

Unlocking the Potential of the Internet

A Scoping Study in the Mozambique Regional Corridors of Beira and Nacala

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Executive Summary

Mozambique, located in the Southern African region, attained its independence from Portugal in 1975. A 16-year civil war, which ended with the signing of the Rome Peace Accord in October 1992, left Mozambique one of the poorest countries in the world with virtually no infrastructure, including roads, schools and health facilities. Communication networks were systematically targeted in the fighting.

Now, two decades of peace and radical reforms have transformed Mozambique into one of the fastest and most consistently growing economies in the world. Yet, despite its positive economic fundamentals, there are several areas—specifically lack of ICT infrastructure—that will critically hamper its future growth.

Significant investment has been made over the years to improve infrastructure, the Mozambique Regional Getaway Programme (MRGP) being a prime example. The MRGP objective is to contribute to the improvement of the Southern African transport (roads, rail, and ports), energy and ICT regional infrastructure network that uses Mozambique as a transit route for international trade. The programme aims to positively impact regional and international trade, increase employment and reduce poverty along the main corridors leading to Mozambique.

The two main corridors linking the landlocked countries of Zambia, Zimbabwe, Malawi and Southern DRC to the sea ports of Mozambique are the Beira and Nacala corridors. The Beira corridor extends from the Port of Beira to Zimbabwe via the

Machipanda border and to Malawi and Zambia via the Villa Fronteira border with Malawi and from Malawi to Zambia via the Mchinji border post. The Nacala corridor is linking the port of Nacala to Malawi through the Chiponde border post and the Mchinji border post to Zambia. This scoping study is focused on the Mozambican components of these two corridors from the ports of Mozambique to the borders with Zimbabwe and Malawi.

Based on the significant investments from the private, public and NGO sector, the future of the region is potentially bright. Yet the question remains what investment in Internet infrastructure is required to support this future growth potential, what are the specific needs and demand areas for Internet, what are the specific challenges preventing internet development, and what actions are required from government, private sector organisations and donor agencies. In this Point of View, we explore these important questions.

Recognising the importance of ICT in the development of the country, the Mozambican Government has made significant reforms to support the development of the Internet. But Mozambique is still lagging the rest of continent in terms of connectivity.

At the end of 2012 there were around 8 million mobile subscribers in the country, which brings its mobile penetration rate to just 33 percent, a very low figure against the average 76.4 percent mobile penetration rate across the rest of Africa. Additionally, it is estimated that between 60–70 percent of mobile subscribers in Mozambique are concentrated in the capital city, Maputo. Internet penetration is even lower at only 5 percent of the population (1m

people) and is again concentrated in large urban areas like Maputo.

As one considers approaches to stimulating and promoting Internet development, we need to recognise the full scope of the challenges that must be addressed from both a demand and supply side. Given that these challenges tend to be multi-layered, improving Internet access only addresses one impediment linked to Internet development. Even with networks in place and accessible, barriers remain due to insufficient demand. This study has found the following key challenges and opportunities across the supply and demand landscape in Mozambique; and specifically the Mozambique sections of the Nacala and Beira corridors:

Availability

The ICT sector has undergone significant sector reforms and is currently in the process of revising the telecoms law, but it lacks a clear vision and roadmap to align sub-sectors in Mozambique, the industry is faced with high entry barriers due to the high cost of infrastructure and requires enforceable regulation to improve downstream competition in the market.

We recommend investing in the development of a clear broadband strategy that will align the efforts of each sub-sector, foster greater competition locally through improved infrastructure sharing regulation and lastly reduce the cost of entry for new competitors through easier rights of way access to civil infrastructure.

Quality

Quality and stability of Internet connection is a critical hurdle to improve

Internet penetration, with market stakeholders reporting critical challenges in speed, lack of common Internet application standards and poor service quality. This has hampered business operations to effectively expand outside of major cities like Maputo, Beira and Nacala.

We recommend investing in a research programme to understand the internet quality needs of small and medium businesses in each of the provinces and use this as an input for new service quality regulations, in addition low cost technologies like "TV White Space" has shown significant potential to provide quality connections in rural areas, we recommend to test this technology with the existing Community Media Centre (CMC) network in the Beira and Nacala corridors.

Affordability

Although service costs have gone down, rates still remain high. Mobile Internet access costs around \$30–50 a month while fixed broadband average between \$100–\$300 depending on bandwidth. Mozambique is ranked 162 out of 169 countries on the ITU broadband index in terms of Internet cost, making it one of the most expensive countries globally.

We recommend promoting the entry and setup of local production facilities of low cost computers, establish a scheme to provide subsidies or tax credits to small and medium enterprise's to help them access the needed internet enabled equipment and finally look at how to

support the Universal Access Fund to effectively deploy its resources to provide affordable internet access in rural areas.

Awareness

There is a significant gap in skills to operate internet-enabled devices. Online commerce is limited and there is general mistrust of using the Internet for commerce due to the lack of adequate laws and regulations to protect online consumers.

We recommend investing in the existing Community Media Centre infrastructure and utilise them as ICT labs to train and build awareness among the population, investigate innovative Internet applications that can improve SME productivity and how it can be tailored for use in Mozambique and finally work with government to ensure there is adequate laws/ regulation in place to protect users of online commerce (e.g. computer emergency response teams).

While there is no overall solution to Internet connectivity, individual efforts by various stakeholders do compound to make a significant contribution. These stakeholder groups have converging interests and the potential to collaborate to reach viable solutions. Capturing these opportunities will require the combined efforts of government, business and broader society.

By seizing these opportunities Mozambique can set itself on the path for growth and solidify its position on the Africa growth agenda.

Methodology

Methodology

Study Objective

This report sets out a critical gap analysis and delivers recommendations on how the Mozambique Regional Gateway Programme (MRGP) can face the challenge of inclusive growth and development in both strategic regional corridors through Internet connectivity solutions. The project aims to understand the potential of the Internet in Mozambique for social and economic development, specifically in the Mozambique sections of the Nacala and Beira corridors.

The report has the following components:

- **Demand and Potential of the Internet**
Assess the needs and demands for Internet connectivity by sector (e.g. health, education, agriculture, SMEs, transport etc.).
- **Current Landscape and Supply of Internet**
Assess the current internet value chain, key players, network infrastructure, technologies, and coverage in the Beira and Nacala corridors.
- **Internet Connectivity Solutions**
Develop a list of high-impact solutions and initiatives that can drive increased Internet connectivity in the Mozambique sections of the Beira and Nacala corridors and compare against Internet solutions leveraged in other emerging markets in Africa.

Scope

Geographic Scope

The geographic focus of this study is the Mozambique sections of the Beira and Nacala Corridors with a focus on key ports, towns and border posts in the corridors.

Sector Scope

Focus sectors have been identified for this study based on their potential impact on, and contribution to, MRGP goals. Specifically, sectors have been prioritised based on the number of people impacted, along with the impact of the Internet on those sectors.

The prioritisation mapping helped in identifying six sectors, namely Agriculture, Financial Services, Government, Health, Education, SME/Retail & Transport, where the largest economic and social impact of the Internet is likely to be concentrated.

Study Limitations

This report offers a rapid assessment of the Mozambique ICT landscape and is not meant to act as a detailed academic study. The report was developed over a 10-week period and the authors recognise key limitations to the outcomes of the study. Very few studies exist to provide detailed coverage of the Beira and Nacala corridors in Mozambique as well as sector demand. The research team focussed on interviewing large representative stakeholder groups with headquarters in Maputo and conducted telephone interviews for locations not physically accessible and recognise that certain key stakeholder groups could not be consulted. The study is not meant to act as a comprehensive review of the landscape, but rather provide a snapshot view of the key elements that require further attention. The authors recommend that each recommendation requires further research and further scoping before implementation.

About this Study

This study was prepared from sources and data which Accenture believes to be reliable but it makes no representation or warranty, express or implied, as to their accuracy or completeness. Any figures and statistics used in this study were up to date at time of writing and are subject to change without notice. The views and opinions expressed in this publication are those of Accenture only and do not necessarily reflect those of any of the companies researched or surveyed or any other third party referenced in the report. Such opinions should not be construed as providing professional advice, recommendations or endorsements, or

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- Soicremo Bank Mozambique
- Soico
- Telecomunicações de Moçambique (TDM)
- Technoserve
- Tvcabo
- UNICEF
- Vodacom Mozambique
- World Bank
- World Health Organisation (WHO)

Chapter 1: Mozambique Development Corridors

Mozambique Fast Facts¹

- Population in 2013: 25m
- GDP in 2012: \$15.6bn
- Forecasted GDP growth rate: 7.6%
- Average estimated inflation for 2013: 4.7%
- Estimated lending rate in 2013: 10%

¹Business Monitor International; Mozambique Business Forecast; 2013

Mozambique Development Corridors

Introduction

Mozambique, located in the Southern African region, attained its independence from Portugal in 1975. A 16-year civil war, which ended with the signing of the Rome Peace Accord in October 1992, left Mozambique one of the poorest countries in the world with virtually no infrastructure, including roads, schools and health facilities. Communication networks were systematically targeted in the fighting.

Now, two decades of peace and radical reforms have transformed Mozambique into one of the fastest and most consistently growing economies in the world.

Development corridors are being established across the Southern African region as a tool to support economic integration, as they serve to open up markets and

promote increased trade and investment. Mozambique has three main development corridors including the Maputo, Beira and Nacala corridors.

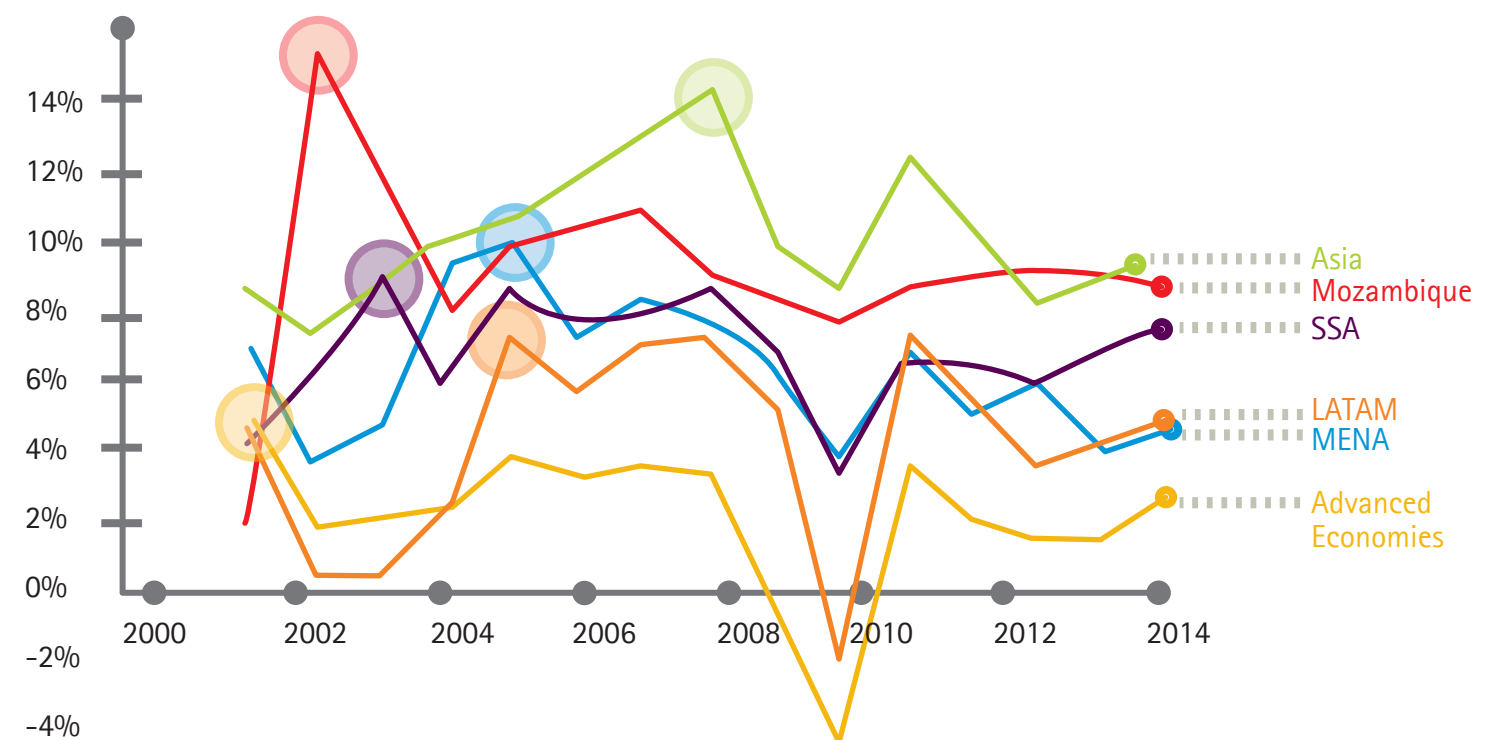
The Beira corridor extends from the Port of Beira to Zimbabwe via the Machipanda border and to Malawi and Zambia via the Villa Fronteira border with Malawi and from Malawi to Zambia via the Mchinji border post. The Nacala corridor is linking the port of Nacala to Malawi through the Chiponde border post and the Mchinji border post to Zambia.

The entire Beira Corridor contains some of the country's most productive land, including the grain basket surrounding Chimoi. The renewed interest in the Beira Corridor is being driven in part by large-scale anchor investments in the agriculture

sector, particularly sugar and cotton; and in part by investments in coal.

Beira, the provincial capital, is the second largest city in Mozambique and its second largest port, with a population of 430,000. Regionally important, it's the gateway for landlocked Malawi, Zambia, and Zimbabwe and the closest port to the industrial city of Lubumbashi in the Democratic Republic of Congo (DRC). It also connects the coal mining regions in Tete with the sea through the Beira Corridor. Its positioning as one of Southern Africa's main transport routes, combined with its proven agricultural potential, also gives the Beira Corridor good potential as an agricultural production zone.

Figure 1: GDP Growth (Constant 2000 Prices)
Source: IMF Economic Database



Legend: Highest point from year 2000 to 2014

The other key area of focus is the Nacala Corridor. The Nacala corridor links the port of Nacala to Malawi through the Chiponde border post and the Mchinji border post to Zambia. Its provincial capital, Nampula, is the third biggest city in Mozambique, and its port city, Nacala, is one of the best deep water ports in East Africa. Served by 29 river basins, with more than 7 million ha

of forests in six reserves covering an area of 316 km², the province is rich in natural endowments. Nacala's widespread mineral reserves—mostly aquamarine, tourmaline, topaz, and corundum—have attracted large-scale investments in recent years.

The Government also aims to attract logistics companies to the zone; however,

this—and the zone's ultimate success—will depend on the implementation of upgrades at Nacala Port and in the rail lines running between Nacala and Malawi, as well as the development of the Nacala Airport.

This scoping study is focused on the Mozambican components of these two corridors from the ports of Mozambique to the borders with Zimbabwe and Malawi.

Mozambique's raw growth potential is significant with abundant natural resources, particularly coal and natural gas, both of which are receiving increased investment attention, with Foreign Direct Investment (FDI) reaching nearly \$5.2bn in 2012, equating to over 36 percent of GDP.² The majority of the FDI is being driven by key developments in the areas of natural gas, oil, coal and hydro, with explorers finding more than 100 trillion cubic feet of gas³, enough fuel to build the world's second largest liquefied natural gas plant. A recent study found a small oil deposit next to the Temane gas field in Inhambane province that will allow Sasol to launch oil production this year. The country's coal reserves are estimated at more than 20 billion tonnes⁴, with the largest known reserves in Tete province. In addition, Mozambique is building significant hydro capacity in the Zambezi Valley by building a power transmission line between Tete and the country's south.

Yet, despite Mozambique's positive economic fundamentals, there are several areas—specifically lack of infrastructure—that will critically hamper its future growth. As Standard Bank infrastructure specialist David Humphrey notes: "Without infrastructure, the Mozambique economy will not grow as fast as it should."

Political and Economic Stability

Effective legal, security and political systems are required for business to thrive. Mozambique has regressed on this front over the last year with increased security threats in parts of the Beira Corridor and central region..

Corruption

In Transparency International's 2012 index, Mozambique was placed 119th out of 175 countries, indicating that corruption is perceived to be a key issue.⁵

Skills Shortages

Out of a total population of 25m, the labour force is estimated to be in the region of 8.5-9m with a literacy rate of less than 50 percent—of whom only 16.4 percent are in salaried employment.

Social Development

Mozambique remains one of the world's poorest countries, with the United Nations Development Programme Human Development Index (UNDP HDI) placing it at 185th position in a total of 187 countries, the lowest in SADC.⁶

ICT Development

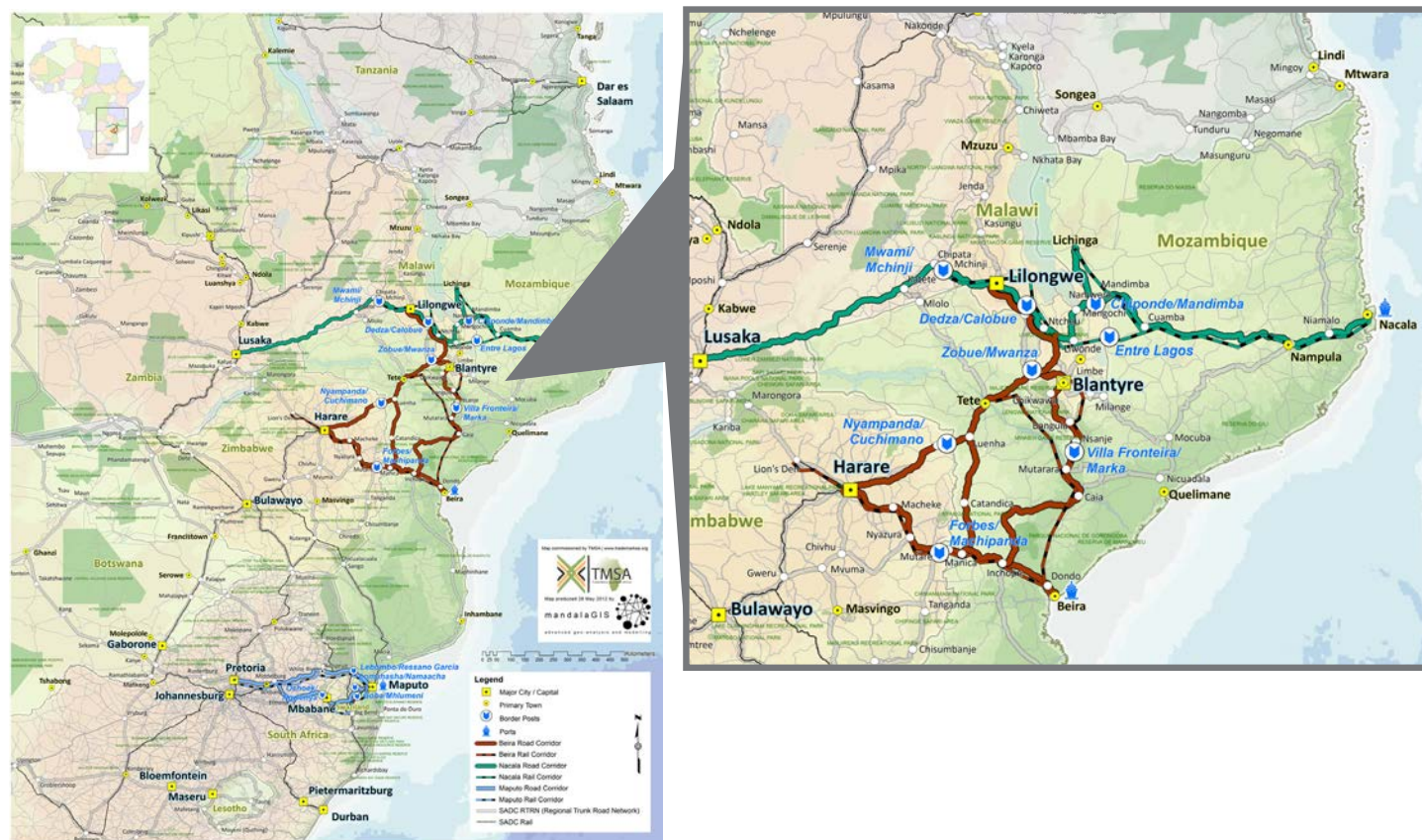
ICT investment is largely dependent on donor and private sector. Mobile penetration is estimated at 33 percent at the end of 2012 and Internet usage is low, with just 5 percent of the population online.⁷

Power Infrastructure

Twenty years after the devastating civil war that left the country without a proper power infrastructure, only 10 percent of households are electrified, with most of the population still relying on kerosene and wood as energy.⁸

Against this background, the Internet is seen as a key enabler that will drive economic regeneration and growth, and go a long way in addressing the key development challenges that stubbornly persist in the country, despite 22 years of relative peace.

Figure 2: Mozambique Development Corridors (Beira and Nacala Development Corridors)
Source: MRGP



²IMF; Data and Statistics; 2014

³Bloomberg Online; Natural Gas Reserves Almost Triple on New Finds; 2012

⁴KPMG; Mozambique Snapshot; 2013

⁵Transparency International; Corruption Index; 2013

⁶United Nations Development Programme; Human Development Index; 2013

⁷Buddecomm; Broadband Forecasts, 2013

⁸AICD; Mozambique's Infrastructure: A Continental Perspective; AICD 2011

Chapter 2: Demand for Internet

Impact of internet

The Internet is a tremendous, undisputed force for economic growth and social change and if cultivated could be a key driver of growth in Mozambique. As Christine Zhen-Wei Qiang of the World Bank's Global ICT Department observes, "the Internet is not just an Infrastructure, it is a general-purpose technology that can fundamentally restructure an economy."⁹

As Mozambique and its landlocked neighbors grow, they will need to be able to easily connect to the outside world as well as connect regionally to enable them

to compete in the global market as well as foster growth in the local market. The Internet has proven a dynamic tool for stimulating economic growth in developing countries, with the World Bank reporting that a 10 percent increase in broadband correlates to a 1.38 percent increase in GDP growth.¹⁰

Beyond firm level growth, the Internet also provides opportunities to pursue social and developmental objectives. Throughout the developing world, the Internet is connecting remote populations

to markets and strengthening the overall efficiency of service delivery in areas such as health, education, livelihoods and financial inclusion, as well as creating access to government services for the most marginalised populations.

The following examples highlight how broadband has improved economic and social outcomes in countries at all levels of development:¹¹

Figure 3: Growth Effects of ICT
Source: World Bank

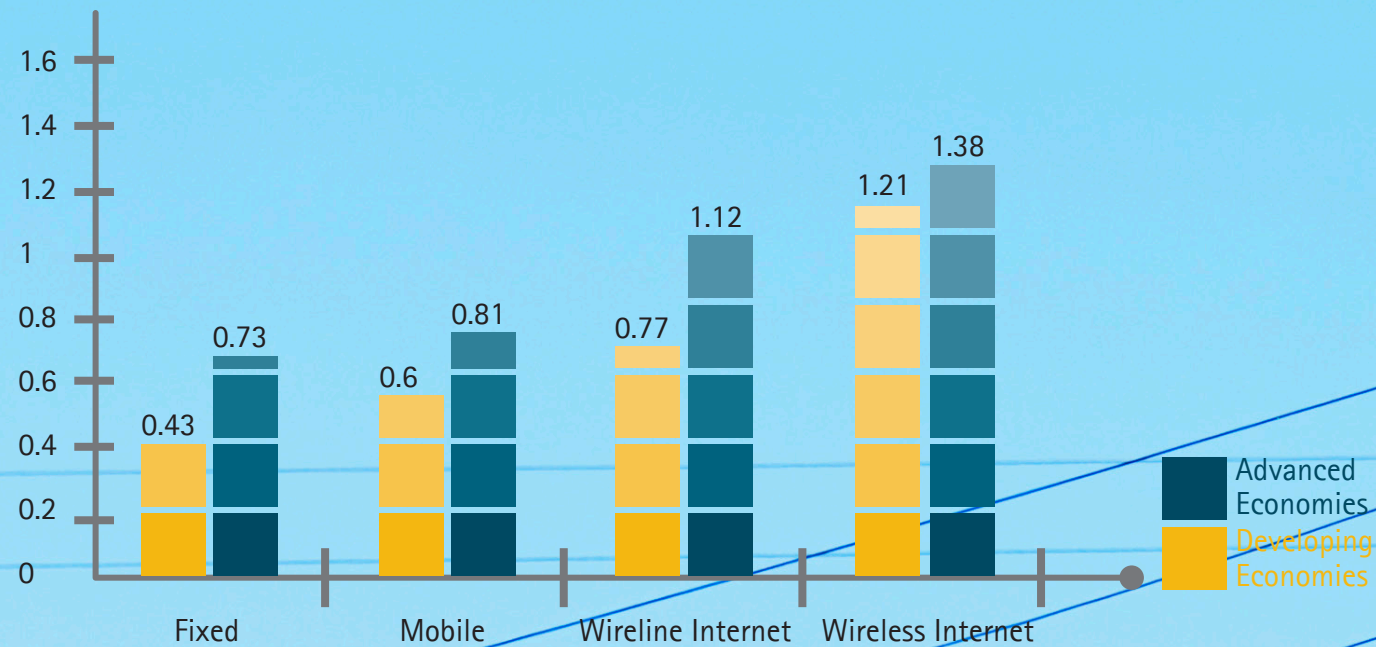
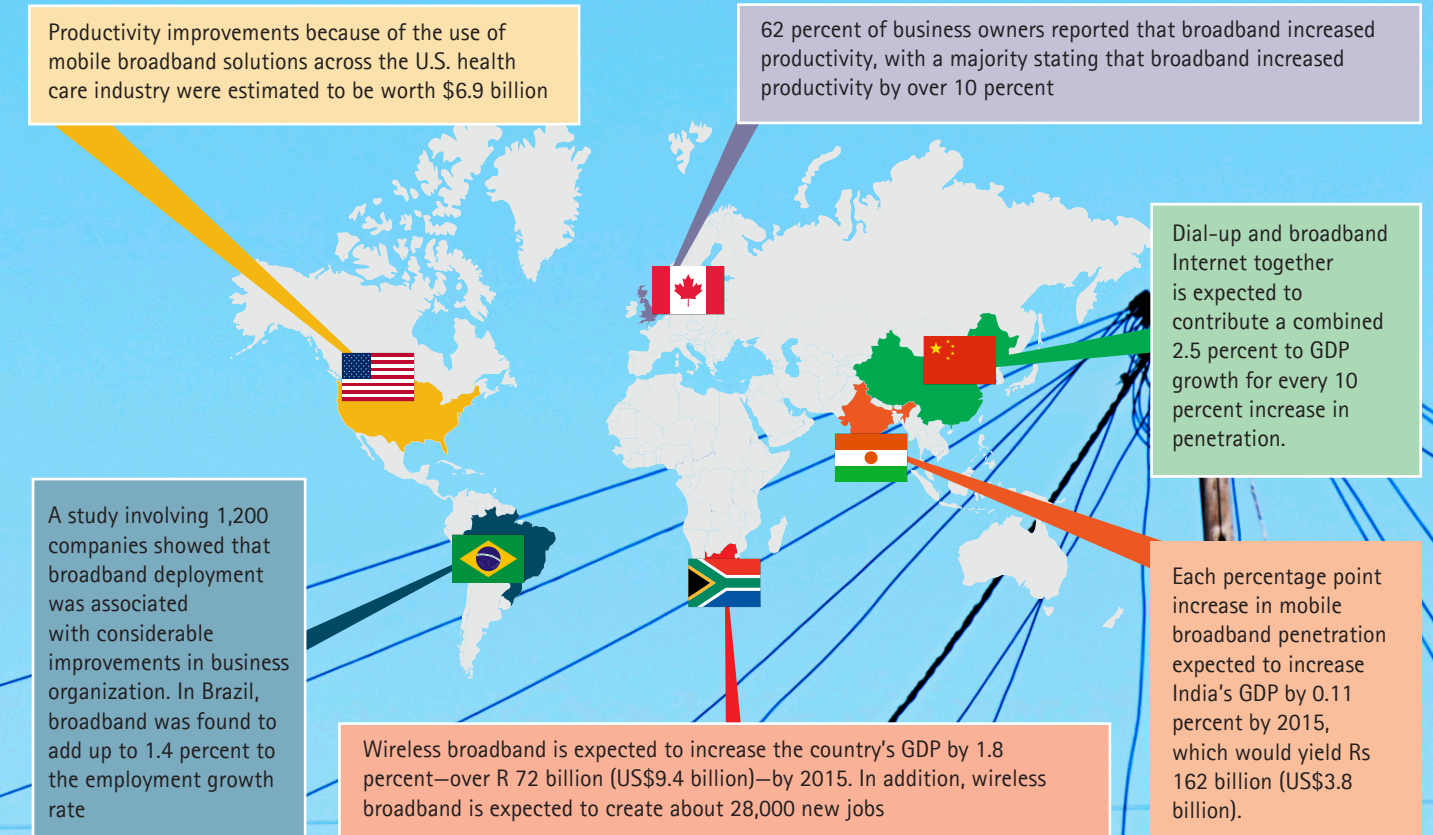


Figure 4: Examples of Internet Effects on Economic Growth
Source: World Bank – Broadband Strategies Handbook



Source: Broadband Strategies Handbook, World bank

⁹World Bank, Economic Impacts of Broadband, 2012
¹⁰World Bank, "IC4D: Extending Reach and Increasing Impact; 2012
¹¹World Bank; Broadband Strategies Handbook; 2012

Current Internet Demand

Mozambique is currently lagging the rest of the world in terms of Internet maturity, providing a significant opportunity for future growth. According to recent research from the McKinsey Research Institute, Mozambique's iGDP is estimated at \$220 million, or 1.6 percent of GDP—which, while it is relatively in line with other developing countries, is low in absolute terms. Most of the iGDP contribution is driven by hardware sales of PCs and phones.¹²

Until recently, ICT investments were concentrated around Maputo, Beira, and other urban areas driving significant demand for internet in these metropolitan areas, but demand for internet has been low to moderate outside these areas due to low education and incomes of the population. This is evident by the fact that less than 5% of the population is currently connected to the internet in 2012.

The largest economic and social impact of the Internet is likely to be concentrated in seven sectors. These sectors face specific service delivery challenges that can be bridged through the use of Internet technologies. They also stand out because of the size of the population that stands to benefit from the efficiencies they could achieve. Despite the future potential of these sectors, the current demand for Internet in the corridors varies significantly across each of these sectors.

Our market interviews revealed low to moderate current demand for Internet in the Agriculture sector. The Agriculture sector is dominated by small holder farmers operating with basic Nokia texting phones,

they have not been exposed to internet-enabled devices nor do they see the potential benefits of using one. The core focus of this sector over the next few years is to test innovative SMS based technology to help connect farmers.

Sectors that have shown moderate to high demand for internet at the moment include Health, Education and Finance. The Health sector faces a critical challenge with the shortage of staff, with less than 1 doctor for every 40,000 patients the sector is looking for innovative tools to help train new nurses and to leverage the available doctors in the sector though the use of tele-centres to reach rural areas. The Education sector faces a similar challenge with basic education at less than 50% and limited educators to effectively run the current school infrastructure. The sector is looking for an innovative mechanism to train educators as well internet enabled tools that increase the quality of education at schools. On both of these sectors the limitations of available infrastructure and technical capacity hampers demand for the Internet and these sectors' focus remains on addressing basic needs first. In the Finance sector the key focus is to help connect the unbanked through basic mobile technology, the sector is investing heavily in applications like M-Pesa and mKesh which can operate on basic Nokia phones, while the extensive adoption of internet banking on home PCs is considered to be a medium to long term goal. The financial institutions on the other hand did indicate a need for increased connectivity to effectively run their branches, especially deeper into the Nacala and Beira corridors.

Sectors that have shown a high and immediate demand for internet include Small and Medium Enterprises in the Retail Sector, Transport, and Government. Almost 98% of enterprises in Mozambique is considered to be small or medium and our interviews in market reveal a key demand to leverage internet based technologies to help them connect to new markets to sell and procure goods; using internet technologies for training on basic business skills like inventory management; and to help them connect to larger firms in Mozambique. The Transport sector is heavily reliant on internet technologies for effective operations ranging from fleet management; document processing; and data transfers at the border posts and ports. The country has already made investment in this area through the deployment of "Single Window" that allows operators to submit applications online to ease the processing at border posts. The Government of Mozambique has also shown a critical demand for internet to help them connect different departments and ministries in Mozambique as evident by the recent Govnet project as well as investments in several online tools like the land management system.

Despite the varied demand for internet across sectors, with the recent exploration of natural gas and significant infrastructure investment, we believe Mozambique is on the brink of significant economic growth that will drive Internet demand across sectors.

Future Internet Demand

Key developments and investments in each of the sectors will drive significant demand for increased connectivity. They include the following:

Agriculture

A \$177m expansion to Mafambisse mill will increase production by 80,000 tons, while USAID and the Millennium Challenge Corporation (MCC) are both supporting commercial agriculture in Nacala with a total investment of \$127 million.¹³

Health & Education

GSK/Vodafone has formed a partnership to use mobile Internet technology to help vaccinate more children, while the building of a \$6 million state-owned drug production plant, Sociedade Moçambicana de Medicamentos, is also planned.¹⁴

SMEs

The Germany Technical Cooperation Agency-funded Rural Development Programme, GTZ, is supporting business environment reforms in the Beira Corridor to simplify rules for business registration, licensing, and inspections, while the World Bank's International Finance Corporation (IFC) is investing in business edge training to up-skill SMEs.¹⁵

Finance

Recent launches of Internet banking from the large banks, coupled with Carteira Móvel launch of its Mkesh mobile money platform in 2011 and Vodacom's launch of mPesa services in 2013 to improve access to finance, are driving investments in this sector.¹⁶

Transport

The African Development Bank (ADB) has

committed \$65m towards the upgrading and maintenance of various road projects in the Manica and Tete provinces, while the E18 and EU have recently lent \$94m towards the Sena Railway.¹⁷

Government

The Austrian Development Agency (ADA) is focusing on strengthening the capacity of district and municipal authorities in the provinces, while the World Bank is working with government to connect departments and roll-out eGovernment services.¹⁸

Sector Demand Profiles

Having focussed on a high-level view of the macro-economic factors driving Internet penetration and usage, we now turn our attention to demand drivers by sector in more detail.

Interviews across sectors reveal key themes of areas where the Internet can play a significant role to improve trade and productivity in the Beira and Nacala corridors.

Service Delivery

Although Mozambique has formalised a policy around eGovernment, the rollout of services has been minimal. Rural populations in the two corridors lack access to basic government services. The Internet has the capacity to bridge this divide by powering the development of smart cities in Africa, resulting in better service delivery for its citizens (e.g. the South African Revenue Services' eFiling).

Distribution

At nearly 10 cents (USD) per tonne kilometre, transport costs in Mozambique are significantly higher than in other

countries¹⁹. Transport companies struggle with frequent breakdowns and repairs. The Internet enables the remote monitoring of technical performance for early problem detection, provides real-time information for customers and facilitates trade information at borders.

Marketing

The growth of SME (which represents 98 percent of enterprises) is hampered by their poor integration with larger firms. eCommerce is non-existent, and online contracts have no legal value. Internet solutions can facilitate transactions through e-commerce solutions (e.g. Nigeria Jumia) and help SME integrate with larger firms by registering online as formal suppliers.

Training

Literacy levels are very low at only 50 percent of the population. Organisations lack basic management skills to improve productivity. In addition, the health sector faces a critical shortage of health care professionals. Internet applications can support access to educational information and allow for remote training of pupils and health professionals—the African Medical and Research Foundation (AMREF)'s nurses training programme in Kenya being a prime example.

Finance

Almost 80 percent of the Mozambique population is financially excluded, with less than 12 percent of the adult population formally banked and less than five percent having any form of insurance²⁰. The Internet provides financial access through Internet banking and digital payment platforms, M-Pesa, the innovative mobile payment solution developed in Kenya being a prime example.

¹²McKinsey, Lions go digital – The internet's transformative potential in Africa; 2013

¹³Beira Agricultural Growth Corridor; Delivering the Potential; 2012

¹⁴<http://www.gsk.com/media/press-releases/2012/GSK-forms-partnership-with-Vodafone-to-help-increase-childhood-vaccination-in-Mozambique.html>

¹⁵http://www.ifc.org/wps/wcm/connect/region__ext_content/regions/sub-saharan+africa

¹⁶<http://www.telegeography.com/products/commsupdate/articles/2013/05/22/vodacom-extends-m-pesa-to-mozambique/>

¹⁷<http://www.iol.co.za/business/international/bottleneck-for-mozambique-s-coal-rush-1.1501290>

¹⁸<http://www.entwicklung.at/en/countries-and-regions/southern-africa/mozambique/>

¹⁹Beira Agricultural Growth Corridor, Deliver the Potential; 2012

²⁰Finscope, Mozambique Survey, 2012



Agriculture

This sector is vital to national well-being, employing around 80 percent of the working population and contributing to around 30 percent of Mozambique's GDP in 2012²¹. Mozambique has a large amount of arable land with huge agricultural potential; soil quality, climate and access to water make the

Beira and Nacala regions particularly well suited to agricultural development. Yet less than 0.3 percent of the arable land in the two corridors is farmed commercially, with 95 percent of its rural households depending on mostly subsistence agriculture for their livelihoods.²²

Level of Internet Enablement Need



Rationale for Internet Need Priorities

- 1 Distribution** At nearly 10 cents (USD) per tonne kilometre, transport costs in Mozambique are significantly higher than in other parts of the world. Internet solutions can play a critical role to reduce shrinkage, improve delivery timing and the speed of collections.
- 2 Marketing/ Sales** Farmers struggle to access larger markets, lack links with larger firms and have limited transparency in terms of prices. Internet applications can play a key role to link farmers to markets and into larger corporations.
- 3 Financing** The commercial lending rate in Mozambique is above 15 percent, on top of which banks typically charge a 3–5 percent margin for agricultural loans due to its risk profile. The Internet can enable improved financial literacy and links with banks.

Source BAGC Status Report 2012

²¹World Bank Data and Statistics, 2014
²²BAGC, Status Report, 2012
²³Business Monitor International, Mozambique Healthcare Report, 2013
²⁴<https://www.amrefuk.org/what-we-do/projects/item/143-e-learning>



Health

Healthcare expenditure in Mozambique is forecast to increase from MZN20.282n (US\$729mn) in 2012 to MZN39.12bn (US\$1.12bn) in 2017²³.

As exploitation of natural gas increases, demand for additional facilities will grow, demonstrated by African Medical Investment's private clinic in the Tete region in 2012. The Internet can enable greater use of remote diagnosis, treatment and education.

Level of Internet Enablement Need



Rationale for Internet Need Priorities

- 1 Training** For every doctor in Mozambique, there is an average of 40,000 patients—eLearning models such as AMREF's in Kenya enable health workers to improve their skills.²⁴
- 2 Marketing/ Sales** A lack of regulatory guidelines means counterfeit drugs are commonplace. Internet applications to check the validity of medicine can make a significant impact to reduce illegal trade of medicine.
- 3 Distribution** Distribution problems mean drug scarcity is commonplace, even for essential medicines. Internet applications to monitor stock levels and distribution have been very successful to improve the visibility and flow of medicine to regional stores.

1 Source BMI Health Care Report 2013



Education

In 1978, the illiteracy rate in Mozambique was 97 percent, but by 1982 it had dropped to 72 percent through large-scale literacy campaigns, although these effectively ended with the beginning of the civil war, which also destroyed about 50 percent of the national school infrastructure. Given that

over 300,000 young people enter the labour market annually, the difficulty of responding to the complex needs of this group is likely to be immense²⁵. Internet-enabled solutions can play a critical role to improve literacy penetration in the two corridors.

Level of Internet Enablement Need



Rationale for Internet Need Priorities

- 1 Service Delivery** Although many children enrol in school, the dropout rate remains startlingly high, with almost half of children dropping out before they reach fifth grade. This high drop-out rate can be reduced through innovative Internet-enabled solutions like Virtual learning or e-reader programmes.
- 2 Training** A study by the Southern Africa Consortium for Monitoring Educational Quality (SACMEQ) found that Mozambique was the only country reviewed to have shown a substantial deterioration in both reading and mathematics between 2007–2012²⁶. Internet-enabled solutions to train educators are essential to alleviate this issue.

1 Source Unicef: Building Schools in Mozambique; <http://www.osisa.org/>

²⁵Unicef: Building Schools in Mozambique; <http://www.osisa.org/>
²⁶SACMEQ, Primary School Performance in Botswana, Mozambique, Namibia and South Africa, 2011
²⁷<http://www.gnbo.com.ng/>

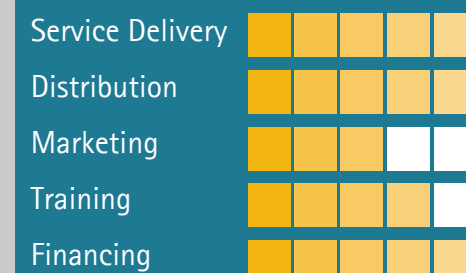


Finance

With 78 percent of its adult population being financially excluded, Mozambique ranks the lowest in terms of financial inclusion compared to other African countries, with just 12 percent of the adult population banked—in other words, using

a commercial bank product—and 4 percent using financial products provided by formal financial institutions. Only 5 percent of adult Mozambicans have insurance products—of which 45 percent have formal products and 55 percent informal products²⁷.

Level of Internet Enablement Need



Rationale for Internet Need Priorities

- 1 Access to Financing** Less than 20 percent of the population is banked, with the majority concentrated in Maputo. Internet-enabled services like mobile and Internet banking can play a significant role to increase access especially in the rural areas within the Beira and Nacala corridors.
- 2 Service Delivery** Internet-enabled financial services can play a significant role across sectors, a key example being Kenya's National Health Information System (NHIS) which electronically links with banks to manage payment processing.
- 3 Distribution** In an environment where the rural population can travel up to 300km to access a branch for transactions, e-commerce solutions can play a significant role in distributing financial services more evenly.

1 Source: Finscope Mozambique Survey



Small and Medium Enterprises

Small and medium enterprises (SMEs) form the backbone of the Mozambique economy, with an estimated 98 percent (30,000) of enterprises in Mozambique classified as small to medium. To support development in this sector, the Mozambican Government has launched the Institute for the Promotion of Small & Medium Enterprises (IPEME),

funded by a \$1.5mn Meticals Banco Comercial de Investimtno (BCI) donation. However, despite the introduction of IPEME, focus on enabling e-commerce for SMEs has been non-existent. Online business contracts still have no legal value and there are no commercial laws in place to accommodate requirements for e-commerce.

Level of Internet Enablement Need



Rationale for Internet Need Priorities

- 1 Service Delivery** Mobile/Internet-enabled payment solutions are transforming the retail SME landscape across Africa. Innovative online solutions enabling online trade is enabling SME access to larger markets and link their services into larger corporations.
- 2 Marketing/ Sales** The Internet can provide huge opportunities for SME to market their product/service. A good example is Get Nigerian Businesses Online (GNBO), a Google-led initiative that has brought over 25,000 SME online in Nigeria.²⁸
- 3 Training** With new entrepreneurs lacking basic management and financial skills, online applications, such as the International Finance Corporation (IFC)'s online SME toolkit has significant potential to up-skill and enhance SME productivity.²⁹

1 Source www.ipeme.gov.mz

²⁸<http://www.gnbo.com/ng/>

²⁹<http://www.businessedge-africa.com/>

³⁰African Development Bank, Country Strategy Paper, 2011



Transport

The transport sector has regional potential and is undergoing major restructuring. The Government has put into place an ambitious programme aimed at rebuilding and expanding the system and strengthening capacity. The transport sector currently comprises 26,235 km of classified

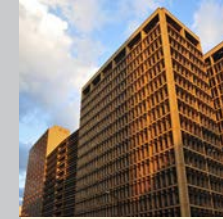
roads—of which only 5,005 km (19.8 percent) are paved; 3,000 km of railway lines: of which about half are operational; and five international airports³⁰. Transport is the key growth sector in the Beira and Nacala corridor transporting goods from the ports to towns and partnering countries.

Level of Internet Enablement Need



Rationale for Internet Need Priorities

- 1 Service Delivery** With poor rail and road infrastructure, maintenance of a fleet is expensive. Online solutions that track service breakdowns and early warning systems can significantly reduce costs and reduce the barriers of entry for new transport operators.
- 2 Distribution** The transport value chain is vast with numerous suppliers that need to be connected, and border posts require online systems to process information. The Internet can play a key role in easing this administration burden.
- 3 Marketing/ Sales** Online solutions that facilitate customer ordering, payment and delivery is a critical enabler to drive growth in the transport sector.



Government

The initial deployment of GovNet took place between 2006 and 2007 with the aim of digitally connecting Government institutions in all 10 provinces. The Mozambique Government generally performs its operations manually, although there are some isolated automated online pockets such as the State Financial Management Information

System, e-SISTAFE. The Internet could facilitate better governance, including strengthening electoral and legislative systems, improving access to justice and expanding capacity to deliver services to marginalized populations.

Level of Internet Enablement Need



Rationale for Internet Need Priorities

- 1 Service Delivery** Although Mozambique has formalised a policy around eGovernment, the rollout of services has been minimal. Expanding the country's Internet footprint will enable the rural population outside of major towns to access government services.
- 2 Marketing/ Awareness** Systems can reduce administrative tasks and enable information-sharing between different government agencies, including public information portals such as the Senegal online portal which enables users to view legislation updates.
- 3 Financing** Administrating systems like tax is a daunting task in Mozambique. Online solutions like SARS eFiling can help government administer tax with high levels of transparency, facilitate fund transfers and other key transactions between departments, and help government manage its budgets appropriately.

Chapter 3: Supply of Internet



Supply of Internet

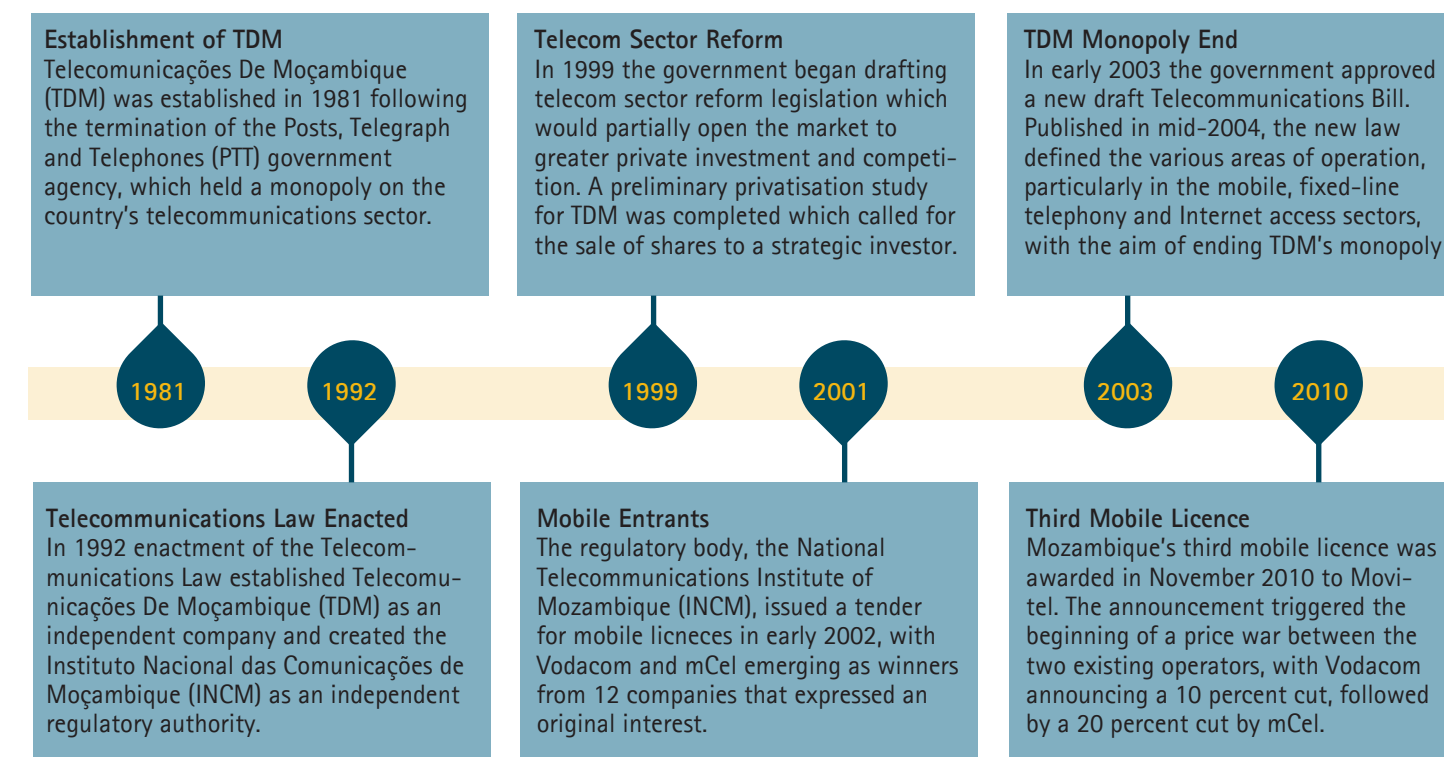
Mozambique Telecommunications History

Having provided an overview of current Internet demand, we now look at how this demand is being supported through the current Internet landscape.

Recognising the importance of ICT in the development of the country, the Mozambican Government has made significant reforms to support the development of the Internet. The figure below highlights some of the key milestones that have been achieved to date.³¹

Figure 5: Mozambique Telecommunications History

Source: INCM and Accenture Research



The Internet in Mozambique was initially introduced in 1993 by the Eduardo Mondlane University through its Informatics Center (CIUEM). Although the Mozambique ICT sector is gaining traction, it still faces key challenges that will hamper its growth going forward.

At the end of 2012, there were around 8 million mobile subscribers in the country, which brings its mobile penetration rate to just 33 percent, a very low figure against the average 76.4 percent mobile penetration rate across the rest of Africa. Additionally, it is estimated that between

60-70 percent of mobile subscribers in Mozambique are concentrated in the capital city, Maputo. Internet penetration is even lower at only 5 percent of the population (1m people) and is again concentrated in large urban areas like Maputo.³² (See Figure 6)

³¹INCM Website and Accenture Analysis

³²Accenture Research

According to the World Bank, the overall telecommunications sector in Mozambique requires between \$150 - \$170m million per year in infrastructure investment through 2016 to be considered a competitive market in Africa³³. Internet access continues to be a luxury for the majority of potential users (schools, universities, and Government and research institutions, etc.).

The Internet value chain in Mozambique consists of three key layers, each managed by a different set of firms and institutions. The first mile (Seacom and East African Submarine System or EASSy) provides links to broadband networks in other countries usually via satellite and fibre optic cables. The middle mile (TDM and Mobile Operators) provides pathways

for transmitting Internet data across the country, while the last mile (Mobile Operators and Internet Solution Providers) provides the wirelines' and wireless connections to end consumers.

Figure 6: Internet Maturity indicators
Source: Accenture Analysis, BuddeComm and Mckinsey

		Internet Penetration (% of pop)	Mobile Penetration (% of pop)	High Speed Internet Access	Government Dept. online (%)
1	Zimbabwe	64	128	-	-
2	Morocco	51	120	1.6	17
3	Egypt	36	115	1.8	53
4	Kenya	28	72	0	24
5	Nigeria	28	68	0.1	10
6	Senegal	18	88	0.6	18
7	South Africa	17	135	1.5	31
8	Zambia	16	91	-	-
9	Angola	15	49	0.1	34
10	Ghana	14	100	0.2	15
11	Algeria	14	103	2.5	10
12	Tanzania	12	57	0	17
13	Cameroon	5	64	0	15
14	Malawi	6	33	-	-
15	Mozambique	5	33	0.1	17
16	Ethiopia	1	24	0.8	20

Technology Overview

Fibre and ADSL are the primary technologies for Internet use in the large cities, while wireless technologies are paving the way forward for the majority of the population in rural areas. In view of the constraints of a fixed-line network, wireless broadband could play an essential role in

improving accessibility, particularly for sparsely populated and rural areas. The primary advantages of wireless broadband are its lower construction costs, shorter rollout timelines, and lower costs for end-users. Wireless broadband has also

been shown to provide an additional boost to business productivity, strengthening the value proposition for potential adopters. Although maximum download speeds are lower, relative to fixed line technologies, they are constantly improving, and should be sufficient for most user needs.

Figure 7: Mozambique Internet Technology Evaluation
Source: Accenture Analysis and BCG

		Fixed Internet Technologies			Wireless Internet Technologies	
Evaluation Criteria		Broadband via cable TV	Fibre to the home (FTTH)	ADSL	Wireless Broadband (3G etc)	TV White Space
Rollout Investment	Cost of network	Moderate Cost	High Cost	High Cost	Low Cost	Low Cost
	Implementation time	Slow Rollout	Slow Rollout	Slow Rollout	Fast Rollout	Fast Rollout
Customer experience	End User Affordability	High Cost	Medium Cost	Medium Cost	Low Cost	Low Cost
	Quality of Service	Moderate Quality	High Quality	High Quality	Moderate Quality	Moderate Quality
Overall adequacy for Mozambique Environment						
Development in Mozambique		<ul style="list-style-type: none"> Cable TV has been available in Maputo since 1999 TvCabo a subsidiary offer TDM currently has a monopoly on this technology 	<ul style="list-style-type: none"> Technology owned by TDM network covers 10 provincial capital cities, 43 district centres and 31 villages Offers service through its ISP Teledata 	<ul style="list-style-type: none"> TDM launched ADSL services in early 2006 By 2008 the service was available in all ten provincial capitals 	<ul style="list-style-type: none"> 3G services launched in 2009 by most operators TDM also offering CDMA service from its fibre backbone 	<ul style="list-style-type: none"> No investment yet on this solution Ministry of Science in discussions with government
Legend: Good Moderate Minimal Unknown						

³³World Bank, Mozambique Infrastructure – A Continental Perspective, 2011

Fixed Line Network

The existing fixed network infrastructure is owned by Telecomunicações de Moçambique (TDM), whose investments over the last 10 years total more than \$160 million³⁴. Because much of its infrastructure was destroyed during the war, TDM's backbone network has traditionally relied on a domestic satellite system for connecting the 10 regional centres in the country.

To reduce the reliance on satellite communications, work on a national fibre optic backbone began in early 2006 which will connect all of Mozambique's 10 provincial capitals. 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.

Mozambique boasts of having fibre coverage in most provinces, but in most cases this is restricted to within a 5km radius of the main district town.

TDM has not made significant progress in terms of building fixed-line penetration, mainly due to the significant cost and logistical challenges of deploying a network at scale. It is estimated that fixed-line connections have grown by less than 0.3 percent compound annual growth rate since 2000.³⁵

Latest estimates indicate some 65 percent of fixed lines are concentrated in Maputo and other major towns, leaving the network outside the major cities limited.³⁶

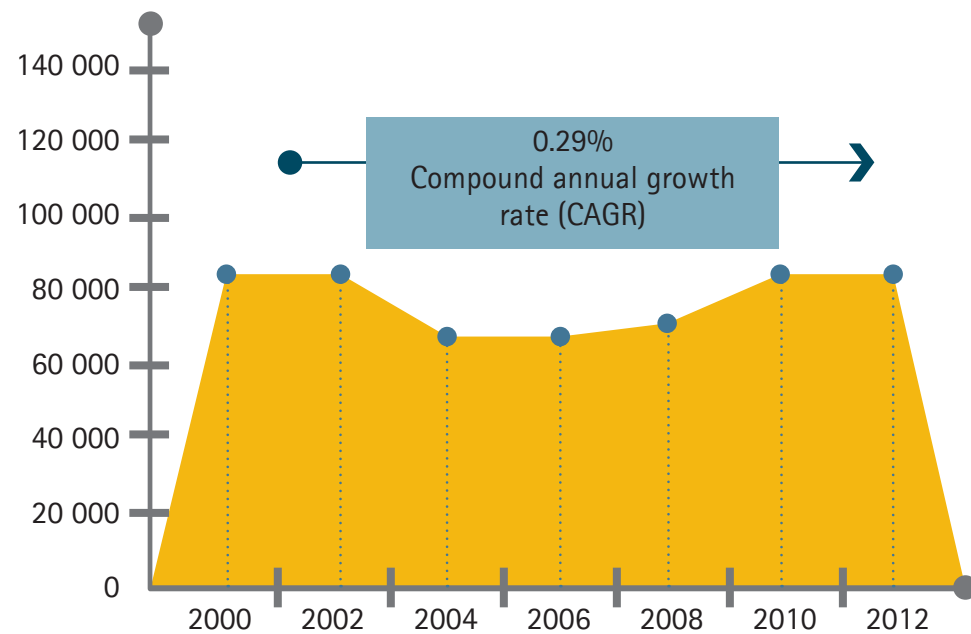
A new fibre optic backbone is being deployed in the south and central areas (See Figure 9) of Mozambique which is being financed by the Chinese corporation ZTE at a cost

of \$25m (USD)³⁷. In addition TDM is also investing in redundancy networks through radio infrastructure as well microwave links to South Africa and Malawi.

TDM is also deploying metropolitan rings in the 10 provincial capitals, this new infrastructure will expand the current single fibre access points to connect to homes

and business in the specific urban areas. This investment is expected to significantly alleviate connectivity issues in the Beira and Nacala corridors, where anecdotal evidence from in-market interviews indicate the fibre network can be down by up to 180 hours each month in the Nacala corridor.

Figure 8: Fixed Line Connection
Source: Research ICT Africa and Accenture Analysis



³⁴ResearchICTAfrica, Mozambique ICT Sector Performance Review, 2010

³⁵Accenture Analysis

Figure 9: Mozambique Fibre Research
Source: TDM and Accenture Analysis



³⁶Interview findings

³⁷Interview findings

The table below provides an overview of fixed line connectivity by town in each corridor:

Figure 10: Quality of Fibre Connections in the Mozambique segments of the Beira and Nacala Corridors
Source: TDM

Area	Type	Priority of Area	Extent of Coverage	Technology
Nacala Corridor (Mozambique Section)				
Nacala	Port	Maximum	Medium	Fibre, Radio, CDMA
Namialo	Town	High	Low	Fibre, Radio, CDMA
Nampula	Town	Maximum	Medium	Fibre, Radio, CDMA
Cuamba	Town	High	Medium	Fibre, CDMA
Mandimba	Town	Medium	Low	Fibre, CDMA
Chiponde/ Mandimba	Border Post	Medium	Low	Fibre, CDMA
Entre Lagos	Border Post	Low	Very low	1 antenna CDMA
Dedza/ Colubue	Border Post	Low	Very low	1 antenna CDMA
Beira Corridor (Mozambique Section)				
Beira	Port/ Town	Maximum	Medium	Fibre, Radio, CDMA
Dondo	Town	High	Medium	Fibre, CDMA
Inchope	Town	Medium	Medium/Low	Fibre
Manica	Town	Maximum	Medium	Fibre + CDMA
Catandica	Town	Medium	Medium	Fibre + CDMA
Caia	Town	Medium	Medium	Fibre + CDMA
Mutarara	Town	Low	Medium	Fibre + CDMA
Luenha	Town	Low	Medium	Fibre
Tete	Town	Maximum	Medium	Fibre + CDMA
Forbes/ Machipande	Border Post	Maximum	Very low	Radio + Fibre
Nyampana/ Chuchamano	Border Post	High	None	Fibre
Villa Fronteira/ Marka	Border Post	High	None	Fibre
Zobue/ Mwanza	Border Post	High	Medium	Fibre
Dedze/ Colubue	Border Post	Low	Very low	1 antenna CDMA
Mwami/ Mchinji	Border Post	Low	Very low	1 antenna CDMA

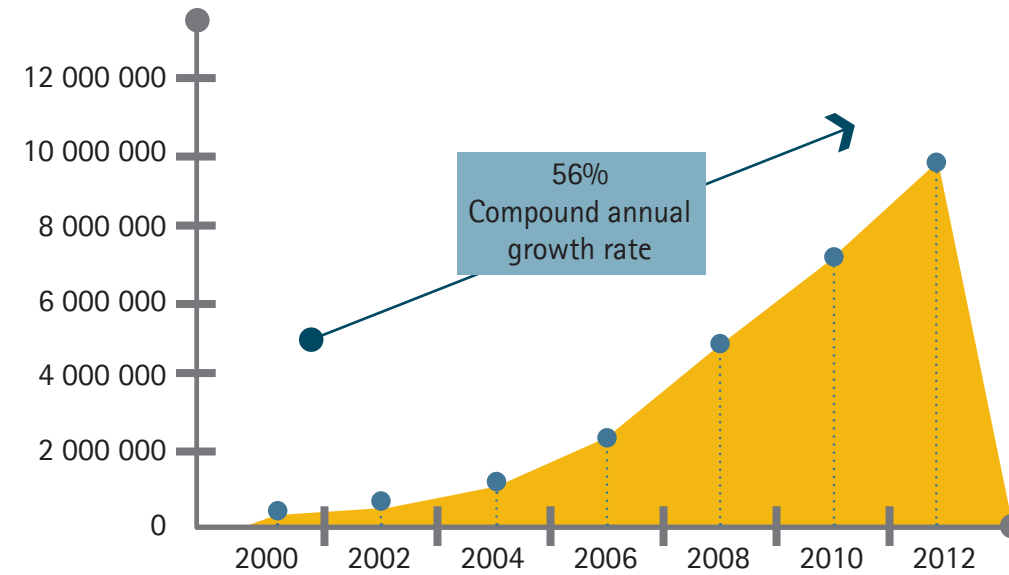
There are three major competitors in the Internet Service Provider (ISP) category, namely, TDM/Teledata, Internet Solutions and TVcabo. Teledata Mozambique, a subsidiary of TDM, was established in 1989. The company offers a wide range of data communications, Internet connectivity, domain registration, e-mail solutions, web hosting and more, based on a MPLS/IP network and two VSAT hubs on a Ku-Band and WiMAX network.

Established in 2001, Intra Lta was one of the first wireless ISPs in Maputo, delivering broadband connectivity to consumers and SMEs through licensed frequency spectrum. In September 2009, Internet Solutions (IS) and Convergence Wireless Networks (CWN) acquired a 68.5 percent stake.

Cable TV has been available in Maputo since 1999. The operator, TVcabo, a 50/50 joint venture between TDM and Visabeira, also provides high-speed Internet access via the cable network under the name NetCabo and has announced plans to establish local networks in Quelimane, Nampula, Nacala, Tete and Pemba.

Wireless/Mobile Network

Figure 11: Wireless Internet Connections
Source: GSM Wireless Intelligence and Accenture Analysis



Wireless coverage has seen dramatic growth of over 56 percent Compounded Annual Growth Rate (CAGR) since 2000.³⁸ This growth is being driven by its lower construction costs, shorter rollout timeframes, and lower costs for end-users. This trend is in line with other developing countries in Africa where mobile is proving to be the most efficient mechanism to deploy coverage in areas that lack adequate infrastructure.

Mozambique has three mobile operators (mCel, Vodacom, and new entrant Movitel). As the largest operator in the country, mCel, has the most extensive network coverage. As of 2012, it had the most subscribers at 4.5 million and 522,000

broadband Internet subscribers.³⁹ However, in recent years, mCel has experienced service quality issues resulting in market share loss to Vodacom and Movitel.

Through significant investment from the three mobile operators, it's estimated that almost 72 percent of the population in Mozambique now has wireless mobile coverage. Regionally, Southern Africa has the highest mobile coverage with 81 percent of the population covered, followed by Eastern Africa at 77 percent. Coverage is lowest in Western and Middle Africa, at 74 percent and 72 percent respectively.⁴⁰

Wireless coverage in Mozambique is provided through a network of base stations, and mostly through a radio transmission network. However, due to unreliable electricity supplies across Mozambique, base stations are primarily powered by diesel generators

While competing telecom service providers prefer to focus on urban areas, Movitel has built 2,500 2G/3G base stations⁴¹ enabling it to cover most of Mozambique's districts and highways providing significantly increased access to rural areas.

³⁸Accenture Analysis

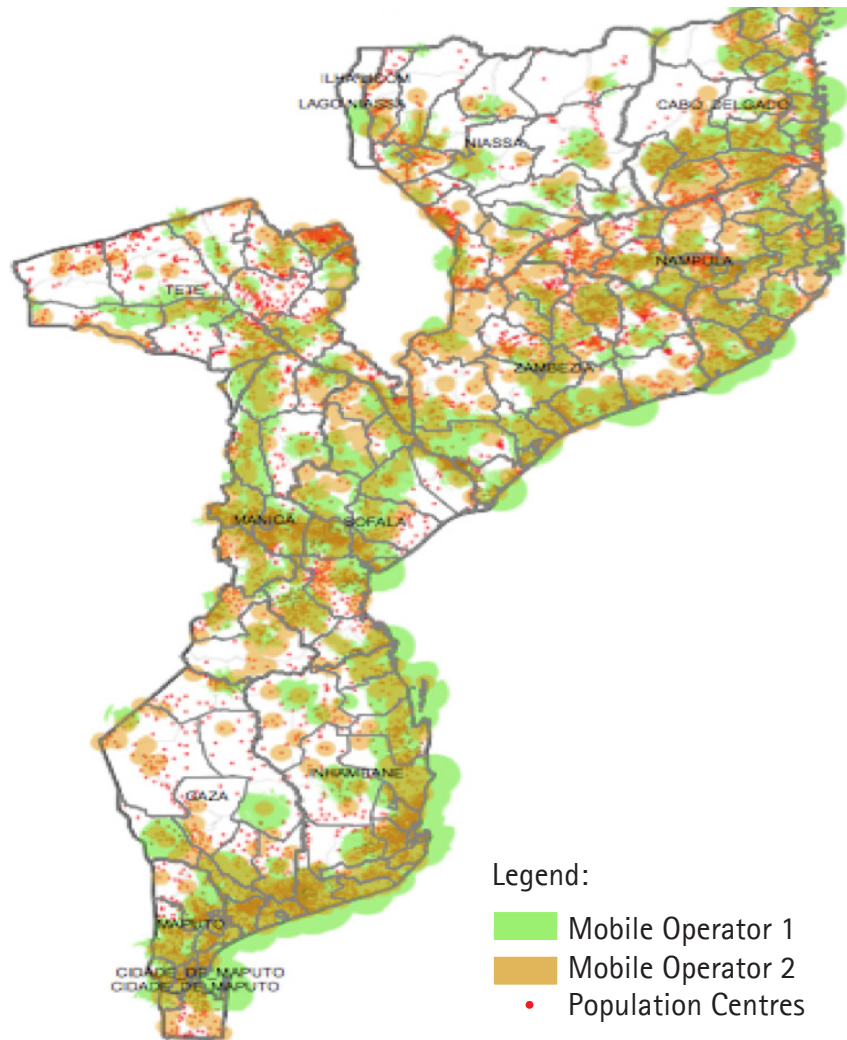
³⁹GSM Wireless Intelligence, 2013

⁴⁰GSM Wireless Intelligence, 2012

⁴¹<http://www.frost.com/prod/servlet/press-release.pag?docid=287756927>

Figure 12: Mozambique Wireless Mobile Coverage
Source: INCM and Accenture Analysis

INDICATIVE



Legend:
■ Mobile Operator 1
■ Mobile Operator 2
● Population Centres

Beira Corridor Wireless Internet Coverage

Main City/ Ports
The main city of Beira has advanced Internet technology installed, with main business connecting primarily through a fibre connection from TDM with back-up links to multiple operators as a redundancy. In addition operators have established 3G base stations to connect users.



Towns
With the introduction of Movitel and rollout of over 2,500 base stations, most towns in the Beira corridor are covered for broadband, but stakeholders complain about quality of speed, which forces them to head to a high point (tree or hill) to get better speeds.



Border Posts
Interviews with transport operators reveal low connection speeds at most borders. Most border posts utilise 3G due to lack of fixed networks, and are prone to breakdowns due to electricity cuts.



Nacala Corridor Wireless Internet Coverage

Main City/ Ports
Connectivity at the Nacala port/ town has improved significant over the past years. The port has dedicated VSAT, Fibre and 3G links. Nacala port is highly dependant on the stability of the rest of countries backbone, with a breakdown in the central and south causing lengthy outages



Towns
Quality wireless Internet connections is limited to the major towns. Our interviews revealed very poor Internet speeds and frequent breakdowns resulting in people using multiple modems from different operators to switch network to improve availability



Border Posts
With the exception of Chiponde/ Mandimba, stable internet connections at the borders are limited and mainly use 3G modems to connect. Most border posts lack access to critical infrastructure to ICT as well the necessary power infrastructure to operate effectively



Connection Strength: Low ■ ■ ■ High

Public Internet Access Locations

Due to the widespread poverty and high cost of access, most Internet users in the two corridors access the Internet through one of the many cybercafés or public media centres.

The number of people in Mozambique who access the Internet through mobile phones is very limited compared to fixed access when compared to other countries. It is estimated that less than 25 percent of all Internet traffic generated flows through mobile devices in Mozambique, compared to Nigeria that handles almost 57 percent of its traffic through smartphones.⁴²

Community Multimedia Centres (CMCs) in Mozambique have been setup for a decade and represent the most common model of public access to ICT venues across the country.

Community multimedia centers (CMCs) are community-based organisations providing access to information and communication technology venues that combine a community radio and telecentre. Besides computers and the Internet, benefits offered by telecentres include technologies such as a fax, a printer, and a phone.

Since they provide access to information, telecentres promote knowledge on critical sectors of socio-economic developments.

In 2010, the CMC program was taken over by the Mozambican Ministry of Science and Technology (MCT), with the goal of providing ICT access to all 128 districts of the country within five years. In total, these public access facilities amount to 42 venues countrywide, including 34 CMCs, 6 Millennium Villages, and 2 Telecentres.⁴³

Yet, despite the roll-out of these venues, recent surveys reveal issues with poor management of the facilities, lack of equipment, and lack of Internet coverage at these locations. A recent survey of 10 centres revealed just two—or 20 percent—had access to the Internet.⁴⁴

Figure 13: Community Media Centres
Source: New Mine Lab



⁴²GSM, Wireless Intelligence, 2012

⁴³Community Multimedia Centres in Mozambique, New Mine Lab

⁴⁴<http://developmentinformatics.org/conferences/2013/papers/Vannini-Rega-Sala-Cantoni.pdf>

Chapter 4: Barriers and Solutions

As one considers approaches to stimulating and promoting internet development, we need to recognise the full scope of the challenges that must be addressed. Given that these challenges tend to be multi-layered, improving Internet access only addresses one impediment linked to Internet development. Even with networks in place and accessible, barriers remain due to insufficient demand.

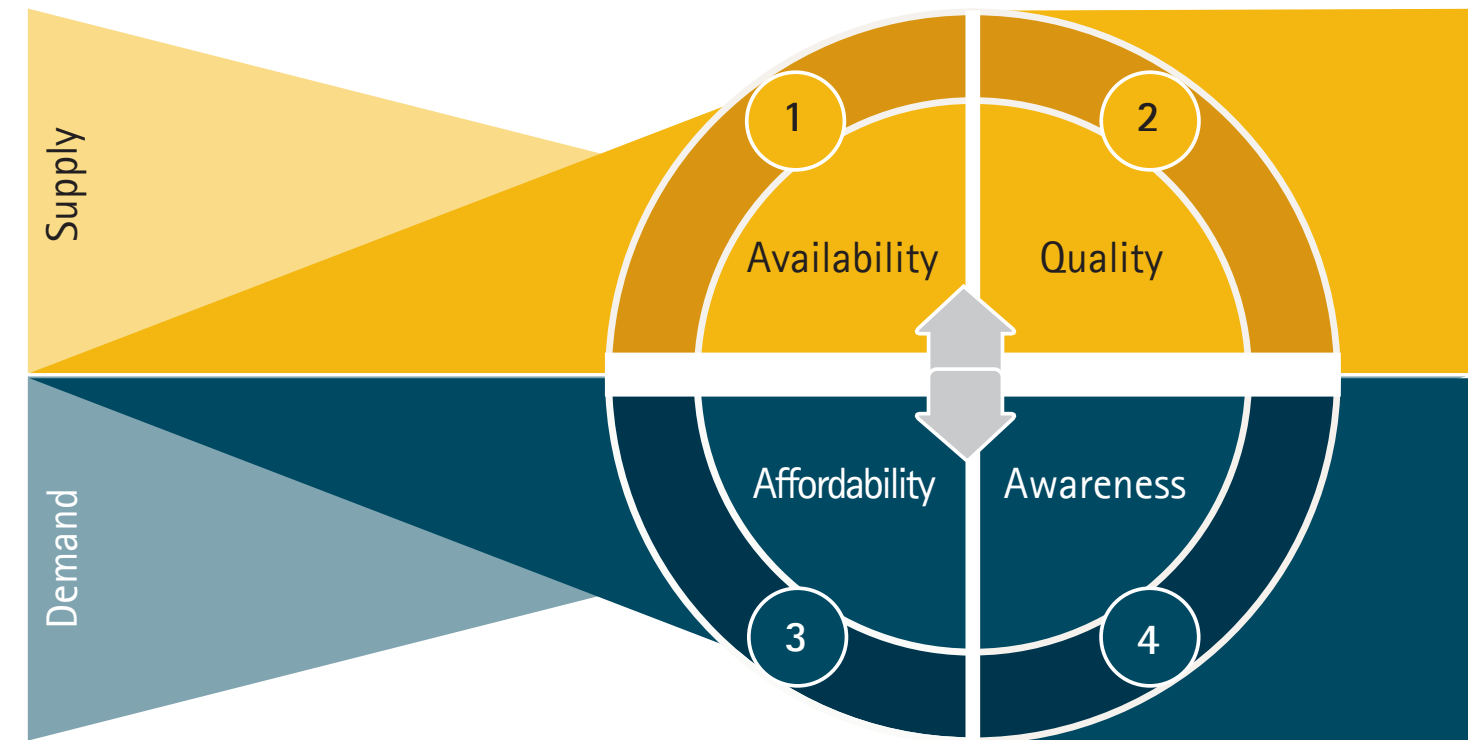
Those countries most successful in Internet development have focused on developing holistic policies to support both sides of the Internet supply and demand equation. Our

research methodology will take a critical look at the issues and opportunities from both a supply and demand perspective, defining a conceptual framework that reviews both sides to assess Internet needs, barriers and potential solutions.

From this, we have mapped this supply and demand matrix into four defining quadrants: Availability, Quality, Affordability, and Awareness.



Figure 14: Internet Research Framework
Source: Accenture Analysis



Summary Findings

Availability

This measures the extent to which a population is exposed to the necessary infrastructure to engage in the Internet economy and looks at three key components namely: The regulatory environment and policies that govern and promote internet development; the business environment and the key factors that promote competition and ease of doing business; and lastly, we look at the physical network and the infrastructure available to support internet development.

Regulation

The ICT sector has undergone significant reforms in the past years and is currently in the process of introducing a revised telecommunications law, but Mozambique still lacks a single clear broadband/Internet vision. The current ICT policy is more than 10 years old and there is a lack of understanding and clarity around the roles for each of the ministries and sub-sectors within Mozambique. We recommend

creating an ongoing, multiyear, broadband-specific strategy board that can work with government on how to define its future strategy as well as a broadband research programme.

Business Environment

There are several initiatives running at the moment to improve the general business environment, but there are still high entry barriers for new mobile operators. Mozambique struggles with lack of stable electricity due to the poor quality and availability transmission lines increasing the cost of operation due to the need for diesel generators.

Competition in the Internet market is limited with only three licenced mobile operators and lack of infrastructure-sharing regulations creating significant cost barriers for new entrants. We recommend investing in the development of effective infrastructure-sharing regulations (e.g. local loop

unbundling) as well as a framework to allow mobile virtual network operators to enter the market to stimulate downstream demand in the Nacala and Beira Corridor.

Physical Network Infrastructure

As a result of low Internet penetration, fewer users mean that networks correspondingly operate at higher cost or that their costs are spread over a smaller user base, making them more expensive to build. In addition, operators lack an efficient and cost-effective mechanism to work with Government and other private sector players to build on existing infrastructure. We recommend the private sector work with Government to simplify the 'rights of way' regulation and open access to its existing infrastructure to more cost effectively deploy new connections.

Quality

This factor measures the quality and stability of services, along with the ability of existing internet technologies to support the needs of organisations. The factor looks at three key

components: Internet Technologies, Common Sector Platforms and Quality of Service.

Internet Technologies

Internet usage in the country has been hampered by inadequate fixed-line infrastructure and the high cost of bandwidth, but this market sector is now accelerating following the introduction of new broadband services, including ADSL, HFC cable modems, WiMAX, 3G mobile and even Fibre to the Home (FtTH). But even with these introductions, the rural populations outside of major towns still lack access to cost effective and quality connections. We recommend developing a research programme to test and pilot the potential of low cost Internet technologies to connect SME in the transport sector, as well border posts and key logistics towns along the two corridors. Although there are various solutions available in the market, TV white space has shown significant potential through trials in various African countries.

Common Sector Platforms

The telecommunications law was drafted in 2004, and focused mainly on voice regulation with limited attention paid to Internet standards. The Ministry of Science & Technology has been tasked to define common sector guidelines, but with limited funding and technical capacity, progress has been slow. We propose that Government foster open application standards and integration of Internet technologies to scale development of transport applications. To this end, we recommend the establishment of a committee to define common and open standards for online data transmission in Mozambique that is cloud-enabled to help host and integrate new internet applications for the transport sector.

Service Levels

While most urban areas in the Beira and Nacala corridors have fixed and wireless networks in place, the fixed networks outside

major cities don't have adequate connection to homes or are operated over copper cables. In addition the wireless networks outside major cities are unreliable and are not capable of supporting broadband speeds and services due to existing network overcrowding. In an effort to alleviate consumer concerns about service quality and help define a common understanding of what is expected from operators, governments are monitoring and compiling reports on service quality. We recommend to conduct a consumer research study on the needs of businesses relating to Internet service quality to support the INCM to update Mozambique's 'Quality of Service' regulations with a specific focus on addressing the quality needs of small and medium enterprises in the Nacala and Beira corridors.

Affordability

This factor measures the level of cost-effectiveness of acquiring an Internet-enabled device, cost of installation and ongoing Internet service costs. Key analysis factors include device penetration, device cost and internet connection cost.

Device Penetration/ Usage

Most handsets in Mozambique lack adequate Internet capabilities. The sector is dominated by basic Nokia texting phones, and mobile Internet cannot yet be considered an alternative connectivity option. In 2012, less than 6 percent of the population had access to a PC. We recommend investing in a programme that works with Government and the Confederation of Business Associations (CTA) to help ease the barriers of entry for global manufactures of computers, laptops and low cost mobiles in the two corridors.

Device Affordability

The cost of mobile Internet-enabled devices has come down significantly but they remain out of reach for most people, limiting their use mainly to corporate entities. Computers produced locally are sold for around \$600-

\$800, while smart phones generally range from \$100 to \$400 depending on capability and brand. We recommend investment and lobbying of the government to establish a subsidy programme to lower the costs of Internet-enabled devices to allow more affordable access to users—specifically small businesses across the entire transpiration (transport and trade) value chain in Nacala and Beira.

Internet Connection Costs

High expectations created around SEACOM that it would lead to the reduction in consumer bandwidth prices are yet to materialise. Mozambique is currently ranked 162 out of 169 on the ITU broadband cost index, making it one of the most expensive countries globally for Internet. The Universal Access Fund was established in late 2006 to support network rollout in rural areas to provide affordable access to masses and in 2009 developed a robust strategy to guide its efforts, but so far very few projects have been implemented. The UAF is faced with a long and administratively heavy tendering process and lack of capacity to run operational activities. We recommend that investment is required to develop a new operating model for the UAF and to implement a sustainable mechanism to train local resources.

Awareness

This factor measures how aware a population is likely to be of the various ways in which the Internet can be used and contribute to their lives. Key analysis factors include digital literacy, locally relevant internet applications and privacy & security.

Digital Literacy

Interviews in the market reveal that most small business owners lack the skill to operate a computer or use the Internet effectively, with the lack of digital literacy especially pronounced in the Beira and Nacala corridor. Stakeholder interviews revealed there is a

critical lack of ICT focussed development programmes at primary school level. One way to expand access to broadband and ICTs in the two corridors is through the deployment of training units at the existing community media centre (CMC) infrastructure and extending access to rural areas through mobile education labs and broadband carnivals.

Internet Applications

One of the critical requirements for business to use the Internet is the availability of locally relevant applications.

Ultimately, what motivates people to buy broadband services and devices is that they believe broadband will enrich their lives. Despite developments in mobile and online payment platforms, penetration of internet applications to improve business productivity has been limited. As a starting point we recommend investing in a programme to look for potential applications developed elsewhere in Africa that can potentially be applied for the Mozambique environment, such as those generated from organisations like Kenya I-Hub.

Privacy and Security

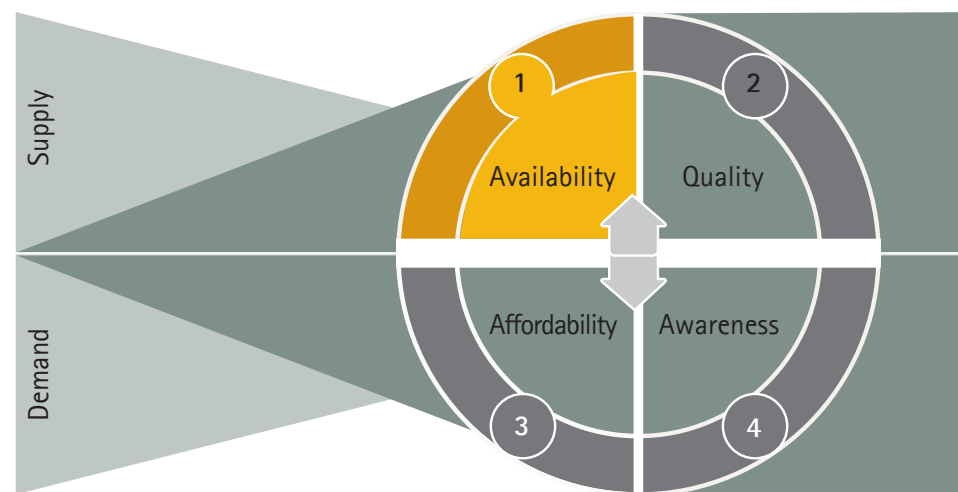
Threats to privacy and data protection must be addressed to foster demand and promote broadband take-up in Mozambique. Currently, there is very little enforceable law around cyber transactions and it lacks the required legal and regulatory tools to ensure efficient prosecution and consumer protection. We recommend the development of programme that can work with the Government to define a legal framework that may include criminal codes, procedures and enforcement, privacy laws, commercial transactions, and electronic communications.

Figure 15: Internet Connectivity Solutions
Source: Accenture Analysis



Detailed Findings

Availability



This measures the extent to which a population is exposed to the necessary infrastructure to engage in the Internet economy and looks at three key components namely: The regulatory environment and policies that govern and promote internet development; the business environment and the key factors that promote competition and ease of doing business; and lastly, the physical network and the infrastructure available to support internet development.

"The regulator has made a concerted effort to improve the ICT environment through new cost models, investment and technical support from the World Bank in past years" – Isabel Neto – World Bank Senior ICT Specialist

Regulatory Environment

This examines the level of Government investment and maturity of policies to improve ICT infrastructure.

The Mozambique ICT sector has undergone significant reforms in the past decade and most recently has partnered with Pyramid Research in conjunction with other partners to develop a revised telecommunications law with new regulations for Internet development, which is expected to come into effect this year.

The World Bank has also been very active to support the government to improve technical capacity and has been providing support on several programmes to improve eGovernment efforts.

But with these improvements, Mozambique is still hampered by a lack of a single clear broadband/ internet vision and roadmap: the current ICT policy is more than 10 years old and there is a lack of understanding and clarity around the roles for each of the ministries and sub-sectors within Mozambique.

To keep up with this dynamic and ever-changing sector, we recommend the creation of an ongoing, multi-year, broadband-

specific strategy board that can work with Government on how to define its future strategy, as well as a research programme that tracks population use, ongoing barriers, and levels of digital literacy with a specific focus on how to improve Internet use in the transport sector.

Setting specific strategy will provide clear direction that will encourage investment and provide a blueprint for long-term action to improve Internet for trade. Such frameworks can launch ambitious national broadband visions, defining service goals and quality, and education and skills issues.⁴⁵

The broadband development process will benefit from the broader range of perspectives that can now be presented to the regulators. One of the early broadband leaders, the Government of the Republic of Korea, has developed six plans since the mid-1980s that have helped to shape broadband policy in the country.

The Korea example shows that policy approaches can effectively move beyond network rollout and include research, manufacturing promotion, user awareness, and digital literacy. It also highlights the possibilities for sector growth based on long-term interventions focused predominantly on opportunity generation rather than on direct public investment.⁴⁶

We recommend that several partners within the country be included in this committee. With the introduction of a revised telecommunications law, the time is right for all sectors to align around a single vision/roadmap.

Business Environment

This examines the extent to which the business environment (e.g. power supply or level of competition) encourages investment in ICT.

Mozambique has one of the largest hydropower generating potentials in the

region, of which 2,075 MW are currently in operation at Cahora Bassa. However, due to poor transmission line infrastructure within the country, much of Mozambique's current power capacity is exported to South Africa and then re-imported back into the country at higher prices. An estimated 9-11 percent of the population has access to electricity. In rural areas this is less than 2 percent, with the vast majority of the population still relying on kerosene and wood as energy.⁴⁷

"Stable electricity supply is a major issue: I would rate it four out of 10, our generators run at least once or twice a week, resulting in significant communication disruptions" – Large Transportation Company in Beira Corridor

Competition in the Internet market is limited with only three licenced mobile operators and lack of infrastructure-sharing regulations creating significant barriers for new entrants. In towns one often sees two cell tower base stations next to each other when this could have been deployed to connect a rural town.

We recommend that parties invests in the development of effective infrastructure sharing regulation (e.g. local loop unbundling). As well as a framework to allow mobile virtual network operators to enter the market to stimulate downstream demand in the Nacala and Beira Corridor. Allowing competition to flourish will lead to greater efficiencies in network build-out.

Competition in broadband supply is also crucial for reducing prices and improving quality of service. With wireless networks, particularly in low-density areas like Nacala where the economics may not support multiple competing infrastructures, carriers can share cell towers and some backhaul facilities as a way of reducing network build-out costs.⁴⁸

Nigeria has been a key example of a country promoting competition and infrastructure-sharing. Operators in Nigeria have entered into a variety of network-sharing agreements aimed at reducing costs and improving the quality of supply. In addition, operators are required to install multiple fibres in their cables, even if they only need one.

These additional "dark" (unused) fibres may not be used initially, but may be held in reserve for future use by an existing operator or new entrant. This may be a very cost-efficient way to manage fibre optic networks because installation (and the associated civil works costs) only needs to be done once as opposed to multiple rounds of digging to install multiple fibres.⁴⁹

At the same time, the demand created by new downstream operators will improve the financial viability of backbone networks, since they are the entities on which traffic and revenue is generated.

Physical Infrastructure

This looks at the level of infrastructure available at the global first mile, metropolitan middle mile, and local last mile.

Coverage of Internet infrastructure is adequate in major towns, but smaller towns and rural areas still face challenges getting access to quality Internet connections.

As a result of low Internet penetration, fewer users mean that networks correspondingly operate at higher cost or that their costs

are spread over a smaller user base, making them more expensive to build. In the absence of mandatory infrastructure-sharing regulation, each operator is establishing its own infrastructure, resulting in a waste of resources and, ultimately, higher service costs.

In addition, operators lack an efficient and cost-effective mechanism to work with Government and other private sector players to build on existing infrastructure. As a result, new operators like Movitel are laying exposed fibre on the ground and on poles in Nacala to expand their reach.

We recommend the private sector work with Government to simplify the 'rights of way' regulation and open access to its existing infrastructure to more cost effectively deploy new connections. Through the current large infrastructure investments in Beira and Nacala, we see significant potential to incorporate ICT infrastructure plans in conjunction with the transport infrastructure investments.

Most of the cost of constructing fibre optic cable network along these alternative infrastructure networks lies in the civil works. By lowering the cost of access to these infrastructure networks and reducing the risk associated with it, Mozambique can significantly increase incentives for private investment in backbone networks.

One way to reduce costs is to make rights-of-way readily available to network developers by simplifying the legal process and limiting the fees that can be charged by local authorities. For example, a railway company could partner with one or more operators to build a fibre optic cable network along railway lines. In January 2011, for example, Serbian Railways and PTT Srbija agreed to construct telecommunications infrastructure jointly along Serbian Railway's corridors, totalling 2,031 km.⁴⁸

⁴⁵World Bank – Broadband Strategies Handbook

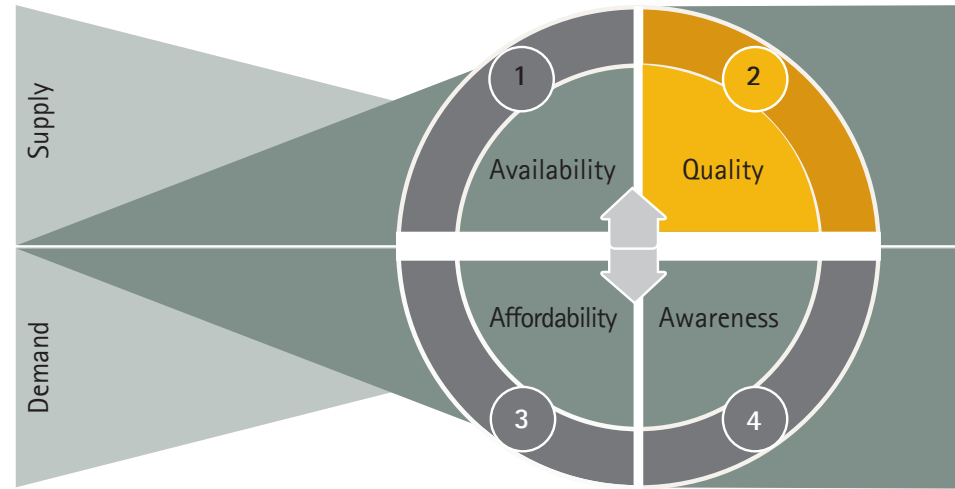
⁴⁶Source: <http://blogs.cisco.com/news/formal-broadband-plans-spur-economic-and-social-development>

⁴⁷Mozambique's Infrastructure: A Continental Perspective, AICD 2011

⁴⁸World Bank – Broadband Strategies Handbook

⁴⁹<https://itunews.itu.int/En/1449-Nigerian-Communications-CommissionBRDelivering-broadband-for-development-in-Nigeria.note.aspx>

Quality



This factor measures the quality and stability of services, along with the ability of existing Internet technologies to support the needs of organisations. The factor looks at three key components namely: Internet Technologies, Common Sector Platforms and Quality of Service.

Internet Technologies

This measures the extent to which the existing wireline and wireless technology capability is able to support public and private needs.

Internet usage in the country has been hampered by inadequate fixed-line infrastructure and the high cost of bandwidth, but this market sector is now

accelerating following the introduction of new broadband services, including ADSL, HFC cable modems, WiMAX, 3G mobile and even Fibre to the Home (FttH).

The Ministry of Science and Technology is in discussion other Ministries and the local cabinet to investigate the use of new technologies like TV white space and 4G. The APC [Association for Progressive Communications] and its partners gathered government officials and industry regulators from South Africa, Kenya and Mozambique at a recent workshop in Johannesburg to focus on rolling out television white space in Africa. All regulators at the event expressed an interest in piloting TV white space technology.

"We see the potential of implementing innovative technologies like TV white space to connect rural areas. To this end, we have started initial discussions in Mozambique"

– Teemu Seppala – Ministry of Science

TV white space technology has significant potential in Mozambique as it does not require a large infrastructure investment and due to radio frequency propagation advantages of TVWS frequency bands, large geographical landscapes can be covered with fewer base stations"
– Dr. Fisseha Mekuria – Research Leader, CSIR Meraka

The key barrier to deployment of these innovative technologies is lack of private sector and government support in terms of funding and technical capacity to investigate, lobby and deploy innovative internet technologies like TV white space to help connect rural populations in Mozambique.

We recommend developing a research programme to test and pilot the potential of low cost Internet technologies to connect SME in the transport sector, as well border posts and key logistics towns along the two corridors. Although there are various solutions available in the market, TV white space has shown significant potential through trials in various African countries.

One of these trials has recently been completed in South Africa. The trial saw Google and partners like the South African Tertiary Education Network (TENET), the Council for Scientific and Industrial Research, Meraka, and the e-Schools Network rolling out broadband access to 10 schools in Cape Town's northern suburbs, giving them a 2.5 mbps service during peak periods from March to September 2013. The test hoped to prove that TVWS could successfully be used to provide wireless internet access to some 9,000 students without interfering with TV reception in the area, as well as to raise awareness about the potential of the technology in the country and the broader continent.⁵⁰

Television spectrum is capable of penetrating obstacles such as trees and buildings much more easily than WiFi spectrum or WiMax, making it easier to roll out and more affordably. Access to this spectrum could enable more powerful public Internet connections—with extended range, fewer dead spots, and improved individual speeds. TVWS technology is designed for unlicensed (but not unregulated) use, enabling it to be deployed in a similar manner to other unlicensed wireless technologies such as WiFi, resulting in lower entry barriers, more competition, and ultimately better consumer service and prices.

Common Sector Platforms

Common sector platforms refer to the integration of IT platforms from the beginning of the system design process, ensuring interoperability.

The telecommunications law was drafted in 2004, and focused mainly on voice regulation with limited attention paid to Internet standards. The Ministry of Science & Technology has been tasked to define common sector guidelines, but with limited funding and technical capacity, progress has been slow. The World Bank, in partnership with Intec Consulting, is in the early

stages of helping the Ministry define these guidelines and the process is expected to be concluded in the next few years. The sector also lacks a coordinating body to leverage disparate applications and ensure a scaling effect for the development community.

We propose that Government foster open application standards and integration of Internet technologies to scale development of transport applications. To this end, we recommend the establishment of a committee to define common and open standards for online data transmission in Mozambique that is cloud-enabled to help host and integrate new internet applications for the transport sector.

The traditional, "ownership" model of technology has presented significant obstacles for development agencies and NGOs to consistently and broadly exploit IT. For enterprises of all sizes in the sector, IT infrastructure costs—including hardware, software, and technical support—can be significantly reduced with the adoption of cloud computing technologies.

One initiative that has been very successful in the agriculture space is e-choupal. The application provides vital information on crop prices, weather conditions, and scientific farming practices to 3.5 million farmers across 31,000 villages. The system allows them to use an e-trading service to get the best prices in selling their crops over the Internet.⁵¹

⁵⁰<http://www.tenet.ac.za/tvws>

⁵¹www.wri.org/sites/default/files/pdf/dd_echoupal.pdf

Service Levels

This measures the level of service, latency and uptime provided by ISPs.

While most areas have fixed and wireless networks in place, the fixed networks outside major cities don't have adequate connection to homes or are operated over copper cables. In addition the wireless networks outside major cities are unreliable and are not capable of supporting broadband speeds and services due to existing network overcrowding. Most people and businesses subscribe to multiple operators in order to switch during frequent breakdowns.

"There is general Internet availability, but our key limitation is the speed and stability of Internet connections. The networks are overloaded and hamper our expansion of branches outside of large towns due to their inability to transfer data effectively" – Large Financial Institution

With the increasing reliance on the Internet, even brief interruption, degradation, or compromise of service may have significant social, economic, and political consequences.

Current service availability has improved but it is still far away from acceptable standards: fibre interruptions of service are reported frequently, leaving most of the Northern provinces isolated.

Unlike prices, which users can easily compare, the telecommunications industry rarely publishes information around quality of services. Although there is a general framework for quality of service in Mozambique, the law is not enforced in practice due to a lack of monitoring mechanisms and tools.

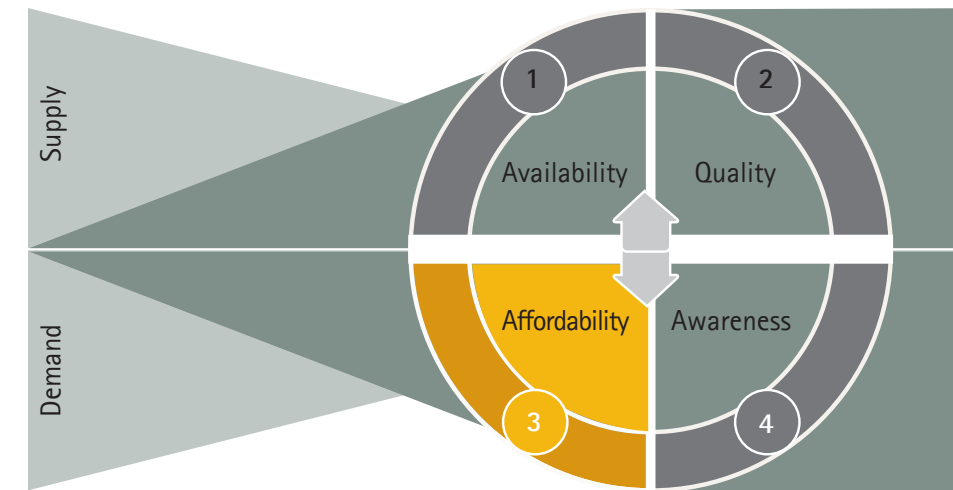
There is often a marked difference between advertised and actual speeds achieved by users, and our market reviews reveal significant differences between towns within the two corridors. In an effort to alleviate consumer concerns about service quality and help define a common understanding of what is expected from operators, governments are monitoring and compiling reports on service quality.⁵² We recommend to conduct a consumer research study on the needs of businesses relating to Internet service quality to support the INCM to update Mozambique's 'Quality of Service' regulations with a specific focus on addressing the quality needs of small and

medium enterprises is the Nacala and Beira corridors.

One example of this is the Telecommunications Regulatory Authority (TRA) in Bahrain, which publishes data on wireline broadband performance. Protecting the interests of subscribers and consumers in respect of quality of service is one of the major duties of TRA as set out in that country's Telecommunications Regulatory Authority Act of 2011. The TRA measures upload and download speeds for different broadband packages, domain name system (DNS) response (time taken in milliseconds to translate a domain name to its IP address), and ping (an echo request sent to a server to test latency)⁵³

There are various mechanisms to record this data, but the most effective means has been through the user consumer surveys to identify the critical pain points in service quality, giving network operators a clear understanding of expectations.

Affordability



This factor measures the level of cost-effectiveness of acquiring an Internet-enabled device, cost of installation and ongoing Internet service costs. Key analysis factors include device penetration, device cost and internet connection cost.

Device Penetration

This factor measures the current usage and future penetration of smart phones to enable Internet access.

Most handsets in Mozambique lack adequate Internet capabilities. The sector is dominated by basic Nokia texting phones, and mobile Internet cannot yet be considered an alternative connectivity option.

Despite the enormous growth of the mobile sector in Mozambique, the real contribution of this segment to increase Internet connectivity remains very low. The number of people who access the Internet through mobile phones is very limited compared to fixed access.

In 2012, less than 6 percent of the population had access to a PC. In partnership with the Mozambican Government, South African company Sahara Computers set up a PC manufacturing facility in Maputo, initially producing between 50 and 70 computers a day, but the operations have come to halt

due to a dispute between Sahara and the local government.

We have two informal markets, one is the grey import, where people individually import electronics and resell them without any guarantees and cheaper than the formal resellers, then you have the "second hand" market, mostly stolen goods, sold at a fraction of the real price" – Bruno Darsam: ICT officer at Institute for Social and Economic Studies

There has been a recent influx of low cost handsets from Asia, but interviews reveal the quality is poor and often have to be replaced within a few months.

We recommend to invest in a programme that works with Government and the Confederation of Business Associations (CTA) to help ease the barriers of entry for global manufactures of computers, laptops and low cost mobiles in the two corridors.

By easing the process of entry one can help facilitate a programme to produce low cost equipment as well as boost employment and trade in the two corridors.

It is recommended that the programme look for partners and programme insights from other East African countries like Kenya and Tanzania that have been focussing on this sector in past years. In collaboration with ICT incubators at Jomo Kenyatta University of Agriculture and Technology (JKUAT), the Government of Kenya is implementing a project to assemble low-cost PCs for the local market which is intended to provide an incubation environment for local university students. In addition, it will give Kenyans access to affordable, robust PCs and create a market that will not only provide hardware and software products, but also create an environment where these products can be developed and manufactured.⁵⁴

Promoting the entry of local manufactures of PCs and mobile devices in the Nacala and Beira corridor will not only increase device penetration among the local population, but also foster ICT skills development in the country and an ecosystem of new ICT developments.

⁵²World Bank – Broadband Strategies Handbook

⁵³<https://www.tra.org.bh/EN/marketQuality.aspx>

⁵⁴IST Africa—ICT Initiatives in Africa

Device Affordability

This measures the ability of citizens and businesses to access the Internet through Internet-enabled cost-effective devices. The cost of mobile Internet-enabled devices has come down significantly but they remain out of reach for most people, limiting their use mainly to corporate entities. Computers produced locally are sold for around \$600-\$800, while smart phones generally range from \$100 to \$400 depending on capability and brand.⁵⁵

According to recent Gartner reports, a \$50 smartphone is set to be released later this year, but this is still out of reach for a population where the average income is less than \$47 per month.⁵⁶

“The cost of Internet equipment is out of range for most people: we have to buy dongles and phones for our suppliers, as there is no way they can currently afford this expense” – Large Transportation Company – General Manager

Due to the high cost of Internet-enabled mobile phones, the landscape is still dominated by basic Nokia texting phones, limiting Internet access and usage. Large companies are supplying dongles and phones to their workforce, but the majority of small businesses lack access.

We recommend investment and lobbying of the government to establish a subsidy

programme to lower the costs of Internet-enabled devices to allow more affordable access to users—specifically small businesses across the entire transpiration (transport and trade) value chain in Nacala and Beira. Using subsidies to overcome obstacles to broadband affordability would spur economic growth, and increase the value of network services in general, and broadband services in particular, as more people participate.

Programmes to subsidise the purchase of laptops or phones can include tax breaks, subsidies, and price reductions. One country that has made significant strides on this front is Colombia. Colombia has implemented subsidy measures aimed at lower-income inhabitants that have allowed, through public-private actions, the widespread use of the Internet. As a consequence, broadband connections grew by 180 percent in the country in 2.5 years. Penetration of personal computers (PCs) has also increased recently, thanks to this policy which eliminated sales taxes and duties on computers, making Colombia the country where the cheapest computers in the region can be found.⁵⁷

Internet Connection Affordability

Internet connection affordability refers to the installation and monthly network connection fees (fixed periodic charges). High expectations created around SEACOM that it would lead to the reduction in consumer bandwidth prices are yet to materialise. Mozambique is currently ranked 162 out of 169 on the ITU broadband cost index, making it one of the most expensive countries globally for Internet.⁵⁸

Contrary to expectations, the price of Internet bandwidth for end-users remains very high. The cost of bandwidth is driven by numerous factors, including the cost of international bandwidth and basic business operational costs (e.g. running diesel

generators at base stations).

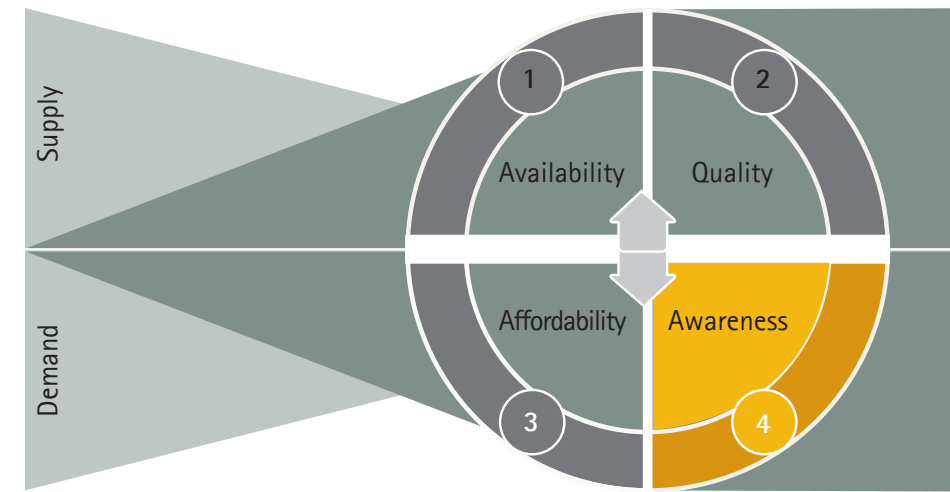
These business barriers are being addressed various development projects in Mozambique, but one area requiring attention is the Universal Access Fund (UAF). A UAF was established in late 2006 to support network rollout in rural areas to provide affordable access to masses and in 2009 developed a robust strategy to guide its efforts, but so far very few projects have been implemented. The UAF is held back by long tendering processes and limited capacity to effectively execute operational activities.

Private sector-only development may not be sufficient to reach the most remote areas in Nacala and Beira. In addition, the private sector may see these markets as less attractive due to low usage factors and focus their efforts on metropolitan areas instead.

One country that has been able to successfully leverage public funds to promote affordable access is Brazil. The objective of the PIRAI-Digital City project in Pirai, a small city in the Brazilian state of Rio de Janeiro, is to grant democratic affordable access to existing ICT resources. The Pirai Digital Project uses a network based on Wi-Fi technology that covers the entire city. The network serves 39 telecentres with 145 computers in public buildings; 20 telecentres in schools, with 188 computers serving over 6,000 students; and 20 access points in public libraries and other institutions with 66 computers. Each telecentre has an average of 220 users per day.⁵⁹

Considering that more than 70 percent of the population in Mozambique reside in rural areas, efforts to extend network coverage to these areas are critical for economic growth. Enabling a more robust Universal Access Fund (UAF) through an efficient underlying operating model to promote expansion projects in the two corridors is a key enabler.

Awareness



This factor measures how aware a population is likely to be of the various ways in which the Internet can be used and contribute to their lives. Key analysis factors include digital literacy, locally relevant Internet applications and privacy & security.

Digital Literacy

Despite significant improvements in education over the last few years, even today only small percentage of children complete their basic education, barely eight percent complete secondary, and just 136 of every 100,000 go on to university highlighting the skills shortage that the country faces.⁶⁰

Interviews in the market reveal that most small business owners lack the skill to operate a computer or use the Internet effectively, with the lack of digital literacy especially pronounced in the Beira and Nacala corridor. Stakeholder interviews revealed there is a critical lack of ICT-focussed development programmes at primary school level.

By educating small business in the transportation value chain through digital literacy programmes, Mozambique can help to drive adoption to a broader user base and educate them at the same time.

Most farmers in Mozambique are still in the basic texting phase and have not adopted the Internet. Almost all small business are technologically illiterate, understanding on how to use a computer or smartphone is low, nor do they see the value in the use of the Internet in their businesses yet” – Todd Kirkbride – Director – Public Private Partnerships TechnoServe

One way to expand access to broadband and ICTs in the two corridors is through the deployment of training units at the existing community media centre (CMC) infrastructure and extending access to rural areas through mobile education labs and broadband carnivals. Countries globally have faced this issue and there are powerful examples of how one can educate the general population.

One of these examples is from Malaysia. The Malaysia Broadband Carnival held at Padang Merdeka Kuching in Sarawak was aimed at raising awareness on the usage of broadband and Internet applications in Sarawak. Among its objectives was to reach out to students, rural folks and small medium enterprises in suburban and rural areas, and to attract broadband subscriptions to help reach the government’s target of 50 percent household broadband penetration by the end of 2014. The carnival educated the public on best practices in Internet usage, the implications of Internet misuse and exposed them to the latest devices for Internet access, application and local creative content.⁶¹

We recommend to first focus on establishing ICT training units at the community media centres and, when proven successful, leverage broadband carnivals to reach the general public.

Internet Applications

One of the critical requirements for business to use the Internet is the availability of locally relevant applications. Ultimately, what motivates people to buy broadband services and devices is that they believe broadband will enrich their lives, offer convenience, provide entertainment, and improve their businesses. Applications add value to broadband, as they provide tools and services that are tangible and valuable for both consumers and businesses.⁶²

⁵⁵In-Market Interviews

⁵⁶World Bank – Data and Statistics 2013

⁵⁷Colombia’s Digital Agenda: Successes and the Challenges Ahead

⁵⁸Measuring the Information Society, ITU 2013

⁵⁹<http://www.intelligentcommunity.org/clientuploads/PDFs/Pirai.pdf>

⁶⁰Mozambique EFA Profile, Unesco 2012

⁶¹www.intel.com/Assets/PDF/casestudies/WA-322898001.pdf

⁶²Source: World Bank – Broadband Strategies Handbook

Despite developments in mobile and online payment platforms, penetration of these services has been limited and only deployed in major cities. There's a lack of tailored solutions to enable online commerce. However, Government has launched several projects with mixed results to enable online government services. The implementation of the Government Intranet project, commonly known as GovNet, was launched in 2004, with financial support from the Italian Government and the World Bank.

As a starting point we recommend investing in a programme to look for potential applications developed elsewhere in Africa that can potentially be applied for the Mozambique environment, such as those generated from organisations like Kenya I-Hub. In addition, investing in a local application hub in partnership

"The use of online commerce in Mozambique is almost non-existent, with just a few of the large SMEs buying inputs from abroad. We see huge potential to grow SMEs through a platform that allows them to trade and sell online" – Wilson Chafinya – IFC Associate Operations Officer – Farmer and SME Training

with universities can promote ICT and skills development in Mozambique. We recommend that a centre like this should focus on applications that directly improve the ability of business in the two corridors to improve productivity.

A key example of a centre like this is from the Netherlands. The Netherlands created a centre for the development of local applications for SMEs which focuses on specific sectors of the economy (for example, hotels, restaurants, health), but also promotes cross-sector applications. The centre is half publicly funded, and projects require the participation of private developers. Examples of applications created in this centre are SME-specific solutions for customer relationship management, Internet marketplaces, and applications to manage radio frequency identification (RFID) and integrate personal data assistants in business processes.⁶³

Privacy and Security

As the Mozambique economy grows, critical services in the Beira and Nacala corridors such as water and electricity supply, banking, transportation infrastructure, and public safety, will rely heavily on critical information infrastructure.⁶⁴

Threats to privacy and data protection must be addressed to foster demand and promote broadband take-up in Mozambique. Currently, there is very little enforceable law around cyber transactions and it lacks the required legal and regulatory tools to ensure efficient prosecution and consumer protection. Our interviews revealed that businesses feel it's too risky to settle in court where it can take up to five months to settle a judgement.

We recommend the development of programme that can assist the Government to define a legal framework that may include criminal codes, procedures and enforcement,

privacy laws, commercial transactions, and electronic communications.

Computer emergency response teams (CERTs) are new types of cooperative endeavours among governments, academic institutions, and commercial entities aimed at identifying cyber vulnerabilities and defending against cyber attacks. In March 2011, the Sri Lankan computer emergency response team (SLCERT) identified several fraudulent websites located in India and China that were selling fake tickets online to the Cricket World Cup 2011 in order to steal users' credit card information. SLCERT was able to inform the Indian computer emergency response team about these fake websites and is seeking legal action against those responsible.⁶⁵

"People and small businesses have significant trust issues with using the Internet for commerce in Mozambique. There is no formally defined online commerce law and litigations can take up to five months to settle" – Eduardo Macuácuá – CTA Deputy Managing Director

Conclusion

Way Forward

At the end of 2012, there were around 8 million mobile subscribers in the country, which brings its mobile penetration rate to just 33 percent, a very low figure against the average 76.4 percent mobile penetration rate across the rest of Africa. Internet penetration is even lower at only 5 percent of the population (1m people) and is concentrated in large urban areas like Maputo.

But the news is not all bad. There is a wealth of opportunities to increase Internet penetration in Mozambique, and specifically in the sections of the Nacala and Beira corridors located in the country. By seizing these opportunities Mozambique can set itself on path for hyper growth and solidify its position on the Africa growth agenda.

Moreover, the problems highlighted in this report have been acknowledged by key stakeholders in the country as well across the globe. Multi-lateral organisations such as the World Bank, the Mozambican Government, corporates and development agencies are all making commitments focused on the resolution of the key barriers. While there is no overall solution to Internet connectivity, individual efforts by various stakeholders do compound to make a significant contribution. The potential solutions outlined in this document are by no means an exhaustive list of imperatives but rather provide a broad insight into the

actions that might be undertaken.

The Mozambican Government should act as an enabler and initiator, increasingly accountable and with greater commitments to delivering on policies, regulations, investment and education. Internet operators in Mozambique need to act as partners and drivers, focusing on day-to-day business practices that extend beyond corporate social responsibility initiatives to support and develop individuals and communities in a bid to become more connected. There is ample opportunity and reward for those that create innovative solutions leveraging their core capabilities.

Development agencies need to be proactive in adopting new practices. As supporters and activators, they should forge ahead with government and business initiatives that solve real day-to-day problems at grassroots level. In this way, the combined efforts of all stakeholders will amount to a solution to Internet connectivity and spur economic development for the benefit of all.

It is critical that all parties work collectively if the challenge of Internet connectivity is to be overcome and Mozambique – and the region's – full potential.

⁶³http://ec.europa.eu/enterprise/sectors/ict/ebsn/national-initiatives/index_en.htm

⁶⁴World Bank: Broadband Strategies Handbook

⁶⁵<http://www.slcert.gov.lk/>

About MRGP

The Mozambique Regional Gateway Programme (MRGP) is a five-year programme funded jointly by DFID Mozambique and DFID Southern Africa.

The objective of the MRGP is to contribute to the improvement of the Southern African transport (roads, rail, and ports), energy and ICT regional infrastructure network that uses Mozambique as a transit route for international trade. The programme aims to positively impact regional and international trade, increase employment and reduce poverty along the main corridors leading to Mozambique.

About DFID

The Department for International Development (DFID) leads the UK's work to end extreme poverty. We're ending the need for aid by creating jobs, unlocking the potential of girls and women and helping to save lives when humanitarian emergencies hit.

DFID's main programme areas of work are Education, Health, Social Services, Water Supply and Sanitation, Government and Civil Society, Economic Sector (including Infrastructure, Production Sectors and Developing Planning), Environment Protection, Research, and Humanitarian Assistance.

About Accenture Development Partnership

Accenture Development Partnerships collaborates with organizations working in the international development sector to help deliver innovative solutions that change the way people work and live. Its award-winning business model enables Accenture's core capabilities — its best people and strategic business, technology and project management expertise — to be made available to clients in the international development sector on a not-for-profit basis.

About Accenture

We are one of the world's leading organisations providing management consulting, technology and outsourcing services, with approximately 289,000 employees; offices and operations in more than 200 cities in 56 countries; and net revenues of \$28.6 billion for fiscal 2013.

Our four growth platforms—Accenture Strategy, Accenture Digital, Accenture Technology, Accenture Business Process Outsourcing—are the innovation engines through which we build world-class skills and capabilities; develop knowledge capital; and create, acquire and manage key assets central to the development of integrated services and solutions for our clients.