A FRAMEWORK FOR

# CALCULATING THE ECONOMIC IMPACT OF INTERNET DISRUPTIONS IN SUB-SAHARAN AFRICA

CIPESA

**A Framework for**
**Calculating the Economic Impact of Internet Disruptions in Sub-Saharan Africa**

## Contents

1.

# Background to the Study

Internet—especially social media—disruptions have become common in Sub-Saharan Africa (SSA). Since 2015, there have been confirmed disruptions in 12 countries in the region, with some disrupting communications on more than one occasion. Shutdowns are becoming more frequent, mostly initiated around election times (e.g. Chad, Gabon, Gambia, Republic of Congo, Uganda), public protests (Burundi, CAR, Cameroon, DR Congo, Ethiopia, Mali, Niger, and Togo) and during national exams (Ethiopia). The longest shutdown was recorded in Cameroon, lasting 93 days beginning January 16, 2017 while the most recent was recorded in Togo in September 2017[1].

In a number of cases, security agencies work with national communications regulators to order the disruption, mostly citing national security or public order considerations, and referencing the regulator's powers to order service providers to interrupt services. The disruptions have taken many forms and are effected through orders to service providers to block access to selected services such as Facebook, WhatsApp, Twitter, and mobile money services, or to disrupt all online communication[2]. Most shutdowns affect the entire country, but Ethiopia and Cameroon in 2016 and 2017 respectively ordered disruptions that targeted regions affected by citizens' protests. In Gabon last year, following a total shutdown, the government subsequently instituted a 12-hour-a-day curfew on internet access[3]. Below is a list of countries that have ordered shutdowns between 2015 and 2017, but note should be taken that this list is non-exhaustive, including in terms of durations of the disruptions.

1 See The internet shutdown in English-speaking parts of Cameroon is finally over, https://qz.com/964927/caemroons-internet-shutdown-is-over-after-93-days/; see also: Internet shutdown amid planned anti-govt protests by Togo opposition, http://www.africanews.com/2017/09/06/internet-clampdown-amid-planned-anti-govt-protests-by-togo-opposition//

2 CIPESA, State of Internet Freedom in Africa 2016, http://cipesa.org/?wpfb_dl=225

3 Under the Radar: Gabon's risky internet curfew, the world's first since 2011, http://globalriskinsights.com/2016/09/gabon-internet-curfew/

*Table 1: Recent internet disruptions in Africa*[4] [5] [6] [7] [8] [9] [10]

| Country | Nature of disruption | Dates | No. of days |
|---|---|---|---|
| Burundi[4] | Social media | April 29–May 13, 2015 | 14 |
| Cameroon[5] | Regional shutdown | January 17-April 20, 2017 | 93 |
| Chad[6] | Total shutdown<br>Total shutdown | April 10-13, 2016<br>February 15-16 2016? | 3<br>2 |
| DR Congo[7] | Total shutdown<br>Social media | January 2015[8]<br>December 18-28, 2017 | 20<br>11 |
| | Social media | August 7-11 2017[9] | 4 |
| Ethiopia[10] | Total shutdown | Various | 24 |
| | Social media | October 5-17 2016 | 12 |
| | | June 1-8 2017 | 7 |

4 Burundi: Access Urges Action On Burundi's Internet Shut Down, http://extensia-ltd.com/burundi-access-urges-action-on-burundis-internet-shut-down/ See also: Burundi Shuts Down Internet, http://www.itwebafrica.com/ict-and-governance/363-burundi/234560-burundi-shuts-down-internet-access

5 Cameroon's Internet Shutdown is over after 93 days, https://qz.com/964927/caemroons-internet-shutdown-is-over-after-93-days/

6 Chad Elections: Major internet blackout ahead of declaration, http://www.africanews.com/2016/04/11/chad-elections-major-internet-blackout-ahead-of-declaration/

7 Democratic Republic of Congo Extends Internet Blockage, https://www.wsj.com/articles/congo-blocks-internet-access-amid-protests-against-president-kabila-1421938042

8 https://cpj.org/2015/01/drc-halts-internet-access-and-cellphone-services-a.php

9 https://www.reuters.com/article/us-congo-violence-internet/congo-orders-internet-slowdown-to-restrict-social-media-telecoms-source-idUSKBN1AN2DE; https://actualite.cd/2017/08/12/rdc-apres-4-jours-de-limitation-congolais-peuvent-a-nouveau-utiliser-pleinement-reseaux-sociaux/

10 Ethiopia turns off entire internet so students can't cheat on exams, http://nypost.com/2017/06/01/ethiopia-turns-off-entire-internet-so-students-cant-cheat-on-exams/ See also: Ethiopia cuts off internet after high school exam leaks, http://www.reuters.com/article/us-ethopia-internet/ethiopia-cuts-off-internet-after-high-school-exam-leaks-idUSKBN18S535

| Country | Nature of disruption | Dates | No. of days |
|---|---|---|---|
| Gabon[11] | Total shutdown[12] | August 31-September 5, 2016 | 5 |
| | Social media | September 5-18, 2016 | 14 |
| | Internet curfew from 6pm to 6am[13] | September 5-18 | 12 |
| Gambia[14] | Total shutdown | November 30-December 2 2016 | 3 |
| Mali | Social media | August 17-20, 2016 | 3 |
| | Social media | June 13-14, 2017 | 2 |
| Niger | Total shutdown | January 22-24, 2016 | 3 |
| Republic of Congo[15] | Total shutdown | October 2015 | 3 |
| | Total shutdown | March 20, 2016[16] | 2 |
| Togo[17] | Total shutdown | September 5-11 2017 | 5 |
| Uganda[18] | Social media and mobile money | February 18-21 2016 | 4 |
| | Social media | May 11-12 2016 | 1 |

11 12 13 14 15 16 17 18

11 Gabon shuts down internet for four days in biggest nationwide blackout ever, http://www.ibtimes.co.uk/gabon-shuts-down-internet-four-days-biggest-nationwide-blackout-ever-1579773 See also: Gabon is the latest country to shutdown https://qz.com/771996/gabon-is-the-latest-african-country-to-shut-down-its-internet-as-election-protests-grow/

12 Internet restored, social media still blocked in Gabon, http://www.news24.com/Africa/News/internet-restored-social-media-still-blocked-in-gabon-20160905

13 Motherboard, Gabon Is Suffering the 'Worst Communications Suppression Since the Arab Spring', https://motherboard.vice.com/en_us/article/gv58vw/gabon-internet-censorship-election-outage

14 Gambia's Government has shutdown the internet on the eve of elections, https://qz.com/850002/gambias-government-has-shut-down-the-internet-on-the-eve-of-elections/; https://ooni.torproject.org/post/gambia-internet-shutdown/

15 Government may have ordered internet shutdown in Congo-Brazzaville, https://www.accessnow.org/government-may-have-ordered-internet-shutdown-in-congo-brazzaville/

16 Communications cut as Congo awaits presidential vote outcome, http://www.theeastafrican.co.ke/news/Communications-cut-as-Congo-awaits-presidential-vote-outcome/2558-3128860-cgxs1k/index.html

17 Internet shutdown amid planned anti-govt protests by Togo opposition, http://www.africanews.com/2017/09/06/internet-clampdown-amid-planned-anti-govt-protests-by-togo-opposition// See also, @internet_SF welcomes restoration of Internet in #Togo..., https://twitter.com/JulieOwono/status/907167265405198336

18 Yoweri Museveni explains social media, mobile money shutdown, http://www.nation.co.ke/news/Yoweri-Museveni-explains-social-media-mobile-money-shutdown/-/1056/3083032/-/8h5ykhz/-/index.html See also, Uganda Again Blocks Social Media to Stifle Anti-Museveni Protests https://cipesa.org/2016/05/uganda-again-blocks-social-media-to-stifle-anti-museveni-protests/

Many human rights civil society organisations and activists have spoken out against the shutdowns, as has the United Nations (UN), which declared internet access a human right in a 2011 report[19]. In June 2016, the United Nations Human Rights Council passed a resolution castigating internet shutdowns. It condemned "unequivocally measures to intentionally prevent or disrupt access to or dissemination of information online in violation of international human rights law and called on all States to refrain from and cease such measures."[20] Reacting to the January 2017 shut down in Cameroon, the UN Special Rapporteur on freedom of expression, David Kaye, stated, "A network shutdown of this scale violates international law – it not only suppresses public debate, but also deprives Cameroonians of access to essential services and basic resources."

The Freedom Online Coalition (FOC), a group of 30 governments that advances internet freedom worldwide, similarly noted in March 2017 that state-sponsored network disruptions undermine the economic benefits of the internet, disrupt access to essential services such as health care, and often fail to meet the established test for restrictions on freedom of expression and the right of peaceful assembly under the International Covenant on Civil and Political Rights (ICCPR)[21].

But while it seems clear how internet shutdowns affect users' fundamental human rights, such as the right of access to information and freedom of expression, the impact of disruptions on a country's economy as well as individuals' livelihoods is less precisely known. This could partly explain why incidences of government ordered shutdowns are becoming prevalent: those ordering them are unaware of the full magnitude and consequences of these actions on their economies and citizens. There have been few studies to estimate the cost of shutdowns, and those that exist have not specifically focussed on SSA.

This paper therefore develops a framework that can be used to estimate the economic cost of shutdowns in SSA. Based on this framework, we have estimated the cost of internet shutdowns in 10 African countries.

19 U.N. Report Declares Internet Access a Human Right, https://citizenlab.org/2011/06/u-n-report-declares-internet-access-a-human-right/

20 Human Rights Council Thirty-second session, https://www.article19.org/data/files/Internet_Statement_Adopted.pdf

21 The Freedom Online Coalition, Joint Statement on State Sponsored Network Disruptions, https://www.freedomonlinecoalition.com/wp-content/uploads/2017/03/FOCJointStatementonStateSponsoredNetworkDisruptions.docx.pdf

2.

# The Digital Economy in Sub-Saharan Africa

The outlook for the digital economy in Africa is positive, as it continues to grow in most countries of the region[22]. Increased affordability of smart devices, improved data connectivity, and falling data prices, are all fueling the digital economy in the region. According to Ericsson, in the two years to early 2015, mobile data traffic in Africa doubled, and it is forecasted that there will be a twelve-fold increase in the amount of mobile data used in the region over the next five years.[23] Indeed, operators' earnings from data services are growing, accounting for 20-40% of the top line of a typical African Mobile Network Operator (MNO). For instance, the MTN Group which has operations in 19 SSA countries[24], reported 27% data revenue share of total revenue in 2016, rising from 23% in 2015[25].


22 The digital economy refers to the various economic and social activities enabled by ICT, and includes activities like banking, buying and selling, and accessing education or entertainment using the internet and connected devices.

23 MTN Group Results 2016, https://www.mtn.com/MTN%20Service%20Detail%20Annual%20Reports1/presentation.pdf

24 Botswana, Benin, Cameroon, Congo-Brazzaville, Guinea-Bissau, Guinea-Conakry, Ghana, Ivory Coast, Kenya, Liberia, Namibia, Nigeria, Rwanda, South Africa, Sudan, South Sudan, Swaziland, Uganda and Zambia

25 MTN Group Results 2016, https://www.mtn.com/MTN%20Service%20Detail%20Annual%20Reports1/presentation.pdf, See also The Mobile Economy Sub-Saharan Africa 2017, https://www.gsmaintelligence.com/research/?file=7bf3592e6d750144e58d9dcfac6adfab&download

**731m**
*the number of SIM cards in use in Sub-Saharan Africa at the end of 2016*

**200m**
*Smartphone connections in SSA having doubled over the past two years*

**280m**
*number of registered mobile money accounts in the region as of March 2017*

According to the GSMA, the number of SIM cards in use in Sub-Saharan Africa reached 731 million at the end of 2016, and is expected to rise to nearly one billion by 2020. By this time, the number of mobile broadband connections will reach half a billion, more than double the number at the end of 2016[26]. Presently, there are 78 mobile phone connections for every 100 inhabitants in Africa[27]. Up to 21.8% of Africa's population uses the internet.[28]

Smartphone connections in SSA have doubled over the past two years to about 200 million, according to the GSMA, with strong growth in demand in countries such as Kenya, Nigeria, South Africa, Cameroon and DR Congo. Furthermore, smartphone ownership and broadband subscriptions are expected to grow exponentially over the coming five years[29].

Meanwhile, mobile money services, are significantly raising financial inclusion while easing the cost of doing business and catalysing the digital economy in SSA. Indeed, SSA leads globally on the use of mobile money as a primary means for financial transactions[30]. The number of registered mobile money accounts in the region stood at 280 million as of March 2017, expanding financial inclusion and offering new opportunities for productivity and efficiency gains

26 The Mobile Economy, Sub Saharan Africa 2017, https://www.gsmaintelligence.com/research/?file=7bf3592e6d750144e58d9dcfac6adfab&download,

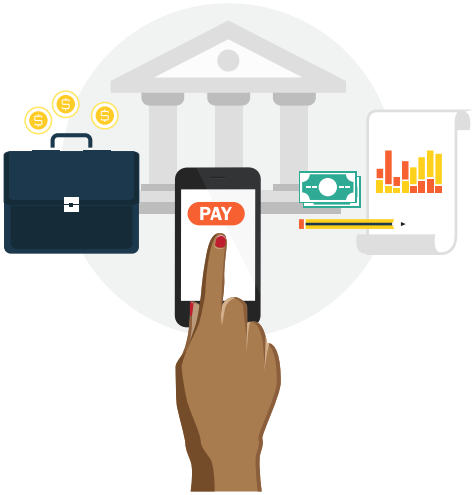
27 ITU Key 2005-2017 ICT data, http://www.itu.int/en/ITU-D/Statistics/Pages/facts/default.aspx

28 Ibid ITU.

29 Africa's smartphone market is on the rise as affordable handsets spur growth, http://qz.com/451844/africas-smartphone-market-is-on-the-rise-as-affordable-handsets-spur-growth

30 State of the Industry Report: Mobile Money, 2015, http://www.gsma.com/mobilefordevelopment/wp-content/uploads/2016/04/SOTIR_2015.pdf

to governments, businesses and individuals[31]. The mobile money sector enables financial transactions through the transfer of money from one party to another either in the form of cash or m-money; m-payments for purchase of goods and services such as phone credit, household utilities including water and electricity. In addition, m-financial services enable banking services like ordering a cheque book, transferring money from one account to another, and cash withdrawals from ATMs using mobile phones[32]. As of 2015, at least 16 African countries had more mobile money accounts than bank accounts, with one in three mobile connections in the region linked to a mobile money account[33].




The Sub-Saharan Africa ICT ecosystem is home to numerous players at different levels of the value chain. As an example, see Table 2 below for a snapshot of some of the key players in the Ugandan ecosystem.

*Table 2: Snapshot of ICT ecosystem actors in Uganda*

| Market Layer | Key Actors |
|---|---|
| Undersea Cable Providers/Carrier IP Transit | • SEACOM (East African Coast)<br>• TEAMS (East African coast)<br>• EASSy (East African Coast)<br>• WACS<br>• WIOCC |
| Satellite Bandwidth Providers | • I-way Africa<br>• Gilat |

31 The Mobile Economy, Sub Saharan Africa 2017, https://www.gsmaintelligence.com/research/?file=7bf3592e6d750144e58d9dcfac6adfab&download

32 Jonströmer, et al (2016). Digital Regulation and the Enabling Environment in East Africa. International Centre for Trade & Sustainable Development

33 Global adoption of mobile money in 2015: A look at the data, http://www.gsma.com/mobilefordevelopment/programme/mobile-money/global-adoption-mobile-money-2015-look-data#_ftnref1

| Market Layer | Key Actors |
|---|---|
| Trans National Terrestrial Fiber | • Simbanet/Wananchi Group<br>• Liquid Telecom |
| National and Metro Fiber Providers | • Google/C-Squared Uganda<br>• Roke |
| Passive Cell site Towers | • American Tower Company<br>• Eaton Towers |
| MNOs and ISPs | • Airtel<br>• MTN<br>• Vodafone<br>• Orange<br>• Uganda Telecom (UTL) |
| Core & Radio Network Equipment Vendors | • Ericsson<br>• ZTE<br>• Huawei<br>• Nokia Siemens |
| Content Delivery and Cloud Platforms | • MTN Cloud<br>• Akamai Technologies |
| Retailers/Distributors/Pay platforms/VAS Aggregators | • Simba Telecom<br>• Dmark<br>• PegasusPay<br>• True African |
| International Traffic Aggregators | • Belgacom Interconnect Clearing Services (BICS)<br>• TATA Communications |

3.

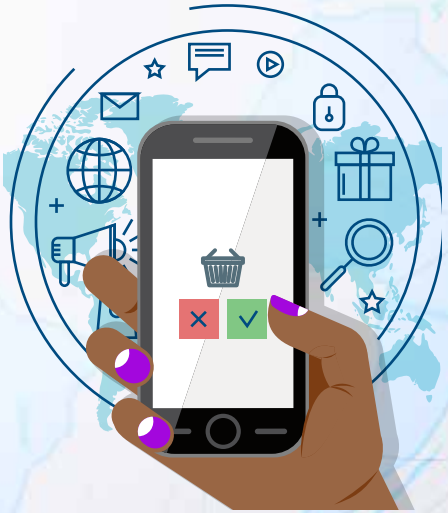
# The ICT Sector's Contribution to African Economies

Besides its direct contributions to GDP, the ICT sector is also a strong catalyst of economic competitiveness, playing a crucial role in overcoming bureaucracies, logistical headaches, poor road networks and other conditions that make business operations in parts of SSA cumbersome. This is enabled through reducing transaction and organisation costs, increasing ease and efficiency of information search, and speeding up the circulation of money within the economy.

Telecom service providers and associated services providers pay various fees and taxes to governments as part of their licensing requirements. Beyond these payments, ICT companies enable significant contributions to the micro and macro economies of African countries. Besides their direct economic contribution, businesses in the ICT ecosystem purchase inputs from other providers in the supply chain and spend some of their earnings on other goods and services, which in 2016 was estimated at $10.5 billion in value added (or 0.7% of GDP) in SSA. Furthermore, ICT productivity impacts resulting from the ICT sector in SSA are estimated to have been worth US$ 62 billion in 2016 (or 4.3% of GDP)[34].

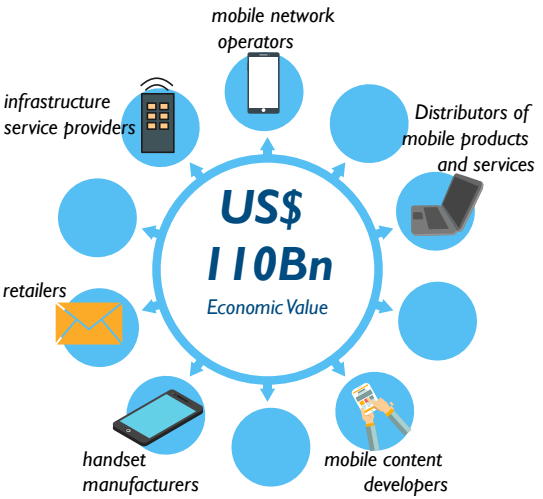
**US$ 62Bn**

*ICT productivity impacts resulting from the ICT sector in SSA are estimated to have been worth US$ 62 billion in 2016*



34 Ibid. GSMA

However, this contribution has not been sufficiently studied and remains largely unquantified. Macroeconomic attempts to quantify the contribution of the ICT sector in African economics have only been seen in the last decade, often tracking a handful of indicators like taxes (such as Value Added Tax [VAT] and excise duty) as well as penetration and access indicators, and grossly undermining the value of ICT and the internet's contribution to the wider ecosystem across sectors like health, agriculture, and education.




The GSMA estimates that in 2016, the mobile ecosystem, consisting of mobile network operators, infrastructure service providers, retailers and distributors of mobile products and services, handset manufacturers and mobile content developers, application and service providers, generated US$ 110 billion of economic value in Sub-Saharan Africa, supported 3.5 million jobs, and raised US$ 13 billion in taxes[35].

According to McKinsey estimates, by 2025 the internet's contribution to GDP in Africa will average 5% or 6% (representing US$ 300 billion), matching that of leading economies such as Sweden, Taiwan, and the United Kingdom[36]. Further, a study by eTransform Africa on ICT competitiveness on the continent estimated that by 2016, ICT expenditure as a percentage of GDP in 10 selected countries would range between 6-7%.[37] The studies allude to a rise in the contribution of internet to GDP but also an increase in ICT investment.

35 The Mobile Economy, Sub Saharan Africa 2017, https://www.gsmaintelligence.com/research/?file=7bf3592e6d750144e58d9dcfac6adfab&download

36 McKinsey Global Institute, Lions go digital: The Internet's transformative potential in Africa, http://www.mckinsey.com/industries/high-tech/our-insights/lions-go-digital-the-internets-transformative-potential-in-africa

37 eTransform Africa, The Transformational Use of ICTs in Africa, http://siteresources.worldbank.org/EXTINFORMATIONANDCOMMUNICATIONANDTECHNOLOGIES/Resources/282822-1346223280837/ICTCompetitiveness.pdf.

The contribution to GDP is generally computed through two methodologies: either by looking at the direct revenue generated by the sector, or by calculating the sum of the value-added contribution of the sector – including jobs created, efficiency created for other sectors, and direct revenues from the sector. The two methodologies produce different results, with the former method – which is mostly used by governments - finding a lower level of ICT contribution to GDP as it does not comprehensively factor in the value added (often indirect) contribution of the sector.

**Many benefits from the internet are not measured**

*The internet offers many benefits to individuals that are not captured in GDP statistics. Countries compute GDP based on activities measured in monetary terms and exclude activities that do not generate monetary transactions. But many online activities generate substantial benefits for the individual, such as time saved, consumer convenience, expanded choice, better quality leisure time, and access to more knowledge …. The increase in time saved and in quality — and thus the productivity of work from using the internet — can indirectly increase GDP statistics.*

*World Bank, Digital Dividends Report 2016.*[38]

In Burundi, the ICT sector's contribution to GDP has grown from US$ 42.7 million (2.58%) in 2011 to US$ 87.6 million in 2015 (3.3%), according to the Institut des Statistiques et Etudes Economiques du Burundi (ISTEEBU). In 2016, Ghana's ICT industry accounted for 3.3% of the country's GDP, up from 2.7% in 2015.[39] Official figures show that in Botswana, the sector's contribution to GDP stood at 2.6% in 2014.[40] In Zambia, ICT was the fastest growing sector in 2016 with a growth rate of 40.2%, contributing 1.2% to the country's GDP.[41] In Uganda the ICT sector contributed 3.4% to GDP in 2015. Currently, Senegal derives 3.3% of its GDP from internet-related activities.[42] In Kenya during 2016, the ICT sector was the source of 6.1% of GDP, with the telecoms sub-sector contributing 5.6%, while publishing, broadcasting, IT and information activities contributed 0.5%.[43] In Nigeria,

38 World Bank, Digital Dividends 2016, http://www.worldbank.org/en/publication/wdr2016

39 Ghana Statistical Service, Provisional 2016 Annual Gross Domestic Product, http://www.statsghana.gov.gh/docfiles/GDP/GDP2017/April/Annual_2016_GDP_April%202017_Edition.pdf

40 Statistics Botswana, Information and Communications Technology Statistics Report 2014, May 2016

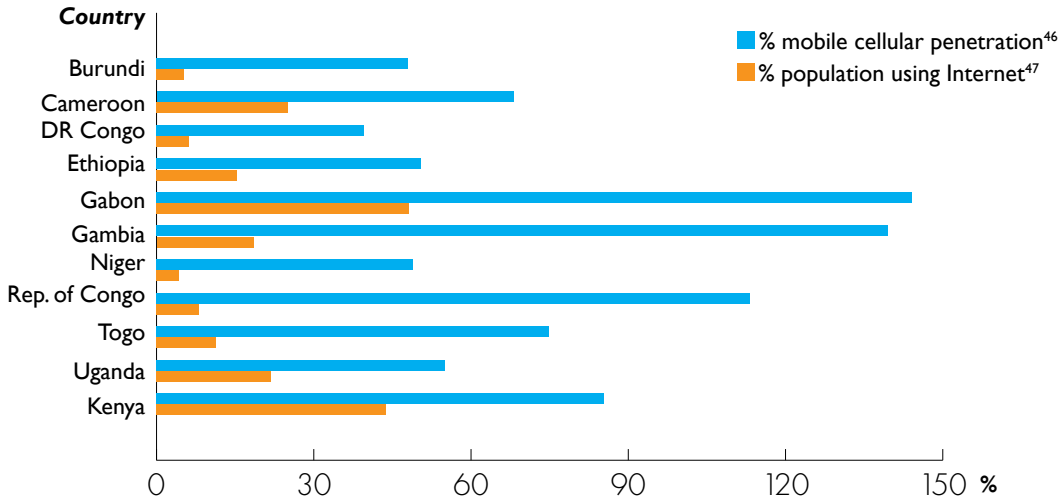
41 Interview with Zambia Central Statistical Office Director John Karumba, July 2017

42 Mobilitas Africa, July 7, 2017, "In ten years, the digital economy will probably weigh 10% of African GDP", Mobilitas Group

43 Kenya National Bureau of Statistics, Economic Survey 2017, https://www.knbs.or.ke/download/economic-survey-highlights-2017/

the sector contributes 9.8% to GDP[44] while in South Africa the contribution is 2.5%.[45] The growth in ICT's contribution to GDP in these countries mirrors many others on the continent.

Table 3: Overview of ICT sector landscape for select countries in Africa [46] [47]




Crucially,African countries have a major informal sector that is largely supported by mobile voice communications, mobile money and apps like WhatsApp and Facebook. A 2012 World Bank study on mobile phone usage among those living below the poverty line in Kenya, found that a third of users reported using their phones for replying to casual job offers and almost half relied on their phones for work, usually in the informal economy, such as selling clothes or food, or offering professional services like hairdressing. For these users, the most desirable feature of their phones was that it made them more "reachable".[48]

44 Nigeria Communications Commission, Percentage Contribution of Telecoms Industry to GDP, http://www.ncc.gov.ng/stakeholder/statistics-reports/industry-overview#view-graphs-tables-7

45 Report on the state of the ICT sector in South Africa, http://www.ellipsis.co.za/wp-content/uploads/2015/10/ICASA Report-on-State-of-SA-ICT-Sector-2016.pdf

46 ITU, http://www.itu.int/en/ITU-D/Statistics/Pages/facts/default.aspx

47 ITU, http://www.itu.int/en/ITU-D/Statistics/Pages/facts/default.aspx

48 Tim Kelly, Mobile phone credit instead of bread? For many Kenyans, a real dilemma, http://blogs.worldbank.org/ic4d/mobile-phone-credit-

**4.**

Estimating the Cost of

# Internet Disruptions

The economic cost of internet disruptions is not precisely known, although there have been attempts to establish these costs. Previous studies on this subject are not focused on the Sub-Saharan Africa (SSA) context, while other claims about the costs of shutdowns have lacked a rigorous method for arriving at the figures they offered.[49] Two studies published in October 2016 by the Brooking Institution[50] and Deloitte[51] stand out in their clarity and rigor in methodology employed for calculating shutdowns. The methods used by these two studies vary in approach and scope of data used. However, they have not been tested in an African context where the dynamics of the internet ecosystem in SSA might differ from other, quite often developed, regions. Africa, for instance, is a mobile-first and at times mobile-only continent. The Organisation for Economic Co-operation and Development (OECD) 2011 study in Egypt – probably the first to measure the economic impact of an internet shutdown - was thin on explaining its methodology.[52] While giving the incurred direct cost as US$ 90 million based on lost revenues due to blocked telecommunications and internet services, the study noted that this amount did not include the secondary economic impacts that resulted from a loss of business in other sectors affected by the shutdown of communication services such as e-commerce, tourism and call centres.

The approach taken by global consulting firm, Deloitte, and some of its suggestions, also need to be tested in an African context.[53] To approximate the effects of disruptions of internet connectivity, Deloitte's study applies estimates based on the impact of broadband usage and speed on the economy. It concludes that the average

instead-of-bread-for-many-kenyans-a-real-dilemma

49 See for instance this report that gives a figure but does not state what informs it: Internet shutdown costs Cameroon $1.39m, http://www.theeastafrican.co.ke/business/Internet-shutdown-costs-Cameroon-dearly/2560-3817992-tw1s26/index.html

50 Darrell M. West, Internet shutdowns cost countries, https://www.brookings.edu/wp-content/uploads/2016/10/intenet-shutdowns-v-3.pdf

51 Deloitte, The economic impact of disruptions to Internet connectivity http://globalnetworkinitiative.org/sites/default/files/The-Economic-Impact-of-Disruptions-to-Internet-Connectivity-Deloitte.pdf

52 OECD, The economic impact of shutting down Internet and mobile phone services in Egypt, http://www.oecd.org/internet/broadband/theeconomicimpactofshuttingdowninternetandmobilephoneservicesinegypt.htm

53 Ibid. Deloitte

per day impact of a temporary shutdown of the internet grows larger as the level of connectivity and GDP increases.[54]

Meanwhile, in a 2016 Brookings Institution report[55] on the cost of shutdowns, Darrell M. West considered the percentage of each country's GDP derived from the internet economy, based on Boston Consulting Group (BCG) projections for 2016. The study analysed the financial impact of turning off mobile services, based on World Bank data on mobile subscription percentages in each nation. This study looked only at the economic impact of a shutdown on GDP and did not include estimates for lost tax revenues associated with blocked digital access, impact on worker productivity, barriers to business expansion connected with these shutdowns, or the loss of investor, consumer, and business confidence resulting from such disruptions. As such, the study suggests that it likely understates the actual economic damage caused by shutdowns.

Some of the parameters these previous studies were based on (e.g. average connection speed; percentage of businesses with internet access; e-commerce as a percentage of GDP) may be imprecise given the informal nature of many African economies, the centrality of mobile internet and mobile money in the Africa, or even the wide use of public access facilities.

Deloitte notes that the impact of internet shutdowns is not widely researched, stating that there are data challenges to this exercise, and "quantifying the impact of very specific types of disruptions would require a level of granularity of data which is beyond the information publicly available."[56] Similarly, West noted that there have been very few publications examining the economic impact of internet disruptions, in part due to the challenges in identifying disruptions and collecting relevant economic data.

Given the rate at which internet disruptions are occurring in SSA, it becomes imperative to adopt a framework to calculate the effect of disruptions in the region that takes into account the informal economy of many countries that ordinary GDP-based approaches do not always accurately measure. This tool will subsequently guide estimations of the cost of internet disruptions in order to support advocacy efforts against shutdowns and to give policymakers a better understanding of the enormous impact internet shutdowns have in SSA.

54 The study estimates that for a highly connected country, the per day impact of a temporary shutdown of the Internet and all of its services would be on average $23.6 million per 10 million population. With lower levels of Internet access and speed, the average estimated GDP impacts amount to $6.6 million and to $0.6 million for medium and low connectivity economies respectively.

55 Ibid. West

56 Ibid. Deloitte

5.

# The Framework for Estimating the **Economic Impact** of Internet Disruptions in Sub-Saharan Africa

## 5.1 Conceptual Approach

The development of this framework was based on a mixed methods approach. Interviews were conducted with economists and ICT actors in the region to understand the internet ecosystem. This was complemented with a review of existing literature and data to understand the ICT landscape in SSA, including the ICT sector's contribution to Gross Domestic Product (GDP) figures, total factor efficiency, cost of doing business, among others. The data analysed was derived from various sources, including official statistics from government statistics repositories, telecom companies, industry bodies such as the GSM Association (GSMA) and the International Telecommunications Union (ITU), the World Bank and various market intelligence and independent research reports.

Next, based on the resulting picture of the ICT ecosystem and its contribution to Africa's economy, we drew up a framework for calculating the economic impact of internet disruptions in the region. Having established how the ICT sector contributes to African economies, the figures were extrapolated to establish the extent of the monetary loss that would be suffered as a result of interruptions to digital communications and services.

The resulting framework can be used to calculate the economic impact of a complete internet shut down, and a partial shutdown targeting social media. The framework developed in this paper incorporates the direct lost earnings in terms of the ICT sector's contribution to GDP and the quantitative effects of loss of confidence in the digital economy stemming from government-perpetuated disruptions and the resultant loss of cost savings by businesses that are deprived of internet access.

The West methodology[57] identifies six categories of disruptions; national internet, subnational internet, national mobile, subnational mobile, national app/services and subnational app/services (including VoIP). For the purpose of this paper and mainly because of their relevance in Africa, two categories of internet disruptions are identified, namely:

i. **Total national internet shutdown** affecting all connectivity via fixed and/or wireless/ mobile internet connectivity for the entire country.
ii. **App/service disruption,** including targeted blocking of social media services, for instance WhatsApp, Skype, and Facebook.

Similar to previous studies by the OECD, Deloitte and West, this framework uses the estimation of GDP loss as a proxy for quantifying the "direct cost" of an internet disruption. It goes a step further and factor in the "indirect cost" that an internet blackout may have on the economy, such as loss of investor confidence and heightened cost of doing business. The framework thus proposes a three-step approach for quantifying the effects of internet disruptions, as described below:

a. **Estimation of lost contribution to GDP** (largely borrowing from foundations laid in the Deloitte and the Brookings Institution studies that greatly leveraged GDP and ICT sector contribution to estimate the cost of shutdowns).
b. **Qualitative and quantitative impacts of internet disruptions** on investor confidence, reputational risk, lost foreign direct investments (FDI), and local business competitiveness. This is a class of shutdown effects that is often overlooked and on which there is limited evidence. We captured this by assessing the estimated percentage of businesses offline due to a shutdown and the loss in cost savings resulting from being offline.
c. **Qualitative and quantitative estimation of shutdowns on country risk profiles and**

57 Ibid. West,

**general cost of doing business.** Little attention seems to have been paid to this effect to-date. This strand borrows largely from work by Westerman, G, et al. on country risk drivers and their impact on ratings and the cost of capital.[58]

As noted above, this framework can be used to calculate the cost of 1) an app/service shutdown and 2) a total national internet shutdown. In addition, the framework can also be used to calculate the cost of regional disruptions such as the one that happened in Cameroon. In this instance, we may take a ratio based on the % population affected. However, this can only provide partially reliable results due to intricacies of calculating the ICT ecosystem in the affected region and its contribution to national GDP, and establishing the population affected. Given the nature of interconnections and network effects, the population impacted goes beyond the residents of the regions where the disruption happens.

### 5.2 Estimating the Impact of an Internet Shutdown

To examine the total economic cost of a national internet shutdown we combine direct and indirect cost as well as country risk premium/cost of capital as below:

**Total Economic Effect** = **Internet GDP Loss estimate (a)** + **National Estimated Lost Digitisation Cost Savings and Efficiency Gains (b) + Country Risk Profile effects (c)**

Where

(a)
= Internet GDP Loss Estimate
= (National GDP * % share of internet services GDP*duration of the disruption (% of the year based on the number of days internet was shut down.

(b)
= Total loss of efficiency gain that would accrue from digitisation of businesses, governments + loss due to weakened confidence arising from internet deprivation;[59]

58 Westerman, G. et al., 'The Digital Advantage: How digital leaders outperform their peers in every industry, https://www.capgemini.com/resources/the-digital-advantage-how-digital-leaders-outperform-their-peers-in-every-industry/

59 Percentage of business not online due to government-instigated interruptions see https://www.strategyand.pwc.com/media/file/Strategyand-Measuring-Industry-Digitization-Leaders-Laggards-Digital-Economy.pdf

= % of offline businesses*GDP Value* Weighted Average Cost Savings and Efficiencies due to digitization[60]
* internet confidence deprivation ratio.

(c)
= Country Risk Profile Effects
= Risk Free Rate + Beta [Expected Return on Market- Risk Free Rate +Country Risk Premium]* A markup for low Internet penetration and disruption as defined in 6.1c above Also refer to note 3 in the annex.

### 5.3 Estimating the Impact of a Social Media and App Shutdown

The formula above for calculating the impact of a shutdown is adjusted to include contributions from the "app economy" (the % share of a given impacted app to the internet economy). Note that direct revenues from app-specific services are still small due to various reasons, including that many Apps widely used in Africa (Facebook, Twitter, WhatsApp, etc.) are hosted outside the region so they do not make direct payments of local fees and taxes the way Mobile Network Operators do. Domestic apps are comparatively limited and where available, a zero -pricing approach consistent with the global market has been adopted.[61]

**Total Economic Effect of App shutdown** = **App GDP Loss estimate (direct cost effects)*** + **National Est Lost Digitisation Cost Savings and Efficiency Gains** + **Country Risk Profile effects (indirect cost effects)**

* Share of the revenues from app-based services including Social Media like WhatsApp, Skype to total internet revenue.

We assume 25% of internet use is access to apps and related services in all countries (expect Kenya at 30%) based on the UN E-Government survey report[62] and the Kenya Economic Survey 2017.[63]
Kenya Business Survey Report 2016.

60 This measure quantifies the benefits of digitalization for businesses/ firms in an economy based on an approach developed by CapGemini (MITSloan) approach - https://hbr.org/2016/04/a-chart-that-shows-which-industries-are-the-most-digital-and-why. See note 1 for explanations of the Estimating Weighted Average Digitalisation Cost Savings and Efficiencies.

61 Freely available online access to services presumed to be priced nil/ zero e.g. Facebook, WhatsApp, etc. where revenues earned from advertising

62 United Nation E-Government Survey, 2016; http://workspace.unpan.org/sites/Internet/Documents/UNPAN96407.pdf

63 Kenya National Bureau of Statistics, Economic Survey 2017, https://www.knbs.or.ke/download/economic-survey-highlights-2017/

6.

# Findings

The framework has been applied to a selection of countries that have experienced internet disruptions between 2015 and 2017. These are Burundi, Cameroon, Republic of Congo, DR Congo, Ethiopia, Gabon, Gambia, Niger and Togo, and Uganda. Although Kenya has not witnessed a similar disruption, it is included in the countries studied on a hypothetical basis given the size of its economy and value of its ICT sector. Data on Kenya's ICT sector is also available to provide a more proxy representation of the methodology defined in this paper.

Table 5: Estimated economic impact of a total internet blackout and app disruption per day in US$

| Country | Net direct economic effect per day (a) | Net indirect economic effect per day (b+c) | Total economic cost of internet disruption per day | Total cost due to app disruption per day |
|---|---|---|---|---|
| Burundi | 82,384 | 84,032 | 166,416 | 41,604 |
| Cameroon | 994,703 | 676,398 | 1,671,102 | 417,775 |
| DR Congo | 958,867 | 978,044 | 1,936,911 | 484,228 |
| Ethiopia | 1,982,856 | 1,516,885 | 3,499,741 | 874,935 |
| Gabon | 584,119 | 297,901 | 882,019 | 220,505 |
| Gambia | 26,427 | 26,956 | 53,383 | 13,346 |
| Niger | 205,726 | 209,840 | 415,566 | 103,891 |
| Republic of Congo | 214,617 | 218,909 | 433,526 | 108,381 |
| Togo | 120,548 | 122,959 | 243,507 | 60,877 |
| Uganda | 1,049,092 | 713,383 | 1,762,475 | 440,619 |
| Kenya | 4,125,464 | 2,191,230 | 6,316,695 | 1,895,008 |

Table 5 shows the estimated economic impact of a total national internet blackout and app disruption per day in

US$ in the countries where shutdowns have been confirmed. Table 6 shows the economic cost to each country per duration of interruption. Overall, the internet and social media shutdowns studied have cost Sub-Saharan African countries an estimated US$ 237 million between 2015 and 2017. Ethiopia has suffered the greatest losses since it had the greatest number of shutdowns, including total nationwide shutdowns, social media shutdowns and disruptions targeting particular regions of the country. Using a combined number of 43 days, the cost to Ethiopia is US$132.1 million. The DR Congo, one of the pioneers of network disruptions in Africa, suffered the second highest cost, at US$46 million. Cameroon, which ordered a 93-day shutdown in Anglophone regions, lost US$ 38.8 million. Gambia, a low-population, low-ICT use country which suffered only a three-day shutdown, faced the lowest cost, at US$160,149.

The same approach was used to calculate what the cost of a total internet shutdown would be for Kenya, a middle class economy with a relatively high ICT competitiveness within the Sub-Saharan region. Our findings show that for such an economy, the cost would be more than US$6.3 million per day when accounting for both direct and indirect economic costs.

Table 6: Economic Impact of a total internet blackout per country in US$ [64] [65]

| Country | Number of days total shutdown | Effect of a total Shutdown |
|---|---|---|
| Cameroon[64] | 93 | 38,853,122 |
| DR Congo | 20 | 38,738,220 |
| Ethiopia | 36 | 125,990,676 |
| Gabon | 11[65] | 9,702,209 |
| Gambia | 3 | 160,149 |
| Niger | 3 | 1,246,698 |
| Republic of Congo | 5 | 2,167,630 |
| Togo | 5 | 1,217,535 |
| **Total Days** | **176** | **218,076,239** |

64 The shutdown was regional; the measure is based on a presumed 25% of the country's population being affected

65 This figure includes 5 days of a total shutdown plus 12 days of the internet curfew which are calculated to be the equivalent of 6 days of a total network disruption

### 6.2 Impact of a Shutdown of Apps

Ethiopia is one of the notable countries with repeated disruptions to specific services. We estimate that it cost the country close to US$ 6 million during the seven days it blocked access to social media in June 2017. The estimated effect of a five-day targeted shutdown in Uganda in 2016 is US$ 2.2 million. If effected, a social media shutdown in Kenya would cost the country almost US$ 2 million per day.

Table 7: Economic Impact of the App Disruption

| Country | Number of days Social media/App Shut down | Total Economic Effect |
|---|---|---|
| Burundi | 14 | 582,457 |
| DR Congo | 15 | 7,263,420 |
| Ethiopia | 7 | 6,124,547 |
| Gabon | 14 | 3,087,070 |
| Uganda | 5 | 2,203,095 |
| Kenya* | Est. cost of a 1 day App disruption | 1,895,008 |
| **Total** | **55** | **19,260,586** |

*Hypothetical case

We compare our findings with the reports carried out by Brookings and Deloitte and find that the impact of blackouts and disruptions are in some cases higher, while lower in others, based on our approach which takes into account both direct (GDP) and indirect loss due to businesses being offline and the effect on the Country Risk Premium.

7.

# Key Conclusions

The significant contribution of the ICT sector and of more prevalent internet services to the economy and society cannot be disputed. This is more so in most African economies where the contribution of the ICT sector to GDP is on average 5%, a contribution greater than in many countries in Europe and Asia. Nevertheless, governments in many African countries are increasingly engaging in a disturbing pattern of blocking access to the internet and apps, without fully grasping the wide-ranging economic and social consequences of their actions.

Accordingly, African governments should desist from ordering disruptions because they have a high economic impact at micro and macro levels, adversely affecting the livelihoods of citizens, undermining the profitability of business enterprises, and reducing the GDP and competiveness of countries that implement them. Moreover, judging from the African cases recorded in the last two years internet disruptions have not been a necessary and proportionate response to the situations for which they have thus far been employed. Far from fostering stability, as governments may hope when they effect disruptions during protests, elections, or exam periods, they in fact undermine economic activity and disrupt normal order.

The economic costs of an internet disruption persist far beyond the days on which the disruption occurs. Indeed, the negative effects of a disruption on the economy may extend for months, because network disruptions unsettle supply chains and have systemic effects harming efficiency throughout the economy. These longer-term effects are not limited to the immediate ICT ecosystem: factors such as investor confidence and risk premiums can affect a country's broader economy long after the disruption has been lifted.

This new research goes beyond previous work by the Brookings Institution and Deloitte—which evaluated the value of the economic impact of a shutdown on GDP—by incorporating other factors that are less frequently considered due to their indirect nature, including efficiency gain losses that accrue from business being offline and the impact of higher perceived risk on ratings and the cost of capital. It also incorporates the impact of targeted disruptions to even a limited set of applications or services. It thereby presents a more accurate picture of the cost of shutdowns in the Sub-Saharan African context relative to previous shutdown cost estimation models. Still, there is significant opportunity for further work that would inform even more accurate evaluations of the impact of internet disruptions in Sub-Saharan Africa.

# Annexes

Annex I [66]

| Country | GDP, US$ (World Bank, 2016) | % Mobile cellular penetration[1] | % of population using Internet[2] | % Share of ICT to GDP | Internet share to ICT volumes[66] | % of businesses offline |
|---|---|---|---|---|---|---|
| Burundi | 3,007,029,030 | 48 | 5.2 | 5 | 20 | 40 |
| Cameroon | 24,204,448,567 | 68.1 | 25 | 5 | 30 | 40 |
| DR Congo | 34,998,638,634 | 39.5 | 6.2 | 5 | 20 | 40 |
| Ethiopia | 72,374,252,815 | 50.5 | 15.4 | 5 | 20 | 40 |
| Gabon | 14,213,558,130 | 144.2 | 48.1 | 5 | 30 | 30 |
| Gambia | 964,599,178 | 139.6 | 18.5 | 5 | 20 | 40 |
| Niger | 7,508,986,509 | 48.9 | 4.3 | 5 | 20 | 40 |
| Republic of Congo | 7,833,509,443 | 113.3 | 8.1 | 5 | 20 | 40 |
| Togo | 4,399,995,987 | 74.9 | 11.3 | 5 | 20 | 40 |
| Uganda | 25,527,910,091 | 55.1 | 21.9 | 5 | 30 | 40 |
| Kenya | 70,529,014,778 | 85.4 | 60 | 6.1 | 35 | 28 |

*Weighted Digitalisation Cost Saving rate used is 27.3% for Kenya and 17% for the rest of the countries

*Confidence based Internet Aversion rate used is 15% for all countries

66 See note 1 below

## Notes 1

### 1. GDP and the ICT sector contribution

Based on the ICT in Africa competitiveness report,[67] % ICT contribution to GDP is between 5–6%. GDP figures at current prices (2017) are available from the World Bank. The % of internet contribution to the overall ICT sector is taken as the average share of internet and data revenues to typical telco revenues. Based on the financial reports of operators such as MTN and Vodacom, average data share ranges between 20-35%.[68]

### 2. Estimating Weighted Average Digitisation Cost Savings and Efficiencies (WADCS)

This measure attempts to quantify benefits of a firm going digital. In a two year study covering more than 400 firms across a range of industries in manufacturing, mining, fashion, sport, government, travel & hospitality, among others, CapGemini measured the impact of digitisation in different bundles of firms based on their level of digitisation.

The impact of digitisation was measured based on three business performance indices:

- Revenue Generation – ability to derive more revenue from a firm's human and physical assets
- Profitability – Net Profit Margin and Earnings before Interest and Tax (EBIT) Margin
- Market Valuation – Tobin's Q Ratio and Price/Book Ratio

From this research it can be derived that;

i. There is a 13% revenue generation differential between highly digital/online firms and tech laggards
ii. 50% profitability differential between highly digital firms and tech laggards
iii. 19% market valuation differential based on extent of digitalization

Based on these three parameters, the weighted efficiencies from digitalization could be estimated as an average of efficiencies in Revenue Generation, profitability and market valuation. We use 27% for Kenya given its advanced level of digitalization and 17% for the rest of the countries with internet penetration of less than 50%.

67 ICT Competiveness in Africa, http://siteresources.worldbank.org/EXTINFORMATIONANDCOMMUNICATIONANDTECHNOLOGIES/Resources/282822-1346223280837/ICTCompetitiveness.pdf

68 See, http://www.mtn-investor.com/mtn_ar2016/index.php and http://www.vodacom.co.za/cs/groups/public/documents/document/integrated-report-2016-lores.pdf

### 3. Estimating the confidence- based Internet/ Digitisation Losses

Confidence based internet aversion rate is the % of businesses that choose to stay offline due to low confidence in digitisation. Following on Note 2 above, the weighted digitisation efficiency gains provide a key input in computing national non-direct efficiency losses due to firms' cumulative decisions to stay offline as a result of intermittent government disruptions.
To-date no study has been made to establish the percentage of offline businesses that have stayed offline because of government created internet instability. An estimate of 15% has been applied because we believe the lack of confidence ranks behind access and affordability in explaining why businesses may stay offline.

Indirect Losses = Offline Business Valuation * WADCS* 0.15

### 4. Country Risk Profiles and general cost of doing business index.

Low internet penetration rates and frequent internet disruptions can negatively affect the Country Risk Premium (CRP). It is therefore imperative that the effect of internet instability on country risk profile and ultimately the cost of money in an economy are estimated. CRP is the specific risk premium associated with investing in a specific country. A country risk premium is added to a would-be capital premium (cost of capital) to account for macroeconomic, exchange rate volatility and political instabilities that foreign investors would assume in investing in any stock or business in a country.[69]

The Capital Asset Pricing Model (CAPM) is usually used to determine cost of equity. However, in valuing a project taking place in a developing country, the Capital Asset Pricing Formula (the rate of return for common equity/ capital), is a bit problematic because Beta does not adequately capture country risk. To reflect the increased risk associated with investing in a developing country, a country risk premium is added to the market risk premium when using the CAPM.
So revised CAPM equation is:
Return on common equity = Risk Free Rate + Beta [Expected Return on Market- Risk Free Rate +Country Risk Premium]
CRP = sovereign yield spread x [annualized standard deviation of equity index of developing country/annualized standard deviation of Treasury ]

69 See http://pages.stern.nyu.edu/~adamodar/

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