	Metical (MZM)
Capital City	Maputo
Fixed Telecom Operators	1
Mobile Telecom Operators	2
Internet Service Providers (ISPs)	20
Teledensity (fixed)	0,40%
Mobile Penetration	28,5%
Internet Users (per 100 inhabitants)	0.9 (2007)

Source: Mozambique SPR 2009/2010

Policy and Regulatory Framework

Policy

The telecommunications sector in Mozambique falls under the Ministry of Transport and Communications.

Previously considered a pre-condition, unlike the 1999 Act, the Telecommunications Act from 2004 requires that the fixed market was to be liberalised in 2007, irrespective of the progress made with the privatisation of the incumbent Telecomunicações de Moçambique (TDM).

Yet, three years later, TDM still has no competitors in the fixed network. The tender for the third mobile licence was launched in April 2010.

the investments made by the incumbent over the past 10 years do not necessarily correlate with the desired results in terms of penetration

The reasons that no new operators entered the fixed market are not clear, but certainly the global trends in relation to the telecom sector in the world and the heavy investments required to deploy the fixed network infrastructure are part of the reason. In the case of Mozambique, the investments made by the incumbent over the past 10 years do not necessarily correlate with the desired results in terms of penetration if compared with mobile penetration figures in the same period of time. According to the 2006 Mozambique SPR, the teledensity of the fixed network was 0,46% in 2006 and has declined in 2009 (0,40%) while mobile penetration has grown from 12,6% to 28,5% in the same period of time.

According to the telecoms regulatory agency, the Instituto Nacional das Comunicações de Moçambique (INCM), there is not yet a licence process and regulatory framework for new operators on the fixed network, which means that, in the event of a request for a new licence in that segment, there would be no specific rules to be followed. INCM is worried about the situation and wants that matter to be part of the new Telecommunications Act, which will be submitted to the Government during the second semester 2010.

The Ministry of Transport and Communications recently approved the national strategy for the sector, but the document essentially covers the Transport segment and contains almost nothing about the communications sub-sector. Therefore there is a common understanding that a new and more comprehensive strategy document has to be produced as soon as possible.

The National ICT Policy from 2000 is in many aspects outdated. That is the reason why most definitions, plans and predictions contained in the document differ from the concepts and priorities of the ICT sector today in Mozambique and in the rest of the world. There is an urgent need for the ICT Policy review. According to the Technical Unit for the Implementation of the ICT Policy (UTICT) the budget for that purpose has been already secured and the process is expected to take place during 2010.

Legal Environment

As indicated, the new Telecommunications Act is expected to be approved by the Government and submitted to the Parliament in the second half of 2010.

Among other issues, the new Act will cover the following aspects:

- converged licensing regime;
- fixed network licensing regime;
- infrastructure sharing;
- quality of service;
- Voice over IP; and
- digital broadcasting.

According to INCM, apart from telecommunications and broadcasting convergence will also cover the postal sector.

Contrarily to the expectations reported in the 2006 Mozambique SPR, where different feasibility studies were announced in preparation for the regulation of VoIP and number portability respectively, these matters are not yet decided.

According to INCM, the experience of countries that have decided to implement number portability shows that the number of people who use this service is insignificant when compared with the required network investments. Therefore, INCM's decision was to postpone this matter.

A draft proposal of VoIP regulation is available on the INCM website comments from the public. However, even without regulation, VoIP is so far accepted, as long as it is used within the same intranet.

The Government has recently approved SIM card registration for the pre-paid segment. According to the "Diploma Ministerial 153/2010 from 15th September 2010", the existing pre-paid users will have sixty days to register their SIM cards, failing that, the respective numbers will be blocked.

The WiFi spectrum is not regulated and consequently not subject to licence. Mozambique follows the ITU recommendations in this regard. INCM regulates the low power equipment, which includes by default the equipment used in the WiFi spectrum.

There are another two important acts waiting for approval by the Cabinet before they can be passed by the Parliament: the Electronic Transactions Act, which deals with e-business and cybercrime, and the Postal Act. These documents were drafted in 2007 and 2009 respectively.

Regulation

The national regulatory authority, INCM was created in 1992 with the mandate to regulate both the Telecommunications and Postal sectors.

To ensure the qualitative growth of the national telecommunications environment, INCM needs to create adequate internal expertise

Although INCM is administratively and financially autonomous, the Government can direct or indirectly influence the decision-making mechanism, especially when it comes to strategic matters, since INCM reports to the Ministry of Transport and Communications. The CEO of the Institute is nominated by the Prime Minister, while the Director General and the Executive Directors, including the Universal Access Fund (UAF) Director, are appointed by the Minister of Transport and Communications. The mandate of all those positions is five years. The operators do not intervene in the process of selecting and nominating INCM officials.

There are still many aspects waiting for specific regulation, such as a converged licensing regime, fixed network licensing, infrastructure sharing, quality of service, pre-paid SIM card registration and digital broadcasting. The current licensing regime is based on a vertical approach, i.e. for each service a different license is required. Converged licensing will be included in the new Telecommunications Act.

To ensure the qualitative growth of the national telecommunications environment, INCM needs to create adequate internal expertise, which can timely react to the regulatory challenges of the sector. Considerable efforts in human resources development and institutional capacity building at INCM are visible in the last five years and the fact that the current Director General is a former RIA member constitutes an encouraging factor for the future of the institution. However, the technical capacity of the agency is thus far not as good as required and that is partly responsible for the poor efficiency of the Regulator.

Market Structure

The market is liberalised and segmented in fixed and mobile. There are three players, one fixed (TDM) and two mobile (Mcel and Vodacom). The third mobile licence was launched in April 2010. Mcel was established in 1997, while Vodacom was awarded the license in 2002 and started operating in the following year.

With the dramatic growth of the mobile sector, quality of services is increasingly becoming a cause for concern

Despite the fact that there are only two mobile operators, there is no usual duopoly situation due to mistrust between both of them. As a consequence, competition is very high. Large amounts of money are spent not only on new investments, but also on marketing campaigns and publicity.

According to official estimates, the total number of mobile users is now about six million, whereby Mcel and Vodacom have about 66,7% and 33,3% market share respectively.

With the dramatic growth of the mobile sector, quality of services is increasingly becoming a cause for concern. Between 2008 and 2009 Mcel has lost a considerable number of customers to Vodacom, because of extremely bad network performance. Currently the availability of service has improved but it is still far away from the acceptable standards. On the other hand, TDM is often seen as the cause of frequent interruptions of telecommunications services in the northern regions

of the Country, due to problems occurring on the backbone fibre-optic cable. The absence of a regulatory framework for the quality of services contributes to the continuation of the poor performance of the service providers.

The two tables below illustrate the very rapid evolution of mobile penetration between 2003 and 2009, versus the almost stagnant fixed network over a time period of 12 years (1997-2008).

Figure 2: Evolution of Teledensity between 1997 and 2008

Year	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
TDM Nr of Subscribers	65 606	75,354	78,072	85,714	87,291	87,367	77,576	69,676	69,735	70,312	78,000	73,080
Teledensity	0,42	0,46	0,46	0,5	0,51	0,46	0,34	0,38	0,38	0,39	0,43	0,40

Source: www.tdm.mz

Figure 3: Evolution of mobile penetration between 2003 and 2009

Year	2003	2004	2005	2006	2007	2008	2009
Mcel	470,000	610,473	1,053,948	1,483,160	2,315,658	3,500,000	4,000,000
Vodacom	-	217,204	434,960	856,157	1,205,434	1,500,000	2,000,000
Total	470,000	610,473	1,503,943	2,339,317	3,455,237	4,000,000	6,000,000
Penetration (%)	2,6	3,39	8,35	12,6	16,8	20	28,5

Source: INCM

Universal Access

Universal access is part of the Telecommunications Act and INCM is indicated as the institution that has to define the annual targets in terms of projects and services to be implemented.

To realise the objective of universal access the Government created the Universal Access Fund in 2004 through the Telecommunications Act 8/2004, from 21st July, 2004. However, the fund only became operational in 2006. According to the law, the fund is to be managed by INCM and sustained by the contributions of the operators, who are obliged to give 1% of their income after taxation. According to INCM, this percentage is very low and it should be set between 2% and 3%. But at the same time the regulator is complaining about the operators' resistance to pay their contribution.

Adequate planning for the application of the UAF could stimulate the operators to focus their business strategies towards the less privileged regions of the country

The number of universal access projects that have been implemented during the three years of the existence of the fund is insignificant. In our opinion, one of the reasons behind this is the organizational structure and the human capacity of the unit that manages the UAF at INCM. The personnel of the UAF unit consists of a single person, who has to deal with all technical, administrative and financial aspects of the UAF. This problem may also explain the reason why the UAF unit in 2008 has only spent the equivalent of US$383,456[1], against an accumulated amount of US$3,341,550 during the period between 2006 and 2008 as illustrated below:

Figure 4: Universal Access Fund Expenditure

Year	2006	2007	2008
AMOUNT COLLECTED (in US$)	657,354	903,862	1,780,334
AMOUNT SPENT (in US$)	0	0	383,456

Source: Interview with UAF Unit Manager, INCM

[1] For any amount converted from the local currency into US$ in this report should be considered the exchange rate from the Central Bank (the Banco de Moçambique), on August 19, 2010, which was US$1:36,51MT.

Another aspect that might need to be optimised is related to the procedures for submission and the selection criteria of universal access project proposals. According to a TDM official the procedures must be simplified and realistically adjusted to the local conditions.

In Mozambique more than 65% of the population live in the rural areas. That means that the argument for a lack of market in those areas is false and misleading. Adequate planning for the application of the UAF could stimulate the operators to focus their business strategies towards the less privileged regions of the country.

Telecom, Internet and Broadcasting Analysis

Size of the Market

According to the comparative table in Figure 3, the current mobile penetration rate is about 28,5%, which means that the mobile market in Mozambique is far from saturated. This was certainly one of the assumptions taken into consideration by the Government for the launching of the third mobile licence. On the other hand, the rapid growth of the number of mobile subscribers has shown that contrary to fixed telephony, mobile is more accessible and affordable for the majority of the population, including those with lower income. In fact, in a poor country like Mozambique the operators must be creative in order to develop innovative solutions that can attract and retain customers, and here is where competition plays an important role.

in a poor country like Mozambique the operators must be creative in order to develop innovative solutions

With the third mobile operator the Government wants to achieve two major goals, namely to increase the penetration rate and territorial network coverage, as well as the improvement of the quality of service through competition.

The quality of service in mobile became a big issue between 2008 and 2009, when Mcel suffered serious technical trouble, resulting in traffic congestion, dropped calls and the network not even being available for periods of time. Given the magnitude and length of the problems, many people have either quit Mcel for Vodacom or bought a second handset for that network.

Financial Analysis

Between 2003 and 2007 the three network operators (TDM, Mcel and Vodacom) have together invested about US$605,6 million. In the same period, Vodacom is leading the group with a total investment of about US$285,56 million against US$211,9 million and US$108,14 million from Mcel and TDM respectively (see Figure 5).

Being a new market entrant in 2003, Vodacom invested in that year more than double the amount spent by Mcel, who had been running their business since 1997. Those investments are partly prompted by the absence of the regulatory framework for infrastructure-sharing in Mozambique.

The following table shows the evolution of investments for each operator per year in the period between 2003 and 2007 in US$x1000:.

Figure 5: Evolution of Telephony Operators Investments (in US$x1000)

Operator	2003	2004	2005	2006	2007	Total
TDM	4,600	14,300	10,600	60,000	18,638	108,138
Mcel	35,000	43,200	42,700	36,000	55,000	211,900
Vodacom	75,589	68,344	60,825	65,000	15,800	285,558
Total	**115,189**	**125,844**	**114,125**	**161,000**	**89,438**	**605,596**

Source: INCM

The following table and the respective graph illustrate the level of turnover of the three operators (TDM, Mcel and Vodacom) during the same period as was considered in the previous table.

Figure 6: Evolution of the telephony operators' turnover (in US$x1000)

Operator	2003	2004	2005	2006	2007	Total
TDM	-	93,461	83,319	94,460	109,200	385,440
Mcel	-	-	130,000	173,000	214,000	517,000
Vodacom	-	-	16,230	22,410	48,000	86,640
Total	**-**	**93,461**	**234,549**	**289,870**	**371,200**	**989,080**

Source: INCM

Network Infrastructure

Fixed Network

As already mentioned in previous sections, despite market liberalisation the incumbent, Telecomunições de Moçambique (TDM), is the only fixed network operator in Mozambique.

The existing fixed network infrastructure is entirely owned by TDM, whose investments over the last 10 years total more than US$160 million.

Currently, all 10 provincial capital cities are linked to the network based on submarine or terrestrial fibre-optic cable.

As part of TDM's network development program, currently the transmission network and all telephone switches are 100% digitalized and use the AXE and UT technology from Ericsson.

Apart from the provincial capitals, TDM transmission network has been extended to 45 districts through ADSL links for the provision of basic services (voice, data and Internet).

In the framework of the referred network infrastructure development program, the existing VSAT-based network will gradually be replaced by less expensive and more effective technologies. Strategically, VSAT will only be used as an exceptional solution for specific customers or locations that cannot be reached otherwise.

The table below illustrates the evolution of the key indicators of the fixed network in the period between 2006 and 2008.

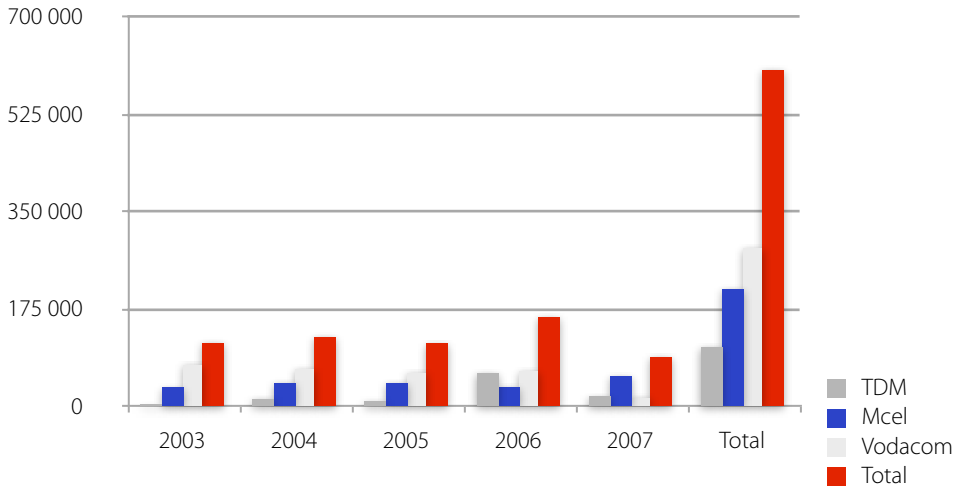


Figure 7: Evolution of key indicators in the fixed network

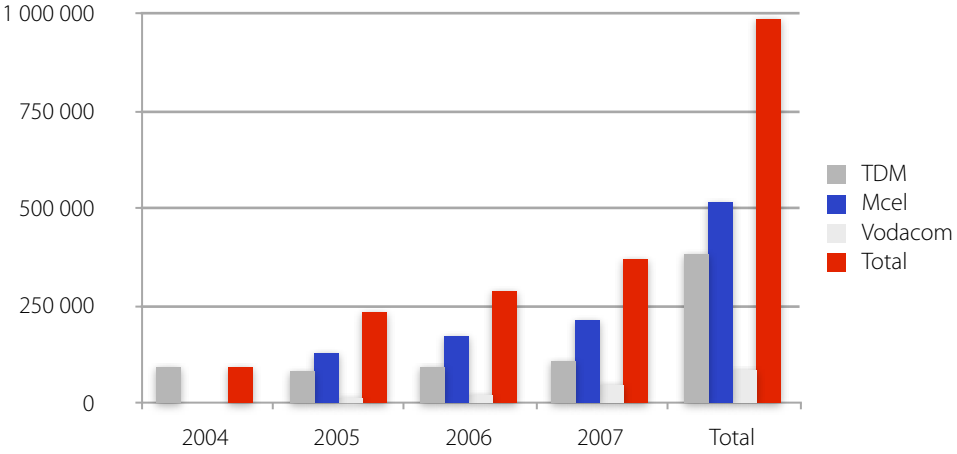
Indicator	Unit	2006	2007	2008
Total Exchange Capacity	Lines	131,525	142,403	134,557
Main Telephone lines in Operation	Lines	66,968	68,867	73,080

Figure 7: Evolution of key indicators in the fixed network

Indicator	Unit	2006	2007	2008
Total ISDN Access	Lines	1,077	1,186	1,504
CDMA Wireless Customers	Lines	1,998	2,861	3,530
ADSL Internet Broadband Customers	Lines	1 702	5 743	10 191
Leased Lines	Circuits	2 096	2 343	2 946

Source: www.tdm.mz

Comparing the growth of the different indicators on this table, one can clearly see the stagnation of the number of fixed lines during the analysed period (2006–2008). The growth of this indicator was



about 8,3%, which corresponds to 6,112 telephone lines, while the leased lines had an increase of about 28,9% and CDMA and ADSL customers have increased by about 43,4% and 82,3% respectively. Although some of the figures may seem to be relatively high, generally none of these indicators has performed satisfactorily if we consider the real demand in the country. Again the price factor here plays a constraining role, making the service unaffordable for potential users.

The green areas on the following maps show the evolution of the fixed network in terms of territorial coverage between 1999 and 2008:

Figure 8: Fixed Network Coverage in 1999
Source: INCM

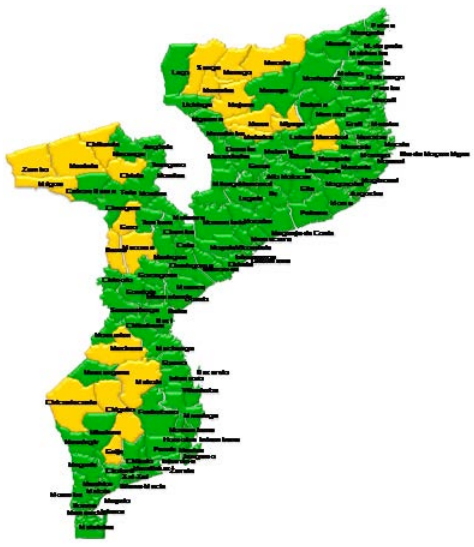


Figure 9: Fixed Network Coverage in 2008
Source: INCM

Fixed-wireless Networks

The fixed-wireless network is mainly deployed by TDM. CDMA technology is used as the solution to reach those areas with no or poor copper coverage. The adopted standard for the urban areas is CDMA 800MHz and 450Mhz in the rural areas (currently being phased out and replaced by CDMA 800Mhz).

The existing fixed network infrastructure is entirely owned by TDM

Through CDMA TDM is offering broadband services for voice, data and Internet for government institutions, business and individuals, especially in the rural areas, where connectivity would not be possible otherwise.

There are three major competitors to TDM and its subsidiary Teledata in the fixed-wireless industry, namely, INTRA Lda, iBurst Africa, Foris Telecom Mozambique and Tropicalweb. These companies are deploying Wimax technology mainly for Internet provision. However, the current coverage of their networks is limited to Maputo City and the surrounding areas. Although some of the ISPs listed above have already expressed their intention to expand their respective networks to other provinces, there is no evidence so far of any plans to extend their business to the rural areas in the near future, probably because of the perceived market limitations in those areas.

In terms of pricing, all Wimax service providers are still very expensive when compared to the offered bandwidth rates with average international figures. Even those which are connected to SEACOM are not yet competitive enough to attract a significant number of users and create a visible market change. To illustrate that situation, the following table indicates the price list from Teledata, one of the first Wimax operators in Mozambique:

Figure 10: Teledata Wimax prices

Service Package	Speeds	Monthly Fee
kwiknet home	64 Kbps	$30 USD
kwiknet light	128 Kbps	$42 USD
kwiknet pro	256 Kbps	$65 USD
kwiknet afterhours 64	64 Kbps	$18 USD
kwiknet afterhours 128	128 Kbps	$30 USD

Source: www.teledata.mz

Mobile Networks

There are two mobile operators in Mozambique, namely Mcel (Moçambique Celular) and Vodacom.

Mcel was established in 1997 as one of TDM's subsidiaries, while Vodacom entered the Mozambican market in 2003.

According to estimates, the total number of mobile users in Mozambique is close to six million, of which 4 million are Mcel customers and 2 million Vodacom customers.

Both mobile operators have heavily and continuously invested in their network infrastructure[2] in such a way that the coverage is no longer limited to the urban areas and along the economic development corridors, as it used to be few years ago.

In the absence of an infrastructure-sharing regulation, each operator is establishing its own infrastructure. Most of the time the towers from both companies appear next to each other, which results in a waste of resources and leads to environmental implications and ultimately to higher service costs. The current Telecommunications Act provides a specific section on infrastructure-sharing obligation, but the Regulator has failed so far to put in place the respective regulation. However, in recent declarations the Regulator has publicly recognised this problem and ensured the development of the necessary regulatory measures. In fact, the draft proposal of the regulation for infrastructure sharing is finally available on INCM website for comments from the public, before it is submitted to the Cabinet.

[2] See Evolution of Telephony Operators Investments, Figure 5 on Page 7

In terms of technology, both Mcel and Vodacom are operating in GSM spectrum and both have introduced 3G in 2009. However, 3G services are not yet available in all locations. After Maputo, the next priorities are the provincial capital cities.

The recent bid for the third mobile license will take six months to finalise the evaluation and license awarding process. It is expected that with the new mobile operator in the scene the market will become more competitive, resulting in better service quality as well as in price reduction.

Broadband

TDM is implementing broadband Internet access based on ADSL technology, with speeds ranging from 128Kbps up to 2Mbps.

Presently, the ADSL network covers 28 locations including all provincial capital cities and some district centres. By the end of 2009 the network was expected to cover 48 locations.

The high prices for ADSL services make it unaffordable for the majority of the public. Therefore, most ADSL customers are corporate entities. According to the table in Figure 7, the number of ADSL users in 2008 was 10,191 – which is very low.

In those regions where the traditional copper network does not reach, TDM is implementing Wimax technology solution (CDMA) to provide broadband access for voice, data and Internet.

The map below illustrates the CDMA coverage in 2008.

Figure12: CDMA coverage in 2008

Source: TDM (Interview with Director for Strategic Development, February 2010)

Through CDMA TDM is offering broadband services for voice, data and Internet

Backbone Infrastructure

Domestic

According to estimates, the total number of mobile users in Mozambique is close to six million

The national backbone infrastructure is owned by TDM and consists of a combination of submarine cable, terrestrial fibre, wireless and VSAT.

The implementation of broadband infrastructure based on fibre optics was started in 2000, connecting Maputo and Beira through a submarine cable. Currently the fibre backbone infrastructure covers all 10 provincial capital cities, 43 district centres and 31 villages.

In terms of bandwidth capacity, the TDM network includes 16 STM1links and in some routes those are being upgraded to 64 STM1.

The last phase of the national backbone infrastructure project consists of building redundancy routing (ring configuration) and is expected to be completed by mid-2011.

In the end, around 7,000km of fibre will be deployed in total, with an investment of about US$115 million.

The following map represents the current situation of the national backbone infrastructure, whereby the legend should be read as follows:

- blue lines indicate the existing fibre coverage;
- yellow lines indicate the fibre links in implementation;
- green lines indicate the existing microwave links;
- light blue lines indicate cross border links; and
- pink lines indicate the planned cross border links.

Presently, the ADSL network covers 28 locations including all provincial capital cities and some district centres

Figure 13: TDM national network infrastructure

Source: TDM (Interview with Director for Strategic Development, February 2010)

In the near future, TDM is planning to become a carrier of carriers under the NGN concept.

International Backbone

Mozambique connected to the SEACOM submarine cable during the first half of 2009. The total capacity of the cable is 1.2Tbps. This was the first connection to an international undersea cable. Previously the country was using VSAT and land fibre to connect to a gateway in South Africa.

Contrary to expectations, the price of Internet bandwidth for the end-users, more than six months later, remains very high, because most of the local ISP's are financially unable to comply with the business model imposed by SEACOM, under which the resellers must buy at least one STM-1 (155Mbps). Only big operators, such as TDM, Mcel, Vodacom, Intra and Foris Telecom can afford to buy one or more STM-1s. Since TDM is buying bandwidth capacity from SEACOM, the prices for Internet access have been reduced gradually. However, the reduction is still insignificant, if comparing international prices versus the purchasing power of the majority of the people in Mozambique.

There appears to be a lack of competition at the operators' level, with the kind of price matching evident in oligopolies of this kind.

Exceptionally, SEACOM is offering special educational rates for research consortiums and higher education institutions, which is close to US$600,000 for an STM-1. This amount gives the right to use the committed bandwidth for 20 years, which is more or less the estimated life time of the sea cable. Commercial price for the same capacity is US$3.8 million.

Figure 14: SEACOM Submarine Cable

Source: http://documentbook.com/seacom-ppt.html

In November 2009, the East African Submarine Cable System (EASSy) was officially launched in Maputo, as the second option to access international bandwidth in the country, with TDM as the local reseller of services.

The total capacity of the EASSy cable is 1.4Tbps. This project was initiated well before SEACOM was in place, but the implementation was delayed. The EASSy cable will connect the following countries: South Africa; Mozambique; Madagascar; Comoros; Tanzania; Kenya; Somalia; Djibouti and Sudan.

Apart from the countries listed above, the EASSy cable will also serve a number of landlocked countries as presented in the picture below.

In the end, around 7,000km of fibre will be deployed in total, with an investment of about US$115 million.

Contrary to expectations, the price of Internet bandwidth for the end-users, more than six months later, remains very high

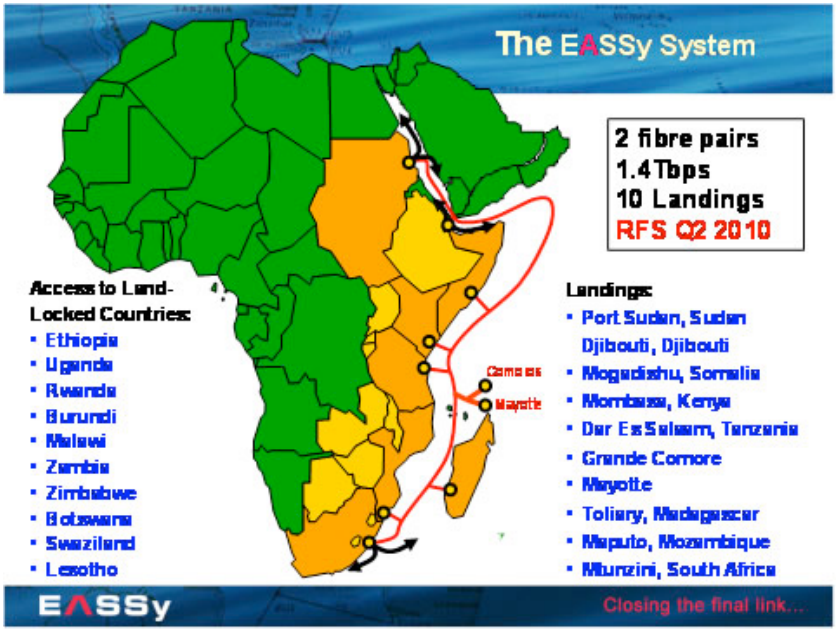


Figure 15: EASSy Submarine Cable

Source: Chris Wood, CEO WIOCC (Presentation at UbuntuNet-Connect 2008, Lilongwe, 11/11/08)

Although the prices of bandwidth are not yet known, the EASSy business model seems to be more inclusive than the one from SEACOM, because it will also serve small clients, starting from 2Mbps ranging up to 10Gbps. Therefore, this project is seen as an opportunity for competition and consequently for a further price reduction for the end-user.

Regional Connectivity

Mozambique is already connected to some of the neighbouring countries as follows:

- South Africa (fibre and microwave)
- Swaziland (microwave to be replaced by fibre by 2011)
- Zimbabwe (fibre)
- Malawi (fibre)

These links will be part of the planned extension of the EASSy cable to the landlocked countries in the Region, as shown in the map on Figure 15 above.

Broadcasting

Unlike radio broadcasting, none of the TV channels use local languages in their programming

According to the Telecommunications Act, INCM has the power and the competency to regulate the frequency spectrum, including licensing. The use of the spectrum and the associated licensing regime are mainly based on the ITU recommendations and the regional spectrum management policies.

The spectrum allocation follows a "first come, first serve" approach and is supported by the national spectrum management allocation plan, which defines specific use for each frequency band and indicates, among other matters, the license-exempt spectrum.

Apart from the military, police and security companies using radio communications networks, there are still large numbers of private radio-based networks in Mozambique, which are mainly owned by corporate organisations. Those networks are gradually being replaced by IP-based networks. Even the government used to run the biggest data communication network in the country, which was based on microwaves (HF and VHF). Today, that network is almost 100% replaced by the modern e-Government network concept, which is fully Internet based.

Radio broadcasting is the most important information and communication vehicle for the majority of the population, particularly for the rural communities, because of the accessibility and

affordability factor. In fact, the geographic coverage of the national radio broadcaster (Radio Moçambique) is far bigger than the coverage of all local TV stations together, and furthermore the cost of radio sets has dropped dramatically in the last years as a result of technology improvements in the electronic industry.

The other significant factor responsible for the widespread usage of radio in Mozambique is the language issue. The Radio Moçambique has one station in each of the ten provinces broadcasting in the major local language, in addition to the national Portuguese channel which covers almost the whole country.

There are also many private and community radio stations spread all over the country. However, the private radio stations are mainly located in the urban centres, covering the major cities and the surroundings districts, while the community radio stations are generally located in the rural areas.

The Government has adopted the national Community Multimedia Centres (CMCs) program, which started as an evolution of the telecentres concept a few years ago. The success of the Telecentres Project, which was implemented by the Eduardo Mondlane University Computing Centre, with the funding from a number of donors including IDRC, UNESCO, and the Suisse Development Agency among others, has attracted the interest of the Government and consequently become part of the poverty alleviation strategy[3] .

According to Government plans, 20 CMCs will be established within the current five-year mandate in different parts of the country. The funds for the implementation of that plan have already been secured by the World Bank and the Finnish Government.

With the expansion of the fibre optics backbone network, TV broadcasting coverage has also increased. Some of the local cable TV channels are now reaching the major cities and some districts. However, most of the rural communities can not yet benefit from this important information vehicle, either because of the limited geographic coverage of the TV broadcast or because of the price of the TV sets. On average, the cheapest TV sets cost about two times the minimum salary, which makes it difficult for the people under this wage range to afford such commodities.

Unlike radio broadcasting, none of the TV channels use local languages in their programming. Considering that the illiteracy rate in Mozambique is still very high, the exclusive use of Portuguese in the media contributes to the limitation of access to the rural communities, since the majority of the people do not speak Portuguese.

There are four local TV channels, one of which is Government owned. Of the private channels, one broadcasts over cable.

The Government is about to introduce digital broadcasting in radio and television. The first public discussions on this issue took place last year and currently there is a study in progress which aims at producing recommendations for the Government about the most suitable steps and technologies. INCM and the Ministry of Transport and Communications are leading the process. One of the matters to be dealt with is the regulation to accommodate the new environment.

Internet Access and Pricing

The real number of Internet users in Mozambique is unknown, because there is no mechanism to keep and update the related statistics. According to the last census (2007), the number of Internet users was estimated at about 162 000, which corresponded to 0,9% of the population at that time.

the EASSy business model seems to be more inclusive than the one from SEACOM

[3] In 1998, the Eduardo Mondlane University Computing Centre was the pioneer in the establishment of telecentres in Mozambique. This community project was initially focusing on connectivity and web-based content. Later, the project included a community radio component, which determined the new designation "Community Multimedia Centres" (CMCs). With the rapid growth of the CMCs network, there was a need for the establishment of a Helpdesk Support Centre, which, apart from providing online support, also includes capacity building programs. The conceptual approach and the implementation strategy of the CMCs project resulted in a great success in such a way that the Government has decided to adopt it as part of the national strategy for poverty alleviation.

The spectrum allocation follows a "first come, first serve" approach and is supported by the national spectrum management allocation plan

Compared to the average on the African continent, Internet penetration in Mozambique is very low. The high prices of bandwidth and lack of PC ownership[4] are the major obstacles to the development of a wider Internet user community.

The expectations created around the SEACOM submarine cable in regard to the reduction in consumer bandwidth prices are yet to materialise. As indicated, the low financial capacity of the local bandwidth resellers prevents most of them from buying services directly from SEACOM. As very few ISPs can afford to buy capacity in bulk as required by SEACOM, most of them still buy bandwidth from TDM. Initially there was a consortium which intended to build a national data centre to serve the smaller companies and act as the reseller for SEACOM bandwidth. However, the consortium fell apart just before the launching of SEACOM services.

Apart from the cost of bandwidth, there are other elements that contribute to low access and usage of Internet, such as:

- High prices of computers,
- High rate of illiteracy,
- Language barriers,
- Lack of awareness and
- Poor coverage of the electricity network at household level.

The following picture shows the comparative position of Mozambique in the context of the RIA countries, in regard to households with working computers and Internet connection.

Compared to the average on the African continent, Internet penetration in Mozambique is very low

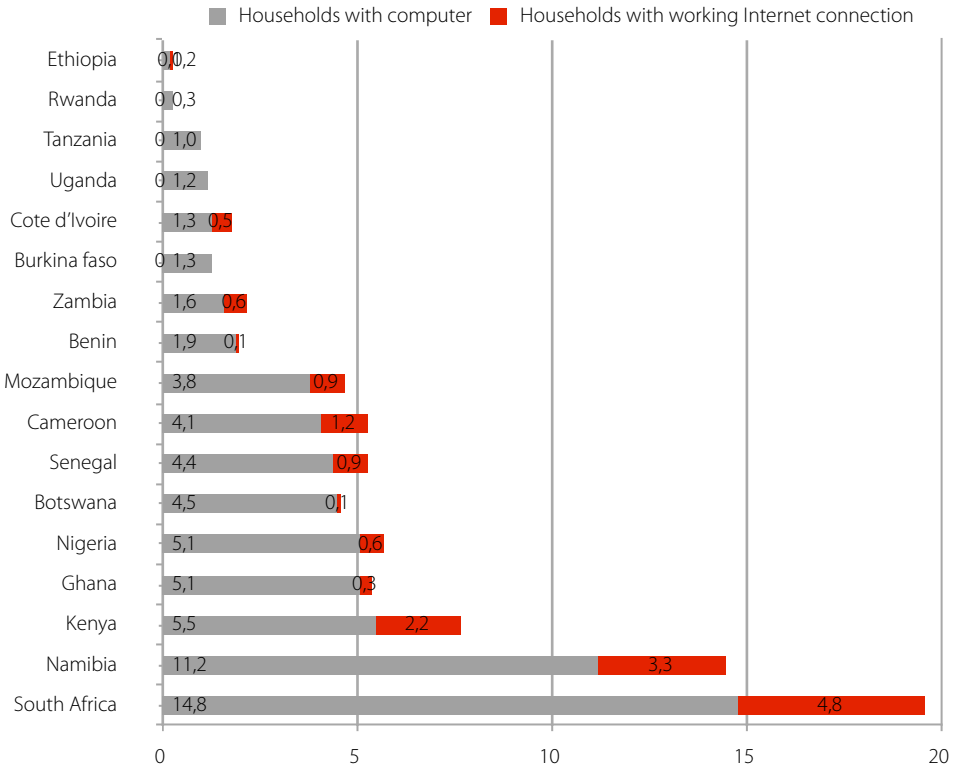


Figure 16 – Households with a working computer and internet connection in Africa

Source: RIA ICT Access and Usage Household and Individual Survey 2007-2008

Mobile Internet

Nowadays, most mobile sets are Internet enabled, but the majority of the people do not use those features, either because of the high cost of the service, illiteracy problems or lack of awareness.

[4] According to the RIA e-Access and Usage Household and Individual Survey conducted in 2007, 3% of the households in Mozambique had a working computer, which corresponded at that time to about 500,000 households (see Figure 16 below).

Despite the enormous growth of the mobile sector in Mozambique, the real contribution of this segment to increase Internet connectivity remains questionable. First of all, the number of people who access the Internet through mobile phones is very limited compared to fixed access. Secondly, one cannot talk about real "expansion" or "increase" of connectivity here, considering that most of the people in this group are likely to be connected already and use the phone for Internet access occasionally as an alternative to the usual computer at home, at the office, at school, at the Internet café or elsewhere.

One cannot talk about real "expansion" or "increase" of connectivity here, considering that most of the people in this group are likely to be connected already

Recently Mcel introduced a pre-paid package for Blackberry, which is regarded locally as an innovative experience. However, the price is again the major barrier for extensive use of Internet features, even for those who can afford to buy a Blackberry mobile phone.

Broadband Services

Broadband services are provided by TDM using ADSL and CDMA. The prices of these services limit their use by individuals, remaining accessible mainly for corporate entities. The table presented in Figure 17 indicates the cost structure of ADSL services. In most cases, what makes the price become too high is the cost of the extra bandwidth consumption.

Figure 17: ADSL Prices

Description	Bandwidth up to 128 unlimited	Bandwidth up to 128 3GB	Bandwidth up to 128 5GB	Bandwidth up to 128 6GB	Bandwidth up to 256 8GB	Bandwidth up to 512 11GB	Bandwidth up to 1024 15GB	Bandwidth up to 2048 21GB
Monthly Fee	US$17,80	US$20,54	US$30,12	US$38,34	US$46,56	US$57,51	US$78,06	US$100
Download Upload	unlimited	3 GB	5 GB	6 GB	8 GB	11 GB	15 GB	21 GB
Additional 100 MB	N/A	US$1,78	US$1,78	US$1,78	US$1,78	US$1,78	US$1,78	US$1,78

Source: www.tdm.mz (original table in Portuguese and local currency)

In addition to the figures on the table above, the customer must pay the telephone charges, a monthly fee of US$34,23 for a fixed IP and buy a modem, which, depending on the number of ports (two or four), will cost US$21,91 or US$43,82 respectively.

Figure 18: CDMA Internet Basic Package

Installation Fee	Monthly Fee	Capacity (MB)	Cost of additional each MB	Nr. of Mailboxes	Capacity per Mailbox	Cost of each additional Mailbox
US$3,12	US$35,60	5 GB	US$0,06	5	10 Mbytes	US$2,05

Source: www.tdm.mz (original table in Portuguese and local currency)

Figure 19: CDMA Internet Executive Package

Installation Fee	Monthly Fee	Capacity (MB)	Cost of additional each MB	Nr. of Mailboxes	Capacity per Mailbox	Cost of each additional Mailbox
US$3,12	US$52,04	9 GB	US$0,05	10	10 Mbytes	US$2,05

Source: www.tdm.mz (original table in Portuguese and local currency)

Interconnection

The first interconnection rates were created by the Government Decree Nr. 34/2001, from 6th of November and are based on the LRIC costing model. Interconnection termination rates have been one of most controversial issues since the introduction of the second mobile operator into the market in 2003. Before that there was apparently no problem, because Mcel was born as a subsidiary of TDM. After tough discussions, the three operators (TDM, Mcel and Vodacom) reached an agreement in 2003 on the interconnection termination rates to be applied among themselves.

The Regulator hired an independent consultant in 2006 to come up with a new proposal for interconnection termination rates

That agreement, however, was subject to a new dispute requiring INCM to intervene. To settle the matter the Regulator hired an independent consultant in 2006 to come up with a new proposal for interconnection termination rates. That resulted in a new agreement signed by TDM, Mcel, Vodacom and INCM in November 2007, on the rates to be applied in 2008 and 2009. The agreement was published by INCM in the Government Gazette "Boletim da República III Série-Número 51". The agreed rates were as follows:

Figure 20: Interconnection Rates for 2008

Interconnection	Tariff for 2008 (excl. VAT)
Termination on the fixed network (TDM)	US$0,02
Termination on the mobile network (Mcel)	US$0,70
Termination on mobile network (Vodacom)	US$0,08

Source: Boletim da República III Série-Número 51

However, in 2009 Mcel refused to settle with Vodacom for the termination of their traffic, forcing this company to undertake legal action after failing to reach any consensus with the competitor. At the same time, Mcel has taken legal action against the Regulator, disagreeing with the termination rates jointly agreed to for 2009.

Before the court had come to a conclusion in regard to Vodacom's case, Mcel approached that company with a proposal for settling their dispute out of court. In December 2009, an agreement was signed between the two mobile operators, aimed at settling the amounts owed. Vodacom agreed on a discounted rate resulting in the lodging of new interconnection termination rates for the year 2009.

Figure 21: Termination Rates for 2009

Interconnection	Tariff for 2009 with discount (excl. VAT)
Termination on Mcel network	US$0,70
Termination on Vodacom network	US$0,84

Source: INCM, Resolução Número 4/CA/INCM/2010, de 23 de Fevereiro de 2010

Because of the high interconnection rates on mobile, some people prefer to carry two mobile handsets, one for each network

For 2010, TDM, Mcel and Vodacom have agreed on the termination rates indicated below, while they are waiting for INCM to hire another consultancy for a new proposal of interconnection rates:

Figure 22: Termination Rates for 2010

Interconnection	Tariff for 2010 (excl. VAT)
Termination from fixed network (TDM) to mobile networks (Mcel or Vodacom)	US$0,08
Termination from mobile networks (Mcel or Vodacom) to fixed network (TDM)	US$0,02
Termination from mobile to mobile networks	US$0,07

Source: INCM, Resolução Número 4/CA/INCM/2010, de 23 de Fevereiro de 2010

As per the table above, the rates are identical between the two mobile networks. But the termination rate from fixed to mobile is slightly higher than from mobile to mobile and more than three times higher than from mobile to fixed network.

Because of the high interconnection rates on mobile, some people (those who can afford to) prefer to carry two mobile handsets, one for each network, or buy two SIM cards to avoid the high call charges when calling from one network to another.

Telecommunications Regulatory Environment (TRE)

This assessment of the telecommunications regulatory environment is based on a study of the perceptions of different groups of people in regard to the level of effectiveness of the regulatory framework (which includes the policy and regulatory dimensions) and is based on a questionnaire containing the following indicators:

- quality of service;
- universal service;
- regulation of anti-competitive practices;
- tariff regulation;
- interconnection and facilities leasing;
- scarce resources; and
- market entry.

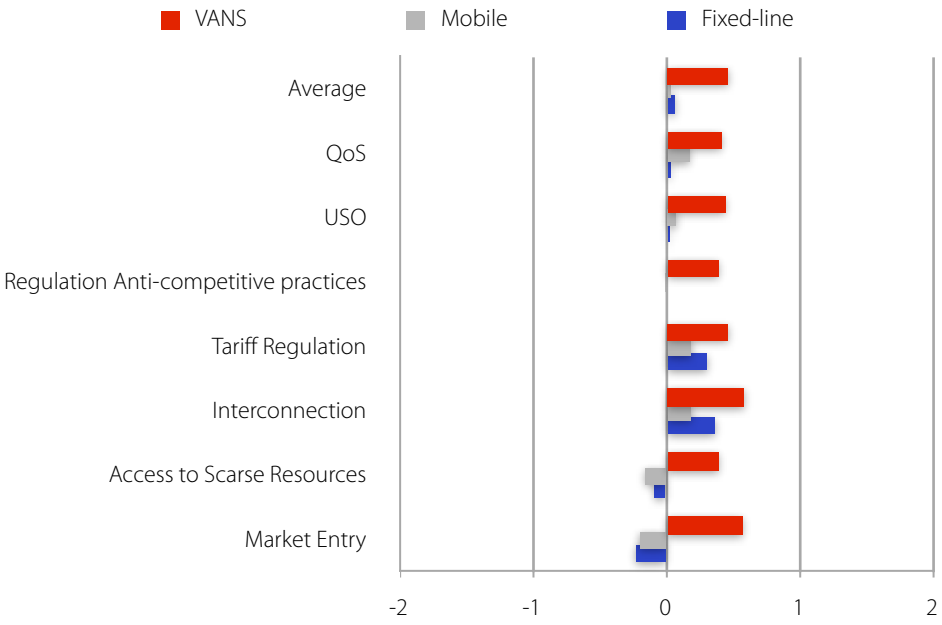
The people surveyed can be classified in the following three categories:

Category 1: Stakeholders directly affected by telecom sector regulation (e.g. operators, industry associations, equipment suppliers, investors)

Category 2: Stakeholders who analyse the sector with broader interest (e.g. financial institutions, equity research analysts, credit rating agencies, telecom consultants, law firms)

Category 3: Stakeholders with an interest in improving the sector to help the public (e.g. academics, research organisations, civil society, other government agencies, current government employees from organizations related to the telecom sector excluding those in the telecom regulatory and policy hierarchy).

From a total of 100 questionnaires that were distributed among the target group, only 52 were correctly completed and returned. Based on the Likert Scale, the answers were scored in values varying between 1 and 5, where 1 means "highly ineffective or inefficient" and 5, "highly effective or efficient".



The environment is viewed positively over the majority of the seven assessed categories

Fig. 23: Mozambique 2009 TRE results by sector

Source: RIA TRE 2009, Mozambique TRE

The picture above shows the disaggregated score for the three sectors selected for the TRE survey, namely VANS, mobile and fixed. According to this illustration, the environment is viewed positively over the majority of the seven assessed categories, except for Regulation of Anti-competitive Practices, Scarce Resources and Market Entry, all regarding mobile and fixed. The graphic also indicates the highest (positive) score on VANS for all categories.

These results clearly do not correlate with the performance of the sector, which as we have seen above under performs in almost every dimension. As can be seen from past RIA TRE surveys in other countries, even small changes can have significant positive or negative effects. The positive perception of the policy and regulatory environment might be affected at the policy level by the opening up of the market and particularly the process underway of bringing a new mobile entrant into the market. At the regulatory level respondents might also have been influenced by the fact that the current Director General of INCM is a former academic who is seen as knowledgeable and has already brought changes that have improved the image and prestige of the institution and which may be expected to be extended to other areas. In the following subsections, we will analyse and discuss each category in line with the respective score and try to find a reasonable explanation for the presented figures. This exercise will also take into account the results of the Comparative Analysis in regard to TRE, which is based on the data submitted by RIA members on behalf of their respective countries.

Market Entry

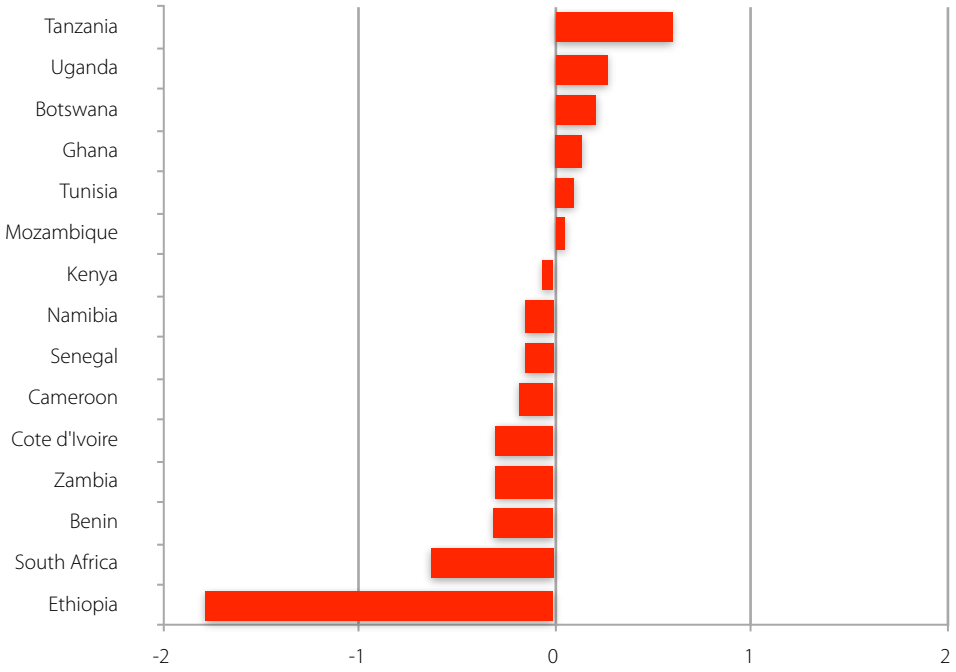


Figure 24: Market Entry (RIA Comparative Analysis)

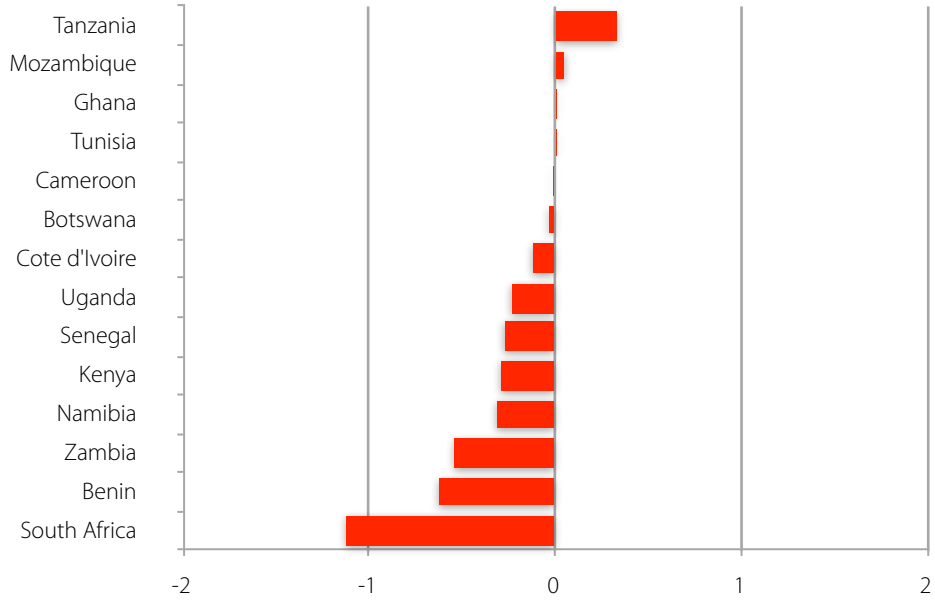
Source: RIA TRE 2009, Market Entry

The Telecoms Act refers to Infrastructure Sharing as part of the obligations of the operators, but INCM has failed so far to produce proper regulation to enforce the Law. As a result of that, new operators are forced to build their own infrastructure to avoid cost speculation or even refusal by others. To illustrate this situation, they are some ISPs who are currently deploying VSAT to expand they networks to the provinces instead of using TDM fibre backbone, because as they say, the cost would simply be too high. Another example is related to the mobile operators, whose towers are often installed next to each other, instead of sharing the infrastructure in those areas of common interest. This aspect may be one of the main reasons for a negative score of the Regulator regarding the two sectors (mobile and fixed).

During the breakfast meeting with the stakeholders (boundary partners), in the framework of the Outcome Mapping process, representatives of TDM, Mcel and Vodacom have unanimously expressed their satisfaction in regard to the possibility of having infrastructure sharing regulated soon, as announced by INCM.

However, INCM performance in regard to Market Entry was positively perceived in relation to VANS, which in our opinion translates the efforts shown by the Regulator towards other elements within this category, such as equal and fair treatment to newcomers in terms of licensing procedures, access to scarce resources, etc.

Access to Scarce Resources



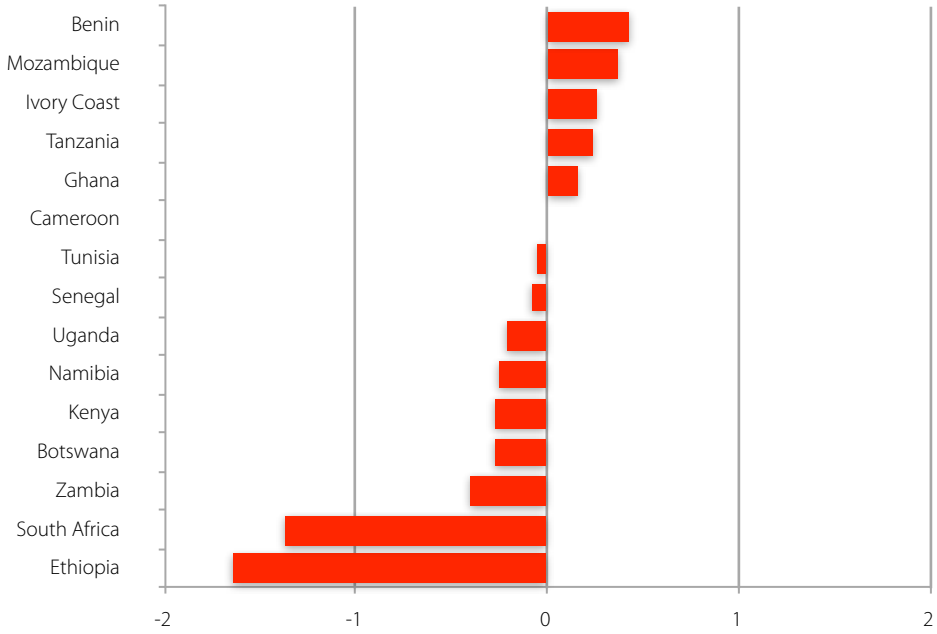
The positive score of INCM in regard to access to scarce resources is justified by the fact that the respective regulation is simple and clear

Figure 25: Access to Scarce Resources (RIA Comparative Analysis)

Source: RIA TRE 2009 - Access to Scarce Resources

In our opinion, the positive score of INCM in regard to access to scarce resources is justified by the fact that the respective regulation is simple and clear, leaving less room for disputes and complaints. Based on international standards and the first-come, first-served principle, the regulation package is easy to enforce. Therefore the few incidents registered here are mainly related to unlicensed use of scarce resources (e.g. frequency spectrum and interferences), rather than the access to it. Another good example of a smooth process conducted by INCM under this category is the numbering system planning and management. It is therefore difficult for us to explain why the survey has brought negative results for the mobile and fixed segments.

Interconnection



The Regulator believed that the operators should themselves agree on the termination rates

Figure 26: Interconnection (RIA Comparative Analysis)

Source: RIA TRE 2009, Interconnection

The role of INCM, specifically in regard to interconnection, was initially very passive. The Regulator believed that the operators should themselves agree on the termination rates without any intervention of this body. However, INCM was forced to change this attitude as soon as conflicts arose between the two mobile operators. The Regulator then had to be pro-active and lead the process. Therefore, the positive score on interconnection is well justified. For more details on this matter, refer to the Interconnection Section on Page 20.

Tariff Regulation

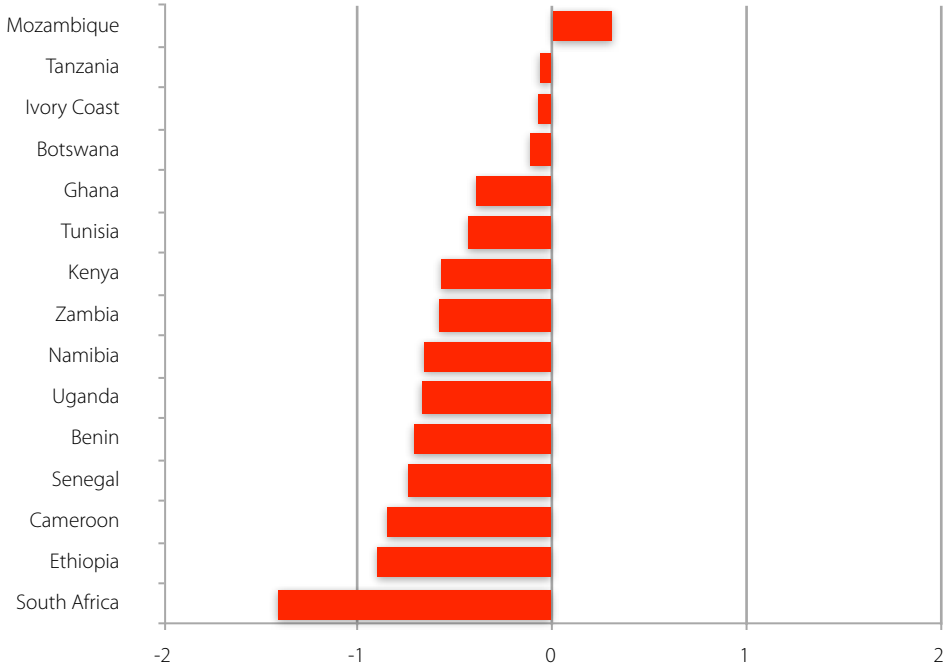


Figure 27: Tariff Regulation (RIA Comparative Analysis)

Source: RIA TRE 2009 – Tariff Regulation

The major incident in relation to tariff regulation occurred when Vodacom requested Mcel to increase the tariffs as a pre-condition for the company to start operating in the country, because they wouldn't otherwise be able to recover the initial investment. Mcel, which had already been in operation for six years, was not interested in the deal and refused Vodacom's proposal. To justify the negative financial results after the first years of operation, Vodacom went to the extreme of publicly requesting the Head of State to use his political power in order to force Mcel to increase the tariffs. Fortunately the President did not interfere in the process. Contrary to its initial position, INCM was then forced to assume a pro-active role, giving an ultimatum to the operators in order to abandon that anti-competitive behaviour and come up with a realistic cost-based tariffs proposal. The proposed tariffs were then harmonised and approved by the Regulator.

The positive score over the other sectors (fixed and VANS) might reflect the effect of INCMs philosophy in the recent past, which was based in exercising as less interference as possible in tariff regulation, leaving the process instead for the market itself. However, the Regulator has finally understood that as the market grows, there is a need for rules and procedures. Today, INCM requires the operators to produce evidences of cost-based tariffs before they can be approved.

Regulation of Anti-competitive Practices

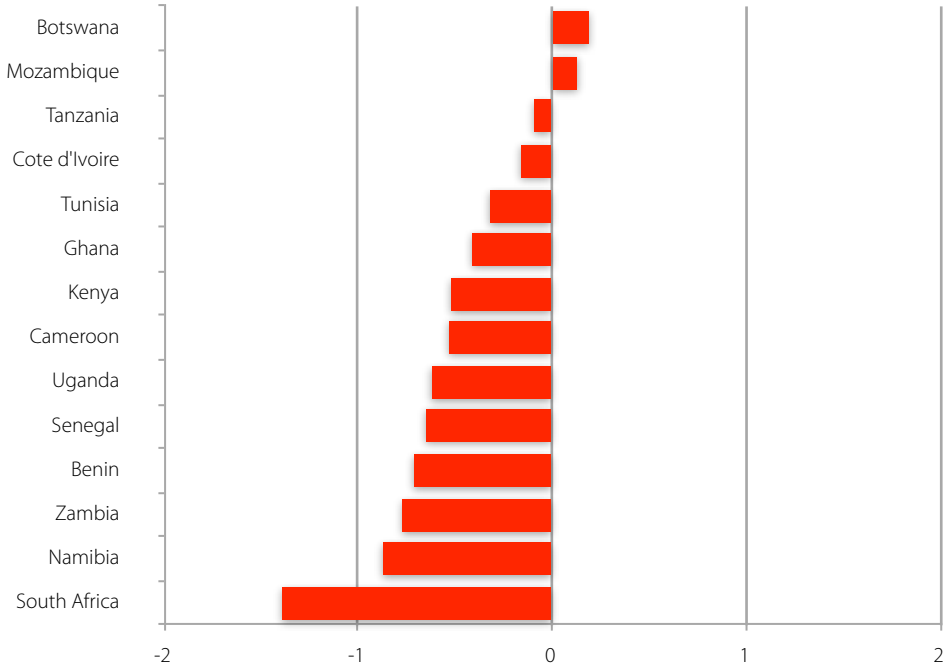


Figure 28: Regulation of Anti-competitive practices (RIA Comparative Analysis)

Source: RIA TRE 2009. Regulation of Anti-competitive Practices

One of the major requirements for Vodacom to enter the market as second mobile operator was the need to change the relationship between TDM and Mcel, since this mobile company was created as a subsidiary of the incumbent. The Government was then confronted with the need to split the two companies, both financially and administratively. The role of INCM in this case was to ensure the correct implementation of the Government decision by monitoring the whole process. The example that was used to illustrate the role of the Regulator in relation to Tariff Regulation can also be applied for this category. Generally, there have been no complaints or disputes among the different players (telecom operators, ISP's and consumers) over anti-competitive behaviour. In our opinion, the explanation for the slightly negative score for mobile and fixed on the current category might be related to the fact that in the past the Regulator has in many cases been reactive to the events rather than being pro-active.

Representatives of TDM, Mcel and Vodacom have unanimously expressed their satisfaction in regard to the possibility of having infrastructure sharing regulated

Universal Service

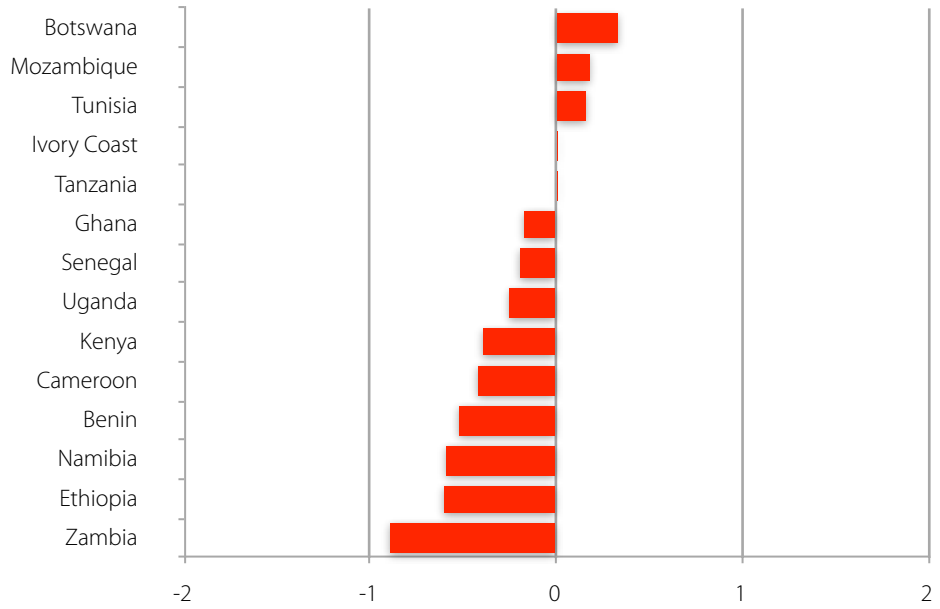


Figure 29: Universal Service Obligations (RIA Comparative Analysis)

RIA TRE 2009 - Universal Service

Despite the fact that the Regulator has made some progress in relation to the implementation of Universal Service, in our opinion the score is too high compared to the results achieved and the problems reported by some operators including the fixed incumbent. For more details, please refer to the Universal Access Section, on Page 6.

Quality of Services

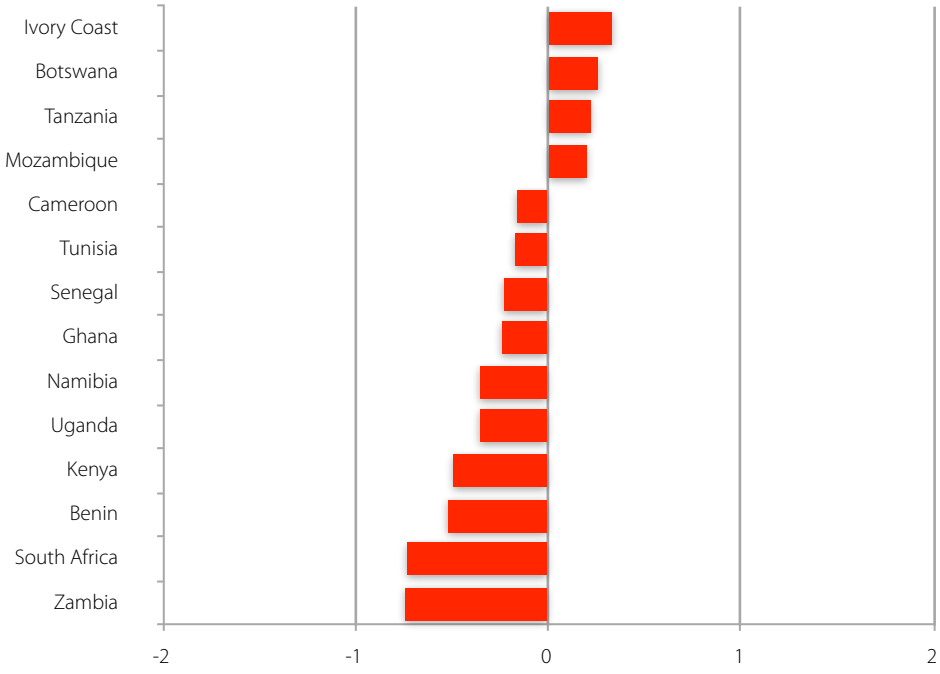


Figure 30: Quality of Services (RIA Comparative Analysis)

Source: RIA TRE 2009 - Quality of Services

The score given to INCM in terms of Quality of Services appears to be very positive and does not reflect the real situation. First of all, there is no regulation for monitoring the Quality of Services in

Mozambique, although the Telecommunications Act empowers the Regulator to put in place the necessary control mechanisms. Secondly, there have been frequent violations of quality parameters without any clear disciplinary action from the Regulator against the infractors. A well-known example of that is the MCel service, which has been very poor over 2009 with a slight improvement this year, though apparently nothing has been done by INCM to force the company to restore the full quality of the service.

TDM is also often reported by the media in relation to the frequent interruptions of the backbone infrastructure services caused by damage on the fibre optic cable. As result of these interruptions, most of the northern provinces are often isolated from the rest of the country. Considering that those situations are incidental and recurrent, TDM should ensure that there is enough redundancy of the network to avoid long down times.

The only possible explanation for the positive score could be that there are currently visible efforts towards the establishment of a regulatory framework for Quality of Service. According to a recent note from INCM, the draft document has been prepared for approval.

According to the representative of Vodacom during the stakeholders breakfast meeting in August this year, despite the absence of regulation for quality of service, each license is issued together with a set of quality parameters to be respected by the operator, but apparently the regulator has no tools to control effectively those quality obligations.

Mozambique TRE Comparative Analysis Between 2006 and 2009

Figure 31 shows in a comparative way the score of INCM for the different TRE indicators in 2006 and 2009.

The Regulator has finally understood that as the market grows, there is a need for rules and procedures

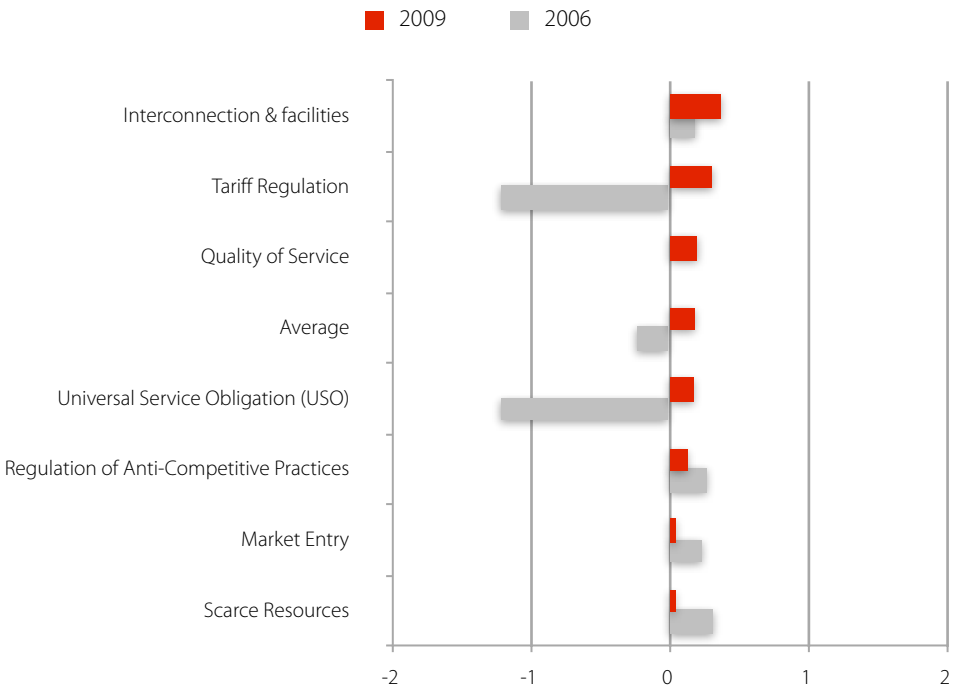


Figure 31: Mozambique TRE comparative indicators (2006 and 2009)

Source: RIA TRE data

Generally, the results of 2009 indicate an improvement compared to 2006, especially in regard to Universal Service (US) and Tariff Regulation. According to this figure, Market Entry and Regulation of Anti-Competitive Practices, although showing a positive performance in 2009, have relatively lower marks than they had earned from the TRE respondents in 2006.

e-Government Applications

The implementation of the Government Intranet project, commonly known as GovNet, was started in 2004, with financial support from the Government of Italy and the World Bank. The pilot phase covering only some public institutions was located in the capital city and had a budget of US $434,000.

The deployment phase of the GovNet took place between 2006 and 2007 and it consisted of the establishment of new links connecting the Government institutions in all 10 provinces, including the respective 128 districts. The total budget for this phase was €1.4million, equally financed by the Italian Government.

The current network infrastructure is based on 64 and 128Kbps leased lines provided by TDM. However, the Government has recently announced that soon there will be an upgrade of the bandwidth capacity for the whole network through a project funded by the World Bank.

Besides email and Internet services, there are some e-Government applications available through the GovNet. The major online applications include:

- the so-called "e-SISTAFE", which is the State Financial Management Information System for the entire public sector;
- the management information system for tax collection, used by the Ministry of Finance and the Customs; and
- the integrated biometric system used by the Migration Services.

Apart from the above mentioned applications, there are other systems that are used in a more restricted sphere, such as Human Resources Management Information System, used to manage the data related to all public servants in the Country and the Health Management Information System.

The Government Portal (www.portaldogoverno.gov.mz) offers some information packages related to essential services provided by the public sector (mainly the ministries), such as, business licensing, investment requirements and procedures, personal ID and passport application, social aid, job opportunities, etc, including relevant legislation and application forms in a downloadable format.

Conclusions and Recommendations

There have been no complaints or disputes among the different players over anti-competitive behaviour

The current study has shown that strong and effective regulation is needed in Mozambique. The complexity of the sector and the very fast changes occurring in the ICT market require a higher level of responsiveness from both Government as well as the regulator. The major challenge is how to equate policy and regulation to the needs and characteristics of the local telecom market while keeping pace with international standards. A converged licensing regime is therefore a main priority.

The National ICT Policy is now 10 years old and needs urgent review. The Government must accelerate the adoption of other vital instruments, such as the new Telecommunications Act and the Law for Electronic Transactions, since some of the missing regulation depends upon the existence of those legal tools.

The regulator must play a more pro-active role in regard to pricing regulation, because the size of the Mozambican telecom market and the level of competition have not yet reached a stage that can lead to pricing self-regulation. Therefore, INCM has to enforce cost-based pricing to protect consumers. Interconnection termination rates are one of the burning issues with direct implications for the consumer price. An evidence-based cost price model could help in legitimating the fairness of the mobile services.

The issue of quality of services is becoming more and more critical as the demand for more sophisticated services arises and the technological solutions become more complex. Once again, the consumer needs to be protected and to grant such protection INCM has to come up appropriate regulations.

The size of the Universal Access Fund versus the Universal Access goals is still unbalanced. Due to regulatory, administrative and organisational factors, INCM is not collecting as much tax as it should be from the operators, resulting in less capacity to finance eligible projects. According to the

current set up, the UAF Unit is located at INCM's building, reports technically to INCM, but formally is not part of the organisational structure of the agency (it belongs to the Ministry of Transport and Communications). Considering that the Law gives the Regulator the responsibility of identifying and defining priority projects to be implemented through the UAF, it makes sense to keep the unit as part of INCM. Additionally, clear eligibility criteria and simplified procedures for accessing the UAF are required.

Broadcasting is subject to double regulation, i.e. all aspects related to spectrum allocation and technology are regulated by INCM, while the content is regulated by Gabinfo (Gabinete de Informação) and the Conselho Superior da Comunicação Social. The Government should find a way of simplifying the licensing process by putting both regulatory functions together in one single entity.

Because of technological limitations of the handsets used by the majority of the people on one side, and the high costs of the service on the other, mobile Internet cannot yet be considered as an alternative option for connectivity in Mozambique. The price factor is also the major barrier for the wide use of broadband. This leaves access to Internet, a key dimension of equitable social and economic inclusion in contemporary society, one of the major challenges for the country.

The current regulatory challenges offer a golden opportunity for INCM to gain more credibility, authority and respect from all players, after many years of uncertainties and doubts about the real role and capacity of the agency. One of the remaining question marks hangs over the issue of how independent INCM is from the influence of the Government and political power when it comes to crucial decision-making and the impact of this on both investment and conflict resolution within the sector.

Mozambique has yet to see the benefits of a competitive environment, in both fixed and mobile and particularly in broadband. To enjoy these Mozambique needs to create the conditions for investment in the different segments of the market that make up a modern infrastructure. For this to happen, the country needs a certain but flexible regulatory environment able to respond effectively to the dynamic technological developments within the country. This would be enabled by a service and technologically neutral licensing and regulatory environment that removes any artificial constraints on the market and would encourage business and service innovation. This is likely to see the necessary reduction in prices and availability of a wider range of services needed to service the different communication requirements in the country.

List of Abbreviations and Acronyms

ADSL	Asymmetric Digital Subscriber Line
CEO	Chief Executive Officer
CDMA	Code Division Multiple Access
CMC	Community Multimedia Centre
EASSy	East African Submarine Cable System
e-SISTAFE	Sistema de Administração Financeira do Estado
GDP	Gross Domestic Product
GSM	Global System for Mobile Communications
HF	High Frequency
VHF	Very High Frequency
ICT	Information and Communication Technology
IDRC	International Development Research Centre
INCM	Instituto Nacional das Comunicações de Moçambique
ISDN	Integrated Services Digital Network
ISP	Internet Service Provider
ITU	International Telecommunications Union
LRIC	Long-Run Average Incremental Cost
Mbps	Megabit per Second
Mcel	Moçambique Celular
MT/MZM	Mozambique Metical
NGN	Next Generation Networks
RIA	Research ICT Africa Network
SIM	Subscriber Identity Module
SPR	Sector Performance Review
TDM	Telecomunicações de Moçambique
TRE	Telecommunications Regulatory Environment
TV	Television
UA	Universal Access
UAF	Universal Access Fund
UNESCO	United Nations Education, Science and Culture Organisation
USD	US Dollar
USO	Universal Service Obligations
UTICT	Unidade de Implementação da Política de Informática
VAT	Value Added Tax
VoIP	Voice over Internet Protocol
VPN	Virtual Private Network
VSAT	Very Small Aperture Terminal
WiMax	Worldwide Interoperability for Microwave Access
WiFi	Wireless Fidelity

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