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Postal Telecentres in Malawi, Tanzania and Zambia

Feasibility Study and Business Model

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Disclaimer:

1 Executive Summary

1.1 Introduction

This study looks at the feasibility of installing internet facilities in rural post offices in Malawi, Tanzania and Zambia and the role the private sector might play in participating in such a venture. The World Bank, through the Dutch Trust Fund, has funded this study to assess the potential for private sector provision of internet facilities through the post office network and PricewaterhouseCoopers have been appointed as consultants to carry out this study through local research in Malawi, Tanzania and Zambia.

1.2 Policy and Regulatory Requirements

Diffusing internet in rural post offices in Tanzania is expected to achieve greater access to ICT services for rural inhabitants. This will impact upon livelihoods by facilitating communication and increasing opportunities for education and employment when done in the context of a broader national ICT policy which frames the sustainable development of ICT at the national level. A common situation in the three countries is the lack of an e-government policy aiming at extending the reach of public services to the rural populations. Also lacking is an operational Rural Communications Fund able to provide internet services at the most rural level with the required level of subsidy. To expedite the Rural Communications Fund we suggest that a promotion agency might be created under the regulator to set up the fund and to promote internet use in rural areas.
The licensing situation also presents a barrier to the development of rural communications to varying degrees across the three countries. In Tanzania the Post office is a licensed ISP which enables it to offer internet services in some of its main post offices and we recommend that the Post Office apply for ISP licenses in Malawi and Zambia. Voice over internet protocol (VoIP) is still not licensed in the three countries and we recommend that to accelerate liberalization within the countries, that VoIP be reviewed in each country to allow voice calls to be made from internet cafés to reduce communication costs and increase familiarity with computer use.

1.3 The Postal Network

The postal network in the three countries presents a ready-made piece of infrastructure through which country wide internet services could be offered. Typically post offices are located near telephone exchanges or are within cellular coverage as the table below shows. Over time it can be expected that the cellular operators will provide coverage to most population centers. Whilst many post offices do not have a fixed line due to disconnection they are often within cellular coverage and the postmaster may already own a mobile phone. Electricity is much less widespread and an estimated 34% in Tanzania, 25% in Malawi and 15% in Zambia of all post offices do not have electricity. Where electricity is not available we have recommended the use of solar power and have factored in the costs accordingly. The costs of solar panels are still high and there would be a role for donor contribution to help bring down the costs of solar energy over time through technical development and subsidy.

Indicator[1]	Tanzania	Zambia	Malawi
% of Post Offices with electricity	64%	85%	75%
% of Post Offices with fixed line	53%	83%	100%
% of Post Offices with mobile coverage	100%	64%	92%
If no internet, distance to nearest internet facility	10-150km	2-3km[2]	10-80km
% of Post Offices with VSAT in use in the areas?	6%	0	0
% of Post Offices with ISPs in area (in 5km radius)	6%	82%	17%

To analyse the post office types we have categorized them into town, rural and remote post offices.

1.4 The Business Model for Post Office Internet Access

Based upon the town, rural and remote categorization we have drawn up a business model for each post office type to test viability under different assumptions. Through the model we are able to calculate the minimum number of users required to make a postal telecentre[3] viable over time or to achieve breakeven in the first year and the test the effect of different tariffs, connection technologies and computer equipment. We also consider how the capital equipment required might be financed through long-term loan, soft loan and commercial loan options. The table below presents a summary of the key results from the business models.

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[1] Data based on responses to questionnaire outlined in Section 3
[2] Data not available for all Post Offices in sample
[3] Throughout the report postal telecentre and internet café refer to the same service

Variable	Town	Rural	Remote
Minimum number of users required per month	850	650	350 (250 if no salary costs)
Tariff	US$0.5	US$0.5	$0.5
Connection technology	VSAT	VSAT	VSAT
Monthly access and speed of connection	$125 128kbps	$125 64kbps	$50 64kbps
Cost of Computers (includes all hardware)	$6,411 for 5 new pc's	$4,350 for 3 new pc's	$855 for 1 secondhand pc, $285 for replacements
Financing	Through 2 loans taken out to finance pc equipment, payable from years 4-10, 18% interest rate. Private sector provides VSAT A commercial loan at 18% repaid over 2 years from the first month would require higher user fees of US$1 in the first two years and US$0.75 thereafter	Through 2 loans taken out to finance pc equipment, payable from years 4-10, 18% interest rate. Private sector provides VSAT A commercial loan at 18% repaid over 2 years from the first month would require higher user fees of US$1 in the first two years and US$0.75 thereafter	Through 2 loans taken out to finance pc equipment, payable from years 2-10, 18% interest rate. Private sector/donor funding for VSAT equipment and maintenance. Solar equipment would require donor funding and an interest free loan to meet maintenance charges A commercial loan at 18% repaid over 2 years from the first month would require higher user fees of US$1 in the first two years and US$0.75 thereafter

We have developed a model for each post office type, town, rural and remote which can be used to test the effect of different assumptions on internet take up and cost. Below we set out the results for the scenario where the PostMaster has taken a loan from the Postal Bank with an 18% interest rate and a payback period of 24 months starting immediately. To make this scenario viable it is necessary to introduce user charges of $1 per session for the first two years decreasing to US$0.75 thereafter. The purpose of this flexible model is to show what conditions are necessary to achieve viability at the different post office types. Section 5 on the business model provides a full description of the methodology and the results.

Town internet model US$	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Postal Loan										
Number of internet users per month	925	1,017	1,119	1,231	1,354	1,490	1,639	1,802	1,983	2,181
Usage fee	1.0	1.0	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Revenues	11,099	12,209	10,072	11,080	12,188	13,406	14,747	16,222	17,844	19,628
Number of pc's	5	5	5	5	5	5	5	5	5	5
Operating costs	6,764	6,764	6,764	6,764	6,764	6,764	6,764	6,764	6,764	6,764
Operating Profit (Loss)	4,335	5,445	3,308	4,316	5,424	6,642	7,983	9,458	11,080	12,864
Capex	(7,236)	0	0	0	0	(6,411)	0	0	0	0
Loan	(7,236)	0	0	0	0	0	0	0	0	0
Interest	(717)	(717)	0	0	0	(635)	(635)	0	0	0
Repayment	(4,335)	(4,335)	0	0	0	(3,841)	(3,841)	0	0	0
Net profit (Loss)	0	1,110	3,308	4,316	5,424	2,802	4,142	9,458	11,080	12,864

Internal Rate of Return (IRR)   `42%`

Rural internet model US$	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Postal Loan										
Number of internet users per month	650	715	787	865	952	1,047	1,152	1,267	1,393	1,533
Usage fee	1.0	1.0	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Revenues	7,800	8,580	7,079	7,786	8,565	9,421	10,364	11,400	12,540	13,794
Number of pc's	3	3	3	3	3	3	3	3	3	3
Operating costs	3,232	3,232	3,232	3,232	3,232	3,232	3,232	3,232	3,232	3,232
Operating Profit (Loss)	4,568	5,348	3,847	4,554	5,333	6,189	7,132	8,168	9,308	10,562
Capex	(5,175)	0	0	0	0	(4,350)	0	0	0	0
Loan	(5,175)	0	0	0	0	(4,350)	0	0	0	0
Interest	(513)	(513)	0	0	0	(431)	(431)	0	0	0
Repayment	(3,100)	(3,100)	0	0	0	(2,606)	(2,606)	0	0	0
Net profit (Loss)	1,468	2,248	3,847	4,554	5,333	3,583	4,526	8,168	9,308	10,562

Internal Rate of Return (IRR)   `87%`

Remote internet model US$	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Postal Loan										
Number of internet users per month	350	368	404	404	404	404	404	404	404	404
Usage fee	1.0	1.0	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Revenues	4,200	4,410	3,638	3,638	3,638	3,638	3,638	3,638	3,638	3,638
Number of pc's	1	1	1	1	1	1	1	1	1	1
Operating costs	1,220	1,220	1,220	1,220	1,220	1,220	1,220	1,220	1,220	1,220
Operating Profit (Loss)	2,980	3,190	2,418	2,418	2,418	2,418	2,418	2,418	2,418	2,418
Capex	(2,770)	0	0	0	0	(1,945)	0	0	0	0
Loan	(2,770)	0	0	0	0	(1,945)	0	0	0	0
Interest	(274)	(274)	0	0	0	(193)	(193)	0	0	0
Repayment	(1,659)	(1,659)	0	0	0	(1,165)	(1,165)	0	0	0
Net profit (Loss)	1,321	1,531	2,418	2,418	2,418	1,253	1,253	2,418	2,418	2,418

Internal Rate of Return (IRR)   `127%`

Viability depends crucially upon the number of users and there is a need to understand the different price elasticity of demand of consumers at the town, rural and remote levels. We find that VSAT presents the most feasible technology option as fixed line options (dial-up and leased line) are

typically more expensive over time and hence that satellite operators present the most suitable private partners for the post office.

We recommend that the responsibility for the internet café at each type of post office be taken on by the PostMaster so that the risk is internalized by each individual post office to encourage cost control and effective sales and marketing. We recommend an individual business model for internet provision whereby each post office runs the internet business as a standalone viable business with technical support from regional and head offices. We have identified the following performance indicators which could be used to assess the relative performance of each individual internet café. A training programme and an implementation plan are also outlined in section 5.

Indicator	Target
IRR	Should be above 0%
Number of internet users per month	Should be above:[4] • Town – 850 • Rural – 650 • Remote - 350
Profitability	Telecenters should generate enough profit to cover years when losses are made (ie IRR will be above 0)
Operating Profit	Teleceneters should be able to cover operating costs through revenues in every year
Service availability	Bandwidth availability performance targets (should be close to 100%) should be agreed with the satellite operator
Loan repayment	The telecenter Management should keep to the proposed loan repayment schedules

In summary therefore, we believe that the town and urban internet cafés will be viable under the assumptions we outline in section 5 but that the remote internet café will require subsidy to enable start-up but should be sustainable in the long-term if enough users visit the post office regularly. Where post offices are outside the reach of the electricity transmission network, solar panels would need to be donated to set up an internet service.

Because all post offices are already generating revenues, we propose that adding internet services will serve to enhance those revenues under the assumptions outlined in the business model chapter.

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[4] These numbers depend crucially upon the assumptions set out under the business model and should be used as a guide only

It makes sense to use an existing business premises with a longstanding customer base to offer what to many may seem a new-fangled service. Being able to set up an internet café without building costs and additional salary costs[5] will give the nascent business a chance to get off the ground in the first year.

Where some post offices are currently loss-making as in Malawi, it is less clear whether internet should be provided at these post offices. It may not seem prudent to add a new and relatively expensive service to an underused post office with potentially low management capacity. However, we recommend that individual postmasters should demand the service and make an application for provision and hence prove that effort will be expended to make the service a success. In addition, it is possible that the provision of internet services may turn an otherwise unprofitable post office into a viable business venture.

1.4.1 Implementing the model across the three countries

Whilst this model seems to work particularly well in Tanzania where TPC already has an ISP licence and has started to offer internet services in its main post offices and does not operate loss making post offices, the model may not work so well in Malawi and Zambia where conditions differ. Affordability levels and expected uses of the internet are comparable across the three countries where average incomes are similar and there is a high proportion of students demanding access to the internet. However the differences tend to occur on the supply side and the applicability of the model depends upon the measures employed to smooth out these differences. In Malawi some of the rural post offices are loss making which as we have discussed may or may not mean internet is a good idea as it could either plunge the business further into debt or create a new source of revenue that generates viability of the overall business. The MPC has already considered the provision of internet access but is cash constrained in doing so. In Zambia, overall profitability presents a brighter picture but again the post office is cash constrained in offering internet services. In addition, there seem to be many alternatives springing up such as internet cafes near to the mining areas run by private individuals or companies. It may be the case that in Zambia a nationwide rural internet project would be better coordinated by the national ICT project under the Zambia Business Forum where the will to provide national internet services has already been mobilized and opportunities sought. Under the Implementation Plan we recommend the first step is to decide in each country which is the appropriate mechanism for offering a nationwide internet service.

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[5] It is anticipated the existing staff would run the internet service supported by a team of IT analysts from regional head offices

2 Government Policy

2.1 National Postal and ICT Policies in Tanzania, Malawi and Zambia

The National ICT policies in all three countries support the private sector provision of internet services through the post office network. The three policies also support the development of a rural communications fund to achieve the desired goal of access to communications for all, but they require a sequenced and timely implementation.

Governments are deploying ICT , however, no mechanisms exist for ensuring that these major initiatives are coordinated or developed within a holistic strategic government plan. To make further progress and reap additional rewards, these governments needs to develop a comprehensive strategy for urgent implementation. Not only will this enhance government productivity, but it will also enable the government to become a "model user" of ICT.

In comparison to Malawi and Zambia, Tanzania has a specific postal policy which refers to the synergy between post office outlets and internet provision. Zambia's policy is in draft form and is not publicly available. Malawi does not have postal policies per se but the development of the postal sector is referred to in the national communications policies.

2.1.1 National Postal Policy of Tanzania

In addition to the National ICT Policy, The Government of the United Republic of Tanzania (URT) through the Ministry of Communications and Transport (MCT) has completed preparing the National Postal Policy (NPP). The Government's Vision in the NPP is to ensure the provision of a sustainable universal quality postal service to all segments of the population and sectors of the economy so that the postal sector becomes part of the global info-communication society.

The Postal Policy states that "the use of postal retail outlets as access points to the internet via public terminals is a major opportunity for exploitation in the future." The policy document has been followed by an implementation strategies document produced by the Government which sets out the goal of universal access which it terms as the UPU (Universal Postal Union) postal density international standard of 7,558 inhabitants per post office by 2025.[6] The accompanying document also sets out the target of installing ICT facilities in all regional centres by 2008 and application of ICT by all post offices at the district level by 2015 and outlines the following implementation strategies to achieve this ICT objective:

- Mobilisation of resources for expansion and modernisation of postal network, systems and services.

- Encourage and support Research & Development activities and use of appropriate technology and equipment in the postal sector.

- Put in place conducive environment for private sector participation in the postal sector

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[6] Tanzania has approximately 79,140 inhabitants per Post Office National Postal Policy

The implementation document also states these implementation strategies which we consider relevant for this study:

- Utilisation of existing postal outlets in the rural areas as communication centres, so as to offer integrated info-communication services as a way of enhancing rural access. To this end the development of privately owned infrastructure into communications centres where there is no post office network will be encouraged.
- Review the existing postal law, regulations and measures so as to ensure the provision of the universal postal service.

However the document fails to set out any clear steps for the implementation of these strategies despite being titled an implementation document. Along with the rural communications fund it is an area that continues to perplex the institutions involved as to how this will be realized in practice. The lack of an implementation plan has prevented progress. The creation of NICTCOM the National ICT Commission should serve to promote ICT issues and could be furthered strengthened as we suggest below under the authority of TCRA (Tanzania Communications Regulatory Authority).

2.1.2 National Postal Policy of Zambia

Zampost have referred the research team to the Postal Services Act, which is Volume 26 of the Laws of Zambia and sets out the role of the post office: to conduct a postal service and telegram service for the Republic. There is no reference to internet services. The Act regulates the provision of postal services into, out of and within Zambia. The lack of even a draft postal policy with reference to the internet suggests that the Postal service is not strongly earmarked for the provision of e-commerce services. This absence of clear policy direction may create a problem for the implementation of postal telecentres across Zambia.

2.1.3 National Postal Policy of Malawi

The Permanent Secretary of the Ministry of Information has referred the research team to the Communications Sector Policy Statement. The Communications Sector Policy Statement outlines the National policy for the development of the country's communications sector, covering broadcasting (both radio and television), telecommunications and postal services.

The Sector Policy states that the "postal network has a particular economic and social significance in rural areas in ensuring access to a wide range of public services." The Statement sets out a change of direction for MPC from a traditionally undervalued enterprise with little commercial drive to a restructured entity striving for commercial return. The Statement refers to a Postal Development Plan but in reality it appears that little has been implemented since 1998, the date of the statement and that the postal service continues to operate on a non-commercial basis. The statement refers to the development of performance targets but there is no indication as to how these might be monitored, for example through a performance contract as in Tanzania.

In addition whilst the statement accords responsibility to the postal operator to achieve specific access goals such as "not to travel more than 10km to the nearest postal service" it does not set out how this will be implemented.

It is therefore a key weakness of all the postal policies whether they are separate documents or included as part of an overall communications policy, that specific goals and targets have been set but that no action has been taken to realize the initiative.

2.2 Regulation and Licensing

2.2.1 Regulation and ISP licensing in Tanzania

The Tanzania Communications Regulatory Authority (TCRA) are responsible for regulating telecoms and postal activities including internet service provision.

There are 23 licensed ISPs in Tanzania as listed below. TPC is a licensed ISP having purchased its licence in February 2001. ISP licence fees are $10,000 annually payable to TCRA with a registration fee of $2000.

Voice over internet protocol is currently illegal but is expected to be liberalized once TTCL, the fixed line operator's exclusivity ends next February 2005.

2.2.2 Regulation and ISP licensing in Zambia

The Communications Authority of Zambia (CAZ) are currently involved in embarking upon a national ICT project and have issued requests for expressions of interest for consultants to assist with the development of the national infrastructure backbone, liberalization of the international gateway and review of the telecommunications Act. There are plans to formulate an ISP Association of Zambia in the near future to which all ISPs will be required to register with. Part of the national ICT project will also focus on setting up a rural communications fund but the ICT project itself is not yet up and running and is still at the planning stage.

The Postal operator, Zampost, could in theory apply for an ISP licence. This costs ZMK 95,400,000 (approximately USD19,875) for 5 years. As an ISP, Zampost would also be required to remit to CAZ 5% of the yearly turnover. There are five licensed ISPs in Zambia: Zamtel, Zamnet, UUNET, Coppernet and Microlink Technologies.

Voice over internet protocol (VoIP) is currently illegal in Zambia.

2.2.3 ISP Licensing in Malawi

In Malawi there are currently 8 licensed and operational ISPs. Licence fees are payable on a yearly basis and companies who may have applied and have been approved in the previous years but have not paid current year fees are not considered registered. The following are currently licensed ISPs: Africa Online, Epsilon & Omega Ltd, Malawi Net, NCR, SDNP, Globe Internet, Celtel Malawi Ltd and Computerland.

According to the regulator, MACRA, there are no regulatory impediments to setting up either internet service provision from post offices. The licence application would follow the normal process of filling in the application form which would need to be approved by MACRA and then paying an annual licence fee of US$1000 and paying 5% of annual revenues to MACRA.[7] Bandwidth is provided by Upstream Service Providers[8] or MTL through their international gateway. In Malawi some use VSAT

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[7] Application guidelines are included in the zip attachment
[8] Upstream service providers include large ISPs in the UK and US

e.g. SDNP and bandwidth depends upon the equipment used. At present there is no internet exchange point (IXP) in Malawi so all traffic is routed internationally via the upstream service providers. There is an association of ISPs in Malawi who are currently trying to set up their own IXP VoIP is currently illegal in order to protect MTL's monopoly rights.

The national ICT policy recommends the setting up of an national autonomous regulatory agency for the ICT sector, NICOTA, the National Information Technology and Communication agency under the office of the President and the Cabinet. NICOTA will be tasked with implementing Malawi's ICT policy. There would appear to be obvious overlap between the functions of NICOTA and MACRA and it is not automatically clear why separate agencies would be required. The Rural Telecoms Policy[9] states that "MACRA is considered as an important player in the development of telecommunications in the country. MACRA shall be the co-ordinator between the users and the Rural Telecoms Fund, and shall develop the licence conditions for the local licences in co-ordination with the RTF."

Interconnection is another area to consider and the rural policy advocates a "fair sharing mechanism" for setting up interconnection agreements which compensate the rural telephony operators for reaching the rural areas. The policy also goes on to acknowledge that some international voice traffic may be routed as VoIP by international service providers to the rural licensee. The role of MACRA is clearly set out to cover all aspects of implementing the rural telecoms policy and the rural policy is stated to be an integral part of the 1998 National Sector Policy Statement. No reference is made to NICOTA which was introduced as an idea in the National ICT Policy of 2003 to be set up under the Office of the President. NICOTA's functions are to promote ICT development whilst MACRA's function is to regulate ICT development. However, it may be more powerful to equip NICOTA with more teeth and to enhance the capacity of MACRA by teaming up the two functions under one larger agency which differentiates between its roles of supervision and advocacy.

In some ways, all three countries, which have been slow to set up their rural communications funds could benefit from this type of arrangement whereby all the communications expertise is grouped under one agency but one arm carries out regulation and the other arm carries out promotion but essentially resources in terms of skills and funding are shared. In countries where regulatory capacity is low, this arrangement would seek to make better use of existing resources and is possible to set up quickly as each regulator already has skilled staff and office premises. The promotion arm could also be tasked with setting up the Rural Communications Fund.

The implementation plan set out at the end of this document recommends that a promotion division be set up under each regulatory agency with a specific e-commerce team. This e-commerce team would draw on representatives from the postal service, the fixed line incumbent, the cellular operators, data operators and ISPs.

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[9] The Rural Telecommunications Policy 2002 is included in the zip attachment

3 Postal Network

3.1 Introduction

3.1.1 Field Trips in Malawi, Tanzania and Zambia

This part of the study has focused on looking at the existing postal network in the three countries and assessing the overall state of readiness for rolling out internet access across the network. We have carried out a survey of a selected number of post offices which is attached in Appendix 6.3. To facilitate the process of data collection we visited the selected post offices to elicit and discuss responses to the set of questions. In total we visited over 40 post offices across Tanzania, Malawi and Zambia in the rural areas. We set out a summary of the findings from these field trips in the following sections.

3.1.2 Research methodology

We drew up a questionnaire which was posted to the selected post offices prior to the arranged meetings. The meetings then consisted of an interview going through the answers to the questionnaire. In some cases we turned up at post offices we passed on route or singled out because of their remoteness which were not aware of the study and took them through the most important questions.

3.1.3 A word of caution

When interpreting the results of the survey it is necessary to exercise a degree of caution. The purpose of the survey was to gather information on the postal network in each country and to discern some idea of how the internet might be adopted in areas outside the major towns. Much of the evidence presented is based on verbal discussion with the manager of the post office rather than hard reported data. It is extremely difficult to predict internet take-up and often statistical analyses are not helpful in forecasting take-up rates due to the weak regression link between income levels and technology take-up. The impact of mobile in Africa has demonstrated this. The difficulty of predicting technology takeup at low income levels is confirmed by regression analysis when we look at the growth of mobile in Africa and weak link between mobile teledensity and income levels. Hence we suggest that masses of statistical data will not inform a feasibility study and instead an informed view based upon local consultation will form a more realistic basis for developing a business model for rolling out the internet to rural post offices.

This word of caution is not to undermine the following analysis in any way, instead we suggest that evaluating likely demand based upon observing consumer behaviour and supplier capacity is the best method available to determine how internet might be adopted across these countries. After all, no one predicted that Africa would be the fastest growing continent in mobile subscribers over 1998-2003.[10]

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[10] Source ITU Telecommunications Indicators 2004

3.2 Results of the Survey

3.2.1 Tanzania

In Tanzania a field trip was undertaken in the Southern region of the country towards the borders with Malawi and Zambia. A total of three regions, Morogoro, Iringa and Mbeya were toured led by visits to the Head Post Offices in each region. The following post offices were interviewed as shown below and on the map.

Post Office	Post office type
Morogoro region	
Morogoro	Head Post Office
Mzumbe	DPO
Mikumi	FPO
Kidatu	DPO
Iringa region	
Iringa	HPO
Tosamaganga	FPO
Ifunda	SPO
Mafinga	DPO
Makambako	DPO
Ilembula	FPO
Mufindi	FPO
Mbeya region	
Mbeya	HPO
Uyole	FPO
Chimala	FPO
Kiwira	SPO
Tukuyu	DPO

Post Office	Post office type
Kyela	DPO
Ipinda	SPO
Songwe	SPO
Mbalizi	FPO

The Morogoro, Iringa and Mbeya regions constitute the Southern Highlands region in Tanzania which is predominantly agricultural. Main crops of the area include sugar, tea, coffee and maize. The route from Dar es Salaam to Mbeya is traveled by the Tanzam highway built in the 1970's after the opening up of the Zambian economy along with the Tazara rail line and the Tazama pipeline. It is known as a major trading route between Zambia and the port at Dar es Salaam built mainly for the export of copper. Hence it is a major transit route. The road has had a dramatic impact on the rural communities in the region drawing many villages closer to the road to sell their goods to travelers and also to be nearer to markets and facilities in the urban centers. Road building has had this effect in most areas of Tanzania, drawing communities away from their traditional rural centers towards the road to enhance their livelihoods. Having said this when one passes through a town, the urban center is often relatively small with housing, shops and markets clustered together and 500m from the town the area is predominantly rural again. Along the highway it is quite normal to see individuals walking for very long distances (eg 5km up to 30km) to reach a desired destination.

This route was chosen because it is easily accessible by road over a 5-day trip. Many parts of Tanzania are relatively inaccessible over a short period of time and huge distances need to be

traveled between post offices. It was agreed with the Post Office that this was a good route to view a representative sample of different Post office types. There are a total of 380 Post Offices in Tanzania which break down into the following type of Post Office:

- 14 Head Post Offices (HPOs). (There are 14 zones in Tanzania and each zone has a head post office eg Mbeya in Mbeya region)

- 140 Departmental Post Offices (DPOs). (These are the next level down and are located at major towns)

- 149 sub Post Offices (SPOs). (These are smaller post offices with fewer services and often have other facilities eg a shop co-located)

- 85 Franchised Post Offices (these are franchised out to individuals who acts as agents to run the Post offices. The agent signs a contract with the Post Office and signs for an inventory. Individuals are encouraged to start their own businesses in addition to the post office activities to encourage more business into the Post Office and to discourage agents from failing to remit full revenues the Post Office)

The purpose of the field trip was to look at the provision of infrastructure at all the different levels of post office and to assess general suitability and readiness for internet service provision in conjunction with assessing the economic rationale for using the postal network for delivering shared internet access services. As the table above shows, we visited a total of 3 HPOs, 6 DPOs, 7 FPOs and 4 SPOs. Whilst the Post Office have plans to put internet services into all the HPOs throughout Tanzania over the coming year, the focus was to look at the next layer of post office – the departmental, franchise and sub-post office levels. All franchise and sub-post offices are considered rural by TPC. We surveyed approximately 5% of all types of post office. It was necessary to survey such a relatively small sample due to time limitations and the sheer geographical size of Tanzania. Despite the small sample size it was easy to get a feel for the standard of service and infrastructure for each post office type that would pervade across the country. Below we set out the results for each part of the questionnaire in detail:

3.2.1.1   Services Provided by the Post Office

Post office type	Services Provided
HPO	Mail and parcels, counter services, Express Money Order (EMO), Postal Order, stamps, Expedited Mail Services (EMS), fax messages, money fax
DPO	Mail and parcels, counter services, Post shop, financial services, EMS, EMO
FPO	Mails, Counter, EMS, EMO
SPO	Postage (no financial services)

The post office sorts 25,017,000 letters per year in total. The Head Post Offices at Morogoro, Iringa and Mbeya account for 11% of this volume. Volumes going through departmental post offices vary widely and are approximately along the following lines:

- Between 500-1000 letters are sent per week from DPOs

- Between 250-500 letters are sent per week from FPOs

- Between 100-250 letters are sent per week from SPOs

3.2.1.2 Demand for services

Below we set out a table showing average number of customers per week by post office type.

Post Office Type	Estimated Average number of individual customers per week[11] (excluding large customer like utilities and factories)
DPO	20-160
FPO	20-165
SPO	20-100

As the table shows the number of estimated regular customers to the Post office varies widely and in some cases can be low even at the departmental level. This will depend upon the location of the Post office. Where the population is less dense we might expect a lower number of regular post office users. When we take number of estimated users per week and divide by a) the post office's estimation of the local population within walking distance and b) the population recorded for the area under the national census, we find very low penetration levels for post office services.

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[11] We asked the PostMasters to estimate how many individuals came to the Post Office each week

Post office type	Percentage of estimated population within walking distance using the Post Office every week	Percentage of actual population in area using the Post Office every week
HPO	0.07-10%	0.07-0.8%
DPO	0.5-4%	0.04-0.3%
FPO	0.4-6.7%	0.13-1.71%
SPO	0.4%	0.12-0.3

According to Post Office unofficial estimates therefore, approximately only 2% of the population who have access to a Post Office in the region are actually visiting the Post office every week. According to the official census data which gives total population for the areas of the visited post offices, a mere 0.4% of the local population are using a post office every week. If we assume that individuals might use a post office every month these figures rise to 8.2% (Post Office estimates) and 1.5% (official census population data). To add to this picture of low usage, affordability of services is generally very low. Customers who use the post office for their own purposes (ie for personal or small business mail not for large business use eg utility bills etc) on average spend between Tsh300-1500 per visit. ($0.3-1.5).

What these figures tell us is that the postal network is already spread widely across Tanzania and many of the rural areas are potentially loss making.[12] Postal volumes are relatively small whilst the population within walking distance of the post office is often extremely large. It would be a simplistic view to take however, to deduce that demand for post office services is low. These post offices often provide the only source of communication for inhabitants of the area who cannot afford to use phone facilities. Indeed upon visiting these places it is clear that post offices can form the lifeblood of a community if equipped with a more comprehensive range of services. Post office queues do not appear common outside of the main urban centers but despite that people in these areas will often depend solely on the post office for their only source of communication.

The Head Post Offices in the region are constantly assessing the region for the need to relocate post offices to more popular positions and to setup new post offices in previously unserved areas. For example, some post office might be located away from the main market area through the history of being joined with the local TTCL building or police station or school and the Post Office has relocated several post offices within the region to market areas to gain a greater customer base. TPC also plans to open new sub-post offices in Mbeya region in Lupa, Kambi, Kanumuli and Isoko.

3.2.1.3   Demand for Internet Services

Only Mbeya Post office currently offers internet access to customers. This is consistent with TPC's current strategy of only offering internet access in the main Head Post Offices. TPC has internet facilities at Mbeya, Dar es Salaam, Zanzibar, Arusha and Mwanza and plans to rollout internet

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[12] The final report presenting the business model will analyse Post office profitability

access to all HPOs including Iringa and Mbeya. The plan then extends to departmental level to install internet access wherever possible across the network. However, it does not appear that costs and revenues are defined at the departmental level and no clear viability assessment has been undertaken to analyse the impact on profitability in the region.

The results of the field survey tell us overwhelmingly that people beyond the main urban centers, Mbeya, Iringa and Morogoro, generally do not have access to the internet but have indicated a need to use it. The categories of people requesting the service include; large farmers, tourist organizations, workers in tourist hotels, teachers, missionaries, small businessmen including taxi drivers and private individuals expressing the view that availability of internet would be a "good thing" for their community as quoted by the father of the PostMaster at Chimala post office outside of Mbeya;

"I think it would be a good for Chimala to have a new form of communication, we need it here in Chimala. It is 75km to the nearest internet café."

Whilst this personal view and the impressions created by talking to individuals along the route who indicated a strong preference for internet access do not constitute an adequate demand survey upon which to base a business model, at this time of weak consumer information it is the next best thing we have. According to our rough calculations, over 50% of the population living in the areas surveyed would have to travel more than 5km to reach an internet café and in many cases would need to travel up to 150km. Extrapolating this to the rest of Tanzania would suggest that over 16 million people would need to undertake a journey to reach an internet café ranging from 5km to over 150km in some cases. Many people in the rural areas rely on public bus transport which may be daily or weekly or any shared vehicles within the community. If people know that they can access the internet through a post office then there journey to a known post office in their area would not be wasted.

In the very rural areas where there is no post office and people's homes are scattered around the countryside rather than grouped close to a road or some kind of center, it remains unclear to what extent these people would benefit from internet access. However if these people who are located away from the main population centers had heard about the internet and decided they wanted to use it then they would likely be willing to travel a long distance to use it, if they could afford to. The concept of walking distances varies widely across Tanzania where some people would be willing to spend a day walking or take the bus and walk in order to find the service they are looking for. It's the same principle that any rural inhabitant faces in any country in the world, they understand that a specialist service is not available in their area and they are willing to travel a distance to get to it and plan accordingly. It is the extent to which this extra cost of traveling disadvantages them from using the internet that TPC and other internet providers need to be aware of when pricing.

Along the surveyed route, public internet access is only available in Morogoro, Iringa, Mafinga and Mbeya where there are the following facilities:

Town	Post Office Internet access	Other Internet Cafés
Morogoro	Planned awaiting standby generator	4 in Morogoro town
Iringa	Planned, building is still in process	4 in Iringa town
Mafinga	No	1 recently opened by an individual
Mbeya	Yes 8 computers offering internet access	10 in Mbeya town

It appears that along the route there have been attempts to open up internet cafes or to offer internet services from a private shop, as there are some signs offering internet service. But upon inspection it transpires that internet service is not available as the service had closed down due to lack of profitability. The following appear to be key factors in determining sustainability:

- Private investors setting up their own individual internet café seem less likely to succeed because:

  - They are solely responsible for paying the licence fee and the monthly fee to the satellite provider and it may be the case that their alternative business may not be able to subsidise access

  - They do not conduct any kind of feasibility analysis before setting up and go into business on the basis of expectation

  - The type of service they sign up for has narrow bandwidth and supplies a slow and interrupted service which customers are unwilling to waste Tsh500 on.

  - They rely solely on word of mouth for letting people know who live far away that they are offering a new service

3.2.1.3.1   Internet take-up

Internet take-up in these areas is still limited, and it is always the internet cafes with the fastest connection that are most popular. Outside of Iringa and Mbeya, most post office employees have not used the internet although they have heard of it and are interested to use it. Individuals in Iringa and Mbeya will use the internet as much as from twice a week to once or twice a day. As with much of African organization there is a strong delegation principle. A senior may ask a junior to go and check their emails for them and hence its easy to envisage a situation whereby a businessman or large farmer who lives in a remote area would ask a computer literate worker to go and check the emails for the business without having to make the journey himself. This messenger would then possibly travel a long distance to reach the service. Alternatively individuals could use the hybrid mail

service[13] to avoid making the journey to the post office to communicate with individuals who do not have internet access. Through this services, the customer emails the letter to the Post office who then prints and delivers the letter to the recipient who does not have email access. TPC currently charge $0.3 to send an email which would be delivered as a letter and a further $0.3 to send an attachment.

3.2.1.3.2 Willingness to pay

In terms of paying for the service, Tsh500 (approximately 50 cents) was unanimously agreed as a suitable price for internet access. Many places seem to charge Tsh500 for half and hour and Tsh1000 for one hour but service providers made the point that users don't generally use the internet for defined half hour periods – people often use either 20 or 40 minutes worth depending upon the speed of connection, the number of emails they wish to send and any internet surfing they plan to do. In either case people are happy to pay Tsh500 for access to achieve their original purpose and if usage goes above an hour to pay extra for that time. The individual internet cafes have all priced competitively to win business from each other, some pricing as low as Tsh400 for half an hour. It does seem that the user fee of Tsh 500 is based upon acceptability and affordability rather than cost of service but there is no evidence of queuing to suggest the price is too low.

Quality of service is extremely important even at the low income levels. The opportunity cost of an internet session might be time spent selling goods at the market and if the connection is slow or disrupted, people may be unwilling to spend both the Tsh500 and the time required.

3.2.1.3.3 Purpose of internet use

The primary use of internet services is for email. When asked about what they wanted to use the internet for, the respondents always replied "email". Once probed further the respondents agreed that other purposes would be useful eg news, entertainment purposes, education, business and ultimately health. The initial desire to use the internet seems to be strongly based on social communication purposes which is what we would expect from the representative sample we were interviewing who were mainly individuals rather than businesses as users.

Looking at the business segment, there is a strong demand for internet service provision direct to the office for some major businesses in the region. In Mbeya, TPC has connected 8 customers to its VSAT network but is limited in connecting the 30 waiting businesses due to low bandwidth capacity and the current requirement to connect by cable within a 200m radius of the HPO VSAT.

In the areas where there is no internet access but there are large businesses – eg mainly in the agricultural sector, like large tea estates, sugar farms, paper mills, tourist hotels etc these enterprises often have their own internet access through VSAT or radio simply because they cannot manage their business in any other way. Hence the focus in this study has been on individual and small and medium enterprise (SME) use rather than looking at large businesses who will generally organize their own internet access. However, if by virtue of gaining VSAT connectivity the Post Office can then link up local businesses to the internet and then charge monthly for the service then this potential revenue could make the internet business viable for the Post Office.

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[13] The customer emails the letter to the Post office who then prints and delivers the letter to the recipient who does not have email access

It is difficult to estimate the benefits of internet use to individuals as one can never predict exactly what the internet will be used for. A recent study carried out in Tanzania[14] found that the main use of the internet in Tanzania amongst the youth has been primarily for entertainment purposes and that searching for educational and health resources are low on surfer's agendas.

However, if individuals start with email then by virtue of becoming familiar with computers and the boundaries of the internet and from communicating with other users, they will start to explore the world wide web. Most universities in the developed world conduct a major part of the syllabus through the web and in this way if internet access becomes more prevalent in Tanzania there is no reason why students shouldn't be able to carry out much of their course through the internet or use it as a tool of research. Indeed this could increase attendance on University courses in the long-run if students are able to study from home by attending nearby internet cafes for course materials, hence bringing down the cost of studying. From the interview process it became clear very quickly that students are the main segment of the population likely to use and ultimately benefit from computer use. Below we segment the population by likeliness to use the internet and it should be noted that this simple analysis is based on the overall impression created from the response the interviews.

Population segment	Likeliness to use the internet
Students	Very likely for emailing friends and family, entertainment and education purposes. Most of the information about courses can be found through the internet. The post office currently coordinates the application process for Tanzanians to study in Uganda and this could be conducted through the internet.
Small businesses/Market traders	Likely for price information, many goods are imported from Zanzibar and Dubai and email contact would facilitate this process. Similarly for vehicle spares which are high in demand and need to be imported.
Large businesses	Unlikely to use for personal use but would request connection to premises
Hospitals	Possible. Currently no hospitals have internet access in the region surveyed but it would be useful for ordering drugs and for consulting specialists. Ultimately hospitals and clinics could use the internet for disseminating health information (including warnings and advice) to the regional population.

3.2.1.3.4   Literacy

From the response to the questionnaires and the interview process, literacy does not present a barrier to the use of the post office services. Overall most people who use post offices can read and

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[14] The Use of Internet Cafés by Young People in Dar es Salaam and Tanga, Dr D Simba, October 2003

write. Of those who cannot, they are usually completing an errand for someone who has written a letter or needs to collect for someone who can read and write, so the initiator of the visit is nearly always literate. Post office managers did not think that people wouldn't come to a post office because they can't read and write.

However this is not surprising because according to our estimated data a maximum of up to 8% of the local population around a post office are using a post office once a month. So we would expect this proportion to be composed of the 71% of the population who are literate.

Literacy levels appear to be high across the region. The national level of literacy is 71%[15]. Estimations of literacy levels in the areas surveyed averaged around 80% for the total local population. These are enforced by the literacy rates recorded in the Household Budget Survey 2000/01 published by the National Bureau of Statistics which are; Morogoro: 72%, Iringa: 81% and Mbeya: 79%. Iringa and Mbeya are known to have high education levels relative to the rest of the country due to the prevalence of good schooling in the area. In the rural areas the household survey records that 33% are illiterate compared to 14.2% in urban areas.

So the conclusions to be drawn are that illiteracy is not likely to be a barrier to internet use but also that the illiterate are unlikely to want to use the internet in the first place. But if an illiterate person has a need to use the internet then they would be assisted by a friend or a relative. For example, they might want to use the letter to email service as described under Simbanet in the investor interest section whereby an individual writes their own letter and then it is either scanned in and sent via email or typed in by an assistant through dictation. If internet service were provided in all post offices then the illiterate would likely be assisted by the internet assistant within the post office.

Computer literacy is a different matter and only an estimated 1% of the population are using a computer.

3.2.1.4 Infrastructure in the Area

As the statistics below show, the majority of post offices have a supply of electricity but that a fixed line telephone connection is a declining feature of post office communications. Many of the post offices visited used to have a fixed line connection but have been disconnected. Indeed, in all these countries the Posts and Telecoms business used to be joined together and hence historically many post offices are located next to the telephone exchange. All post offices are located in areas where there is mobile coverage and hence there has been major substitution of fixed services. Even in the more rural areas visited in Ipinda and Mufindi there was mobile coverage. Along stretches of the road network there are gaps in coverage but wherever there was a population center the mobile operators appear to have coverage. The prevalence of mobile can probably explain much of people's knowledge of the internet and their willingness to use it. Nowadays everybody in population centers is aware of mobile phones and has been made more so by the new appearance of community phone kiosks whereby people can go in and pay only for the cost of a call as shown in the above picture.

Below is a summary of post office infrastructure.

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[15] Household Budget Survey, National Bureau of Statistics, 2000/01. All statistics refer to adults only.

Name of post office	Electricity	Fixed phone	Mobile coverage	ISP coverage	Availability of car batteries	Space for computer and equipment	Extra security costs required?
Morogoro	Yes	Yes	Yes	Yes	Yes	Yes – separate building available	No
Mzumbe	Yes	Yes	No	No	Yes	Yes	Yes
Mikumi	Yes	No	Yes	No	Yes	Yes	Yes
Kidatu	Yes	Yes	Yes	No	Yes	Yes	No
Iringa	Yes	Yes	Yes	Yes	Yes	Yes new building under construction	No
Tosamaganga	No	No	Yes	No	Yes	Yes	Yes
Ifunda	No	No	Yes	No	Yes	Yes	Yes
Mafinga	Yes	Yes	Yes	Yes	Yes	Yes	No
Makambako	Yes	Yes	Yes	No	Yes	Yes	Yes
Ilembula	No	No	Yes	No	Yes	Yes	Yes
Mufindi	Yes	Yes	Yes	No	Yes	Yes	Yes
Mbeya	Yes	Yes	Yes	Yes	Yes	Yes existing internet café in separate room	No
Uyole	Yes	Yes	Yes	No	Yes	Yes	Yes
Chimala	Yes	No	Yes	No	Yes	Yes	Yes
Kiwira	No	No	Yes	No	Yes	Yes and office being currently relocated	Yes

Name of post office	Electricity	Fixed phone	Mobile coverage	ISP coverage	Availability of car batteries	Space for computer and equipment	Extra security costs required?
						nearer the road	
Tukuyu	Yes	Yes	Yes	No	Yes	Yes	No
Kyela	Yes	Yes	Yes	No	Yes	Yes	No
Ipinda	Yes	Yes	Yes	No	Yes	Yes	Yes
Songwe	No	No	Yes	Yes	Yes	Yes	Yes
Mbalizi	No	No	Yes	No	Yes	Yes	Yes

The measure of access to communications is much higher than the traditional teledensity statistics show. Relating penetration to the number of individuals with phones or households with telephony does not capture the principle of shared access which works extremely well across Africa. To calculate the number of people without access to telephony we would need to assess how many people live more than say 50km from shared phone line and who cannot afford Tsh300 for a phone call or the bus fare to reach to phone. With the extent of rural bus services in Tanzania, rural populations are relatively mobile but affordability remains an issue for subsistence farmers.

The main barrier to providing internet access through the post office is the 30% of offices without electricity. However, it may be worth the Post Office offering to pay for electricity at the sub post office level as it does at the FPO level. The issue then remains with the agent and their ability to pay the usage charges. In places where the Tanesco[16] grid does not reach, villagers use car batteries to power devices such as radios. Through the trip it became clear that this was a main use of car batteries in the rural areas and that the battery owners would travel to the nearest town to charge the batteries when required. As a typically male occupation to be a fundi (or mechanic) in Tanzania[17], one could then deduce that access to the radios and hence to information is predominantly in male hands.

Most post is delivered by public transport demonstrating the complementarity between the rural bus network (run by private individual operators) and the post office network. There is an overnight van which runs between Dar es Salaam and Mbeya which transports mail along the major route. Mail is then distributed to the rural post office via public transport as the Post Office has a contract with local bus operators who pick up mail bags en route.

Most schools in the area do not have phone line access and none have the internet.

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[16] The state-owned electricity transmission and distribution company in Tanzania
[17] The impact of this statement is to in no way assert that there are no female fundis in Tanzania

3.2.1.5   Post Office Capacity

TPC currently has six post offices connected to a VSAT network and a further 7 post offices around the country with VSAT terminal but where data transmission is not yet operational.

Perhaps due to keenness to adopt the internet in all post offices, all respondents indicated there would be space for internet access and that it would be possible to keep it secure and dry. The on site visits proved that space was on the whole not a problem. In the DPO's, the Post masters are generally looking at creating a special area/room/building for internet use. At the FPO and SPO level there was usually a suitable space near the post office counter which could house one or two computers and printing facilities under the eye of the Post Master suggesting that it would not be necessary to employ extra staff to run the internet service. Users would queue at the counter to pay for access (the existing level of queuing as mentioned was not seen as a problem) and would then take their place at the computer.

In terms of number of employees per post office and the availability of people who can train in computers or the use of the internet, the table below refers:

Name of post office	Number of employees	Availability of trainers in computers	Availability of trainers in internet use
Morogoro	37	Yes	Yes
Mzumbe	1	Yes	No
Mikumi	1	No	No
Kidatu	3	No	No
Iringa	18	Yes	Yes
Tosamaganga	1	No	No
Ifundo	1	No	No
Mafinga	3	Yes	No
Makambako	3	No	No

Name of post office	Number of employees	Availability of trainers in computers	Availability of trainers in internet use
Illambula	1	No	No
Chimala	1	Yes	No
Mufindi	1	No	No
Mbeya	36	Yes	Yes
Uyole	1	No	No
Kiwira	1	No	No
Tukuyu	4	Yes	No
Kyela	1	No	No
Ipinda	1	No	No
Songwe	1	Yes	Yes
Mbalizi	1	Yes	Yes

In most towns there are individuals who are able to train others in the use of computers, but expertise in the use of the internet is more limited. The Vocational Educational Training Association (VETA) run computer training courses all over Tanzania and it would make sense for the Post Office to ally with such an organization in terms of training its own staff and then providing on-site computer courses at the internet stations.

The key limitation of the post office is the availability of technicians to fix computer and hardware problems as they arise. Currently, the Mbeya internet café relies upon technicians traveling overnight from Dar es Salaam (850km away) from either Posta Headquarters or SATCOM (the satellite provider for TPC's VSAT network) to come and fix the problem. This means that service could be interrupted for at least 12 hours before a solution is found.

3.2.2 Zambia

There are 235 post offices in Zambia which fall into the following categories:

- Post Offices – 116 (These offer all postal services)

- Sub Post Offices – 64 (These do not offer all the postal services. They usually offer mail and parcel services only)

- Postal Agencies – 55 (These are independent companies which have been contracted by the Head Post Office to offer any of the postal services)

The following rural post offices marked on the map and listed in the table were visited to assess the capacity of the selected post offices in terms of infrastructure and to find out more about the demand for internet services.

Name of Post Office	Post Office Type	Post Office Grade	Post Office Classification
Lusaka Rural			
Mumbwa	Post Office	Grade 3	Rural
Nangoma	Sub Post Office	Grade 3	Remote
Mazabuka	Post Office	Grade 2	Rural
Kafue	Post Office	Grade 2	Rural
Southern Area			
Choma	Post Office	Grade 1	Rural
Chisekesi	Post Office	Grade 4	Remote
Pemba	Post Office	Grade 4	Remote
Monze	Post Office	Grade 2	Rural

Central Area			
Kabwe	Post Office	Grade 1	Town
Kapiri Mposhi	Post Office	Grade 3	Rural
Chisamba	Post Office	Grade 4	Remote

All post offices are classified under Class A, B or C as the table below shows, All post offices apart form the main offices at Lusaka, Livingstone, Ndola and Kitwe fall under category C. All the post offices visited in this study fall under class C which is further subdivided into grades 1,2,3 and 4.

Class	Post Office referred to
A	Lusaka Main Post Office
B	Kitwe, Ndola and Livingstone Post Offices
C	All other Post Offices

Grade 1 refers to post offices serving the most people with all the postal services on offer and Grade 4 refers to post offices serving the least number of people with the basic minimum postal services. However, the Post Office do not appear to operate an up to date and consistent grading system. it These grades were developed more than 5 years ago and have neither been upgraded nor reviewed since then. The post office personnel who worked on classifying these grades are themselves unable to define the grades or reveal the basis on which the grades where arrived at.

Southern and central provinces are predominantly agricultural areas comprising peasant and commercial farmers, whilst the larger number of commercial farmers have settled in the Chisamba area (this is central Zambia, to the north of Lusaka). All the areas visited, with the exception of Nangoma and Mumbwa are along the line of rail. The rail line is an important business route in Zambia and the main towns are found along this route. Both local and international travelers passing through on business or leisure therefore frequently visit these towns.

3.2.2.1   Services Provided by the Post Office

Post office type	Services provided
Post office	Mail and parcel collection and delivery, counter services, money orders, box rentals, Expedited Mail Services (EMS), state lottery services, television license collection, motor vehicle licensing, Western Union money transfer services, pension services

Sub post office	Mail and parcel collection and delivery, counter services, money orders, postal orders, box rentals, Expedited Mail Services (EMS) (however, there is no consistency in services offered)
Postal agency	Mail and parcel collection and delivery, box rentals and Western Union money transfer (services offered by the postal agencies vary from one to the other)

In general it was found that all the post offices provide letter and parcel collection and delivery; money orders and box rentals. With the exception of Nangoma sub-post office, all the other post offices provide expedited mail services (EMS); state lottery services; television license collection for the national television station, Zambia National Broadcasting Corporation (ZNBC); motor vehicle license payments, Western Union money transfer services and Pension services. In addition, Kapiri-Mposhi is the only post office which collects house rentals on behalf of Zampost. On the other hand, Kabwe is the only post office with a business centre offering services including faxing, photocopying, binding, selling of stationery and telephone services to both fixed phones and mobile phones. The volume of letters sent and received through various post offices ranges from 111 in Nangoma to over 21,000 mail items handled every month by towns like Kabwe and Choma. Financial services are offered at all post offices however most transactions tend to be postal rather than financial.

3.2.2.2 Demand for Post Office Services

It was observed that the demand for postal services is generally high in all the areas visited and it is common to receive customers requesting internet services. Customers who visit the post office on a regular basis, i.e. in a week ranged from 20 to 700. On average, most people use post offices to send mail within Zambia and this costs approximately US$ 0.25. The amount of money people spend per visit ranges from US$0.25 to USD1.25. It should be noted that there has been an increase in the number of visits to the post office because of the introduction of television license fees. The Zambia National Broadcasting Corporation through Ministry of Communications and Transport recently enforced a law for all TV viewers to pay a monthly license fee of approximately USD0.42. However ZNBC indicate that approximately 80% of collections are made through electricity bill payments and the remaining 20% is shared between post offices, resident development committees and ZNBC itself. To help ZNBC collect TV license fees, it (ZNBC) requested bodies that are far spread around Zambia to help in the collection process. These bodies include schools, council headquarters and post offices. Furthermore, literacy levels are above the national average of 55%[18] in these areas and the PostMasters expressed the view that the local population does not avoid visiting the post offices because they cannot read and write.

3.2.2.3 Demand for Internet Services

None of the post offices visited have internet access. However, with the exception of Nangoma, all the post offices have heard of the internet and have received requests to offer internet services. Two of the post offices, Kabwe and Mazabuka, have members of staff who use internet cafes which are within walking distance on a monthly basis, paying US$2.08 and US$1.25 per hour respectively. Postmasters in the various offices estimated that customers would be willing to pay between US$1.25 and US$4.17 per hour.

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[18] Central Statistical Office

The post office headquarters has access to internet on some of its computers. However this is just for internal use and not offered to customers. There were intentions to set up internet points for customer use, however, Zampost has been financially constrained and no action has been taken to set this up.

Information thought to be lacked by people in the areas visited includes information on agricultural prices, current affairs, health, education, entertainment, local social events and e-business. It was generally felt that the main use of internet will be for obtaining information on prevailing agricultural prices of commodities being sold within Zambia including fertiliser prices. The internet was also seen as a source of current affairs information for both the international and the local scene.

Because of the nature of the towns visited, i.e they are situated along the line of rail, with the exception of Mumbwa and Nangoma, it is expected that the demand for internet would tend to be high. Apart from farming, there is a significant amount of business activity in these areas and most formal institutions such as banks, government institutions and non-governmental organisations who do not have access to the internet will be willing to pay for and use the internet. Customers would likely include not only the local population but also travellers passing through. Of the 11 post offices visited 6 have internet cafes within walking distance as the table below shows. The other areas do not seem to have internet cafes within their area unless individuals are linked up by dial up connection in their homes, such as Chisamba. As earlier mentioned, Chisamba is a predominantly commercial farming area. It is located approximately 30km from the main road and is a closed area with one entrance and exit. According to the Postmaster at Chisamba, some farmers have internet access in their farms. However, requests for internet access still come in.

Towns with internet cafés	Distance between Internet Café and post office
Choma	500 metres
Monze	2 km
Mazabuka	2 km
Kafue	2 km
Kabwe	500 metres
Kapiri Mposhi	100 metres

3.2.2.4   Post Office Infrastructure and Capacity
Below is a summary of post office infrastructure relating to the setting up of telecentres.

Name of post office	Electricity	Fixed phone	Mobile coverage	ISP coverage	Availability of car batteries	Space for computer and equipment	Extra security costs required?
Mumbwa	Yes	Yes	No	Zamnet, Zamtel	Yes	Yes	No
Nangoma	Yes	No	No	No	No	No	No
Choma	Yes	Yes	Yes	Coppernet, Zamnet, Zamtel	Yes	Yes	No
Pemba	Yes	No	Yes	Zamnet	Yes	Yes	No
Chisekesi	Yes	Yes	Yes	No	Yes	Yes	No
Monze	Yes	Yes	Yes	Zamnet	Yes	Yes	Yes
Mazabuka	Yes	Yes	Yes	Coppernet, Zamnet, Zamtel	Yes	Yes	Yes
Kafue	Yes	Yes	Yes	Zamnet, Zamtel	Yes	Yes	Yes
Kapiri-Mposhi	Yes	Yes	Yes	Zamnet, Zamtel	Yes	No	Yes
Kabwe	Yes	Yes	Yes	Coppernet, Zamnet, Zamtel	Yes	Yes	Yes
Chisamba	Yes	Yes	Yes	Zamnet, Zamtel	Yes	Yes	Yes

Note: Zamtel uses dial up connection.

As earlier mentioned, the main post office has internet access for some of its staff. In total there are 40 computers at head office with another 60 in towns other than the head office. Of the 40 computers in head office, two-thirds are used by the finance department and these are the only ones that have been networked through a local area network. There have been plans for a complete networking to be done at head office but this has not happened due to resource constraints. All the post offices visited have supply of electricity and no back-up generators. Currently post office services are not heavily dependent on electricity and so in-spite of experiencing some interruptions in electricity supply, business goes on normally. This is with the exception of Kabwe which will have some of its operations in the business centre interrupted.

The extra security costs that were identified are night guards or putting up burglar bars. It should be noted that some post offices will not require extra security costs as they are next to police posts, such as Mumbwa and Nangoma.

Of the areas visited, some of the primary and secondary schools have access to telephones but none of them have internet access.

In terms of number of employees per post office and the availability of people who can train in computers or the use of the internet, the table below refers:

Name of post office	Number of employees	Availability of trainers in computers	Availability of trainers in internet use
Mumbwa	3	Yes	No
Nangoma	1	No	No
Choma	11	Yes	Yes
Pemba	3	Yes	No
Chisekesi	2	Yes	No
Monze	3	Yes	No
Mazabuka	12	Yes	Yes
Kafue	6	Yes	No
Kapiri-Mposhi	5	Yes	No
Kabwe	24	Yes	Yes
Chisamba	1	Yes	No

In the post offices visited, post masters identified individuals who might be able to train in computers or the internet. In some cases these are teachers at nearby schools or colleges or individuals who know how to use computers and the internet but are currently not utilizing their computer skills. For instance, at both Mazabuka, Chikankata Training School and Mazabuka Girls High School there is a teacher who knows how to use the computer and the internet. In Kabwe, Nkurumah Teachers Training College and Angelina Tembo Convent School were identified as having possible trainers in

computers and the internet. In Choma, there is a computer center, Micronet Professional Designs Computer Centre, which offers training in computers and the internet

3.2.3 Malawi

In Malawi, the following rural post offices, covering all the three regions of Malawi, were visited to assess the capacity of the selected post offices in terms of infrastructure and find out more about the demand for internet services. One Head Post office in the northern part of Malawi, Mzuzu, was also visited. The map above sets out the location of these post offices and demonstrates that the survey managed to cover most areas of the country due to the smaller relative size of Malawi compared to Tanzania and Zambia.

The Post Office classifies post offices as city, district and rural which we show below. However, some of the district POs would still fall under rural according to the definition of rural according to the Ministry of local government. The Post office defines any post office outside the district centres as rural even those some of these centres may not appear rural in the traditional sense as they are busy trading centres.

Post Office	Distance from nearest major town (Km) within the region	Post office type (Rural/Urban Classification
Northern Region		
Bolero	80	Rural
Rumphi	70	District
Ekwendeni	20	Rural
Mzuzu	0	Urban
Chikangawa	60	Rural

Central region		
Nkhamenya	180	Rural
Madisi	76	Rural
Mponela	60	Rural
Ntcheu	176	District
Manjawira	110	Rural
Southern region		
Mpemba	10	Semi-rural (close to Blantyre)
Nchalo	80	Rural (but high economic activity due to sugar plantation and factor nearby)

These post offices are situated along the main road which runs from down the southern region of Malawi up to the northern region of Malawi. The main source of livelihood is agriculture mainly in central and northern part of Malawi where the main crop is tobacco. In the southern region, the main source of livelihood is petty trading and it is common to see people clustered along the road in order to sell different merchandise. In all the three regions people also practice small scale vegetable farming. As such most people travel some distance to the main road in order to access the main towns.

This route was taken because it is easily accessible by road over a 3 day trip and the Post Offices visited represent a good sample of the different types of Post Offices in Malawi

In Malawi, there are 176 post offices which can be broken down into the following types:

- 13 urban Post Offices (These are situated in the main cities of Malawi in each of three regions. Out of these, there are three head post offices, one for each region.)

- 24 district post offices for each of the 24 districts (These are the next level down. Malawi has 27 districts but 3 are covered under head office post offices)

- 139 rural post offices (These are the rest of the post offices with some offices located in major trading centres across the country).

The purpose of the field trip was to look at the provision of infrastructure at all the different levels of post office and to assess general suitability and readiness for internet service provision. As the table above shows, we visited a total of 1 head office, 2 district offices and 9 rural post offices. Whilst the Post Office have plans to put internet services into all the head offices plus 2 at other post offices

(Mangochi which is tourist attraction near Lake Malawi and Zomba another big municipal town), the focus was to look at the next layer of post office – the district and rural office levels. We surveyed approximately 6% of all types of post office. It was necessary to survey such a relatively small sample due to time limitations. Despite the small sample size it was easy to get a feel for the standard of service and infrastructure for each post office type that would pervade across the country. Below we set out the results for each part of the questionnaire in detail:

3.2.3.1   Services Provided by the Post Office

In general it was found that all the post offices provide letter and parcel collection and delivery; money orders (telegraphic and ordinary), postal orders, sale of stationery, stamps and box rentals. In addition Rumphi, Mzuzu and Ntcheu post offices provide Express Mail Services (EMS); Nkhamenya, Madisi, Mponela, Ekwendeni and Manjawira act as agencies for the Malawi Savings Bank. In addition, Ntcheu, Mpemba and Nchalo pay out pension benefits to retired government personnel. Ntcheu, Rumphi and Ekwendeni sometimes sell, on behalf of Malawi Telecommunications Limited, Telekom Networks Limited and Celtel prepaid cards.

All post offices provide the same type of services except for the head, district and selected rural post offices situated in the main trading centres which provide Express Mail Services (EMS).

3.2.3.2   Demand for Services

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Below we set out a table showing average number of customers per week by post office type.

Post Office Type	Estimated Average number of individual customers per week[19] (excluding large customer like utilities and factories)
Head Office	20-250
District Post Office	20-175
Rural	10-50

As the table shows the number of estimated regular customers to the Post office varies widely and in some cases can be low even at the departmental level. This will depend upon the location of the Post office. Where there are large trading centers and the population is more dense we might expect a higher number of regular post office users for rural post offices than some district post offices. When we take number of estimated users per week and divide by a) the post office's estimation of the local population within walking distance, we find very low penetration levels for post office services.

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[19] Based on the estimates given by the PostMasters

Post office type	Percentage of estimated population within walking distance using the Post Office every week
Head Post Offfice	0.2- 0.3%
District Post Office	0.2- 0.4%
Rural Post Office	0.09- 0.3%

According to Post Office unofficial estimates therefore, approximately only 0.2% of the population who have access to a Post Office in the region are actually visiting the Post office every week. Although there is low usage, affordability of services is not considered low. Customers who use the post office for their own purposes (ie for personal or small business mail not for large business use eg utility bills etc) on average spend between MK 0.15 to MK 30 per visit. ($0.13- 0.26).

Most of the rural Post Offices in the country are loss making because they were only constructed to provide a service and not based on their financial viability. Nevertheless, the revenues earned by the urban post offices, especially on commission on money and postal orders are generated because of the rural masses as city dwellers send money to their relatives in the rural areas.

3.2.3.3   Demand for internet services

None of the post offices visited have internet access. The Post Office has one internet café located at the post office in the commercial city of Blantyre and intends to open other internet cafes in the main cities of Zomba, Lilongwe, Mzuzu and tourist attraction Mangochi district.

However, all the post offices[20] have heard of the internet and have received requests to offer internet services with the exception of Bolero, Manjawira and Ekwendeni. Two of the post offices, Mzuzu and Nchalo, have members of staff who use internet. At Mzuzu, it is the Regional Manager who has internet in her office, (some 0.5 km from the post office). At Nchalo, the member of staff accesses internet from offices of friends at a near by sugar production company. All Postmasters have never used an internet café.

Along the surveyed route public internet access is only in Mzuzu, Ntcheu and Blantyre where following facilities are available:

Town	Post Office Internet access	Other Internet Cafés
Mzuzu	Planned awaiting funds	3 in Mzuzu town
Ntcheu	No	1 at the district centre.

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[20] Interview with the PostMaster

Town	Post Office Internet access	Other Internet Cafés
Blantyre	Yes, one at Head Post office. 7 computers at the café.	At least 10 private bureaus

3.2.3.3.1 Internet take-up

Internet take-up in these areas is still limited, and it is only in the urban areas where people are commonly found accessing the internet. Most post office employees have not used the internet although they have heard of it and are interested to use it. Individuals in the cities of Blantyre and Mzuzu will use the internet as much as from twice a week to once or twice a day.

3.2.3.3.2 Willingness to pay

In terms of paying for the service, MK270.00 (approximately $2.45) was put forward as a suitable price for internet access. Many internet cafés seem to charge MK 4.50 to MK5.00 per minute in Blantyre ($2.45-2.7 per hour) and MK10.00 to MK 20.00 ($5.45-10.9 per hour) per minute in Mzuzu. People often use either 5 or 30 minutes worth depending upon the speed of connection, the number of emails they wish to send and any internet surfing they plan to do. Due to the few internet cafes, pricing is only competitive where the cafes are nearby each other.

Connection speed is extremely important especially at the low income levels and since most of the people who visit the cafes are young people without an income. Young people typically substitute email use for other activities they would carry out after school for example they would use the spare change they have to purchase snacks or lunch and spend it on the internet instead.

Purpose of internet use

The primary use of internet services is for email. When asked about what they wanted to use the internet for, the respondents always replied "email". Once probed further the respondents agreed that other purposes would be useful eg news, entertainment purposes, education, business and ultimately health. The initial desire to use the internet seems to be strongly based on social communication purposes which is what we would expect from the representative sample we were interviewing who were mainly individuals rather than businesses as users.

It is evident by watching customers at internet cafes that the main use of internet is mail with a few isolated cases where it was found that people were searching for educational and entertainment resources.

However, if individuals start with email then by virtue of becoming familiar with computers, civic education of the boundaries of the internet and from communicating with other users, they will start to explore the world wide web. Many individuals doing courses on their get most of the course material through the web and in this way if internet access becomes more prevalent in Malawi, there is more reason to believe that students will be using the internet as a search tool.

Below we segment the population by likeliness to use the internet and it should be noted that this simple analysis is based on the overall impression created from the response the interviews.

Population segment	Likeliness to use the internet
Students	Very likely for emailing friends and family, entertainment and education purposes. Most of the information about courses can be found through the internet.
Small businesses/Market traders	Likely for price information, many goods are imported from South Africa, Japan and Dubai and email contact would facilitate this process. Similarly for vehicle spares which are high in demand and need to be imported.
Large businesses	Unlikely to use for personal use but would request connection to premises
Hospitals	Not very likely. Currently no hospitals have internet access in the region surveyed but it would be useful for research by doctors and for consulting specialists. Ultimately hospitals and clinics could use the internet for disseminating health information (including warnings and advice) to the regional population.

3.2.3.3.3   Literacy

From the response to the questionnaires and the interview process, literacy does not present a barrier to the use of the post office services. Overall most people who use post offices can read and write. Of those who cannot, they are usually the elderly ones. Post office managers did not think that people wouldn't come to a post office because they can't read and write.

Literacy levels appear to be high across the country. The national level of literacy is 79% and 46%[21] for males and females respectively. Estimations of literacy levels in the areas surveyed averaged around 82% for the total local population. In the rural areas the household survey records that 23% and 58% of males and females are illiterate compared to 1% and 28% in urban areas.

So the conclusions to be drawn are that illiteracy is not likely to be a barrier to internet use but also that the illiterate are unlikely to want to use the internet in the first place. But if an illiterate person has a need to use the internet then they would be assisted by a friend or a relative. If internet service were provided in all post offices then they would likely be assisted by the internet assistant within the post office.

3.2.3.4   Infrastructure in the Area

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[21] Source The National Statistical Office of Malawi 2002 data

The main barrier to providing internet access through the post office is the 26% of offices without electricity. However, most of the Post Offices have access to electricity lines nearby and connection can be done any time. In places where the ESCOM[22] grid does not reach, villagers use car batteries to power devices such as radios. This is the main use of car batteries in the rural areas and that the battery owners travel to the nearest trading centre to charge the batteries when required.

Most post in Malawi is delivered by the Malawi Postal Corporation itself by means of vans. In some cases, however, public transport is used between the rural bus network (run by public company, Shire Bus Lines Limited) and the post office network.

Most schools in the area do not have phone line access and none have the internet.

3.2.3.5   Post Office Capacity

The on site visits proved that space was on the whole not a problem. Most of the post offices visited operate in their own buildings except for Chikangawa and this together with Nchalo are the only ones with shortage of space. In almost all the post offices, the Post masters are generally looking at creating a special area, room or building for internet use. The extra security costs that were identified generally included night or weekend guards or putting up burglar bars windows.   Below is a summary of post office infrastructure relating to the setting up of telecentres.

Name of post office	Electricity	Fixed phone	Mobile coverage	ISP coverage	Availability of car batteries	Space for computer and equipment	Extra security costs required?
Bolero (Northern Malawi)	No	No	Yes but weak signal	No	Yes	Yes	No
Rumphi (Northern Malawi)	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ekwendeni (Northern Malawi)	Yes	Yes	Yes	Yes	Yes	Yes	No
Mzuzu (City selection)	Yes	Yes	Yes	Yes	Yes	Yes	No
Chikangawa (Northern Malawi)	Yes	Yes	Yes	Yes	Yes	No	Yes
Nkhamenya (Central	No	No	No	No	Yes	Yes	Yes

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[22] The state-owned electricity generation and distribution company in Malawi

Name of post office	Electricity	Fixed phone	Mobile coverage	ISP coverage	Availability of car batteries	Space for computer and equipment	Extra security costs required?
Malawi)							
Madisi (Central Malawi)	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Mponela (Central Malawi)	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ntcheu (Central Malawi)	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Manjawira (Central Malawi)	No	Yes	Yes	Yes	Yes	Yes	Yes
Mpemba (Southern Malawi)	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Nchalo (Southern Malawi)	Yes	Yes	Yes	Yes	Yes	No	Yes

MPC has 38 pcs which are all stand alone. Individual people i.e regional managers and a few selected top managers have e-mail and internet access. One computer is currently used for data input for the accounts. The package used is Pastel. All transactions are currently manual. MPC are working on networking 75 offices with automation of counter services.

In terms of number of employees per post office and the availability of people who can train in computers or the use of the internet, the table below refers:

Name of post office	Number of postal employees	Availability of trainers in computers	Availability of trainers in internet use
Bolero	1	No	No

Name of post office	Number of postal employees	Availability of trainers in computers	Availability of trainers in internet use
Rumphi	5	Yes	Yes
Ekwendeni	3	No	No
Mzuzu	19	Yes	Yes
Chikangawa	1	Yes	No
Madisi	1	Yes	Yes
Mponela	1	Yes	Yes
Ntcheu	5	Yes	No
Manjawira	1	No	No
Mpemba	2	Yes	Yes
Nchalo	3	Yes	Yes

3.3   Summary of three countries

3.3.1   Interpretation of results

There is no reason to believe that these results are statistically significant and can be used to draw sound statistical conclusions across the three countries. To do so is a huge exercise that would involve appropriate sampling techniques and rigorous statistical analysis on the results. For example in Tanzania we visited only 20 post offices, only 5% of the total number of Post Offices. In order to produce statistically significant results we would assume a sample size nearer to 80 or 20% of total post offices.[23] What we have tried to do here is to use the survey questionnaire and meetings with PostMasters to create a picture of the postal network and its readiness and suitability for internet service. From our experience of meeting with the PostMasters all over the three countries, there is no substitute for field work of this type to assess the actual potential for internet service provision. It provides a reality check on the numbers we will present at the next stage in the business model.

3.3.2   Services Provided by the Post Office

In general the Post Office across the three countries provide a wide range of services, but all of which are institutionally focused. For example outside of the traditional postal services of postage, collection and delivery, other services are mainly money transfer through Western Union, TV licence payments, Giro, and pension services. All services which we traditionally associate with the Post

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[23] As a guide such an exercise would take at least a full four weeks

Office. There is little evidence of the Post office branching into other typically private sector related activities apart from the sale of prepaid mobile airtime cards in some post offices. Thus the Post Office has little to support its staple income from postal services as we move to an increasingly digital economy.

3.3.3 Demand for Post Office Services

The impression created by the PostMasters and the visits overall is that demand for postal services is generally high in all the areas visited. Customers who visit the post office on a regular basis, i.e. in a week ranged from 10 to 700 (and over 2000 at Mbeya Head Post Office). However taking these numbers as a proportion of the local population gives a low usage figure as shown in the table below. Looking also at average affordability also gives a picture of low spending.

Surveyed factor	Tanzania	Malawi	Zambia
Average spend per visit US$	1	0.28	0.62
% of local population using a PO per week[24]	2.07%	0.30%	2.36%
% of local population using a PO per month[25]	8.27%	1.21%	9.44%

3.3.3.1 Literacy and Content

Across the three countries, literacy levels were observed to be around ????80%/high and do not constitute a barrier to post office use. However as noted in the Tanzania section, whilst Post Office services are open and accessible to all, it is not necessarily a representative segment of the population who are actually using post office services. Instead parts of the population (which are difficult to estimate) may never come near a post office because they farm subsistently and have no need to read or write. I disagree – hospitals, schools etc – everybody needs.

3.3.4 Demand for Internet Services

Customers in Tanzania appear to be far more price sensitive for internet usage than customers in Malawi and Zambia, as the graph below demonstrates.

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[24] Using Post office local population estimates
[25] Using Post office local population estimates

Relative Internet Prices
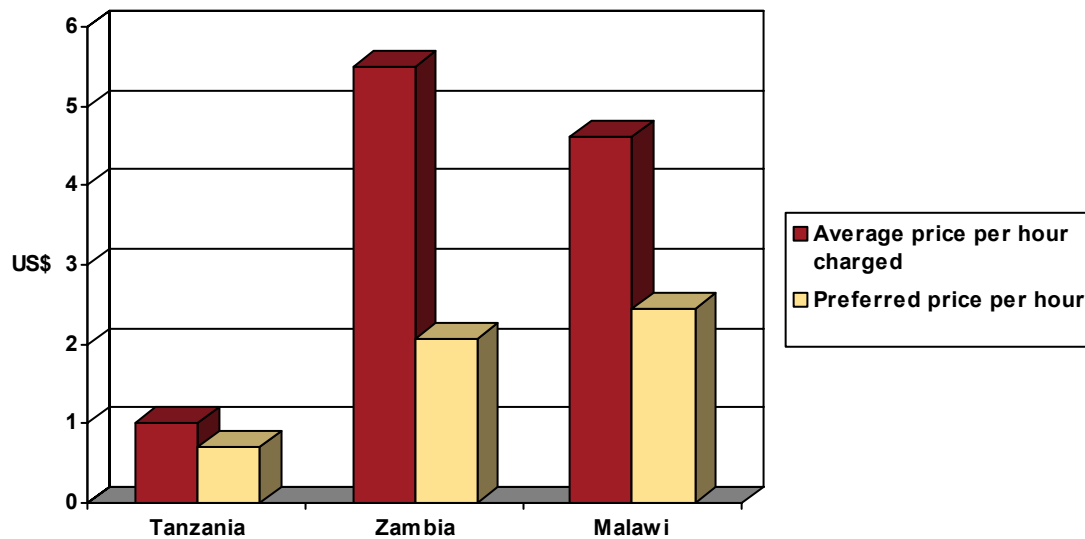
This is probably due to the fact that internet service provision has become more competitive in the urban centers in Tanzania eg in Mbeya and consumers have a good idea of what relative prices are. In order to win market share many internet cafes priced at around $0.50 per usage.[26] People are now familiar with this price and internet café managers recognize that it is now difficult to increase the price beyond this level. The same has happened with mobile telephony where Tanzania is a far more competitive environment and hence has lower call charges .

In all three countries the primary use and expectation of use of the internet is for email communications. Further benefits such as information regarding entertainment, news, market prices, education, and health are all deemed secondary. But it is expected as with internet take-up everywhere that users progress beyond email use once they have a stable and fast connection and have been introduced to effective search methods.

The largest segment of the population asking for internet services in the Post offices are students. Students are already regular users of the post office, requiring postal services to communicate with friends and family and also to receive money to pay for fees and living expenses. The fact that they are already asking for internet services suggests the extent of latent demand. It is likely that students will substitute email for postal services to furnish their communication needs as far as possible. Hence the post office could find a loss of revenues as users of this type spend their communications budget (which might be $0.30-1.5 per month) at the local internet café. However, if the post office is able to offer internet services then the students would be likely to use the post office as against the internet café if they can also address their other communication needs at the same time eg postal services to communicate with relatives without email addresses.

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[26] See discussion under Tanzania section for customers lack of preference to distinguish between ½ hour and 1 hour usage and charge.

3.3.5 Infrastructure in the area

The availability of infrastructure varies widely across the three countries as the following table shows.

Indicator	Tanzania	Zambia	Malawi
% of Post Offices with electricity	64%	85%	75%
% of Post Offices with fixed line	53%	83%	100%
% of Post Offices with mobile coverage	100%	64%	92%
If no internet, distance to nearest internet facility	10-150km	2-3km[27]	10-80km
% of Post Offices with VSAT in use in the areas?	6%	0	0
% of Post Offices with ISPs in area (in 5km radius)	6%	82%	17%

To compare the suitability of Post Offices to house public internet facilites compared to schools, the following table helps to show the current level of telephony access in schools which is clearly limited.

Indicator	Tanzania	Zambia	Malawi
% of areas surveyed where schools have fixed telephony access	40%	73%	58%
% of areas surveyed where schools have internet access	0	0	3 schools in entire area have internet access

[27] Data not available for all Post Offices in sample

In Tanzania and Zambia, schools outside of the main urban areas are unlikely to have internet access. What became clear throughout the study that in the area of each post office there are usually a number of schools (ranging from 2 to 30). If all these schools need to have access to the internet then the post office would provide a useful focal point for internet access if only one point of access is installed in the area. As schools mobilize funding for internet access then they could become customers to the post office for internet connections to their own premises.

3.3.5.1   Availability of trained staff

Most post office staff across the three countries require training for both computer and internet use. It is therefore advisable to set up a nationwide training scheme for staff which would then train staff to be able to train users in both computer and internet use. The lack of public computer availability across the three countries suggests that if installed, computer facilities would not only be used for internet but also for basic word processing purposes and for equipped local people with skills to enhance their job search capability.

It is recommended that all relevant staff who would be involved in offering the internet service will require training in computer use, internet use and in training others. This might be conducted through the Postal Headquarters and local private training firms. For example, some specialist courses run through headquarters at a national level could be attended by individuals who would then go back to their districts and train staff in their region and some courses might be run by outside training companies in the regions who offer the relevant training.

3.4   Critical Prerequisites and Key Success Factors for Sustainability

3.4.1   Initial suggested criteria.

Throughout the field trips it became clear that the following would be a useful list of criteria for judging whether a post office is a suitable location for an internet café.

- Are there schools within 5km?

- Is there a university and a local student population over 350?

- Is there business/market trading carried out within the vicinity eg 500m?

- Is there a hospital within 5km?

- A minimum revenue level for the Post office

- A minimum level of economic activity for the area (judged on contribution to GDP or value of total goods sold at the market)

3.4.2   The Competitive Environment

As with the development of mobile telephony we can expect the ISP and internet café market to become more competitive as liberalization of the sector occurs and people turn to the internet as a new and superior form of communication. Where the Post office already has internet cafés, for example, in Dar es Salaam and Mbeya in Tanzania, the post office must compete with existing ISPs and internet cafés for customers and at the present stage of take-up by relatively high income customers does so on the basis of price and quality of service. Internet cafés in the urban centers in

Tanzania are pricing low to attract customers who will then use the internet café regularly out of habit. In areas where there is only one internet café eg Mafinga, the manager of this internet café cannot expect the situation to remain like this for long. Given the entrepreneurial nature of small shopkeepers across Tanzania, Malawi and Zambia, other small businesses will recognize the opportunity and also mobilize investment to offer such services. This trend will spread from the urban centers eg Mbeya, Morogoro and Iringa to the more rural centers dictated by the profitability motive. The Post Office is also following this route of installing internet access in its most urban post offices – all the Head Post Offices in Tanzania, followed by the departmental post offices, and similarly post offices in the major cities in Malawi. This is a natural path to follow especially when investment resources are scarce and the Post office is looking for a return on its investment. However, if the Post Office were to develop an alternative strategy of addressing towns where there is currently no internet access first, they would likely develop a more sustainable model with greater returns. For example, by installing internet access in the Tukuyu post office, where there is no internet access within a radius of 75km, the Tukuyu post office has a captive population of up to 307,270[28] who would be willing to travel to use the internet facility. News travels fast in these regions and if people became aware that most post offices in towns were now offering post offices then people would plan to make a trip to visit the post office and would also now start to associate the post office with offering e-commerce services. If someone is looking for internet in the area, just as in the same way a person would be looking to post a letter, they would know to go to the post office.

Undoubtedly as post offices start to offer internet access in previously unconnected towns, other small providers will come into the market. But the post office should be able to maintain its first mover advantage through economies of scale generated by its network and through strong branding. Consumers will associate the Post Office with internet. Customer loyalty will thenceforth hinge upon pricing and quality of service.

3.4.3 The pervasiveness of the postal network

The post office network in the three countries manages to cover all the main population centers. Post offices are typically located near to schools, universities, hospitals, police stations, telephone exchanges, markets and areas of social and economic activity. It became clear from the Tanzania field trip that TPC are constantly on the lookout for new centers to set up and are well aware of areas where communities may not be so well served and also of the need to relocate existing post office services. Where the Post Office may lack capacity is in encouraging the local population to make more of the facilities the post office offers. For example, none of the franchised post offices or sub-post offices visited in Tanzania which are located in the more rural areas, were very busy. And indeed the weekly estimated customer numbers reflect this. Thus the post office could act to bring more business in by offering a wider range of services such as phonecards, stationary and basic foodstuffs where availability of other shops in the area is limited. Bringing in the internet would then create an extra competitive advantage for the post office enhancing its service offering over and above other internet cafés in the area. And where there is no existing internet service (as in most towns) the local community will benefit from the new service availability and will be drawn to the post office on this basis.

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[28] Included under the Rungwe region in the Tanzania National Census 2002

Enticing customers to internet use will depend much on the entrepreneurial and marketing skills of the Post Master in each post office. Whilst the Head office may drive an enthusiastic marketing campaign to increase internet awareness and use through the postal network, the success will ultimately depend upon the individuals who encourage their customers to experiment with the internet. Training and technical support are essential and without proper training prior to internet launch the project would likely fail. Availability of local technical expertise from the local major town is essential to ensure service is not disrupted.

Another key advantage the post office has over institutions and individual providers on internet is that each office can communicate effectively with one another. Once the VSAT network is installed for all post offices through Tanzania, Post offices will be able to communicate instantly through their intranet. But if it is not feasible to connect all the sub post offices and franchised post offices due to financial constraints, these offices can still communicate effectively with each other through the system of organized mail collection and delivery through the public bus service. So in this way it would still be possible for individuals using a sub-post office without the internet to access information and emails. Relevant content could be downloaded on a weekly basis from the Head Post office and then delivered to the local post offices. Customers can then either pay a small fee for the information they are looking for eg a set of market prices, a news rounds-up, or pages from a chosen website or could receive the email they had been expecting through the hybrid mail service. Whilst the Post Office may not be able to finance internet provision to all Post Offices due to the cost of VSAT and the monthly access fee, this may be an acceptable substitute until VSAT becomes viable which also allows time for the local population to become familiar with the benefits of the internet.

3.4.4 SWOT Analysis

We have prepared the following SWOT analysis for the three countries.

Tanzania

Strengths	Weaknesses
✓ Ready-made network and known brand	✗ Low bandwidth capacity
✓ Existing customer base	✗ Inability to meet demand
✓ Existing infrastructure and buildings	✗ Slow and insufficient technical support
✓ Can communicate well with local communities and other post offices	✗ Relies heavily on postmasters
✓ Aware of existing social needs	✗ Lack of internet capability amongst staff
✓ Locally run	✗ 34% without electricity, no standby generators
✓ Located near to population centres	

Opportunities	Threats
↑ Consumers demanding service	↓ Competition
↑ Low penetration of internet	↓ Below cost pricing and low affordability
↑ First mover advantage in rural areas	↓ Initial cost of VSAT set-up and maintenance fee
↑ Training needs within community	↓ Monthly access fee
↑ New revenue source	↓ Lower than expected usage
↑ Increase popular perception of Post Office	↓ No financing available
↑ Schools in the area do not already have internet access	↓ Equipment security

Malawi

Strengths

✓ Internet awareness

✓ Existing customer base

✓ Space available

✓ Can communicate well with local communities and other post offices

✓ Aware of existing social needs

✓ Located near to population centres

✓ Car batteries available

Weaknesses

✗ Unprofitable post offices in rural areas

✗ No internet cafés at present

✗ Mobile coverage is limited

✗ Slow and insufficient technical support

✗ Lack of experience

✗ 25% without electricity, no standby generators

Opportunities

↑ Consumers demanding service

↑ High prices

↑ Plan to put in Main Post Offices

↑ People lack information

↑ Training needs within community

↑ New revenue source

↑ Increase popular perception of Post Office

Threats

↓ Cost of equipment

↓ Initial cost of VSAT set-up

↓ Monthly access fee

↓ Existing business in rural areas already requires subsidy

↓ Equipment security

↓ Lack of training expertise

Zambia

Strengths

- ✓ Ready-made network and known brand
- ✓ Existing customer base
- ✓ Existing infrastructure and buildings
- ✓ Can communicate well with local communities and other post offices
- ✓ 85% of offices have electricity
- ✓ Located near to population centres

Weaknesses

- ✗ No current plans to install internet
- ✗ Lack of experience
- ✗ Lack of internet capability amongst staff
- ✗ Lack of interest in providing internet
- ✗ Lack of up to date postal policy

Opportunities

- ↑ Consumers demanding service
- ↑ Low penetration of internet
- ↑ First mover advantage in rural areas
- ↑ Training needs within community
- ↑ New revenue source
- ↑ Increase popular perception of Post Office
- ↑ Schools in the area do not already have internet access

Threats

- ↓ Initial cost of VSAT set-up
- ↓ Monthly access fee
- ↓ Equipment security
- ↓ Other ICT initiatives being set up
- ↓ Lack of committment

3.4.5 Conclusions

The field trips undertaken in the three countries produced strong anecdotal evidence that the post office network would make a suitable basis for offering public internet access throughout the three countries. The post office has one of the best distribution networks in all three countries reaching out further than existing private national networks such as petrol stations, banks and shops, and receiving a wider visitor based than public institutions such as schools, universities, Government district offices and police stations.

3.4.6 Classifying the post offices by type

It has been important to generate a common classification system for the three countries to reflect how rural post offices are. The following table sets out comparative urbanity and shows how post offices are classified in each country.

Generic Classification	Criteria	Tanzania	Zambia	Malawi
City (Urban)	• Main city population over 250,000. • High post office revenues.	Head Post Office	Post Office	City
Town (Secondary urban)	• Main areas of economic activity outside of the cities. • Population may be as large as a city depending on the catchment area of town. • Medium post office revenues.	Departmental Post Office	Post Office	District
Small town (rural)	• Next level of economic activity down from town level. • Again population varies widely from 5,000 to 30,000 depending on catchment area. • Low post office	Franchise Post Office	Sub Post Office	Rural

Generic Classification	Criteria	Tanzania	Zambia	Malawi
	revenues. • This could be a small market town in a rural area			
Large village (remote)	• A population center which is more remote with the least economic activity • Population varies from 3000 to 20,000 • Very low post office revenues and may be loss-making (eg Malawi)	Sub Post Office	Postal Agency	Rural

We therefore classify post offices as either city, town, rural or remote and the table above relates this to each in-country classification.

3.5 The ideal candidates for internet provision?

The Post office presents a ready made network in each country for the provision of public internet services. However traditionally these postal organizations have been crippled by poor organization, management and financial accountability. How can they be expected to provide the latest electronic services? The answer partly lies in looking at the key alternatives to the postal network which include: Government district offices, police stations, schools, hospitals, banks and private entrepreneurs. Two features which the post office have which none of these institutions have is that firstly anyone can walk into a post office whereas not everyone will want to go to a school, hospital, district office and certainly not police station. Secondly, it's a publicly owned institution and can in theory through a policy directive be encouraged to provide internet service whereas a bank or a private entrepreneur might not. Training and careful financial management are prerequisites to ensure that the post office can offer internet services effectively.

Many post offices are already engaged in offering financial services and it is these post offices which will particularly benefit from intranet and internet access to enable transactions to be carried out over a network rather than through costly fax transmissions. Indeed already satellite operators and banks are looking at opportunities through post offices in Tanzania to offer electronic financial services to individuals living away from the bank branch network.

4 Current Profitability

4.1 Tanzania Costs and Revenues

As part of the overall commercialization process, TPC has been engaged in a performance contract which measures overall profitability of TPC each year against a target of 10%. For the purposes of the performance audit to measure TPC's performance, profitability is calculated by comparing pre-tax profit to turnover as stated in the accounts. The figures quoted are presented as a guide rather than as a definitive profitability measure as some adjustment to the accounts was recommended under the previous performance audit[29] and is required to put them in line with IFRS. In 1999 TPC reported profitability of 5.48% and in 2000, 1.77%. However if adjustments are made to the pre-tax figures in line with International Financial Reporting Standards (IFRS) then profitability would be reduced. The target of 10% is particularly high as most African Postal Operators report negative profitability. Even in most liberalized markets in Europe, profitability levels are little over 5%.

Postal volumes have been growing for domestic mails and parcels but in decline for international mails due to the increasing market presence of the private courier companies. Counter services (express money orders, postal orders, postal bank transactions) have been declining in volume since 1997 whilst expedited mail services including fax messages and money fax have been growing over this period. Overall revenues have been growing well above the rate of inflation and profit after tax has varied but has remained positive.

TPC's expected positive profitability can be partly attributed to its treatment of rural post offices in terms of its overall cost structure. TPC has franchised off all its previously unprofitable post offices. To qualify as a departmental post office (DPO), a post office must be able to meet the cost of its own expenses and at the very minimum be able to pay the one member of staff who runs the post office. If a post office was loss-making then it was franchised off. These franchised post offices (FPO) are now commonly run by retired TPC staff who operate a postal service but are encouraged to earn revenues from other sources of business, for example a side business of a grocery stores or selling other goods and services from the post office premises. The rationale for taking over a franchise is to be able to operate a business from a post office building which usually is in a good location close to other shops/markets and schools and hospitals. Sub-post offices (SPO) may be the lowest source of revenue for TPC as they are operated under the universal service principle of the licence. If a post office cannot be franchised then it is passed to an agent who might have another business to run it as a sub post office. They are given an inventory to sell and 10% of the revenue is earned as income by the SPO agent. SPO's and FPO's typically have very low operational costs which is why TPC's overall profitability remains positive. Operational costs are low for the SPOs and FPOs because the Post office covers only the costs shown in the table below. The Post office does not cover phone or fax charges or electricity for example, so overall running costs to the Post office as a whole are low and hence they can afford to supply services to that type of Post office. Transport costs are relatively low as the rural post offices use public transport. The Post office may pay rent to the owner of the premises to offer post office services where it does not own the building at the FPO and SPO level. In this way, TPC are able to offer far-reaching services to remote locations where services would otherwise be unprofitable because the operational costs are so low and cover only:

- Salary of agent

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[29] The previous Performance Audit was carried out by PricewaterhouseCoopers in 2002

- Transport costs for delivery of mail

- Office rent if applicable

- Office cleaning

The following table sets out costs for typical post office types: DPO, FPO and SPO shown as a percentage of total expenditure which is set out in the final row in US$. This shows exactly how low expenditures are at the FPO and SPO level. Instead of collecting a salary the franchisee or the agent takes a percentage of the revenues (normally about 10% as commission).

EXPENDITURE	DPO	FPO	SPO
Salary	53%		
Transport costs	3%	26%	11%
Administration	1%		1%
Electricity	2%		
Other	9%	6%	
Office rent		20%	29%
Cleaning	2%	8%	8%
Postal agents	4%	41%	52%
Telephone	7%		
Fax Charges	19%		
Total US$	25,227	1,194	629

Revenues are broken down as follows:

Revenues	DPO	FPO	SPO
Mails	69%	75%	87%
Counter	21%	25%	13%
EMS	7%	0%	0%
Other	3%	0%	0%
Total US$	40,648	4,353	1,076

Breaking revenues down further we can see that stamps presents the greatest revenue earner for the Post Office. This is partly why the questionnaire asked how much do people spend per visit in a post office by asking the question how many stamps do people typically buy, given that this is the number one item demanded in post offices.

Revenues	DPO	FPO	SPO
Mails			
Stamps	65%	70%	67%
Box rental	20%	29%	33%
Parcels	0%	2%	0%
Other	15%	0%	0%
Counter			
Money Order Commission	85%	68%	89%
Postal Order Commission	0%	0%	11%
Postal Bank Commission	3%	0%	0%
Post Shop sales	9%	28%	0%
Other	3%	4%	1%
EMS			
Postage	28%		
Money Fax	49%		
Fax	1%		
EMS other	22%		

As the table below shows, at the more rural level over 50% of revenues accrue from the sale of stamps as a greater proportion of people use the post office for a pure communication need as financial services are not available.

Main services	DPO	FPO	SPO
Stamps	45%	52%	58%
Box rental	14%	21%	29%
Money Order Commission	18%	17%	12%
Money fax	4%	0%	0%

This analysis tells us that individuals are using the Post office primarily to serve a communication need but that at the larger post offices in the more urbanized areas more people are using the Post office to carry out financial transactions. It is very common in Tanzania for an income earner in the towns to send money to their relatives. This is currently carried out through fax facilities which is proving costly to the post office. At the departmental post office level approximately 20% of expenditures accrue to fax charges. If much of this correspondence could be carried out through email or TPC's intranet then operational costs could be reduced.

In general profitability at the individual post office level is positive. It is when the Post Office is considered as an entire organization with the large operational costs of head office that overall profitability is lower. We have modeled the impact of introducing internet services into post offices at

the individual post office level to see the impact on the different types of post office. This is to see how viable it is for each postmaster to offer internet service out of choice rather than imposed from headquarters and also takes into account the different type of post office and the rural market they may be serving.

4.1.1 Analysis of TPC's current internet revenues

TPC is currently providing internet service in Dar es Salaam, Zanzibar, Mbeya and Arusha. The following table sets out revenues for the first three months of 2004 for Dar es Salaam, Zanzibar and Mbeya.

2004	Jan	$	$	Feb	$	$	March	$	$
Post Office	Users	Revenues	ARPU	Users	Revenues	ARPU	Users	Revenues	ARPU
Dar es Salaam	2958	970	0.33	2711	1000	0.37	2556	1300	0.51
Mbeya	819	400	0.49	759	400	0.53	841	490	0.58
Zamzibar	274	130	0.47	162	80	0.49	249	140	0.56

Average revenue per user (ARPU) varies widely implying that the internet café agents may be counting the number of customers but not collecting money from all customers.

As part of their business plan, TPC calculated a basic set of cashflows for their Dar es Salaam and Mbeya internet cafés which forecast positive cashflows over a five year period. However current revenues are below projections due to lower than expected usage. The internet café in Mbeya is not currently well used as there is an internet café within 10 metres that offers a higher connection speed.[30] The private internet café also has much more modern feel to it which is likely attracting a higher customer base.

It is part of TPC's overall automation plan to introduce internet access through VSAT connectivity at all head post offices and it makes sense that by virtue of doing this TPC should also offer public internet access facilities. But as we have noted previously by taking the top down approach and offering internet facilities at the head post offices ahead of the district post offices, TPC miss out on a first mover advantage in the towns where there is no existing internet access but high demand. Under phase two of their networking plan, TPC intend to install VSATs and internet access at a further 10 post offices but yet again these are the busiest post offices situated in the urban areas where there is already a high degree of competition between internet cafés.

In addition to TPC's weak strategic plan for internet cafés, the business plan upon which they have based the internet business is perhaps not as robust as a final business plan should be. Whilst the analysis presented below is rough and ready at the feasibility stage to establish whether in theory it will be feasible to establish internet cafés in the rural areas and hence is simplistic, the Mbeya and Dar es Salaam business plans lack rigorous testing in terms of expected take-up and identifying possible sources of finance.

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[30] When we asked customers at the private internet café they cited connection speed as the main reason for using the private café over the postal café

4.2 Zampost costs and revenues

The following table sets out expenditures for the 11 post offices visited under the following types: town, rural and remote. The percentages are a reflection of each expenditure item as a percentage of the post offices' total expenditure. As can be seen from the table, the highest expenditure is on salaries. All the post offices visited do not pay any rentals because the buildings are owned by Zampost. Transport costs to the post offices visited are zero or negligible because the post offices use Zampost vans which carry mail and parcels in and out of the town. It must be noted that when monthly revenue and expenditure is tabulated at the post office, the results are sent to the area manager who then forwards them to head office. The copies that remain are not kept in an organized and orderly manner.

At the individual post office level, it appears that services are profitable. However, we have not been provided with any data from Zampost headquarters which has not made it possible to evaluate overall profitability.[31]

EXPENDITURE (per month)	Town (1 post office)	Rural (6 post offices)	Remote (4 post offices)
Salary	77.6%	73% to 94%	79% to 97%
Water and electricity	3.4%	2.5% to 6.5%	3% to 16%
Telephone	10%	3% to 20.8%	12.5%
Other	9%		
Total US$	**5,508**	**7,983**	**830**

The major revenue earner for most post offices is stamps and box rentals. Western Union money transfer is also as a high revenue earner for some post offices. The post offices receive a commission of 25% for whatever money it transfers through western union. Post Offices also handle TV license fees and receive K400 ($0.08) for every K3,000 ($0.63) collected. However TV license collections are at present very low as most people pay the fee through their electricity bill. The table below shows revenue items as a percentage of the total revenue for an individual post office.

Revenues (per month)	Town	Rural	Remote
Stamps	28%	25% to 62%	17% to 56%
Box rentals	24%	13% to 55%	1% to 28%
Western union	28%	8% to 18%	-
EMS	19%	3 to 10%	-
Total US$	12,722	19,291	1,318

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[31] Our research team have requested this information on the basis of this study but have not received any information

4.3   Malawi Post Corporation costs and revenues

Since 2001, MPC has aimed at becoming profitable and self reliant as opposed to depending upon government subvention and grants. The profit and loss accounts have been improving from 2002 on a yearly basis but MPC remains unprofitable. In 2002, MPC made an annual operating loss of MK 122,061,000 (US$1.1m) which was reduced to MK 60,363,000 (US$0.55m) in 2003. As at March 2004, the Corporation had an operating loss of MK 5,201,000 (US$47,000). These accounts are however unaudited and may change in order to bring them in line with International Financial Reporting Standards.

Postal volumes have been dwindling for both domestic mails and international mails for the period 2001 to 2003. International mails have declined because of mainly companies using e-mail facility and use of faster, reliable courier companies such as DHL to send mails outside Malawi. The decline in domestic mail is attributed to the prevalence of public phones booths where people go and make phone calls and pay for the time spent over the phone. Counter services (money orders, postal orders, postal bank transactions) have been growing over this period. According to MPC, overall revenues have been growing solely because of increased tariffs. MPC's positive movement in financial performance can be attributed to the Corporation's efforts to cut costs in order to attain self-reliance. In additoin, MPC, under the Public Utilities and Reform Programme, also ran a retrenchment programme which saw a number of staff being laid off.

Below we examine typical expenditures and revenues for different post office types. The following table sets out costs for typical post office types: Head PO (Regional), Town, Rural and a remote Post Office shown as a percentage of total expenditure which is set out in the final row in US$. This shows that expenditures are at the rural and remote PO level. (These figures are to April (10 months) extrapolated to 12 months; a rate of MK110 to the US$)

EXPENDITURE[32]	Head PO (Regional)	Town PO	Rural PO	Remote PO
Salary	39%	76%	75%	61%
Mail transport	4%	10%	5%	2%
Housing allowance	12%	10.5%	0	14%
Travelling	0	0	0	0
Security	4%	3%	17%	23%
Motor vehicle expenses	40%	0%	0	0
Electricity	0.5%	0.2%	1%	0
Water	0.5%	0.3%	2%	0
Total US$	59,412	20,120	3,161	2,390

[32] Not all the costs per PO have been captured due to problems in getting data for individual Post Offices and some are absorbed by the regional offices e.g. transport costs

Revenues are broken down as follows and clearly indicates that some remote post offices are loss-making.

Revenues	Head PO (Regional)	Town PO	Rural PO	Remote PO
Mails	77%	80%	68%	91%
Counter	15%	17%	27%	9%
Other	8%	3%	5%	0
Total US$	135,312	30,011	11,843	1,473

Breaking revenues down further we can see that stamps again present the greatest revenue earner for the Post Office.

Revenues	HEAD PO (Regional)	Town PO	Rural PO	Remote PO
Mails				
Stamps	74%	69%	77%	45%
Box rental	21%	29%	23%	55%
Parcels	0%	1%	0	0
Other	5%	1%	0	0
Counter				
Money Order Commission	66%	71%	61%	94%
Postal Order Commission	17%	8%	19%	4%
Other	17%	22%	20%	2%

As the table below shows, at the more remote level revenues accruing from the sale of stamps is on the lower side than the box rentals. This may be a result of lower income levels but people have post office boxes in order to receive letters and perhaps money from their relatives in town. On the other hand the busier rural post offices have postage stamps as a higher revenue generator since greater number of people are actively sending letters.

Main services	Head PO (Regional)	District PO	Rural PO	Remote PO
Stamps	57%	55%	53%	41%
Box rental	17%	24%	16%	50%
Money Order Commission	10%	12%	16%	8%

This analysis also tells us that individuals are still using the Post office primarily to serve a communication need rather than to carry out financial transaction. The rural post offices have a lowest percentage of financial transactions since it is very common for an income earner in the

towns to send money to their relatives. In the busy rural post offices, usage looks higher possibly because of parents and guardians usually send school fees and pocket money to students in towns.

In general profitability at the individual post office level is positive except for the very rural areas. However, these rural areas help the bigger post office in revenue generation through commission earned on sending money to the rural areas.

However, when the Post Office is considered as an entire organization with the large operational costs associated with head office, overall profitability is reduced.

5 Business Model

5.1 A simple Cost Benefit Analysis

5.1.1 Approach to determining viability

The viability of the postal telecentre model depends crucially upon the expected demand and the costs of connectivity. With enough users any telecentre would in theory be viable. So what we present below is an analysis of the number of users that would be required to achieve viability and how reasonable that expectation is. We also set out different options for connectivity and show the relative costs.

Key variables determining viability

- How many users – depends on how rural the area is and the level of competition

- Cost of connectivity – depends on whether satellite or fixed line and bandwidth required

Assumptions

The business model for putting internet into Post offices is modeled on the three types of post office:

- Main town post office (town)

- Small town post office (rural)

- Large village post office (remote)

Given that the focus of this study is on rural internet access we have omitted cities from the viability analysis. The Post office has plans to put internet access into post offices in the main cities in Tanzania and Malawi and hence we do not see that it is helpful to repeat the business analysis and have presented an analysis of the costs and revenues from the internet cafés at the head post offices in Tanzania in the previous section.

5.1.2 Caveats

Whilst this model sets out the basic viability of internet models in different types of post office and outlines the requisite conditions for viability, it is recommended that a thorough financial modeling exercise be undertaken prior to setting up the business model. We present below a simple business model to test viability rather than a detailed financial model which can be relied upon to launch a network of postal internet cafés. We can therefore accept no responsibility for the accuracy of the projections but advise the reader to use the projections as a guide to determining viability. We strongly recommend that the internet service is piloted at the three different types of post office in different areas in the three countries to test the proposed viability.

Viability is tested at each level of post office based on the following assumptions.

Relative Internet Prices
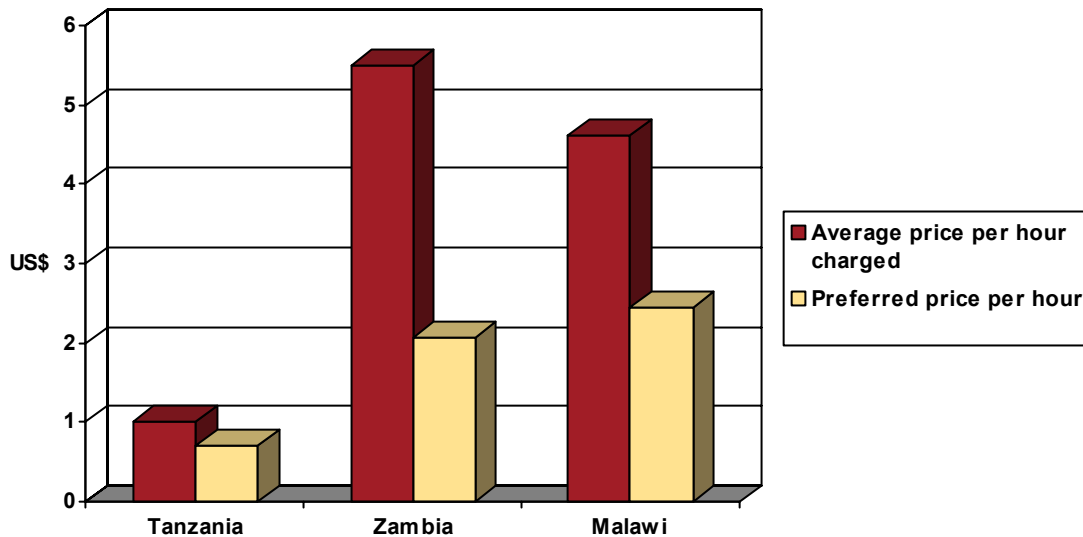
5.1.3 Revenues

Revenues are calculated on the basis of expected number of users and payment per internet usage. From the survey questionnaire it became clear that in Tanzania the generally accepted level of payment is the equivalent of $0.5 per usage (either per half hour or per hour) whereas users would be prepared to pay more in Zambia and Malawi because prevailing rates are higher as the graph above shows. However, as more internet cafés set up service in Zambia and Malawi we would expect tariffs to decrease. We use $0.5 as a base case cost per usage and $1 as the higher case scenario. We accept that over time many more services would be provided by the internet café such as set out in the box below.

Possible telecentre services:	
• Telephone calls	• Internet search
• Photocopying	• Access to downloaded information
• Word processing	• Graphic design
• Desktop publishing	• Printing
• Spreadsheets and databases	• Web page design
• Computer use	• Scanning
• Education and training	• Binding
• Computer training	• Laminating
• Secretarial	• Fax
• CV preparation	• Video conferencing
	• On-line banking facilities

However we expect the primary use of the internet café to be email use and have modeled revenues on the basis of internet usage for email.

Calculating expected number of users is based on a very simple demand forecast taking into account the following factors:

- Existing number of customers per month

- Number of schools in the vicinity (assuming the headteacher would require internet use)

- Number of hospitals

- Number of local Government offices

- Number of students in the area

The proportion of the population in the local catchment area is then calculated for each post office type:

Post office type	Potential Proportion of local population using internet at post office every month	Estimated Potential number of users per month
Town Post Office	0.94%	2700
Rural Post Office	6.05%	1500
Remote Post Office	13.5%	400

We then assume up to an optimum 18 users per day per computer to calculate the number of computers required by post office type. This is based on service availability of 9 hours per day with usage of half an hour. Post offices are open from 8am to 12.30pm and from 2pm to 4.30pm and this offer 7 hours of service currently. The expectation is that the office would remain open over lunchtime to offer the service and the postmaster would either arrange to man the office themselves or would arrange cover for the lunchtime, and hence likely busy, period. The trips to the post offices proved that in all areas, postmasters are usually assisted by family or friends if they need to shut up the post office or take lunch and hence finding cover is not expected to be costly or a problem. Rules would need to be made clear about how long people can use the internet for to allow sharing of facilities and how people are recompensed during service availability problems. Based on the expected number of users, the following number of computers are required for each post office type:

Post office type	Number of users per day	Number of computers required
Town	90	5
Rural	50	3
Remote	14	1

We then assume at the town level that one dedicated internet sales assistant would be required to monitor 5 computers and attend to 90 customers per day but that at the rural and remote level the existing Post Master should be able to serve the customers. An IT analyst from the regional head post office would then be allocated to post offices in the area to spend 1 day a week at a town, rural and remote posts offices to train users and to provide advice on computer and internet use and to support the Postmaster. At rural internet offices where usage is higher it may be necessary to allocate an IT analyst to spend 2.5 days a week at each post office and this would incur higher monthly costs.

5.1.4 A note regarding the usage assumptions

The usage assumptions we have set out may appear high but are based upon what demand could be as a result of putting internet facilities into public places. They are built up from the population of expected user groups surrounding each post office type and then a minimum number of users is set for the first year to enable the postmaster to break even on internet revenues. Usage then grows over time and it is expected that surfing periods will become shorter as people become more sophisticated in internet use and can achieve their information and communication need within a shorter period of time. It should be borne in mind when considering the number of users set out in the model that with this level of usage less than 1% of the population in each country is accessing the internet each month and these are users who are likely not to have had access to the internet before.

5.1.5 Operating costs

Based on these simple assumptions operating cost per post office type can then be calculated. Operating costs directly attributable to the internet service fall under the falling categories:

Operating Cost	Rationale	Assumed cost per month US$ Town	Assumed cost per month US$ Rural	Assumed cost per month US$ Remote
Computer maintenance[33]	Ongoing contract with local IT company in each area	12.5	7.5	2.5
VSAT Equipment maintenance	Provision of technician to deal with technical problems as they arise	16.6	16.6	0
Monthly access	Fixed line dial-up access or VSAT access	350	125	50
Electricity[34]	Required to power VSAT and computers	30	30	15
Phone costs	Required to make calls to contact local IT company and bandwidth provider. Prepaid mobile package.	10	10	10
Salaries [35]	To cover internet sales staff and IT analyst based on current salaries paid at the Mbeya internet café	114 (based on existing TPC internet café salaries) *:280 for IT analyst* *:58.5 for internet sales staff*	56	0

[33] Computer maintenance costs are lower for remote as the IT equipment suppliers have quoted computer maintenance costs as price per computer. The contract to maintain the computers would be countrywide based on using local technicians who would travel to the post office from the regional centre by public transport and similarly spare parts could be sent on public transport along with the mail bag.

[34] Costs shown are for electricity usage as a result of installing the VSAT and computer equipment. Costs are based on using 1kwh at town and rural post offices and 0.5kwh at remote post offices

Operating Cost	Rationale	Assumed cost per month US$ Town	Assumed cost per month US$ Rural	Assumed cost per month US$ Remote
Training	1 training course per year	1.6	1.6	1.6
Administration	Includes costs of recruitment, printing cartridges and paper	28.3	22.5	22.5
Total operating costs		563.67	269.33	101.67

The assumption regarding salaries is that the Post office (the head and town post offices) bear the cost of the IT analysts. Each town post office has one full time internet sales staff on $57 a month and a part-time (20%) IT analyst on effectively $57.5 per month per post office. The IT analysts are employed by head office to cover all the post offices in each region and travel by public transport to reach those post offices. It would also present a method of the Post office monitoring sales and performance at all post offices.

5.1.6 Capital expenditure

5.1.6.1 Connectivity - Different technology options

We have calculated capital expenditure costs for different technology options:

- Satellite (VSAT)

- Fixed line (Leased line and dial-up connection)

We have obtained indicative quotes from satellite, dial-up and leased line providers in the three countries and have used the lowest cost option[36] in the model. The indicative costings supplied by the operators are set out in Appendix 6.6. It should be emphasized that these costings are indicative only and do not in any way commit the operators to supplying equipment and connectivity to the Post Office at this price. The costings have been set out to show how prices vary and in order to make the project viable the least cost option needs to be selected. It is recommended that the contract to supply connectivity to the chosen national network (be it the Post Office or other) is selected through open competitive tender. In order to elicit the most competitive responses it might be advisable to set out potential anonymous costings as shown in the appendix to encourage firms to price

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[35] Note we do not include the cost of an extra security guard for the internet café. This is because not all post offices require the additional security and there is partly an argument to include this in the operational costs of the main post office business. A night security guard could cost in the region of $50 per month.

[36] This is the lowest quote obtained to supply the required amount of bandwidth

competitively. It is a concern that whilst Tanzania Postal Corporation have in the past consistently selected the most competitive bid for their current VSAT connections, by tying themselves to one provider they may not be encouraging the most competitive bidding process in the future.

Lowest cost options are set out below.

Operator	Ku Band VSAT US$	Installation Fee US$	Monthly Access 64 kbps US$	Monthly Access 128kbps US$
Satellite Provider 1	0	825	50-125	125-350
Satellite Provider 2	1,575	400	75	125

We have set out the costs for Ku Band VSAT only due to the small number of expected computers per site. The satellite operators have advised that a shared bandwidth of up to 64kbps should be sufficient to support up to 3 computers in rural and remote internet cafés but up to 128kbps would be required to support 5 computers in town internet cafés. Internet cafés in cities such as Dar es Salaam generally have 128kbps and this can comfortably support up to ten computers in an internet café but this connection may also be supporting private customers who have their own internet connection through the ISP. The satellite operators have provided the lowest cost option as an input to the model based on the minimum level of bandwidth that would be required. Shared bandwidth[37] of 64kbps means that each computer has the required 4-5kbps to support internet browsing at the same time. It will be possible to surf 5 computers at once on a 128kbps connection and to surf 3 computers on a 64kbps connection at the same time. If one user were to download large music files or video clips then this would restrict the bandwidth availability for the other users and so it will be necessary to enforce rules of use. We have selected the lowest bandwidth options available to assess viability given that we are expecting to rollout internet services to areas with no existing internet service and hence users will accept a lower connection speed than is available in the main cities. If the Post office decide to offer individual connections as well then a C-band VSAT would be required which are considerably more expensive.[38] We recommend that in the town, rural and remote internet cafés bandwidth per user be managed and limited. It would be wise to enforce rules regarding downloads, such as downloading music files and other large files to ensure that service availability is maintained at a constant level and no one users excessive use will disadvantage another. The advantage of VSAT is that bandwidth can be monitored at the central hub and reports delivered to the internet analysts at each center who could inform each postmaster about the problems associated with allowing customers to download large files.

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[37] VoIP is only possible with dedicated bandwidth. 64kbps shared bandwidth will not support the quality of connection required for VoIP. It would be necessary to dedicate one channel of 12-16kbps exclusively to VoIP

[38] C-band VSAT costs are included in appendix 6.6

In 6.5 we set out a detailed analysis of the technology options available and our rationale for selecting VSAT technology.

5.1.6.2 Hardware Costs

We have then calculated the cost of the required hardware based upon quotations taken from different IT companies in the three countries.

As computer maintenance is factored in monthly operational expenditures, capex need only consist of the cost of the hardware for the computers and the connection. It is estimated that the life of a pc is 5 years, so every five years the Post office will need to buy new computers and UPS and in the meantime the computer maintenance firm will be responsible for keeping the computers in working order.

Detailed hardware costs for new computers, clones and secondhand computers are set out in Appendix 6.7.

5.1.7 Inflation, real and nominal projections and tax

In order to simplify the model and its ability to distinguish between the effects of different variables, we assume zero inflation. This is because if we include inflation, the impact of revenues is greater than operating costs on the resulting rate of return in nominal terms. Deriving the real rate of return would then require discounting the cashflows over the period which requires a weighted average cost of capital which is not calculated for this simple model. The purpose of this business model is not to forecast accurate cashflows but more to indicate what variables will make the internet café viable in different types of post office.

Similarly no tax is included in the model to keep it simple. No VAT or corporation tax is included.

5.1.8 Loan schedule

5.1.8.1 Three loan scenarios

The viability of the internet café depends upon the availability of funding to purchase the capital equipment. The longer the payback period the more viable the project becomes but in these countries long-term loans are not available for individual businesses and in addition interest rates are relatively high. So we present three different scenarios, one with a long term loan and a preferred payback period, one with a low rate of interest termed a soft loan and a third option, a commercial loan with a short payback period under existing conditions which we have examined in Tanzania.

5.1.8.2 Long term loans

The business model includes a simple loan schedule which sets out the loan that each individual post office would need to take out to finance the capital expenditure on connection cost via VSAT, leased line or modem, the computer hardware costs and any furniture or other infrastructure costs. We do not recommend that the Post Office takes out a loan on behalf of all the PostMasters given the poor debtor situation that most post offices in Africa experience. For example the Post office in Tanzania has already taken out a loan from the EADB to finance the automation project. We recommend that each post office internet café should be treated as an individual business and whilst it benefits from the economies of scale of a larger infrastructure, responsibility for generating revenues and minimizing operational costs needs to be drilled down to the lowest level to maximize profitability. PostMasters who take out their own individual loans on the basis of expected revenues

from their post office are far more likely to work to make the project a success rather than relying on soft loans from head office. The first loan structure we have proposed in the model is as follows:

- In Year 1, a loan covering the setup capex requirements is taken out

- Interest accrues annually but repayments do not commence until Year 4

- In Year 6, a further loan is taken out to finance the replacement of computers

- Repayment of both loans plus interest is completed by the end of year 10

Such a schedule obviously relies upon the availability of credit which is currently scarce in countries like Tanzania. It is not currently possible to take out a loan under these repayment conditions which are required to maximize viability. The table below summarises current loan facilities in Tanzania.

Bank	Contact person	Loan facilities
Standard Chartered Bank	Branch Manager	- They do not offer long-term loans. The maximum payback period offered is 2-3 years. - No grace period is offered and pay back starts from the first month. - They offer loans to individuals with registered business and check past 2 years audited account statements. - Employees of TPC can be offered loans but through TPC. In this case, TPC will deduct a certain amount every month from the salary of the employee availing loan facility. - Maximum loan offered is 10 times an individual's monthly net salary. - Rate of interest = 23% p.a.
National Microfinance Bank	Loans Administrator	- They do not offer long-term loans. The maximum payback period offered is 1 year. - No grace period is offered and pay back starts from the first month. - They offer loans to small traders to increase their working capital but do not offer loans to start new business. - Maximum loan offered is TShs. 3.5 million - Rate of interest = 24% p.a.
Tanzania Postal Bank	Chief Loans Manager	- They do not offer long-term loans. The maximum payback period offered is 2 years. - No grace period is offered and pay back starts from the first month. - They offer loans depending upon the tangible security offered and after verification of the title deed. They also check viability of the project and analyse the financial statements. The loan offered is 80% of security value. - Maximum loan offered is TShs. 1 billion; but these days they

Bank	Contact person	Loan facilities
		are reluctant do give such an amount of loan and tend to keep the max. to TShs. 100 million. • Rate of interest = 16-20% p.a.
Exim Bank	Credit Manager	• They do not offer long-term loans. The maximum payback period offered is 2 years. • They offer a 6-months grace period and pay back starts from the seventh month. • They offer loans depending upon the tangible security offered and after verification of the title deed. They also need a letter of undertaking and salary slips of the person applying for loan. • Maximum loan offered is 80% of security value. • Rate of interest = 20% p.a.

It is recommended that the availability of microfinance loans be examined under the next stage of this project, if it is decided to go ahead with pilot testing. In theory it would be ideal to engage the Postal Bank in each country in the provision of microfinance loans to individual post offices but this could also present an area whereby donor funding through soft loans could help to kickstart the project. Despite the argument that the Post Office could take out one loan to cover capital expenditure requirements to put internet cafés into all post offices deemed viable throughout the country and might be able to negotiate a lower rate of interest as one large organization, we do not recommend this option. Firstly the post office is already cash constrained in these countries and may be tempted to divert the funding sources to developing their main profitable post offices and secondly the PostMasters will ultimately be responsible for generating revenues and are much more likely to put effort into marketing their product if it is their own business responsible for the loan and they requested the opportunity to offer internet services in the first place.

5.1.8.3   Soft Loan

If it were possible in some way to provide a soft loan with an interest rate of, for example, 6%, this would make each internet model more viable. It is recommended that options are examined whereby a donor provides a loan to a Government who then on-lends the money to the Postal Corporation who then makes the loan available to PostMasters. As we note above, exposing the Postal Corporations to risks associated with loans taken out by individual postmasters may not be ideal but may enable access to lower interest rates and longer payback periods.

5.1.8.4   Existing loan conditions

Given that we are looking at making a commercial business proposition for internet in the rural areas, we consider the effect of a commercial loan. We have set out a scenario whereby each individual PostMaster takes out a loan to finance capital expenditure under the conditions set out above under Tanzania Postal Bank ie real loan conditions in Tanzania. Here we assume that a loan is taken out in year 1 with a rate of interest of 18% and repaid over twenty-four months starting in the first month. A second loan is then taken out to finance replacement computer hardware and repayment begins immediately over twenty-four months.

So we present three scenarios, one taking an interest rate of 18% based on TPB's range of 16-20% and another lower interest rate of 6% anticipating what rate of interest a soft loan might generate and a third scenario with a commercial loan at 18% and immediate repayment over two years.

5.1.9 Calculating the economic rate of return

Throughout the analysis we have calculated the internal rate of return for each scenario. The internal rate of return is the interest rate received for an investment consisting of payments and income that occur at regular periods. We recommend that where the internal rate of return is positive then that scenario could be trialled under a pilot project. It is important to consider the internal rate of return for each post office so that each postmaster internalizes the impact of the internet café and hence makes more effort to make the café a success. Capturing economic rate of return is a more elusive notion. Economic rate of return expresses the benefit to both the private owner of the internet café who receives the income stream but also the benefit to the local community from having access to the internet café. It is impossible to estimate what the community benefit would be from having access to an internet café within walking distance and instead user prices generally represent a better method of valuing consumer benefit. Economic rate of return will vary considerably depending upon what the internet café is used for – whether the internet is used solely for personal email use or for health and education information for the community as a whole. It is impossible to put a value on the kind of benefit that will accrue to the local community in terms of reducing poverty as a result of access to information. Instead we recommend that as long as the IRR is positive, and the postmaster is making a profit then the economic rate of return will be higher than the internal rate of return due to the positive externalities from community access to information and communication.

5.1.10 Forecasting takeup

Once operational costs have been calculated it is then possible to work out how many consumers need to be using the internet service every month to achieve a break even level of revenues. The basis of viability that we are forecasting assumes that in the first year of operations, operating costs acrruing to the operations of the internet café are covered exactly through revenues achieving break even. This gives us a number of internet users which is then used to forecast take-up of the service over the forecast period. We would not expect the number of users to be at the maximum forecast demand level in the first year. Rather we would expect some kind of slow takeup or S-curve effect. In the first year, pent up demand is released so the people who already wanted to use the internet start to use it and then take-up tails off as not all users of the post office are familiar with its uses. Users of the internet in the first year are most likely to be those who have used it before in other locations and students who have access to computers at their local college. The majority of the local community will be unfamiliar with computer and data use and may be skeptical of using a computer at first. As the community starts to use it more and more, familiarity increases and people go for training and the number of users steadily increases. There is no perfect science for estimating demand and takeup. There is a weak regression link between income levels and mobile usage and for internet the correlation is also likely to be spurious. It is advisable therefore to base it on the numbers of people who can be expected to have a need to use the internet in a particular area and then to fit a basic 10% growth rate on the minimum number of users. By the end of the 10 year forecast period, the number of users reaches it expected level. It must be emphasized that this is an extremely simplistic method for forecasting take-up and revenues but internet demand forecasting in rural areas is not a robust modeling procedure and actual projections are best tested through pilot projects rather than complicated modeling techniques.

It should be noted that in the town and rural internet models, we assume constant usage with 18 users per computer per day. It is possible that power supply problems and congestion in the post office may disrupt constant usage.

Rural consumer behaviour is generally not well observed or understood and needs to be tested. Viability can only truly be tested and proven through pilot projects. The National Malaria Control Programme (NMCP) in Tanzania set up a voucher programme for distributing insecticide treated nets to women and children in the rural areas. The voucher subsidises the cost of the net so that the consumer only pays a minimal amount for the net so the product is not entirely free so people recognize some value and register willingness to pay. At first the actual amount that people would be prepared to pay in addition to the voucher was unclear and the NMCP only found the final level through trial and error. At the first trial people were expected to contribute about $1 to the cost of the net (between $3-4 retail price) but this was found to be too expensive and reducing the retail price of the net through increased subsidy to approximately $0.5 had a dramatic effect on take up of the product. Different districts are able to charge different prices and it is important to note that the policy here is to enable 100% of the population to sleep under a mosquito net. Access to the internet is likely to impact on a much smaller proportion of the population with a higher level of affordability. Using a voucher programme to launch internet use in rural areas may be a promotional tool that the post offices could consider under some donor support. Alternatively other methods to encourage internet use could be considered such as putting televisions[39] into the internet area to encourage people to come to the location where the internet facility is offered.

At the town post office level expected number of users per day start at approximately 43[40] users per day up to 100 users per day by 2013. This compares with an actual 28 users per day at Mbeya which is a head post office. Internet was launched at Mbeya post office in May 2003 and now averages around 28 users per day.[41] However, in Mbeya there are 10 other internet cafés which are seemingly more popular than the post office internet café.[42] At the district post office level, the service would in theory be offered on a monopoly basis with no competing internet cafés in the vicinity hence we could in theory expect there to be more users at a district post office than a head post office.

According to our assumptions up to 90 users a day could be reasonably accessing the internet at a town post office.[43] Once demand goes above this level then either usage would need to be limited to 20 minutes or the opening hours would need to be extended or more computers could be added to internet café. Starting with 43 users a day assumes just under 9 users per computer per day each spending one hour on the internet. A connection speed of 128kbps which we recommend for the town post offices is sufficient to support 5 computers at the same time. Bandwidth is shared and

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[39] Anecdotally we hear that this has had an impact on attracting users to telecentres in China

[40] Approximate figure assuming post office shut on Sundays

[41] 841 users recorded for March 2004

[42] Reasons cited by internet users are the slow connection speed offered by the Post office internet café. The problem with the Mbeya connection is that the post office operates as an ISP and connects individual customers to their 128kbps connection which reduces the amount of overall bandwidth available for the internet café. If the connection was used for the internet café only then speed would be the same as the competing internet cafés and usage would likely be higher.

[43] 18 users per computer per day, 9 half hour sessions described as the optimum level in 5.1.3

managed as file size downloads are limited to a specific size to enable adequate bandwidth for all computers. We do recommend pilot testing to demonstrate that this will work in practice.

5.1.11 Application – voice or data?

Whilst many argue that voice is the key application in Africa, fixed line public payphones do not automatically present the appropriate universal access solution. TTCL have set up public payphones in many small towns throughout the rural areas where the fixed line network reaches but people cannot afford to have their own phone line. However these public payphones do not appear to be much used. This is mainly because there are now over a million mobile subscribers in Tanzania but less than 150,000 fixed line subscribers so the majority of calls are made to mobile phones. However it is more expensive to call from fixed to mobile than on the same mobile network so people would rather use a mobile phone to make a call or send a SMS from a community phone center or a phone owned and lent by an individual.

It is recommended that the post offices should also offer a phone line service either over the internet or through fixed or cellular access.

5.2 Sensitivities

We consider a number of sensitivities to test the effect of different assumptions as set out in the table below.

Sensitivity	Number of users	Tariff US$	Cost of Connection Equipment	Cost of Monthly Access	PC Equipment	Interest Rate
Base Case	Minimum required to break even in first year	0.5	VSAT – installation only	Shown for two types of bandwidth 64kbps 128kbps	Cost of hardware for 1 pc 3 pc's 5 pc's	18%
Low Users	75% of base case	As base case	As base case	As base case	As base case	As base case
High tariff	As base case	1.0	As base case	As base case	As base case	As base case
VSAT Connection	As base case	As base case	VSAT equipment plus installation fee	Shown for two types of bandwidth 64kbps	As base case	As base case

Sensitivity	Number of users	Tariff US$	Cost of Connection Equipment	Cost of Monthly Access	PC Equipment	Interest Rate
				128kbps		
Fixed line connection	As base case	As base case	Leased line or dial-up modem	Leased line monthly access or dial-up call charges	As base case	As base case
Low cost computers	As base case	As base case	As base case	As base case	Secondhand computers Lower cost but replace every 2 years	As base case
Soft loan	As base case	As base case	As base case	As base case	As base case	6%
Postal Bank loan	As base case	US$0.75-1	As base case	As base case	As base case	18%, 2 year repayment begins in first month

5.3 Model results

5.3.1 Town internet model

5.3.1.1 Base case

Town internet model	US$	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Base Case VSAT 128kbps											
Number of internet users per month		1,128	1,241	1,365	1,501	1,652	1,817	1,998	2,198	2,418	2,660
Usage fee		0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Revenues		6,768	7,445	8,189	9,008	9,909	10,900	11,990	13,189	14,508	15,959
Number of pc's		5	5	5	5	5	5	5	5	5	5
Operating costs		6,764	6,764	6,764	6,764	6,764	6,764	6,764	6,764	6,764	6,764
Operating Profit (Loss)		4	681	1,425	2,244	3,145	4,136	5,226	6,425	7,744	9,195
Capex		(7,236)	0	0	0	0	(6,411)	0	0	0	0
Loan		(7,236)	0	0	0	0	(6,411)	0	0	0	0
Interest		1,302	1,537	1,814	2,140	1,964	1,756	1,510	1,221	879	476
Repayment		0	0	0	(3,119)	(3,119)	(3,119)	(3,119)	(3,119)	(3,119)	(3,119)
Net profit (Loss)		4	681	1,425	(875)	26	1,017	2,107	3,306	4,625	6,075

Internal Rate of Return (IRR) **6%**

Under the base case, in a town post office we assume 5 computers with internet access and a bandwidth of 128kbps (shared bandwidth) connected via VSAT. 1,128 users are required per month to cover operating costs in the first year and takeup is forecast to reach 2,660 users per month by year 10, still below the maximum forecast penetration of 1% of the local population. Based on this repayment schedule the post office makes a profit every year except in year 4 when in theory the post master should have offset this loss against the previous year's profit. Bringing repayment forward and reducing the number of repayment years has the effect of increasing the internal rate of return but creates losses in the early years which the PostMasters may not be able to cope with despite the expectation of higher future profits.

Under the base case, the usage fee is $0.5 per user. In the first year there are just under 9 users per computer per day. This assumes a varying usage of half an hour to one hour so that for example, in the first year users spend an hour each but over time more people consume shorter sessions as usage rises to 18 users per day, which is the anticipated optimal level of use. The number of users per computer rises to 20 users per computer per day by 2013. It is then assumed that as the demand grows the internet facility part of the post office would stay open for longer hours to serve this demand and users would surf for twenty minutes or half an hour only.[44]

In year 1, the post office achieves a break even level of revenues for its internet services. This is calculated simply by finding the minimum number of users required per month to achieve break even by dividing the operational costs by the tariff ($0.5).

5.3.1.2 Low user scenario

Next we run a scenario which basically asks what happens if 75% of the number of users proposed above actually use the internet café every year. This would immediately make the project unviable with a negative set of cashflows and negative internal rate of return. However, if we anticipate a lower takeup in the first year we could also anticipate a higher growth rate until the maximum

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[44] These assumptions are used to present a base case scenario of viability and can be easily changed within the model to assess the impact of less users per computer per day.

number of possible users is achieved. So here we assume a growth rate of users of 20% per year until 2010 at which no more users can use the internet every month without adding more computers and bandwidth. The internal rate of return is slightly higher than the base case but only because we assume a higher rate of growth of subscribers. If far fewer people use the internet café than expected the internet café will not be viable unless growth rates are much higher which is why it is important to pilot the internet café at each level of post office.

Town internet model	US$	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
User Case VSAT 128kbps											
Number of internet users per month		846	1,015	1,218	1,462	1,754	2,105	2,526	2,526	2,526	2,526
Usage fee		0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Revenues		5,076	6,091	7,309	8,771	10,526	12,631	15,157	15,157	15,157	15,157
Number of pc's		5	5	5	5	5	5	5	5	5	5
Operating costs		6,764	6,764	6,764	6,764	6,764	6,764	6,764	6,764	6,764	6,764
Operating Profit (Loss)		(1,688)	(673)	545	2,007	3,762	5,867	8,393	8,393	8,393	8,393
Capex		(7,236)	0	0	0	0	(6,411)	0	0	0	0
Loan		(7,236)	0	0	0	0	(6,411)	0	0	0	0
Interest		1,302	1,537	1,814	2,140	1,964	1,756	1,510	1,221	879	476
Repayment		0	0	0	(3,119)	(3,119)	(3,119)	(3,119)	(3,119)	(3,119)	(3,119)
Net profit (Loss)		(1,688)	(673)	545	(1,112)	642	2,747	5,274	5,274	5,274	5,274

Internal Rate of Return (IRR)   8%

5.3.1.3 High tariff scenario

We next run the same model but with a user tariff of $1 per usage. With a higher tariff we would expect usage to decrease significantly as the NMCP net voucher experience showed. To the average Tanzanian the difference between spending $1 and $0.5 is significant and so as a result of

Town internet model	US$	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
High Tariff VSAT 128kbps											
Number of internet users per month		564	620	682	751	826	908	999	1,099	1,209	1,330
Usage fee		1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Revenues		6,768	7,445	8,189	9,008	9,909	10,900	11,990	13,189	14,508	15,959
Number of pc's		5	5	5	5	5	5	5	5	5	5
Operating costs		6,764	6,764	6,764	6,764	6,764	6,764	6,764	6,764	6,764	6,764
Operating Profit (Loss)		4	681	1,425	2,244	3,145	4,136	5,226	6,425	7,744	9,195
Capex		(7,236)	0	0	0	0	(6,411)	0	0	0	0
Loan		(7,236)	0	0	0	0	(6,411)	0	0	0	0
Interest		1,302	1,537	1,814	2,140	1,964	1,756	1,510	1,221	879	476
Repayment		0	0	0	(3,119)	(3,119)	(3,119)	(3,119)	(3,119)	(3,119)	(3,119)
Net profit (Loss)		4	681	1,425	(875)	26	1,017	2,107	3,306	4,625	6,075

Internal Rate of Return (IRR)   6%

a 200% increase in price we might expect the number of users to decrease by 50%. This elasticity is not based on any actual demand data but more on the expectation of fairly price elastic demand in rural Tanzania indicated by the NMCP experience referred to in section 5.1.10. This has the effect of deriving a result close to the base case which has the converse of higher users but lower price. The rate of return is the same.

5.3.1.4 Alternative satellite provider scenario

In this case, we plug through the costs provided to us by an alternative satellite provider who charge for the equipment but charge a lower monthly access fee. Profitability never dips below zero and the internal rate of return is much higher than the base case because the operational costs are much lower. However the initial start-up cost is much higher requiring a loan of approximately $8,400

which might be difficult on the basis of a postal business which normally generates revenues of about $40,000 a year.

Town internet model	US$	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Alternative VSAT 128kbps											
Number of internet users per month		1,128	1,241	1,365	1,501	1,652	1,817	1,998	2,198	2,418	2,660
Usage fee		0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Revenues		6,768	7,445	8,189	9,008	9,909	10,900	11,990	13,189	14,508	15,959
Number of pc's		5	5	5	5	5	5	5	5	5	5
Operating costs		4,064	4,064	4,064	4,064	4,064	4,064	4,064	4,064	4,064	4,064
Operating Profit (Loss)		2,704	3,381	4,125	4,944	5,845	6,836	7,926	9,125	10,444	11,895
Capex		(8,386)	0	0	0	0	(6,411)	0	0	0	0
Loan		(8,386)	0	0	0	0	(6,411)	0	0	0	0
Interest		1,509	1,781	2,102	2,480	2,276	2,035	1,750	1,415	1,019	551
Repayment		0	0	0	(3,615)	(3,615)	(3,615)	(3,615)	(3,615)	(3,615)	(3,615)
Net profit (Loss)		2,704	3,381	4,125	1,329	2,230	3,221	4,311	5,510	6,829	8,280

Internal Rate of Return (IRR)   `50%`

Yet with the lower operational costs, repayment could begin earlier say in year 2 and the two loans could be repaid over 5 years and generate an IRR of 35% as the results table below shows.

Town internet model	US$	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Alternative VSAT 128kbps											
Number of internet users per month		1,128	1,241	1,365	1,501	1,652	1,817	1,998	2,198	2,418	2,660
Usage fee		0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Revenues		6,768	7,445	8,189	9,008	9,909	10,900	11,990	13,189	14,508	15,959
Number of pc's		5	5	5	5	5	5	5	5	5	5
Operating costs		4,064	4,064	4,064	4,064	4,064	4,064	4,064	4,064	4,064	4,064
Operating Profit (Loss)		2,704	3,381	4,125	4,944	5,845	6,836	7,926	9,125	10,444	11,895
Capex		(8,386)	0	0	0	0	(6,411)	0	0	0	0
Loan		(8,386)	0	0	0	0	(6,411)	0	0	0	0
Interest		1,509	1,781	1,532	1,238	892	483	(0)	(0)	(0)	(0)
Repayment		0	(3,164)	(3,164)	(3,164)	(3,164)	(3,164)	0	0	0	0
Net profit (Loss)		2,704	216	961	1,780	2,681	3,672	7,926	9,125	10,444	11,895

Internal Rate of Return (IRR)   `35%`

With this alternative VSAT provider, a minimum of 850 internet users would be required every month growing at 10% until 2000 internet users per month is reached in year 10 as shown below with an IRR of 1%.

Town internet model	US$	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Alternative VSAT 128kbps											
Number of internet users per month		850	935	1,029	1,131	1,244	1,369	1,506	1,656	1,822	2,004
Usage fee		0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Revenues		5,100	5,610	6,171	6,788	7,467	8,214	9,035	9,938	10,932	12,026
Number of pc's		5	5	5	5	5	5	5	5	5	5
Operating costs		4,064	4,064	4,064	4,064	4,064	4,064	4,064	4,064	4,064	4,064
Operating Profit (Loss)		1,036	1,546	2,107	2,724	3,403	4,150	4,971	5,874	6,868	7,962
Capex		(8,386)	0	0	0	0	(6,411)	0	0	0	0
Loan		(8,386)	0	0	0	0	(6,411)	0	0	0	0
Interest		1,509	1,781	2,102	2,480	2,276	2,035	1,750	1,415	1,019	551
Repayment		0	0	0	(3,615)	(3,615)	(3,615)	(3,615)	(3,615)	(3,615)	(3,615)
Net profit (Loss)		1,036	1,546	2,107	(891)	(212)	535	1,356	2,260	3,253	4,347

Internal Rate of Return (IRR)   `1%`

5.3.1.5 Fixed line dial-up access scenario

Running the model with fixed line dial-up monthly access fees of $760 which includes dialup call charges is not viable. Instead, a minimum 1,950 users per month would be required to cover operating costs and break even in the first year. The maximum number of users is then reached much earlier in year 5 and remains constant at that level without further investment in extra equipment.

Town internet model	US$	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Fixed line Dial-up											
Number of internet users per month		1,950	2,145	2,360	2,595	2,700	2,700	2,700	2,700	2,700	2,700
Usage fee		0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Revenues		11,700	12,870	14,157	15,573	16,200	16,200	16,200	16,200	16,200	16,200
Number of pc's		5	5	5	5	5	5	5	5	5	5
Operating costs		11,684	11,684	11,684	11,684	11,684	11,684	11,684	11,684	11,684	11,684
Operating Profit (Loss)		16	1,186	2,473	3,889	4,516	4,516	4,516	4,516	4,516	4,516
Capex		(6,725)	0	0	0	0	(6,411)	0	0	0	0
Loan		(6,725)	0	0	0	0	(6,411)	0	0	0	0
Interest		1,211	1,428	1,686	1,989	1,825	1,632	1,404	1,135	817	442
Repayment		0	0	0	(2,899)	(2,899)	(2,899)	(2,899)	(2,899)	(2,899)	(2,899)
Net profit (Loss)		16	1,186	2,473	990	1,617	1,617	1,617	1,617	1,617	1,617

Internal Rate of Return (IRR)   `4%`

5.3.1.6 Leased line access scenario

Again the model is not viable with leased line access unless the number of internet users is increased to 1150 users per month but this then generates a negative rate of return as the positive

Town internet model	US$	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Leased Line											
Number of internet users per month		1,150	1,265	1,392	1,531	1,684	1,852	2,037	2,241	2,465	2,712
Usage fee		0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Revenues		6,900	7,590	8,349	9,184	10,102	11,113	12,224	13,446	14,791	16,270
Number of pc's		5	5	5	5	5	5	5	5	5	5
Operating costs		6,884	6,884	6,884	6,884	6,884	6,884	6,884	6,884	6,884	6,884
Operating Profit (Loss)		16	706	1,465	2,300	3,218	4,229	5,340	6,562	7,907	9,386
Capex		(10,211)	0	0	0	0	(6,411)	0	0	0	0
Loan		(10,211)	0	0	0	0	(6,411)	0	0	0	0
Interest		1,838	2,169	2,559	3,020	2,771	2,478	2,131	1,723	1,240	671
Repayment		0	0	0	(4,402)	(4,402)	(4,402)	(4,402)	(4,402)	(4,402)	(4,402)
Net profit (Loss)		16	706	1,465	(2,102)	(1,183)	(173)	938	2,161	3,505	4,984

Internal Rate of Return (IRR)   `-7%`

cashflows are less than the investment required. However if 1300 users visit per month right from the beginning then the internet café would be viable. Some private internet cafés have been set up in towns in Tanzania with a leased line connection, but as the table below shows they will require a minimum of 1300 users per month if they charge $0.5 per usage. In addition they will need to cover infrastructure costs such as the building to house the internet café, the staff, and administration such as the business licence. Indeed there are some internet cafés which operate without any licence and take business away from the licensed ISPs. Many internet cafés have been set up in this way but only to close down during the first year because the owner cannot cover the start-up and operational costs.

Town internet model	US$	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Leased Line											
Number of internet users per month		1,300	1,430	1,573	1,730	1,903	2,094	2,303	2,533	2,700	2,700
Usage fee		0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Revenues		7,800	8,580	9,438	10,382	11,420	12,562	13,818	15,200	16,200	16,200
Number of pc's		5	5	5	5	5	5	5	5	5	5
Operating costs		6,884	6,884	6,884	6,884	6,884	6,884	6,884	6,884	6,884	6,884
Operating Profit (Loss)		916	1,696	2,554	3,498	4,536	5,678	6,934	8,316	9,316	9,316
Capex		(10,211)	0	0	0	0	(6,411)	0	0	0	0
Loan		(10,211)	0	0	0	0	(6,411)	0	0	0	0
Interest		1,838	2,169	2,559	3,020	2,771	2,478	2,131	1,723	1,240	671
Repayment		0	0	0	(4,402)	(4,402)	(4,402)	(4,402)	(4,402)	(4,402)	(4,402)
Net profit (Loss)		916	1,696	2,554	(904)	134	1,276	2,533	3,914	4,914	4,914

Internal Rate of Return (IRR)   7%

5.3.1.7 Low cost Computer Equipment

We do not recommend that the Post Office procure second hand computer equipment as it will likely be unreliable and require a high degree of maintenance and replacement every year. Whilst the IRR is much higher with the lower loan requirements to finance the hardware equipment, in practice this may not be sustainable if the quality of the low cost computers has an impact on the number of users for example if users are dissatisfied with the speed of the computer or the limited applications and limit their use of the internet accordingly.

Town internet model	US$	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Low cost computers											
Number of internet users per month		1,128	1,241	1,365	1,501	1,652	1,817	1,998	2,198	2,418	2,660
Usage fee		0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Revenues		6,768	7,445	8,189	9,008	9,909	10,900	11,990	13,189	14,508	15,959
Number of pc's		5	5	5	5	5	5	5	5	5	5
Operating costs		6,764	6,764	6,764	6,764	6,764	6,764	6,764	6,764	6,764	6,764
Operating Profit (Loss)		4	681	1,425	2,244	3,145	4,136	5,226	6,425	7,744	9,195
Capex		(3,911)	0	0	(1,420)	0	(3,086)	0	(1,420)	0	(1,420)
Loan		(3,911)	0	0	(1,420)	0	(3,086)	0	(1,420)	0	(1,420)
Interest		704	831	980	1,157	1,061	949	816	660	475	257
Repayment		0	0	0	(1,686)	(1,686)	(1,686)	(1,686)	(1,686)	(1,686)	(1,686)
Net profit (Loss)		4	681	1,425	558	1,459	2,450	3,540	4,739	6,058	7,509

Internal Rate of Return (IRR)   30%

5.3.1.8 Soft loan scenario

Unsurprisingly introducing a soft loan with an interest rate of 6% increases the IRR to 19%.

Town internet model US$	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Soft loan										
Number of internet users per month	1,128	1,241	1,365	1,501	1,652	1,817	1,998	2,198	2,418	2,660
Usage fee	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Revenues	6,768	7,445	8,189	9,008	9,909	10,900	11,990	13,189	14,508	15,959
Number of pc's	5	5	5	5	5	5	5	5	5	5
Operating costs	6,764	6,764	6,764	6,764	6,764	6,764	6,764	6,764	6,764	6,764
Operating Profit (Loss)	4	681	1,425	2,244	3,145	4,136	5,226	6,425	7,744	9,195
Capex	(7,236)	0	0	0	0	(6,411)	0	0	0	0
Loan	(7,236)	0	0	0	0	(6,411)	0	0	0	0
Interest	434	460	488	517	455	390	321	248	170	87
Repayment	0	0	0	(1,544)	(1,544)	(1,544)	(1,544)	(1,544)	(1,544)	(1,544)
Net profit (Loss)	4	681	1,425	700	1,601	2,592	3,682	4,881	6,200	7,651

Internal Rate of Return (IRR)   `19%`

5.3.1.9 Postal Bank Loan Scenario

With two loans from the Postal Bank at a rate of interest 18% in years 1 and 6 and each repaid immediately over twenty-four months, the model becomes unviable with base case assumptions regarding number of users and tariffs. The internal rate of return is positive at 8% but the postmaster suffers a loss of approximately US$4000 in the first two years of operation and unless the postmaster can cover that loss through revenues from the existing postal business with the expectation of the future revenue stream that will come from providing internet services as set out below, then the PostMaster will be unable to bear that loss and will end up defaulting on the loan.

Town internet model US$	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Postal Loan Base Case										
Number of internet users per month	1,128	1,241	1,365	1,501	1,652	1,817	1,998	2,198	2,418	2,660
Usage fee	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Revenues	6,768	7,445	8,189	9,008	9,909	10,900	11,990	13,189	14,508	15,959
Number of pc's	5	5	5	5	5	5	5	5	5	5
Operating costs	6,764	6,764	6,764	6,764	6,764	6,764	6,764	6,764	6,764	6,764
Operating Profit (Loss)	4	681	1,425	2,244	3,145	4,136	5,226	6,425	7,744	9,195
Capex	(7,236)	0	0	0	0	(6,411)	0	0	0	0
Loan	(7,236)	0	0	0	0	(6,411)	0	0	0	0
Interest	(717)	(717)	0	0	0	(635)	(635)	0	0	0
Repayment	(4,335)	(4,335)	0	0	0	(3,841)	(3,841)	0	0	0
Net profit (Loss)	(4,331)	(3,654)	1,425	2,244	3,145	295	1,385	6,425	7,744	9,195

Internal Rate of Return (IRR)   `8%`

To enable the PostMaster to pay back the loan over the required two year period, it will be necessary

Town internet model US$	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Postal Bank Loan Low users										
Number of internet users per month	925	1,017	1,119	1,231	1,354	1,490	1,639	1,802	1,983	2,181
Usage fee	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Revenues	11,099	12,209	13,430	14,773	16,250	17,875	19,663	21,629	23,792	26,171
Number of pc's	5	5	5	5	5	5	5	5	5	5
Operating costs	6,764	6,764	6,764	6,764	6,764	6,764	6,764	6,764	6,764	6,764
Operating Profit (Loss)	4,335	5,445	6,666	8,009	9,486	11,111	12,899	14,865	17,028	19,407
Capex	(7,236)	0	0	0	0	(6,411)	0	0	0	0
Loan	(7,236)	0	0	0	0	(6,411)	0	0	0	0
Interest	(717)	(717)	0	0	0	(635)	(635)	0	0	0
Repayment	(4,335)	(4,335)	0	0	0	(3,841)	(3,841)	0	0	0
Net profit (Loss)	0	1,110	6,666	8,009	9,486	7,270	9,058	14,865	17,028	19,407

Internal Rate of Return (IRR)   `68%`

to increase user fees to $1 a session. With a higher user fee, less users will be required in the first year of operations to break even after operating costs and loan repayments. Growth in demand is then forecast forward from 925 users per month as shown below.

With high users and relatively high usage, a high IRR of 82% is achieved. It would then be possible to say that usage fees could be reduced after the first loan has been paid for. It is emphasized that demand elasticities have not been built into the model and we are making ad hoc assumptions about how responsive demand is to a change in price. But if we reduce the tariff back down to $0.5 per session in the third year, then the model becomes unviable again incurring losses. But if the tariff is only reduced to $0.75 then the model is viable as presented below.

Town internet model US$	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Postal Bank Loan Low users and tariff										
Number of internet users per month	925	1,017	1,119	1,231	1,354	1,490	1,639	1,802	1,983	2,181
Usage fee	1.0	1.0	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Revenues	11,099	12,209	10,072	11,080	12,188	13,406	14,747	16,222	17,844	19,628
Number of pc's	5	5	5	5	5	5	5	5	5	5
Operating costs	6,764	6,764	6,764	6,764	6,764	6,764	6,764	6,764	6,764	6,764
Operating Profit (Loss)	4,335	5,445	3,308	4,316	5,424	6,642	7,983	9,458	11,080	12,864
Capex	(7,236)	0	0	0	0	(6,411)	0	0	0	0
Loan	(7,236)	0	0	0	0	(6,411)	0	0	0	0
Interest	(717)	(717)	0	0	0	(635)	(635)	0	0	0
Repayment	(4,335)	(4,335)	0	0	0	(3,841)	(3,841)	0	0	0
Net profit (Loss)	0	1,110	3,308	4,316	5,424	2,802	4,142	9,458	11,080	12,864

Internal Rate of Return (IRR)	42%

It would be necessary to assess the willingness of consumers to pay $1 per session in the first year and then to pay $0.75 thereafter. A supporting rationale might be that in the first two years of operation the community could see the telecentre as a community investment and be prepared to pay a higher usage fee, if they understood the PostMaster was not making a profit. In return, they have access to the internet and the assistance of an IT analyst once a week. By the third year the community is more sophisticated in its internet use and so is able to surf for shorter periods and hence is keen to pay less for the service over time.

5.3.2   Rural Internet Model

5.3.2.1   Base Case

Under the base case with the current satellite operator providing the VSAT equipment free of charge and a monthly access fee of $125 for a 128kbps connection, the rural post office has three computers offering internet access and generates an IRR of 11%. This is slightly higher than for the town internet model, despite the lower number of users because of the lower capital expenditure cost of three computers and the lower monthly access fee. It is important that 650 or 3% of the local surrounding post office are using the internet every month. If we forecast break even take up in the first year and increase that by 10% every year the returns are too low to generate an IRR. So a minimum usage of approximately 600-650 users per month (8-9 users per computer per day) is

required to make it viable. With 10% growth in users, the maximum number of users 1530 is reached by year 10.

Rural internet model	US$	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Base Case VSAT 128kbps											
Number of internet users per month		650	715	787	865	952	1,047	1,152	1,267	1,393	1,533
Usage fee		0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Revenues		3,900	4,290	4,719	5,191	5,710	6,281	6,909	7,600	8,360	9,196
Number of pc's		3	3	3	3	3	3	3	3	3	3
Operating costs		3,232	3,232	3,232	3,232	3,232	3,232	3,232	3,232	3,232	3,232
Operating Profit (Loss)		668	1,058	1,487	1,959	2,478	3,049	3,677	4,368	5,128	5,964
Capex		(5,175)	0	0	0	0	(4,350)	0	0	0	0
Loan		(5,175)	0	0	0	0	(4,350)	0	0	0	0
Interest		932	1,099	1,297	1,530	1,404	1,256	1,080	873	629	340
Repayment		0	0	0	(2,231)	(2,231)	(2,231)	(2,231)	(2,231)	(2,231)	(2,231)
Net profit (Loss)		668	1,058	1,487	(272)	247	818	1,446	2,137	2,897	3,733

Internal Rate of Return (IRR)   11%

5.3.2.2   Low User scenario

As explained under the base case, the rural internet model is extremely sensitive to the number of users. However it we assume 75% of expected takeup in the first year followed by a higher growth rate of 20% until full usage of 1500 user per month is achieved then a positive rate of return is

Rural internet model	US$	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Low User Case											
Number of internet users per month		488	585	702	842	1,011	1,213	1,334	1,401	1,471	1,471
Usage fee		0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Revenues		2,925	3,510	4,212	5,054	6,065	7,278	8,006	8,406	8,827	8,827
Number of pc's		3	3	3	3	3	3	3	3	3	3
Operating costs		3,232	3,232	3,232	3,232	3,232	3,232	3,232	3,232	3,232	3,232
Operating Profit (Loss)		(307)	278	980	1,822	2,833	4,046	4,774	5,174	5,595	5,595
Capex		(5,175)	0	0	0	0	(4,350)	0	0	0	0
Loan		(5,175)	0	0	0	0	(4,350)	0	0	0	0
Interest		932	1,099	1,297	1,530	1,404	1,256	1,080	873	629	340
Repayment		0	0	0	(2,231)	(2,231)	(2,231)	(2,231)	(2,231)	(2,231)	(2,231)
Net profit (Loss)		(307)	278	980	(408)	602	1,816	2,543	2,944	3,364	3,364

Internal Rate of Return (IRR)   10%

possible. Low take up and low growth rates (10%) generate negative returns and the growth rate of subscribers needs to be at least 15% until saturation is reached to generate a positive return.

5.3.2.3   High Tariff scenario

With a higher tariff of $1 per usage, depending upon elasticity of demand which we expect to be very elastic at the rural level, the number of users will decrease. We assume here that usage decreases by 50% and show below that a positive rate of return is generated.

Rural internet model	US$	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
High Tariff											
Number of internet users per month		325	358	393	433	476	523	576	633	697	766
Usage fee		1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Revenues		3,900	4,290	4,719	5,191	5,710	6,281	6,909	7,600	8,360	9,196
Number of pc's		3	3	3	3	3	3	3	3	3	3
Operating costs		3,232	3,232	3,232	3,232	3,232	3,232	3,232	3,232	3,232	3,232
Operating Profit (Loss)		668	1,058	1,487	1,959	2,478	3,049	3,677	4,368	5,128	5,964
Capex		(5,175)	0	0	0	0	(4,350)	0	0	0	0
Loan		(5,175)	0	0	0	0	(4,350)	0	0	0	0
Interest		932	1,099	1,297	1,530	1,404	1,256	1,080	873	629	340
Repayment		0	0	0	(2,231)	(2,231)	(2,231)	(2,231)	(2,231)	(2,231)	(2,231)
Net profit (Loss)		668	1,058	1,487	(272)	247	818	1,446	2,137	2,897	3,733

Internal Rate of Return (IRR)　　`11%`

However, if demand was highly elastic, that is a change in price brought about an even larger change in quantity demanded then if demand is reduced by more than 50% negative returns will be generated. Again it will be extremely important to test affordability in different areas and it may be appropriate to price internet access differently in the rural areas compared to the urban areas.

5.3.2.4   Alternative satellite provider scenario

The rural internet model is more sensitive to the number of users in the first year and the capital expenditure costs in the first year, as revenues are lower than the town internet model. Therefore when we introduce an alternative satellite provider with a higher start-up cost but the same monthly access fee then a larger number of users are required to make the internet café viable. Approximately 700 users per month (50 more than the base case) are required in the first year to achieve an IRR of 11%.

Rural internet model	US$	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Alternative VSAT 128kbps											
Number of internet users per month		700	770	847	932	1,025	1,127	1,240	1,364	1,501	1,651
Usage fee		0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Revenues		4,200	4,620	5,082	5,590	6,149	6,764	7,441	8,185	9,003	9,903
Number of pc's		3	3	3	3	3	3	3	3	3	3
Operating costs		3,232	3,232	3,232	3,232	3,232	3,232	3,232	3,232	3,232	3,232
Operating Profit (Loss)		968	1,388	1,850	2,358	2,917	3,532	4,209	4,953	5,771	6,671
Capex		(6,325)	0	0	0	0	(4,350)	0	0	0	0
Loan		(6,325)	0	0	0	0	(4,350)	0	0	0	0
Interest		1,139	1,343	1,585	1,871	1,717	1,535	1,320	1,067	768	416
Repayment		0	0	0	(2,727)	(2,727)	(2,727)	(2,727)	(2,727)	(2,727)	(2,727)
Net profit (Loss)		968	1,388	1,850	(368)	191	806	1,482	2,226	3,045	3,945

Internal Rate of Return (IRR)　　`11%`

But if the satellite provider has a lower monthly access fee as the alternative provider offers then the IRR goes up to 27%.

Rural internet model	US$	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Alternative VSAT 64kbps											
Number of internet users per month		700	770	847	932	1,025	1,127	1,240	1,364	1,501	1,651
Usage fee		0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Revenues		4,200	4,620	5,082	5,590	6,149	6,764	7,441	8,185	9,003	9,903
Number of pc's		3	3	3	3	3	3	3	3	3	3
Operating costs		2,632	2,632	2,632	2,632	2,632	2,632	2,632	2,632	2,632	2,632
Operating Profit (Loss)		1,568	1,988	2,450	2,958	3,517	4,132	4,809	5,553	6,371	7,271
Capex		(6,325)	0	0	0	0	(4,350)	0	0	0	0
Loan		(6,325)	0	0	0	0	(4,350)	0	0	0	0
Interest		1,139	1,343	1,585	1,871	1,717	1,535	1,320	1,067	768	416
Repayment		0	0	0	(2,727)	(2,727)	(2,727)	(2,727)	(2,727)	(2,727)	(2,727)
Net profit (Loss)		1,568	1,988	2,450	232	791	1,406	2,082	2,826	3,645	4,545

Internal Rate of Return (IRR)   27%

5.3.2.5 Fixed line dial-up access scenario

Despite the lower start-up cost of $314, the dial-up access scenario is not viable at all for the rural internet model. 1800 users per month would be required to make the internet café viable from the first year and the café with only three computers can only support a maximum of 1500 users per month. This is because of the high monthly access fee generated by per minute call costs charged by the fixed line operator. If a special arrangement was made with the fixed line operator to charge lower call costs for bulk usage then this option may be viable.

Fixed line services for dial up and leased line continue to be relatively expensive in these countries as the incumbent operator faces no fixed line competition. The market in Tanzania is due to be liberalized in 2005 when it is expected that all operators will be able to apply to fixed voice and data licences. The timescale in Malawi and Zambia will be much longer as even part privatisation of the fixed line operator has not yet been achieved. The market is much smaller in these two countries so it is possible that no fixed line operator would be interested in installing a nationwide fibre optic network and that the market may go fully cellular and satellite. Presently fibre optic coverage by the incumbent telco is limited to Dar es Salaam and Mwanza in Tanzania and to a few areas in Malawi. Zamtel report that they have no fibre.

5.3.2.6 Leased line access scenario

Similarly putting a leased line into a rural internet café is not viable due to the high connection cost of $3800 and the high monthly access fee of $360. Revenues generated from up to 1500 users per month are just not enough to generate a positive return. However if the number of users was expected to be higher and the post office wanted to set up its own private network and offer connections to individual customers then it would potentially be viable but in this case we are more likely to be considering a town internet model rather than a rural internet model.

5.3.2.7 Low cost computer equipment

Using secondhand computers raises the IRR dramatically but only if there is no impact on usage. In reality we would expect the use of second hard computers to significantly reduce usage as users find the speed of the computer slow. Very rarely do companies dispose of computers which are in good working order.

Rural internet model	US$	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Low Cost Computers											
Number of internet users per month		650	715	787	865	952	1,047	1,152	1,267	1,393	1,533
Usage fee		0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Revenues		3,900	4,290	4,719	5,191	5,710	6,281	6,909	7,600	8,360	9,196
Number of pc's		3	3	3	3	3	3	3	3	3	3
Operating costs		3,232	3,232	3,232	3,232	3,232	3,232	3,232	3,232	3,232	3,232
Operating Profit (Loss)		668	1,058	1,487	1,959	2,478	3,049	3,677	4,368	5,128	5,964
Capex		(2,845)	0	(852)	0	0	(2,020)	0	(852)	0	(852)
Loan		(2,845)	0	(852)	0	0	(2,020)	0	(852)	0	(852)
Interest		512	604	713	841	772	690	594	480	346	187
Repayment		0	0	0	(1,226)	(1,226)	(1,226)	(1,226)	(1,226)	(1,226)	(1,226)
Net profit (Loss)		668	1,058	1,487	733	1,252	1,823	2,451	3,142	3,902	4,738

Internal Rate of Return (IRR)   47%

5.3.2.8   Soft Loan scenario

Introducing a soft loan with a more favourable interest rate of 6% increases the IRR and ensures that profitability remains positive in every year. This may encourage postmasters to take on the responsibility of running an internet café due to the prospect of extra revenue each year.

Rural internet model	US$	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Soft Loan											
Number of internet users per month		650	715	787	865	952	1,047	1,152	1,267	1,393	1,533
Usage fee		0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Revenues		3,900	4,290	4,719	5,191	5,710	6,281	6,909	7,600	8,360	9,196
Number of pc's		3	3	3	3	3	3	3	3	3	3
Operating costs		3,232	3,232	3,232	3,232	3,232	3,232	3,232	3,232	3,232	3,232
Operating Profit (Loss)		668	1,058	1,487	1,959	2,478	3,049	3,677	4,368	5,128	5,964
Capex		(5,175)	0	0	0	0	(4,350)	0	0	0	0
Loan		(5,175)	0	0	0	0	(4,350)	0	0	0	0
Interest		311	329	349	370	326	279	230	177	121	62
Repayment		0	0	0	(1,104)	(1,104)	(1,104)	(1,104)	(1,104)	(1,104)	(1,104)
Net profit (Loss)		668	1,058	1,487	855	1,374	1,945	2,573	3,264	4,024	4,860

Internal Rate of Return (IRR)   26%

5.3.2.9   Postal Loan Scenario

Adding in a postal loan with payback commencing immediately over two years requires at least 1055 users per month from the first year. Instead if we increase user fees to $1 a session for the first two years and then reduce to $0.75 from year three, a high IRR is generated and the PostMaster generates a reasonable profit each year.

Rural internet model	US$	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Postal Loan											
Number of internet users per month		650	715	787	865	952	1,047	1,152	1,267	1,393	1,533
Usage fee		1.0	1.0	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Revenues		7,800	8,580	7,079	7,786	8,565	9,421	10,364	11,400	12,540	13,794
Number of pc's		3	3	3	3	3	3	3	3	3	3
Operating costs		3,232	3,232	3,232	3,232	3,232	3,232	3,232	3,232	3,232	3,232
Operating Profit (Loss)		4,568	5,348	3,847	4,554	5,333	6,189	7,132	8,168	9,308	10,562
Capex		(5,175)	0	0	0	0	(4,350)	0	0	0	0
Loan		(5,175)	0	0	0	0	(4,350)	0	0	0	0
Interest		(513)	(513)	0	0	0	(431)	(431)	0	0	0
Repayment		(3,100)	(3,100)	0	0	0	(2,606)	(2,606)	0	0	0
Net profit (Loss)		1,468	2,248	3,847	4,554	5,333	3,583	4,526	8,168	9,308	10,562

Internal Rate of Return (IRR)   87%

Again, we emphasise that no elasticities have been incorporated and it is essential that a minimum of 528 users per month visit the internet café in the first year.

5.3.3 Remote Internet Model

5.3.3.1 Base Case

With operating costs reduced in line with the provision of one computer with internet access, the remote internet model is not viable and generates a negative rate of return. In order to make the model viable it is necessary to provide the services of the IT analyst free of charge so that salary costs are zero as the existing postmaster is expected to monitor and sell the internet usage to approximately 14 users per day. It is also necessary to provide the maintenance of the VSAT equipment free of charge and to reduce electricity consumption by half (realistic with only one computer). An IRR of 0% is generated with positive profit each year as shown below. But this requires at least 350 users per month (13.5 users per day).

Remote internet model	US$	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Base Case VSAT 64kbps											
Number of internet users per month		350	368	404	404	404	404	404	404	404	404
Usage fee		0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Revenues		2,100	2,205	2,426	2,426	2,426	2,426	2,426	2,426	2,426	2,426
Number of pc's		1	1	1	1	1	1	1	1	1	1
Operating costs		1,220	1,220	1,220	1,220	1,220	1,220	1,220	1,220	1,220	1,220
Operating Profit (Loss)		880	985	1,206	1,206	1,206	1,206	1,206	1,206	1,206	1,206
Capex		(2,770)	0	0	0	0	(1,945)	0	0	0	0
Loan		(2,770)	0	0	0	0	(1,945)	0	0	0	0
Interest		499	588	558	521	478	428	368	297	214	116
Repayment		0	(760)	(760)	(760)	(760)	(760)	(760)	(760)	(760)	(760)
Net profit (Loss)		880	225	446	446	446	446	446	446	446	446

Internal Rate of Return (IRR)   0%

We do not show any results for the other connection types; alternative VSAT, dial-up and leased line as they are all more expensive for this model and hence not viable.

5.3.3.2 Low cost computer equipment

Using secondhand computer equipment would allow the remote internet model to pay for an internet analyst to visit the internet café for one day every two weeks and to generate an IRR of 10%. But yet again the number of users needs to be above 350.

Remote internet model	US$	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Low cost pc's											
Number of internet users per month		350	368	404	404	404	404	404	404	404	404
Usage fee		0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Revenues		2,100	2,205	2,426	2,426	2,426	2,426	2,426	2,426	2,426	2,426
Number of pc's		1	1	1	1	1	1	1	1	1	1
Operating costs		1,555	1,555	1,555	1,555	1,555	1,555	1,555	1,555	1,555	1,555
Operating Profit (Loss)		545	650	871	871	871	871	871	871	871	871
Capex		(1,680)	0	(285)	0	0	(855)	0	(285)	0	(285)
Loan		(1,680)	0	(285)	0	0	(855)	0	(285)	0	(285)
Interest		302	357	338	316	290	259	223	180	130	70
Repayment		0	(461)	(461)	(461)	(461)	(461)	(461)	(461)	(461)	(461)
Net profit (Loss)		545	189	410	410	410	410	410	410	410	410

Internal Rate of Return (IRR)	10%

If the cost of the internet analyst is subsidized and salaries return to zero then the maximum number of users required per month falls to 250 as shown below.

Remote internet model	US$	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Low Cost Computers Low User											
Number of internet users per month		250	275	303	333	366	403	403	403	403	403
Usage fee		0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Revenues		1,500	1,650	1,815	1,997	2,196	2,416	2,416	2,416	2,416	2,416
Number of pc's		1	1	1	1	1	1	1	1	1	1
Operating costs		1,220	1,220	1,220	1,220	1,220	1,220	1,220	1,220	1,220	1,220
Operating Profit (Loss)		280	430	595	777	976	1,196	1,196	1,196	1,196	1,196
Capex		(1,680)	0	(285)	0	0	(855)	0	(285)	0	(285)
Loan		(1,680)	0	(285)	0	0	(855)	0	(285)	0	(285)
Interest		302	357	338	316	290	259	223	180	130	70
Repayment		0	(461)	(461)	(461)	(461)	(461)	(461)	(461)	(461)	(461)
Net profit (Loss)		280	(31)	134	316	515	735	735	735	735	735

Internal Rate of Return (IRR)	12%

5.3.3.3 Soft Loan scenario

Introducing a soft loan at 6% interest rate has a significant impact of IRR increasing it from 0% under the base case to 25% as shown below.

Remote internet model	US$	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Soft Loan											
Number of internet users per month		350	368	404	404	404	404	404	404	404	404
Usage fee		0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Revenues		2,100	2,205	2,426	2,426	2,426	2,426	2,426	2,426	2,426	2,426
Number of pc's		1	1	1	1	1	1	1	1	1	1
Operating costs		1,220	1,220	1,220	1,220	1,220	1,220	1,220	1,220	1,220	1,220
Operating Profit (Loss)		880	985	1,206	1,206	1,206	1,206	1,206	1,206	1,206	1,206
Capex		(2,770)	0	0	0	0	(1,945)	0	0	0	0
Loan		(2,770)	0	0	0	0	(1,945)	0	0	0	0
Interest		166	176	161	145	127	109	90	69	47	24
Repayment		0	(432)	(432)	(432)	(432)	(432)	(432)	(432)	(432)	(432)
Net profit (Loss)		880	553	774	774	774	774	774	774	774	774

Internal Rate of Return (IRR)	25%

5.3.3.4 Postal Loan Scenario

Adding in a postal loan with payback commencing immediately over two years requires at least 480 users per month from the first year. Instead if we increase user fees to $1 a session for the first two years and then reduce to $0.75 from year three, a high IRR is generated and the PostMaster generates a small profit each year.

Remote internet model	US$	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Postal Loan											
Number of internet users per month		350	368	404	404	404	404	404	404	404	404
Usage fee		1.0	1.0	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Revenues		4,200	4,410	3,638	3,638	3,638	3,638	3,638	3,638	3,638	3,638
Number of pc's		1	1	1	1	1	1	1	1	1	1
Operating costs		1,220	1,220	1,220	1,220	1,220	1,220	1,220	1,220	1,220	1,220
Operating Profit (Loss)		2,980	3,190	2,418	2,418	2,418	2,418	2,418	2,418	2,418	2,418
Capex		(2,770)	0	0	0	0	(1,945)	0	0	0	0
Loan		(2,770)	0	0	0	0	(1,945)	0	0	0	0
Interest		(274)	(274)	0	0	0	(193)	(193)	0	0	0
Repayment		(1,659)	(1,659)	0	0	0	(1,165)	(1,165)	0	0	0
Net profit (Loss)		1,321	1,531	2,418	2,418	2,418	1,253	1,253	2,418	2,418	2,418

Internal Rate of Return (IRR)	127%

Again, as with the rural internet model, no demand elasticity is accounted for as result of introducing a higher tariff.

5.3.3.5 Remote internet model without electricity

In many cases (135 post offices in Tanzania, 35 post offices in Zambia and 40 of post offices in Malawi) we can expect remote internet cafes not to have electricity although in some areas it is only a matter of connecting the post office to the local grid. In the cases outside the national grid we recommend using a solar panel rather than a generator as the running costs of a generator (petrol) will amount to about $4000 per year, compared to expected remote internet revenues of about $2500 a year. Instead maintenance costs on a solar panel can be expected to total approximately $300 a year if no damage is caused to the solar panel. If the solar panel is damaged then repairs might cost up to $2000 in any one year. A solar panel costs about $9000 and slotted into the remote internet model makes the whole model unviable. It would be necessary to provide the solar panel equipment free of charge to postmaster and for the postmaster to purchase the computer equipment with an interest free loan. This is the only way the postmaster will be able to meet the maintenance costs of the computer and the solar panel but not for the VSAT. As the results below show at this level with a minimum of 350 users per month the Postmaster makes a small profit.

Remote internet model	US$	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
No electricity											
Number of internet users per month		350	368	404	404	404	404	404	404	404	404
Usage fee		0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Revenues		2,100	2,205	2,426	2,426	2,426	2,426	2,426	2,426	2,426	2,426
Number of pc's		3	3	3	3	3	3	3	3	3	3
Operating costs		1,340	1,340	1,340	1,340	1,340	1,340	1,340	1,340	1,340	1,340
Operating Profit (Loss)		760	865	1,086	1,086	1,086	1,086	1,086	1,086	1,086	1,086
Capex		(2,770)	0	0	0	0	(1,945)	0	0	0	0
Loan		(2,770)	0	0	0	0	(1,945)	0	0	0	0
Interest		0	0	0	0	0	0	0	0	0	0
Repayment		0	(308)	(308)	(308)	(308)	(308)	(308)	(308)	(308)	(308)
Net profit (Loss)		760	557	778	778	778	778	778	778	778	778

Internal Rate of Return (IRR)   23%

If low cost computer equipment is used then the model becomes more attractive with an IRR of 82% and slightly higher profits.

Remote internet model	US$	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Solar Panel Low cost pc's											
Number of internet users per month		350	368	404	404	404	404	404	404	404	404
Usage fee		0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Revenues		2,100	2,205	2,426	2,426	2,426	2,426	2,426	2,426	2,426	2,426
Number of pc's		1	1	1	1	1	1	1	1	1	1
Operating costs		1,340	1,340	1,340	1,340	1,340	1,340	1,340	1,340	1,340	1,340
Operating Profit (Loss)		760	865	1,086	1,086	1,086	1,086	1,086	1,086	1,086	1,086
Capex		(1,680)	0	(285)	0	0	(855)	0	(285)	0	(285)
Loan		(1,680)	0	(285)	0	0	(855)	0	(285)	0	(285)
Interest		0	0	0	0	0	0	0	0	0	0
Repayment		0	0	(210)	(210)	(210)	(210)	(210)	(210)	(210)	(210)
Net profit (Loss)		760	865	876	876	876	876	876	876	876	876

Internal Rate of Return (IRR)   82%

5.3.3.6 Remote internet model without electricity and with Postal Loan

If instead we assume that only the solar equipment will be provided by donors free of charge but that the PostMaster must finance the VSAT connection cost and the computer hardware through a Postal Bank Loan with repayments commencing immediately over a two year period then as with the town and rural internet models, it is necessary to raise user fees to $1 in the first two years and then $0.75 in the remaining years. This enables the PostMaster to make a small profit in each year. It should be borne in mind that the profit presented below is approximately equal to existing salaries for PostMasters in rural areas and would provide an excellent incentive to provide the internet facility.

Remote internet model	US$	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Postal Loan Solar Power											
Number of internet users per month		350	368	404	404	404	404	404	404	404	404
Usage fee		1.0	1.0	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Revenues		4,200	4,410	3,638	3,638	3,638	3,638	3,638	3,638	3,638	3,638
Number of pc's		1	1	1	1	1	1	1	1	1	1
Operating costs		1,340	1,340	1,340	1,340	1,340	1,340	1,340	1,340	1,340	1,340
Operating Profit (Loss)		2,860	3,070	2,298	2,298	2,298	2,298	2,298	2,298	2,298	2,298
Capex		(2,770)	0	0	0	0	(1,945)	0	0	0	0
Loan		(2,770)	0	0	0	0	(1,945)	0	0	0	0
Interest		(274)	(274)	0	0	0	(193)	(193)	0	0	0
Repayment		(1,659)	(1,659)	0	0	0	(1,165)	(1,165)	0	0	0
Net profit (Loss)		1,201	1,411	2,298	2,298	2,298	1,133	1,133	2,298	2,298	2,298

Internal Rate of Return (IRR)   110%

5.3.4 Business model results at the aggregate level

To see the larger picture of profitability for the whole country as a result of putting internet into all post office types, we show the following tables which show net profits and IRR under each base case scenario.

Base Case Town internet model: IRR: 6%

Net Profit (Loss)	No	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Tanzania	141	564	95,993	200,964	(123,376)	3,640	143,357	297,046	466,104	652,068	856,628
Zambia	84	336	57,187	119,724	(73,501)	2,168	85,404	176,964	277,679	388,466	510,331
Malawi	24	96	16,339	34,207	(21,000)	619	24,401	50,561	79,337	110,990	145,809

Base case rural internet model: IRR: 11%

Net Profit (Loss)	No	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Tanzania	86	57,448	90,988	127,882	(23,382)	21,260	70,366	124,382	183,800	249,160	321,056
Zambia	74	49,432	78,292	110,038	(20,119)	18,293	60,547	107,027	158,154	214,394	276,258
Malawi	46	30,728	48,668	68,402	(12,507)	11,372	37,637	66,530	98,312	133,272	171,728

Base case remote internet model: IRR: 0%

Net Profit (Loss)	No	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Tanzania	181	159,280	40,796	80,707	80,707	80,707	80,707	80,707	80,707	80,707	80,707
Zambia	77	67,760	17,355	34,334	34,334	34,334	34,334	34,334	34,334	34,334	34,334
Malawi	93	81,840	20,962	41,468	41,468	41,468	41,468	41,468	41,468	41,468	41,468

5.4 Performance Indicators

Given the assumptions we have used and the sensitivities we have run, the following are proposed as a set of criteria to assess performance of each individual post office internet café.

Indicator	Target
IRR	Should be above 0%
Number of internet users per month	Should be above:[45] • Town – 850 • Rural – 650 • Remote - 350
Profitability	Postmasters should generate enough profit to cover years when losses are made (ie IRR will be above 0)
Operating Profit	PostMasters should be able to cover operating costs through revenues in every year
Service availability	Bandwidth availability performance targets (should be close to 100%) should be agreed with the satellite operator
Loan repayment	Postmasters should keep to the proposed loan repayment schedules

It is recommended that the list of performance indicators be kept short so that the post offices can submit monthly reports to the regional head post offices. In this way the regional PostMasters can monitor the viability of the post office and act to relocate the service if revenues are too low or the postmaster is unable to manage the business.

5.5 Key Risks

A key risk is that Postmasters do not wish to take up the opportunity of internet service provision at the rural and remote levels even where supported with subsidy. Here we recommend that it may be appropriate to invite local entrepreneurs in the village to apply to run the service for the postmaster in

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[45] These numbers depend crucially upon the assumptions set out under the business model and should be used as a guide only

the post office premises with some kind of revenue sharing arrangement between the entrepreneur and the post master.

In summary, we set out below the key risks involved in setting up the three types of internet café and the potential mitigators:

Risk	Mitigator
• PostMasters express interest and enthusiasm which wanes once operational	• PostMasters should be made responsible for their own internet business and should make an application to head office to set up an internet café by filling in a designated form • Local entrepreneurs who have an interest in running an internet business could be sought to run the internet business on post office premises
• PostMasters are unable to manage the internet business in addition to their existing post business	• Postmasters need to be trained in setting up an internet business
• Post office is unable to fund nationwide training for postal staff	• Donor funding could be sought
• Post office unable to recruit staff from private sector	• Additional training will be required to fill to skills gap
• Private partners decide not to join a consortium	• A clear tender process • Clear roles and responsibilities • Clear definition of the business opportunity
• Other entrepreneurs set up internet cafés in the selected locations whilst the post office delays	• Project should proceed as soon as possible • Postmasters should engage in discussions with local community to ascertain if rival internet cafes will be set up and if so reconsider the business case
• Operating costs turn out to be higher	• A revised financial model should be

Risk	Mitigator
than expected	developed prior to launch seeking to clarify operational costs
• Capital expenditure costs turn out to be higher than expected	• A revised financial model should be developed prior to launch seeking to confirm and clarify capex
• Number of users is much lower than expected	• PostMasters need to market the service effectively • Adequate training programmes for users need to be set up
• Bandwidth is too low to support desired use	• Pilot projects should establish whether proposed bandwidth is adequate • Satellite providers should be able to provide further guidance on proposed bandwidth • Upgrade equipment to higher bandwidth capacity
• Loans are not available to finance capex	• Project manager engage in discussions with microfinance institutions • Possibilities of donor funding be investigated
• Subsidy is not available for remote post offices	• Set up rural communications fund as a priority • Investigate possibility of donor funding
• Post Masters default on loan repayment and steal equipment	• PostMasters could be made to feel responsible for the loan by pledging personal equity • The initiative should not be imposed from above but rather offered to postmasters as a business opportunity
• Coordination of the nationwide project is weak	• A project manager is required to ensure the project is implemented effectively at the town, rural and

Risk	Mitigator
	remote levels with adequate support from head and regional offices • Project manager required to lead consortium

5.6 Assessing Private Sector Interest

5.6.1 Forming public private partnerships or consortia

We have talked to satellite operators, fixed line operators, ISPs, cellular operators and equipment suppliers to assess their appetite for teaming up with the post office in offering public internet services in the rural areas. Much private sector interest is currently skeptical of the return that can be generated from offering internet in rural areas. However, the companies who have the most to gain from offering this product in the rural areas, that is the satellite operators are extremely interested in this potential project. Satellites operators generate revenues through providing connectivity in remote areas and so it is no surprise that they would be the keenest proponents of such a project. Interest from the cellular operators was generally more lukewarm as internet service does not yet form a key service offering for them. ISPs require connectivity in the rural areas so do not recognize the post office as a direct competitor yet. Indeed, a major theme of the discussions was the agreement that connectivity to the rural areas is to be prized over competition and it is only likely through some form of partnership or consortium that it will actually be possible to reach the rural areas. The fixed line operators presented a technical view of what might be possible in terms of connecting the rural areas and came from less of a commercial angle. Interestingly their first question was how would it be technically feasible rather than economically feasible. It is recommended therefore, that whilst the postal corporations will benefit from being reunited with the technical expertise of their former entities, commercial know-how resides firmly in the private sector and in the new breed of data and wireless operators and these will make the ideal business partners.

5.6.2 Private sector discussions

The following companies were interviewed to discuss the possibility of partnership and investment in a telecentre project potentially involving the Post Office. All discussions were kept at the theoretical level with no commitment made on either side to engage in the project.

Company	Contact person	Contact details
Tanzania		
Potential VSAT providers		
SATCOM	Harish Bhatt, Managing Director	hbhatt@satconet.com +255 748 224 476

Company	Contact person	Contact details
Simbanet	Rakesh Kukreja, General Manager	rakesh@simbanet.net +255 744 786586
Meeco Unisys Ltd	Jasvir Singh	+55-748-733209
IWAY (AFSAT)	Heinrich Northnagel, Manager Afsat Tanzania	hnothnagel@afsat.com +255(748)646298
Cellular operators		
Vodacom	Elizabeth Mwamfwagasi, Community Service Telephone Coordinator	emwamfwagasi@vodacom.co.tz +255 744 710 181
Celtel	Hilda Perez Marketing Department	Perez.h@tz.celtel.com +255 748 670 254
Fixed line operator		
TTCL	F.G. Ngonyani Manager, Data Network Services Issaya T K Ernest (Product Manager, Data Services)	Fregrin.ngonyani@ttcl.co.tz +255 22 212 8380 +255 748 805833 / +255 748 359024
IT Equipment Suppliers		
ComputechICS	V. Jayatheerthan	info@hptz.com +255 744 763763
Business Machines Tanzania Ltd / Copycat Tanzania Ltd	Murugan R	murugan@businessmachines.co.tz +255 741 751295
Computer Centre (Tanzania) Ltd	Mr. Samir Habib	samir@cctz.co.tz +255 748 225588
Micronix Systems Ltd.	Vijay Jobanputra	vjobanputra@micronix.co.tz

Company	Contact person	Contact details
		+ 255 748 329099
Mitsumi Computer Garage Ltd.	Mr Rinku	+255 741 568458
Solar energy equipment		
Rex Investments Ltd.	Mr. Francis Kibhisa Managing Director	solarenergy@cats-net.com +255 741 607533
Zambia		
ZAMNET	James Chamunorwa, Network Specialist	james@zamnet.zm +260 97 801922
UUNET	Ms Mateele Sinzala, Account Manager	mateele@zm.uu.net +260 96 742 246
Zamtel	Mr Kandolo, Director Customer Service Mr Chisi, IT administrator	kandolos@zamtel.zm chisibarth@yahoo.com
Malawi		
MTL	Ms P Lemani Sales Officer MTL M Streams (Data Lines)	+265 1 621 602
Celtel	Mr F Bisika, IT Director	bisika.f@mw.celtel.com +265 9 989 800
Malawinet	Kamal Patel Managing Director	kamal@malawi.net +265 8 829612
SDNP	Mr D. Chima, Information Specialist	mw@sdnptech.org.mw

Company	Contact person	Contact details
iT Centre	Salim Makani Managing Director	smakani@it-centre.biz, salim_makani@hotmail.com + 265 8 821 028

5.6.3 Key potential partners

5.6.3.1 SATCOM

SATCOM are TPC's existing VSAT providers (C-band) for their head post offices. SATCOM are currently in discussions with the post office regarding the next phase of VSAT rollout to the major towns in TPC's network. SATCOM are keen to provide VSAT connectivity to all post offices in order to offer electronic banking services throughout Tanzania. SATCOM's clients also include Exim Bank and Tanesco and they hope that they will take on the contract with Tanzania Postal Bank to offer ATM facilities at all post offices throughout Tanzania. Current discussions between the post office and SATCOM do not include providing connectivity to all departmental post offices and certainly not to any franchised or sub post offices so the analysis here does not in any way duplicate what TPC are currently planning. Providing connectivity at the rural level is off TPC's current radar and they will only do so once all the major post offices have been connected to their own intranet. Notwithstanding this SATCOM are extremely keen to develop a partnership arrangement with TPC whereby they would provide the VSAT (Ku Band) free of charge at all rural sites but TPC is required to pay the monthly access fee. In the most rural areas which we have termed remote at the sub post office level, SATCOM have indicated that they would charge a monthly access fee as low as $50 a month for a single user. At the sub-post office level this makes the model viable under the conditions presented in the previous section.

SATCOM have proposed that they can assist with finding local IT firms to carry out maintenance and would be able to provide training for TPC technicians from a Dar es Salaam base.

5.6.3.2 Simbanet

Simbanet is a licensed public data operator in Tanzania. Simbanet have an IP satellite hub in Dar es Salaam and route traffic via Europe through a single hop to enable high throughput. They have expressed strong interest in supplying VSAT equipment and full network management solutions for the postal network. A satellite operator has a strong interest in marketing its product to an organization like the Post Office with offices all over Tanzania because it will earn a future revenue stream from the monthly access fee from a large number of sites. This creates the incentive to subsidise the initial set-up cost of the VSAT equipment. Whilst Simbanet have not offered to provide the VSAT equipment free of charge they have offered a low monthly rental charge for 128kbps shared bandwidth. It is envisaged that if Simbanet were encouraged to compete for the contract with TPC they might be able to offer the VSAT equipment free of charge. It is highly recommended that an open tender process is organized which discloses recommended prices in the terms of reference.

Simbanet recommend that the rural post offices be connected with Ku Band VSATs to start with and if demand should exceed initial expectations then it would be possible to upgrade the satellite equipment to C-band under the existing contract requiring the replacement of equipment. The Ku

Band VSAT is an always on connection with a 45mb shared downlink and a 16 kbps to 4mb uplink. VoIP and video conferencing would be possible over this link.

Simbanet can provide management of the following; prepaid platform, security provisions on the network, network and bandwidth management, maintenance and some training. They advise that it will be important to offer voice services as well as data and that there is great value to be derived from offering other applications such as Paper to email which is similar to TPC's hybrid mail service.

A key advantage of opting for a partner like Simbanet is that they have offered to set up the same VSAT connectivity in Malawi and Zambia through their partners in these countries. VSAT costs tend to be higher in Malawi and Zambia as usage and the level of competition is lower so using a company like Simbanet to negotiate a deal on the same basis as the Tanzania costs would be advantageous to the project.

5.6.3.3   Fixed line providers

The fixed line providers, eg TTCL would in principle have an interest in partnering with the postal organization to offer internet services. TTCL have even gone through the list of Post offices in Tanzania in each region and have proposed whether they would recommend dial-up, leased line or alternative forms of connectivity. Unfortunately the current prices that TTCL have proposed are not economic for this type of project but if TTCL were brought in as a partner it is possible that they might be able to offer lower monthly access costs if they were to see a return in the project. However, the benefits of partnering with the post office are purely to piggyback off their existing customers services and management capability because, the fixed line providers typically have premises in the same locations as the post office due to their historical relationship. What the fixed line operator may lack is the constant interface with the customer to serve daily communication needs which the post office already offers.

In conclusion, developing a partnership with the fixed line operator is likely to be extremely hard work requiring impetus to come from a neutral source ideally with some funding. Unlike the satellite operators, the fixed line operators, whilst still partly parastatal, are lacking in hard commercial drive to make a project like this viable.

5.6.3.4   Cellular operators

We talked to Celtel and Vodacom both of whom expressed a lukewarm interest in the project. Voice and SMS are the core product offerings for these operators in increasingly competitive markets and they do not view internet service as an immediate priority. The excellent distribution strategies of Celtel and Vodacom can do much to guide a marketing strategy for the post office if it plans to offer internet service in the rural areas. Celtel and Vodacom have undergone effective branding such that even in the rural areas, brand familiarity is strong and low denomination prepaid cards are available for sale.

The fact that Celtel is present in the three countries would make it an obvious partner for the post office. However Celtel Malawi currently offer internet service provision facilities in Malawi and are starting to set up internet cafés and may see the post office as a direct competitor. It is recommended that at the next stage of this project, discussions with Celtel should be sought taking into account the sensitive potentially competitive nature of the project.

5.6.3.5   Equipment suppliers

The majority of equipment suppliers we talked to intimated that they were ready to go into partnership and that they would be able to supply the post offices hardware needs in the three countries. Equipment suppliers in Tanzania were particularly enthusiastic about the project and suggested that they would provide the computer hardware at cost in return for some revenue sharing arrangement. It is likely therefore that these suppliers could be relied upon to provide computer maintenance and some training with links to local IT firms and suppliers in all the regions which would facilitate the running of the internet business. With a revenue sharing incentive to keep the post office internet cafés operational, the equipment suppliers will be keen to react quickly to trouble shoot any computer problems.

5.6.4   Private sector allocation of risk

Firms with no immediate strategic interest in setting up internet cafés in rural areas eg firms whose core offering is not internet, are less likely to tender for such a project to partner with the Post office or any public organization. Instead the project coordinators would need to attract their interest proving that the project is potentially viable and bring in the private participant within a consortium providing them with a very clear idea of their role and the potential return on their investment. Firms whose core offering is internet and satellite are more likely to bear some of the risk.

5.6.5   Alternative models

We do not consider the option to rent out post office space and infrastructure to offer private internet access as a viable option. This approach has merits in terms of limiting the post office's risk but means that service delivery will be reliant upon entrepreneurs setting up in a particular area so services will not be offered uniformly throughout the country. The advantage of offering through the post office is that everyone will learn that Post offices always offer internet services and so will look for post offices when they need to use the internet. If this is offered on an ad hoc basis the advantage of internet branding will be lost.

Potential private sector partners were not willing to rent out space from the post office and then take on all the risk associated with offering internet services. They liked the idea of partnering with the post office to offer the service as the risk is to some extent shared and each partner comes with their own competitive advantage eg the Post office is able to handle the administration and customer service side, the satellite operator manages connectivity, the hardware supplier manages the computers and in effect each partner offers what he does best.

The key point is that there are no existing internet chains in these countries who are in need of space and infrastructure to provide services. Other ISPs might potentially want to use Post office infrastructure to offer internet services but if the Post office can itself operate as an ISP then there is no need of duplication.

This model of renting out infrastructure may work better in Malawi and Zambia where internet provision is less wide spread and more on an ad hoc basis by private individuals. If the alternative is that no internet would be provided because the premises could not be found or afforded then renting out the infrastructure would be the second best option.

5.6.6 Recommendations

It is recommended at this stage that ideas about public private partnerships be kept open. It is envisaged that a public private consortium may be appropriate which brings together the network provider (the post office), the connectivity provider (the satellite operator), the equipment supplier and the operating system supplier. In a consortium it will be important not to duplicate any roles or to bring in competing partners. Responsibility will need to be allocated to ensure effective operation. For example, if the internet café shuts down because of power failure whose responsibility is it to fix it? All roles and responsibilities will need to be clearly defined in a contract between partners.

An important point to note is that the operators emphasized the importance of a pilot project. This is possibly because they have seen many internet cafés fail because they did not adequately test the market in the first place or select a connectivity option that would be viable in the long-term.

5.7 Other factors to take into consideration

5.7.1 Operating Systems

Microsoft have recently announced that they are due to translate their operating systems into kiswahili. Kiswahili Microsoft products are expected to be available by the end of 2004. Microsoft anticipate that in a region with few computers and high illiteracy rates the kiswahili version of windows will inspire East African governments to expand their IT economies, encourage literacy programmes and attract more computer users. Indeed, the Tanzanian government currently do not use email as an official method of communication. In order to communicate with ministries it is necessary to print off an email of a letter and deliver the hard copy to the relevant ministry as the ministries will not respond formally through the email system. Individuals within the civil service may have email accounts that they use but this is not the formal method of communication. This is partly because not all employees have computers and most ministries do not have email accounts. However this is set to change with the introduction of the Client Service Charter in July 2004 when all ministries will be given email accounts. Yet unless individuals are trained email use will remain limited. The use of email for official use appears to be far more limited in Tanzania, Zambia and Malawi than in for example, Kenya, Ghana, Nigeria and Uganda. In Uganda, internet was rolled out in the ministries one year ago and many criticized the project arguing that email takeup would be low amongst Government officials. However the project has been a success and now email is commonly accepted as a formal means of communication. The main barrier to email use may be language. For example, outside of Dar es Salaam, most (but not all) Government officials will speak only kiswahili and would therefore not wish to communicate in English when the recipient groups are mixed english and kiswahili speakers. However many district offices have no direct means of communication with the central ministry being in a remote area and being able to access a public internet point and send a message in kiswahili would be of great benefit.

There are more than 100 million kiswahili speakers in the region of which 10% are estimated to have access to computers and Microsoft hopes to attract 5% more when it launches the kiswahili version of its product.

5.7.2 Local Content

Development of local content will be key to the uptake of internet in Tanzania, Malawi and Zambia. The development of the kiswahili operating system will undoubtedly encourage growth in the number of kiswahili websites and portals. It will be important that websites are also developed locally so that internet users appreciate the familiarity with their local surroundings. This will entail website hosting

facilities at major towns to ensure that not all content comes from the capital cities and that information is posted regionally.

Content services can be made available to offices and schools as well. These organizations/bodies can store their documents in their respective accounts and hence information can be made available locally. As the content services can password protected this type of service can even used for distributing confidential documents like exam question papers.

5.7.3 Range of services

As mentioned above, it is considered crucial to offer voice services in conjunction with data. Voice over internet protocol presents the perfect opportunity to offer low cost calls to customers but is currently not licensed in all three countries. Liberalising this service and perhaps regulating a minimum call price would allow the fixed line and cellular operators to continue to compete effectively but would add an incentive for consumers to familiarize themselves with the internet.

Offering applications which do not require computer use will appeal to the older generations who may refuse to learn computer use. For example offering to type up an email or letter or downloading information on a certain subject would enable access to information and communications for those with limited literacy and zero computer literacy.

5.7.4 Training

Effective training is paramount to ensuring that revenues are generated in the rural areas. It will be essential to train every postmaster in offering and using the service and to train IT analysts in identifying and addressing problems. The business model we propose rests upon the assumption that Postmasters will want to offer internet services in their post office and we suggest that the post office organize regional presentations to explain this business model to post masters to enable them to understand both the opportunity and the risks involved and to explain the application process.

The following training needs have been identified.

Identified training need	Proposed Solution
Regional IT Managers	• Training at Head Office to then take to regions to train PostMasters • Train the trainer
PostMasters	• Presentation of internet business model and explanation of application process • Training in business management of an internet café run at the regional head post offices • Training in internet and computer use • Training in marketing

Identified training need	Proposed Solution
	• Training in training individual customers to use the internet and computers • Attend annual local courses running by local training institutions to expand knowledge of computers (included in business model)
Internet sales staff	• Training in customer service and sales management of an internet café run at the regional head post offices • Training in marketing • Training in internet and computer use • Training in training individual customers to use the internet
IT analysts	• Training in training postmasters, internet sales staff and individual customers to use the internet and computers • Training in IT support and trouble shooting
Internet users	• Training by Internet sales staff • Training by visiting IT analyst • Promotion of local IT training courses at the post office

It would make most sense to run the training programmes on a nationwide basis so that the following courses were offered at each regional post office headquarters:

- Introduction to offering internet services in post offices and how to apply for the service

- Introduction to running an internet café as a business which would include the following course elements: (suitable for PostMasters and Internet Sales staff)

  o How to market your internet café

  o Introduction to basic computer use

  o Introduction to Windows

  o Introduction to the Internet

  o How to train your customers

- Intermediate computing skills: (suitable for new IT analysts and experienced postmasters and internet sales staff)

    o Training the computer illiterate

    o Intermediate word and excel

    o Dealing with basic computer problems

- Advanced computing skills (suitable for experienced IT analysts)

    o Training new IT Staff

    o Advanced applications

    o Trouble shooting IT problems

The advantage of offering a tiered training system is that it provides an incentive for the postmasters, sales staff and IT analysts to progress over time and to acquire key skills that will help them sell more internet time and applications. It would be ideal if the Post office were able to offer these course through a centralized system at a nominal fee or even free of charge. The next stage of this study could look at the possibility of donor funding to support nationwide training programmes.

We recommend that the employment of IT analysts be covered under the postal headquarters budget as the networking and counter automation project in each country will require the services of trained IT personnel. In addition we recommend that a significant proportion of these IT staff are recruited from the private sector to help engender the commercial principle into the operations of the post offices. In particular, potential private sector partners have indicated the importance of recruiting private sector minded personnel to the project.

5.7.5 According Community responsibility

As the Community Telecentre Cookbook states "The best way to minimise risk in a Telecentre is to promote a sense of ownership and pride in the Telecentre among users and the community at large." The Post office network is already a shared community resource. It will be important to develop rules for usage to ensure the facility is shared by the community and that computers are well maintained. Virus protection software will be essential and has been included in the computer set-up cost. A sense of community responsibility will be important in promoting equipment security and care taken not to damage the VSAT, solar and hardware equipment to minimize maintenance and replacement costs.

Mzee Charles Mwakibinga

"It would be very good for
 Chimala to have a new form of
communication, we need it here
in Chimala. It is 75km to the
nearest internet café"

6 Appendices

6.1 Terms of reference

Scope of work

7.   Government policies

In the sample countries the Consultant will analyze the government policies relative to postal sector and ICI development, and identify areas in which both can complement each other, specifically:

- Analyze the current government's strategy regarding the development of the postal sector

- Update the current state of legal and regulatory framework relative to ICI development on the basis of Annex 2 and identify whether the historical postal operator is granted a specific mission in this framework; if not, explain why it has not retained the attention of policy makers, and suggest actions to better explain and communicate towards policy markers the importance and potential of the postal network in the development of access to ICI.

8.   Postal network as a rural delivery channel of information and communication services

The Consultant will assess the e-readiness of postal networks in the sample countries, in particular:

- Describe the current state of the postal network particularly in the light of rural presence and ICI readiness: number of permanent offices, number of postal agencies privately-run, state of computerization and networking of the postal network, qualification of postal staff regarding computers and information systems,…)

- Analyze whether postal operators that have already engaged in a diversification of their activities, especially financial services, are better candidates for internet services;

- Analyze the economic rate of return of setting up, managing and delivering a variety of services through the Internet in post offices. A special attention should be given to private-public partnership relative to the provision of equipment (hardware, software) and the management of the postal outlet (franchise model).

- Provide a SWOT analysis for each postal operator of the sample countries regarding the development of telecenters in the internet segment, and in particular analyze the strength and weaknesses of the post office vis-à-vis other infrastructures (schools, telecenters, municipalities,…).

This analysis will point out at critical prerequisites and key success factors necessary to roll out in a successful and sustainable way internet access in post offices.

9.   Business model for delivering internet in rural post offices
On the basis of the country cases analysis, the Consultant will:

-       Identify the main regulatory, institutional, technical and financial bottlenecks;

-       Propose specific measures and strategies that would be needed to implement internet and other electronic services in post offices, and identify those that request a higher-level government decision-making;

-       Identify the critical organizational and technical infrastructure prerequisites required to successfully lay out internet access in rural post offices, including in places with limited power resources;

-       Identify the cost of equipment and provide a simplified cost-benefit analysis, as well as the calculation of the economic rate of return for such projects;

-       Identify the performance indicators to monitor successful implementation;

-       Present a business model for the implementation of internet access through the postal network, in preparation for the pilot phase.

10.   The Consultant will prepare a one-page summary of the findings of his work, presented as a graph, table or box, and meant to be easily usable for internal and external communication purposes on this subject.

6.2 Definition of rural

In Malawi the definition of a rural area is set out as follows[46]

"Any area that lies outside an urban as well as peri urban areas of a district, and is usually associated with huge deficiencies and inadequacies in social and economic services (high levels of poverty), subsistence farming and petty trading as the major sources of livelihood. The area enjoys or experiences a strong influence of traditional leadership *on customary land distribution and control of use of natural resources*, administration peace, justice and maintenance of culture. Even though the area might have a distinct trading centre, settlements and citing of infrastructure are not deliberately planned as the case may be in towns. While only a few of the inhabitants of the rural area hope to see their area urbanised, a good fraction of them either yearn to and in some cases migrate the urban areas as a way of 'liberating' themselves from poverty and the strong influence of tradition."

[46] Source: Director of Planning and Development in the Ministry of Local Government

6.3 Postal Network Survey Questionnaire

Rural Post Offices Questionnaire

This questionnaire should be circulated to the selected Post Offices in advance of the visit. We will use our visit to clarify and understand answers and to assess the state of the infrastructure in relation to its readiness for internet service provision.

Name of Post Office and Location:
Distance from nearest major town:

Questions	Response
A. Services Provided by the Post Office	
1) What services do you currently provide?	
2) What other services do you provide besides basic letter and parcel collection and delivery?	
3) How many letters are sent and received at your post office?	
4) Please provide a breakdown of postal revenues from your post office. For example, please indicate the money collected from selling regular mail/parcel delivery, counter services, financial services etc?	
5) Please provide a breakdown of the operating costs of your post office. For example, please indicate the staff costs, costs for electricity, transport, rental of premises and other administrative costs.	
B. Demand for services	
6) How many customers use the Post Office on a regular basis – eg once a week?	
7) How many people are there within walking distance of your Post Office? Eg what is the local population?	
8) How much do people on average spend at your post office per visit?	

Questions	Response
C. Demand for Internet Services	
9) Do you have internet access?	
10) Have you used the internet before?	
11) If so how regularly do you use the internet?	
12) Have people in your area heard of the internet? Do you think they would want to use it?	
13) Are there any other internet cafés within walking distance of your post office?	
14) Do you use them?	
15) If there is no internet café within walking distance, how would you get to one and how far away is that?	
16) How much would you pay to use the internet for one hour? For example is Tsh 1000 per hour too much?	
17) How much do you think your customers would pay to use the internet for one hour?	
18) What kind of information do you think people in your area lack access to? Education? Agricultural prices? Health information?	
19) Can most people who visit your post office read and write?	
20) Do you think people don't come to your post office because they can't read and write?	
D. Infrastructure in the area	
21) Does your post office have a fixed telephone line?	
22) Is there mobile coverage provided by the	

Questions	Response
mobile operators in your area?	
23) Do you know of any satellite phone access in your area?	
24) Does your post office have a regular supply of electricity?	
25) If no electricity, what sources of power can you use?	
26) Are there any mechanics in the area who loan and or repair car batteries?	
27) By what means of transportation is post brought and taken from your Post Office?	
28) Are there any micro-finance banking facilities in your area? Where would you go if you wanted to borrow money to start up a business?	
29) Please list Government offices in your region.	
30) Please provide contact details for the District officer in your region.	
31) Please list primary and secondary schools in your area and names of the Headteacher if you know them	
32) Does the local school have telephone and or internet access?	
E. Post Office Capacity	
33) Is there space within the post office to set-up a desk with a computer and printer?	
34) Can this computer be made secure? Can the post office be securely locked at night?	
35) Would the installation of a computer require extra security costs? Eg a day and or night guard?	
36) Is there space to install equipment to link up to the telecommunications system – eg	

Questions	Response
the size of a small fridge that can be kept secure and dry?	
37) How many employees are there working on the postal business in your post office?	
38) What level of education and qualification do these employees have?	
39) Is there anyone in the area who can use computers and train others to use computers?	
40) Is there anyone in the area who can use the internet and train others to use the internet?	

6.4 List of contacts

In addition to the private sector contacts listed under 5.6.2, we also met the following representatives from the public sector

Tanzania	Person met
Ministry of Communications	Director of Posts, Eng Kowero Dr M Daftari, Deputy Minister
TCRA	Mr Madeje, Postal Division Mr Lemanya, Postal Division Mr Gundula, Spectrum and Licensing Mr Mpapalika, Director ICT
TPC	Mr Minde, PostMaster General Mr Andrew Gewe, IT Manager Mr Kapelega, Director Operations Mr Mpulule, Director Finance Mr George, Marketing Mr Mwageni, Mails Mr Musemakweli, Head Postmaster Morogoro Mr Kassanga, Head Postmaster Iringa Mr Mwasaga, Head Postmaster Mbeya Mr Ponela, Iringa Post Office Mr Tinga, Mbeya Post Office C Mulungu, IT analyst
Zambia	
Ministry of Communications and Transport	Mr Victor Mumbwae

Tanzania	Person met
The Communications Authority of Zambia	Mr Richard Mwanza, Deputy Controller Mr Lotty Kakubo, Senior Licensing Officer
The Zambia Business Forum	Dr Mwenechanya
ZAMPOST	Mr Moola, IT manager, Ms Cheela, PostMaster General, (by phone)
Malawi	
Ministry of Information	Mr A Livuza, Permanent Secretary
Malawi Post Office	Mr N Mkandawire - Acting PMG Mr T Luka Planning & Operations Manager Mr Chiusiwa Director Projects Mr L Khangamwa Controller IT
MACRA	Mr E Namanja - Director General
Malawi ISP Association	Mr Munjal Jhala Chairperson

6.5   Connectivity Options

6.5.1.1   Technology Options

There are different technologies that could be used to implement Wireless area network (WAN) links, the most feasible ones that local vendors can support are:

- Dial-up

- Leased line

- Wireless

- VSAT

We recommend that VSAT is used to provide connectivity at the internet sites and set out a brief description of each technology below and a table comparing the relative merits of each type.

Dial-up

Dial-up links are easy to set-up and cheap to run for short distances, but are normally slow in speed, not reliable and not very easy to operate. They can be used to access the backbone network from remote locations. There are three types of dial-up lines that can be used i.e.

- landlines from local telecommunication company

- mobile GSM phone line from mobile phone service provider

- satellite phone from Thuraya company

This type of connection refers to connecting a device to a network via a modem and a public telephone network. Dial-up access is just like a phone connection, except that the parties at the two ends are computer devices rather than people. Because dial-up access uses normal telephone lines, the quality of the connection is not always good and data rates are limited. In the past, the maximum data rate with dial-up access was 56 Kbps (56,000 bits per second), but new technologies such as ISDN are providing faster rates.

Leased Line

An alternative way to connect two computers is through a leased line, which is a permanent connection between two devices. Leased lines provide faster throughput and better quality connections, but they are also more expensive than dial-up access. A leased line is a permanent telephone connection between two points set up by a telecommunications carrier. Typically, leased lines are used by businesses to connect geographically distant offices. Unlike normal dial-up connections, a leased line is always active. The fee for the connection is a fixed monthly rate. The primary factors affecting the monthly fee are distance between end points and the speed of the circuit. Because the connection does not carry anybody else's communications, the carrier can assure a given level of quality. For example, a T-1 channel is a type of leased line that provides a maximum transmission speed of 1.544 Mbps. One can divide the connection into different lines for

data and voice communication or use the channel for one high speed data circuit. Dividing the connection is called multiplexing.

Increasingly, leased lines are being used by companies, and even individuals, for Internet access because they afford faster data transfer rates and are cost-effective if the Internet is used heavily. Digital Leased lines use (Remote access device) RAD modems at the client site and accepts digital signal format from the client's equipment. They are quite efficient and operate from the speed of 64Kbps or more in multiples of 64Kbps. The local telecommunication companies in the 3 countries provide leased line connection. Here data termination equipment (RAD Modem) will need to be placed at the telecommunication service provider and client end.

Wireless Networks

Wireless networks are quick and easy to install, but careful planning is required to establish an optimal system that can deliver maximum coverage, speed and quality of service. There are number variations for this technology available, say, Wireless Local Loop (WLL) and HF Radio. The coverage of this connectivity depends on the ISP. In all the three countries, the ISPs have restricted their coverage to the main cities only.

Network access point (NAP) is a public network exchange facility where Internet Service Providers (ISPs) can connect with one another in peering arrangements. The NAPs are a key component of the Internet backbone because the connections within them determine how traffic is routed.

We do not consider a wireless option for connectivity simply because the cellular operators in the region are unable to offer high data rates over wireless dial-up access and to install remote access servers in each location is too costly.

VSAT

VSAT stands for Very Small Aperture Terminal and refers to receive/transmit terminal installed at dispersed sites connecting to a central hub via satellite using small diameter antenna dishes (0.6 to 3.8 meter). VSAT technology is a cost effective solution for independent communications network connecting a large number of geographically dispersed sites. VSAT network offers value-added satellite-based services capable of supporting internet, data, LAN and voice/fax communications. Data rates range from 64kbps to several mbps. VSAT applications can be receive-only or transmit-receive (i.e. bi-directional.) Basically it is an earthbound station used in satellite communications of data, voice and video signals, excluding broadcast television. A VSAT consists of two parts, a transceiver that is placed outdoors in direct line of sight to the satellite and a device that is placed indoors to interface the transceiver with the end user's communications device, such as a PC. The transceiver receives or sends a signal to a satellite transponder in the sky. The satellite sends and receives signals from a ground station computer that acts as a hub for the system. Each end user is interconnected with the hub station via the satellite, forming a star topology. The hub controls the entire operation of the network. For one end user to communicate with another, each transmission has to first go to the hub station that then retransmits it via the satellite to the other end user's VSAT. Data can be transferred from one place to a large number of locations together into one large data network. Broadcasting video, audio, or even widespread distribution of data to many locations simultaneously is possible using VSAT.

Taking the receive-only case for a moment, here are but a few of the possibilities:

- Receive video and/or audio: This could be for music, corporate video, sales, promotion, or whatever.

- Receive data: This could include digitized video and/or audio (real-time or faster/slower than real-time) as well as raw data such as information feeds, or even distributions of large files (such as operating systems, executables, packages, etc.)

When you add transmit capability to the mix, there are even more possibilities:

- Point-of-sale ("POS")

- Telemetry

- EFT (Electronic Funds Transfer) and credit/debit card verification

- Batch traffic (sales/inventory, for example)

- Internet access

- Voice telephony

Satellite Internet from VSAT Systems does not require the user to have any particular type of software, hardware or network. A single-box platform meshes with any combination of PCs, Macs, UNIX or mainframe computers. It is a plug and play device.

Adding capacity can be handled remotely on the same band but if bandwidth requirements increase then the satellite operators have indicated that it is possible to upgrade the equipment to C-band without foregoing the initial cost of investment.

There are two basic frequency bands used for commercial satellite communications: C-band and KU-Band.

- C-band is a robust wavelength for regions with high rainfall. But has a higher monthly recurring charge.

- KU-band transmission is not advisable in regions with high rainfall. This is due to rain fading, during heavy storms. It does however offer a significant saving on space segment costs. Note the use of forward error correction (FEC) techniques can greatly reduce link outages caused by rain fade.

Advantages of VSAT:

- VSAT is inherently a broadcast oriented methodology and is useful for connecting remote locations on a large scale such as the post office network. It can be used to broadcast large

amounts of data to as many sites are receiving it. This could be useful for distributing files, executables, operating system upgrades, audio, or even video.   Doing this sort of operation can be tricky using land-based technologies such as Frame Relay or other terrestrial internet connections. In the case of these two methodologies, a large data transfer can saturate a network, cause congestion and packet loss - interrupting the normal data flow as well as requiring a lot of retransmissions.

- Satellite connections are generally very reliable and predictable. If, for some reason a packet is lost in a "data broadcast" there are at least two ways to get the missing data:

- Send the data broadcast more than once. Multiple "sendings" will take a lot less bandwidth than on a terrestrial network where, for each transfer to each site, a separate connection may need be established. It is unlikely that exactly the same information will be missing on each data broadcast. The receive end can "listen" to the broadcast and, when it "hears" a packet that it knows that it missed, it can fill-in the missing data.

- After the data broadcast(s) are done, request "fills." In this case, the remote sites would report which packets of data were missing and then, in a batch process, those pieces of data could be re-transmitted. Any sites missing the same pieces would hear this "fill-in" broadcast and would be able to receive those packets when they were sent.

- VSAT is considered to be a "reliable" connection: That is, if a packet goes in one end, it is guaranteed to come out the other end. This is not always the case with a Frame Relay or Internet connection where stuffing a packet in one end of the network does not guarantee its "safe transport" to the destination. If a packet is lost on these networks, it is up to the end devices to make sure integrity is maintained. These "retransmissions" can result during network congestion - and they always slow the pace of the data transfer.

- Data entering a VSAT network does not necessarily go into a mysterious "cloud" - and, like a terrestrial network, "hopefully" appear intact on the other side on the first transmission. Being a more limited-scope network, it is possible to have very tight control of what sort of applications run on that network, when, and for how long. Because of this, traffic profiling is practical and more control can be given to ensure reliable data transfer and to limit large downloads.

- VSAT is also capable of statistical multiplexing. Many applications require throughput that is not consistent and varies throughout the day - depending on, say, customer activity in a retail environment. If, for example, you have locations spread across a large geographical area, peaks in customer activity will not occur everywhere simultaneously. In this case, the network should be sized so that it can handle the expected peak aggregate load. In a terrestrial circuit, it is more difficult to spread this statistical advantage over a large geographic area: Your individual circuits must be sized to handle the highest peaks - even if those peaks occur for only short times over the course of a day. What this means is that you must have a much higher potential capacity (when all sites are considered) than you will actually ever use - which means increased cost.

- A VSAT network does not rely on terrestrial data circuits: If there is a large "local" (to the remote site) network outage due to a cable cut, telco failure, or natural disaster, service is

unaffected. As long as there is electrical power, service can be maintained. Because it does not rely on telco circuits, it can be placed nearly anywhere where a view toward the southern sky is possible - and done quickly. With the system being self-contained, repair and maintenance may be done expeditiously.

Disadvantages of VSAT:

VSAT is not without its drawbacks - and these should be considered in the system design:

- Latency. With the speed of light and the distance from satellites to the equator (about 23,000 miles), it takes the signal approximately 0.26 seconds to reach to the satellite and back. This delay can play havoc with certain types of applications. Some interactive applications (such as dumb terminal with remote echo) can be nearly unusable unless appropriate measures are taken. There are also non WAN-friendly applications which require a number of data exchanges for even the most trivial of functions: It should be pointed out that these applications are typically poor candidates for any WAN application - be they terrestrial or otherwise.

- Occasional outages due to the sun. Twice a year, there are brief periods (lasting a few minutes) where the Sun moves directly inline with the satellite. The Sun, as a very powerful source of radio signals, temporarily jams the satellite signal. These outages can be predicted very precisely and last only a short time. (Most users can tolerate "scheduled" outages and it is those "unscheduled" ones that cause the most problem)

- Occasional outages due to weather. Occasionally, very heavy precipitation will block the signal for short periods. These outages are fairly rare and don't normally last for more than a few minutes. Another possibility is that of snow building up in a dish, but proper system design (e.g. installation of covers, heaters, and occasional vigilance and, in a worst-case scenario, the use of a broom) can prevent such outages from ever happening in the first place.

Failure of the Satellite itself. Fortunately, this is extremely rare. Satellites are normally extremely reliable and are loaded with redundant systems. Even in the event of a failure, it is practical to restore service simply by pointing the antenna at a different satellite.

Summary table to compare the alternative technologies

Factor	Dial up	Leased Line	Wireless (Network Access Point)	VSAT
Ease of set-up	Dial-up links are easy to set-up	Leased lines are difficult to set up as compared to dial-up connection	Wireless networks are quick and easy to install,	VSAT equipment is most difficult to set up as compared to the others.
Speed of connection	Slow in speed	Leased lines provide faster throughput and better quality	Wireless connectivity needs experience to establish an	VSAT provides the fastest connectivity

Factor	Dial up	Leased Line	Wireless (Network Access Point)	VSAT
		connections	optimal system that can deliver maximum speed and quality of service	
Reliability of connection	Connectivity is not reliable	Connectivity is reliable but largely depends on the condition of wiring.	Connectivity is more reliable than in dial-up but less than leased line and VSAT	Connectivity is most reliable as the transceiver receives or sends a signal to a satellite transponder in the sky. The satellite sends and receives signals from a ground station computer that acts as a hub for the system. Hence no wiring is involved.
Ease of operation	Not very easy to operate especially at remote areas	It can be operated in areas where the telecommunication company provides leased line facilities. Hence the coverage is very much dependent on the companies.	The coverage of this connectivity depends on the ISP. In all the three countries, the ISPs have restricted their coverage to the main cities only.	VSAT technology is a cost effective solution for independent communications network connecting a large number of geographically dispersed sites
Set-up costs	Initial setup costs is less but the running cost depends on the usage of the landline number. Hence not economical when the connection remains continuous.	Initial setup costs are more expensive than dial-up access but a client pays a fixed amount every month.	Initial setup costs are more than dial-up but less than leased line and VSAT. The fee for the connection is a fixed monthly rate.	Initial set-up cost and bandwidth costs are almost equivalent to leased line. The fee for the connection is a fixed monthly rate.
Method of connectivity	Uses normal telephone line for connectivity	Uses dedicated leased line (telephone) and RAD modems for	Uses wireless equipment for connectivity	Uses VSAT terminal for connectivity

Factor	Dial up	Leased Line	Wireless (Network Access Point)	VSAT
		connectivity		
Connection speed	Max. speed 33.6bkps	Max. speed depends on bandwidth and how much telecom company can offer.	Max speed depends on bandwidth and on the ISP	Max. speed depends on bandwidth and on the VSAT provider.
Application to geographical distance	Dial-up is not usually used to connect geographically distant offices	Leased lines are used by businesses to connect geographically distant offices	Wireless connectivity is not usually used to connect geographically distant offices	VSAT is are used by businesses to connect geographically distant offices and also broadcasting video, audio, or even widespread distribution of data to many locations simultaneously is possible.
Always-on	Normal dial-up connections are not always active	Unlike normal dial-up connections, a leased line is always active.	Unlike normal dial-up connections, a leased line is always active.	Unlike normal dial-up connections, a leased line is always active.
Quality	The dial-up connection carries anybody else's communications, hence the carrier cannot assure level of quality	Because the connection does not carry anybody else's communications, the carrier can assure a given level of quality.	The wireless connection carries anybody else's communications, hence the carrier cannot assure level of quality	Because the connection does not carry anybody else's communications, the carrier can assure a given level of quality.
Data transfer rate	Slow data transfer rates and not cost-effective if internet is used heavily	Faster data transfer rates and cost-effective if the Internet is used heavily.	Data transfer rates is faster than dial-up and also cost-effective if the Internet is used heavily.	Faster data transfer rates and cost-effective if the Internet is used heavily.
Troubleshooting	Troubleshooting is easy.	Troubleshooting is difficult as compared to VSAT and dial-up as Level 1 diagnostics is not possible, hence no troubleshooting can be done.	Troubleshooting is more difficult than dial-up access but less than leased line.	Troubleshooting is easier as compared to leased line as Level 1 diagnostics is possible, hence troubleshooting can be done.

Factor	Dial up	Leased Line	Wireless (Network Access Point)	VSAT
Maintenance	Maintenance is not difficult	Maintenance is difficult as copper or aluminium wires are involved in connection. Also the PSTNs are involved in connections; hence detecting of errors and maintenance needs to be done at various points on which client has no control.	Maintenance is easier as compared to leased line but difficult than dialup.	Maintenance is easier as copper or aluminium wires are not involved but satellite communication is involved. Hence detecting of errors is easier and maintenance points are less. Also with the system being self-contained, repair and maintenance may be done expeditiously.
Test sites	Adding test sites is easy at point where telecom have dialup facilities	Adding test sites is not easy and hence a temporary increase for a special situation is not possible.		Adding test sites is easy and hence temporary increase for a special situation is possible.
Weather	It does not get affected by high rainfall if the telecom wires are unaffected	It does not get affected by high rainfall if the telecom wires are unaffected.	It gets affected by high rainfall and speed decreases.	C-band is a robust wavelength for regions with high rainfall. But has a higher monthly recurring charge. Whereas, KU-band monthly recurring charges are lower but transmission is not advisable in regions with high rainfall.
Ease of data transfer	Large data transfer can saturate a network, cause congestion and packet loss - interrupting the normal data flow as well as requiring a lot of	It can be used to broadcast large amounts of data to as many sites are receiving it. This is useful for distributing files, executables, operating system	Large data transfer can saturate a network, cause congestion and packet loss - interrupting the normal data flow as well as requiring a lot of	It can be used to broadcast large amounts of data to as many sites are receiving it. This is useful for distributing files, executables, operating system

Factor	Dial up	Leased Line	Wireless (Network Access Point)	VSAT
	retransmissions.	upgrades, audio, or even video. Doing this sort of operation can be tricky using land-based technologies such as Frame Relay or other terrestrial internet connections. Hence a large data transfer does not saturate a network.	retransmissions.	upgrades, audio, or even video. Doing this sort of operation can be tricky using land-based technologies such as Frame Relay or other terrestrial internet connections. Hence a large data transfer does not saturate a network.
Terrestrial dependence	Dialup relies on terrestrial data circuits.	Leased line connection relies on terrestrial data circuits.	Wireless connection does not rely on terrestrial data circuits.	VSAT network does not rely on terrestrial data circuits. If there is a large "local" (to the remote site) network outage due to a cable cut, telecommunication failure, or natural disaster, service is unaffected.

6.6   Connectivity Costs

The unofficial quotes obtained from operators in the region can in no way be taken as an official commitment from these providers to offer these prices, hence have been removed from the published report for liability reasons. The figures mentioned in the business model should be used only as an indication of the magnitude of costs the project would involve.

6.7 Hardware costs and assumptions

Branded computers

Site I:
5 Computers with electricity

Qty	Item	Unit price	Sub-total
5	Computer hardware	800.00	4,000.00
5	MS Works	12.00	60.00
5	Norton antivirus	22.00	110.00
5	APC UPS 700VA	220.00	1,100.00
1	D-Link 8-port switch	30.00	30.00
5	Network equipments	109.20	546.00
1	LaserJet printer	315.00	315.00
5	Spike arrestors	40.00	200.00
1	Training user	50.00	50.00
		Total (US$)	6,411.00

Site II:
3 Computers with electricity

Qty	Item	Unit price	Sub-total
3	Computer hardware	800.00	2,400.00
3	MS Works	12.00	36.00
3	Norton antivirus	22.00	66.00
3	APC UPS 700VA	220.00	660.00
1	D-Link 8-port switch	30.00	30.00
3	Network equipments	109.20	327.60
1	LaserJet printer	315.00	315.00
3	Spike arrestors	40.00	120.00
1	Lightning arrestor	345.00	345.00
1	Training user	50.00	50.00
		Total (US$)	4,349.60

Yearly Recurring costs

Qty	Item	Unit price	Sub-total
2	Toner for printer	70.00	140.00
5	Desktop repairs	30.00	150.00
			-
		Total (US$)	290.00

Yearly Recurring costs

Qty	Item	Unit price	Sub-total
1	Toner for printer	70.00	70.00
3	Desktop repairs	30.00	90.00
			-
		Total (US$)	160.00

Site III:
1 Computers with electricity

Qty	Item	Unit price	Sub-total
1	Computer hardware	800.00	800.00
1	MS Works	12.00	12.00
1	Norton antivirus	22.00	22.00
1	APC UPS 700VA	220.00	220.00
1	D-Link 8-port switch	30.00	30.00
1	Network equipments	109.20	109.20
1	LaserJet printer	315.00	315.00
1	Spike arrestors	40.00	40.00
1	Lightning arrestor	345.00	345.00
1	Training user	50.00	50.00
		Total (US$)	1,943.20

Yearly Recurring costs

Qty	Item	Unit price	Sub-total
1	Toner for printer	70.00	70.00
1	Desktop repairs	30.00	30.00
			-
		Total (US$)	100.00

Site III:
1 Computer without electricity

Qty	Item	Unit price	Sub-total
1	Computer hardware	800.00	800.00
1	MS Works	12.00	12.00
1	Norton antivirus	22.00	22.00
1	APC UPS 700VA	220.00	220.00
1	D-Link 8-port switch	30.00	30.00
1	Network equipments	109.20	109.20
1	LaserJet printer	315.00	315.00
1	Lightning arrestor	345.00	345.00
1	Generator	2,000.00	2,000.00
1	Invertor	1,200.00	1,200.00
1	Training user	50.00	50.00
		Total (US$)	5,103.20

Yearly Recurring costs

Qty	Item	Unit price	Sub-total
1	Toner for printer	70.00	70.00
1	Desktop repairs	30.00	30.00
3900	Petrol to run generator	1.00	3,900.00
		Total (US$)	4,000.00

Clone computers

Site I:
5 Computers with electricity

Qty	Item	Unit price	Sub-total
5	Computer hardware	550.00	2,750.00
5	MS Works	12.00	60.00
5	Norton antivirus	22.00	110.00
5	APC UPS 700VA	220.00	1,100.00
1	D-Link 8-port switch	30.00	30.00
5	Network equipments	109.20	546.00
1	LaserJet printer	315.00	315.00
5	Spike arrestors	40.00	200.00
1	Training user	50.00	50.00
		Total (US$)	5,161.00

Site II:
3 Computers with electricity

Qty	Item	Unit price	Sub-total
3	Computer hardware	550.00	1,650.00
3	MS Works	12.00	36.00
3	Norton antivirus	22.00	66.00
3	APC UPS 700VA	220.00	660.00
1	D-Link 8-port switch	30.00	30.00
3	Network equipments	109.20	327.60
1	LaserJet printer	315.00	315.00
3	Spike arrestors	40.00	120.00
1	Lightning arrestor	345.00	345.00
1	Training user	50.00	50.00
		Total (US$)	3,599.60

Yearly Recurring costs

Qty	Item	Unit price	Sub-total
2	Toner for printer	70.00	140.00
5	Desktop repairs	30.00	150.00
			-
		Total (US$)	290.00

Yearly Recurring costs

Qty	Item	Unit price	Sub-total
1	Toner for printer	70.00	70.00
3	Desktop repairs	30.00	90.00
			-
		Total (US$)	160.00

Site III:
1 Computers with electricity

Qty	Item	Unit price	Sub-total
1	Computer hardware	550.00	550.00
1	MS Works	12.00	12.00
1	Norton antivirus	22.00	22.00
1	APC UPS 700VA	220.00	220.00
1	D-Link 8-port switch	30.00	30.00
1	Network equipments	109.20	109.20
1	LaserJet printer	315.00	315.00
1	Spike arrestors	40.00	40.00
1	Lightning arrestor	345.00	345.00
1	Training user	50.00	50.00
		Total (US$)	1,693.20

Yearly Recurring costs

Qty	Item	Unit price	Sub-total
1	Toner for printer	70.00	70.00
1	Desktop repairs	30.00	30.00
			-
		Total (US$)	100.00

Site III:
1 Computer without electricity

Qty	Item	Unit price	Sub-total
1	Computer hardware	550.00	550.00
1	MS Works	12.00	12.00
1	Norton antivirus	22.00	22.00
1	APC UPS 700VA	220.00	220.00
1	D-Link 8-port switch	30.00	30.00
1	Network equipments	109.20	109.20
1	LaserJet printer	315.00	315.00
1	Lightning arrestor	345.00	345.00
1	Generator	2,000.00	2,000.00
1	Invertor	1,200.00	1,200.00
1	Training user	50.00	50.00
		Total (US$)	4,853.20

Yearly Recurring costs

Qty	Item	Unit price	Sub-total
1	Toner for printer	70.00	70.00
1	Desktop repairs	30.00	30.00
3900	Petrol to run generator	1.00	3,900.00
		Total (US$)	4,000.00

Second-hand equipment

Site I:
5 Computers with electricity

Qty	Item	Unit price	Sub-total
5	Computer hardware	250.00	1,250.00
5	MS Works	12.00	60.00
5	Norton antivirus	22.00	110.00
5	UPS 700VA	150.00	750.00
1	D-Link 8-port switch	20.00	20.00
5	Network equipments	109.20	546.00
1	LaserJet printer	100.00	100.00
5	Spike arrestors	40.00	200.00
1	Training user	50.00	50.00
		Total (US$)	3,086.00

Site II:
3 Computers with electricity

Qty	Item	Unit price	Sub-total
3	Computer hardware	250.00	750.00
3	MS Works	12.00	36.00
3	Norton antivirus	22.00	66.00
3	UPS 700VA	150.00	450.00
1	D-Link 8-port switch	20.00	20.00
3	Network equipments	109.20	327.60
1	LaserJet printer	100.00	100.00
3	Spike arrestors	40.00	120.00
1	Lightning arrestor	100.00	100.00
1	Training user	50.00	50.00
		Total (US$)	2,019.60

Yearly Recurring costs

Qty	Item	Unit price	Sub-total
2	Toner for printer	70.00	140.00
5	Desktop repairs	30.00	150.00
			-
		Total (US$)	290.00

Yearly Recurring costs

Qty	Item	Unit price	Sub-total
1	Toner for printer	70.00	70.00
3	Desktop repairs	30.00	90.00
			-
		Total (US$)	160.00

Site III:
1 Computers with electricity

Qty	Item	Unit price	Sub-total
1	Computer hardware	250.00	250.00
1	MS Works	12.00	12.00
1	Norton antivirus	22.00	22.00
1	UPS 700VA	150.00	150.00
1	D-Link 8-port switch	20.00	20.00
1	Network equipments	109.20	109.20
1	LaserJet printer	100.00	100.00
1	Spike arrestors	40.00	40.00
1	Lightning arrestor	100.00	100.00
1	Training user	50.00	50.00
		Total (US$)	853.20

Yearly Recurring costs

Qty	Item	Unit price	Sub-total
1	Toner for printer	70.00	70.00
1	Desktop repairs	30.00	30.00
			-
		Total (US$)	100.00

Site III:
1 Computer without electricity

Qty	Item	Unit price	Sub-total
1	Computer hardware	250.00	250.00
1	MS Works	12.00	12.00
1	Norton antivirus	22.00	22.00
1	UPS 700VA	150.00	150.00
1	D-Link 8-port switch	20.00	20.00
1	Network equipments	109.20	109.20
1	LaserJet printer	100.00	100.00
1	Lightning arrestor	100.00	100.00
1	Generator	2,000.00	2,000.00
1	Invertor	1,200.00	1,200.00
1	Training user	50.00	50.00
		Total (US$)	4,013.20

Yearly Recurring costs

Qty	Item	Unit price	Sub-total
1	Toner for printer	70.00	70.00
1	Desktop repairs	30.00	30.00
3900	Petrol to run generator	1.00	3,900.00
		Total (US$)	4,000.00

Assumptions regarding hardware costings:

1. **Computer Hardware**

   - Branded computers (HP-Compaq / IBM)
     - These computers carry a 3-years warranty; first year on free labour and three years on parts.
     - These computers would need to be replaced every 5 years.
     - We suggest to use Windows operating system as it is easily compatible with most of the other equipments.
     - English and Kiswahili version of Windows operating system. A combination of both at one site is suitable. In areas where language is a problem, we recommend use of the Kiswahili version.
     - During discussions Microsoft, it would be possible to ask for subsidised prices for their products and include to Kiswahili version of operating systems at sites

   - Clone computers
     - These computers carry a 1-year warranty; first year on free labour and parts.
     - These computers would need to be replaced every 3 years.
     - Need to install licensed Windows operating system on all these machines. The prices indicated are inclusive of Windows operating system.
     - The maintenance costs after the first year on parts could be high.

   - Second-hand computers
     - These computers carry no warranty.
     - These computers would need to be replaced every 2 years.
     - These machine come with pre-installed operating system, hence we are left with no option of selecting the version of operating system.
     - Support on these machines is a concern as Microsoft does not support Windows 98 and earlier versions of operating system.
     - The maintenance costs on these machines is highest.

   - We have not recommended Linux operating system as compatibility could be a problem with these machines. Also it currently lacks the advantage of using Kiswahili version of operating system and this would be a problem in rural areas with the language problem.

2. **UPS**

   - We recommend using APC UPSs.
   - We do not recommend to use 2KVA or 3KVA UPS at one site instead of using separate 700VA UPSs. This is due to the fact that in the event that one 2/3KVA UPS goes down, all the computers are put at risk. If a 700VA UPS goes down at one site, the other computers can continue working and are not affected.

- Also, the cost difference of putting 700VA UPSs with each computer as compared to single 2/3KVA UPS is very marginal. Hence separate 700VA is recommended.

3. Switch

- We recommend using a switch instead of a hub as their prices are almost the same and performance of a switch is better.
- D-Link switches are the best option in terms of price and durability.

4. Word processing and spreadsheet

- Keeping in mind that the tele-centres would essentially require basic word processing and spreadsheet functionalities, we recommend MS Works 7.0 OEM application. MS Works has all the basic functionalities of MS Word and MS Excel.
- MS Office or Star Office would increase the overall costs.

5. Antivirus

- We recommend that Norton antivirus OEM to be installed on the machines to protect the machines from viruses.
- Regular update of antivirus is very important at all sites. The antivirus can be configured to be updated automatically.

6. Printer

- We recommend LaserJet printers to be used instead of DeskJet printers for the following reasons:
  - Maintenance costs of laserjet printers are much lower as compared to deskjet printers.
  - Running costs of laserjet printers is also much lower as compared to deskjet printers.
  - The cost per page of laserjet printout is lower than deskjet.

7. Lightning arrestors

- Lightning arrestors are required in areas where lightning and rainfall is persistent. This is very common in areas around the lake region.

8. Desktop back to base labour charges

- We need to minimise the downtime of computers and hence maintenance needs to be made on regional basis.

- BMTL and ComputechICS have offered to create regional service centres for this project. Currently BMTL already have their presence directly and through agents in Dar-es-Salaam, Mwanza, Mbeya, Arusha, Iringa, Dodoma and Morogoro. A wide coverage will help to have access to stocks, spares and required services in the quick possible time.

9. Training users

- We need to identify the current level of computer skills among the TPC user and then decide the training to be provided.
- At each site, one person needs to take ownership of the tele-centre and be responsible for its maintenance.

10. Spike arrestors

- Spike arrestors need to be put at each point in order to increase the life of UPS and keep the maintenance costs as low as possible.

11. Power generation options

- We have 2 options of generating power at places where there is no electricity:
  - Generator + Invertor
  - Solar Cell + Invertor

The price comparison is as shown below:

S.No.	Solution	Core cost (US$)	Running costs* (US$)					Total cost of ownership Year 0 – 5
			Year1	Year2	Year3	Year4	Year5	
1.	Generator + Invertor	3,200	4,000	4,000	5,800	4,000	4,000	**25,000**
2.	Solar Cell + Invertor	9,000	300	300	300	300	300	**10,500**

* The above calculations are done taking into consideration that the power generating equipment would be running continuously for 9-12 hours per day.

- From the above calculations, we recommend that solar cells with the invertor is the best solution for areas where there is no electricity as it saves costs in the long run.

We suggest that it would be possible to discuss with Microsoft, HP-Compaq, IBM, APC, Symantec, etc to give a discount and the goods to be delivered through one of their partners in the local country. By doing so, it would be possible to get the best prices and uniform pricing in the 3 countries.