Development of the Digital Economy as a driver for Economic Transformation/ Upgrading and Structural Reform
1. Introduction

Information and communication technologies (ICT) offer innovative new solutions that could empower the poor. Although, these advances have emerged in South Africa over the past decade, various challenges remain that prevent these technologies from being used fully. Poverty and inequality in the country continues to deny digital inclusion to the masses of the South African population, hence participating in the productive aspects of the knowledge economy remains elusive to many as much of the population remains in a survivalist mode.

Unemployment is a major factor in South Africa which traps the population in a state of poverty. Unemployment is fueled by the country’s poor performing education sector which is plagued by a large number of school system dropouts. Less than half of all school learners complete grade 12 and less than 10% complete some form of higher education. Thus the formal skills base in the country is very low, and the majority of the population find that they are unemployable. The economy is divided unequally as the fewer and more affluent portions of the population continue to move into the higher productive jobs whilst the poorer majority, the unemployed and semi-skilled remain either unemployed or feed the low paying jobs within the economy. This cycle repeats across generations and thus the majority seldom move out of the poverty trap.

Structural reforms are required to transform unequal nature of the South African economy to help the country meet the Sustainable Development Goals (SDGs) of 2030. Three key goals within the SDGs are crucial and require a priority focus in Africa, viz: (Goal 1) End Poverty, (Goal 4) Ensure inclusive and quality education and (Goal 8) Promote Inclusive and Sustainable Economic Growth. Goal 8 is actually the most important to break the cycle of poverty. Promoting the employment of the low-skill masses will provide the necessary impetus to move households out of the current high levels of poverty. Employment creation initiatives should be conducted in unison with improving the education system which is currently produce unsatisfactory results.

Innovative ICT programmes can be used a catalyst to improve the quality of education system and provide greater access to vocational training. Such programmes are applicable to a wide range of social services and can also introduce greater numbers to formalized banking and the formal economy. The primary impediment to the success of these services is the relative high cost of internet connectivity for the poor. One finds that the population is often uninformed of these benefits or see little value in using it. For the poor, the price of internet access is substantial and such access is not prioritised when your housing, transport and food costs first need to be attended to.

Due to the high costs of private internet access, state subsidised initiatives provide offer the greatest value to the under-privileged. The roll out of services in schools and libraries widens the reach of the available resources. However, the benefits of such services have not been found to be fully appreciated and there are various challenges that are experienced in terms of budgeting, management and physical operations, such as in the schools for example. This documents further highlights a few examples of well-managed beneficial ICT projects from the BRICS that are useful for South Africa.

In South Africa, structural reforms are required to shift greater numbers out of poverty. The key levers for this the change are improving education and reducing unemployed. Greater numbers require the necessary skills to compete in the service and product producing sectors of the economy. Such changes will lead to a more sustainable growth path.
2. Structural Reform vs. Sustainable Development Goals

2.1. South Africa’s SDG Performance

Three of the Identified Sustainable Development Goals are crucial for structural reform of the South African economy. Amongst BRICS countries South Africa performs poorly in terms of the large percentages of the population affected by poverty, inequality and unemployment primarily. These triple-threat challenges are further exacerbated by poorly performing education system in the country.

2.1.1. Goal 1: End poverty in all its forms everywhere

The first goal of the SDGs is to eradicate poverty in all its forms by 2030. The definition for poverty is based on all living on less than $1.25 a day. In South Africa, there are three poverty lines, viz., the food poverty line, the lower bound poverty line and the upper bound poverty. SDG 1 requires that poverty based on these national definitions are halved by 2030, however the choice of poverty has not been officially determined. The food poverty line is based on the cost for an individual to purchase food necessary for an adequate diet. The lower bound poverty line is based on the person’s ability to purchase food, but make some sacrifices in doing so. The upper bound poverty line is based on the person’s ability to purchase food and other necessities (Statistics South Africa, 2014b). These lines are updated annually, which adds a layer of complexity when setting a target.

South Africa is often referred to as one of the most unequal states in the world when one considers the Gini Coefficient calculation of the share of income between the richest and poorest of the society. Within the BRICS, South Africa by far displays the greatest range of inequality with a Gini Coefficient of 0.63 as highlighted in Figure 1. When we consider the high levels of poverty in the BRICS using the nationally defined poverty lines of the countries, the World Bank identifies that South Africa must contend with greater than 53% of the population falling below the poverty line (Figure 2). The high inequality is also found in access to basic services such as shelter, water, and sanitation and electricity.

Figure 1: Income inequality in the BRICS, Gini Coefficient

<table>
<thead>
<tr>
<th>Country</th>
<th>2005</th>
<th>2009</th>
</tr>
</thead>
<tbody>
<tr>
<td>China</td>
<td>0.33</td>
<td></td>
</tr>
<tr>
<td>India</td>
<td></td>
<td>0.4</td>
</tr>
<tr>
<td>Russia</td>
<td>0.43</td>
<td></td>
</tr>
<tr>
<td>Brazil</td>
<td></td>
<td>0.55</td>
</tr>
<tr>
<td>South Africa</td>
<td>0.63</td>
<td></td>
</tr>
</tbody>
</table>

Figure 2: Poverty headcount at national poverty line

<table>
<thead>
<tr>
<th>Country</th>
<th>2014</th>
<th>2015</th>
<th>2011</th>
<th>2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brazil</td>
<td>7.4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Russia</td>
<td></td>
<td>13.4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>India</td>
<td></td>
<td></td>
<td>21.9</td>
<td></td>
</tr>
<tr>
<td>China</td>
<td></td>
<td></td>
<td></td>
<td>53.8</td>
</tr>
<tr>
<td>South Africa</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


The cycle of poverty and inequality in the country is perpetuated through high unemployment and a reliance on unskilled labour in the informal sector. The majority of the population has not garnered suitable tertiary education qualifications to contribute to the growing services sectors and therefore the type of employment that the masses offer is not competitive in the global knowledge economy. As per Statistics South Africa’s analysis of Census 1996, 2001 and 2011, despite the progress made within the country, only 11.8% of the population over 20, had acquired a higher education qualification (South
African Census Bureau, 2012) (see Figure 5). The inequalities that plague South African society are generally racially biased. Unemployment affects the population groups affected by the system of Apartheid the worst where we find the Black African group consists of 46% that are either officially recognized as unemployed or have lost hope in finding formal employment in the labour market (Figure 4) (South African Census Bureau, 2012).

2.2. Goal 4: Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all

SDG 4 refers to the need to ensure inclusive and quality education and lifelong learning opportunities for the entirety of the country. The goal is inclusive of providing free and equitable access to early childhood education, primary and secondary as well as affordable access to university and vocational skills training. A crucial sub goal (Goal 4.7) requires that every country ensures that learners acquire the necessary skills to promote sustainable development of their country. In order to attain this goal, careful consideration must be paid to what a country must do to ensure that it remains competitive in the global economy, hence the need to evaluate the structure of the education system, its outputs the resultant impact the system has on the sustainability of the country’s economy.

In South Africa the output of the Education system has a direct bearing on the high levels of unemployment which continues to foster the generational cycle of poverty. Nicholas Spaull (2015) has contextualized the link between the country’s poor education standard and the country’s continued high unemployment. As highlighted in Figure 3, the poor socio economic conditions and the poor quality of primary and secondary schools directly leads to the high unemployment rate of 35%. These learners that leave poor schools generally make up 80% of the school leaving population and feed the unemployed, unskilled and semi-skilled positions in the labour market. The poor standard of education received does not develop this population’s capabilities and denies them an opportunity at high productivity jobs (Figure 3).

In contrast, the learners that leave schools with higher socio-economic conditions produce better results, complete school in high numbers, are more likely to attain tertiary qualifications and are ultimately absorbed into the high skilled, high productivity positions that provide higher incomes as compared to those with from the bottom 80% whom find low wage earning jobs or none at all. This cycle has yet to be broken which leads to the poverty trap which affects South Africa’s ability to effectively compete in the modern knowledge economy. Ultimately, the poor school quality found in SA’s poorer schools reinforces social inequalities and these learners inherit the social positions of their parents despite ability or motivation (Spaull, 2015).
In addition, the stark inequalities that face the population in terms of education opportunities, the quality of the education output even amongst those in the highest performing income quintile of public South African schools still falls below that of average middle income countries. Comparatively when reviewing science scores of the richest quintile of South African schools, we find that these scores still perform worse than schools on average across Chile for example. Similar results exist in the other key gateway subject of Mathematics (Spaull, 2015). A striking feature of the international Trends in Mathematics and Science Studies (TIMSS) Survey identified that the top 5% of learners in South Africa performed at the ability of an average student from in Singapore, Chinese Taipei, Republic of Korea, Japan, Finland, Slovenia and Russian Federation. Consequently, the education system suffers not only from issues of unequal access and circumstance but also does not enable students to perform at an equivalent and competitive international standard, hence there is a need to address the falling levels of quality resultant from the school system.

When one considers the demographic profile of the unemployed in South Africa, clear trends emerge. Firstly, using Census 2011 data, we find that the overwhelming majority (71%) of the unemployed or economically in-active population across the provinces, racial divisions and gender split have not completed the secondary level of education (i.e. completed Grade 12). An additional 18% only have some primary school education. Therefore, the skills base of the unemployed in the country is very low which corroborates Spaull’s contention of poor learners ultimately feeding into the low productivity job space or have no means to attain any sustainable employment. Importantly, this large proportion do not have any means to compete for the high productive jobs required to be competitive in the modern knowledge economy and therefore mostly remain in a survivalist mode attempting to make ends meet.
2.3. Goal 8: Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all

SDG 8 refers to a country’s ability to attain a sustainable economic growth path with a specific focus on productive employment and decent work. Attaining full and productive employment in South Africa is a challenge considering the low skill base and high levels of unemployment, particularly amongst the youth. A strong focus must be paid to the requirements of the ever expanding knowledge economy. Governments must be aware that innovative growth plans are required that move away from traditional employment strategies. In South Africa this is particularly challenging as the majority of the unemployed are not equipped to participate in the productive aspects of the knowledge economy. Thus efforts are needed to transform their skillset to ensure that the unemployed are provided opportunities and stepping stones to attain the necessary skills base to perform competitively in the higher productivity sectors of the economy.

2.3.1. Unemployment is a driver of poverty

Creating employment opportunities for the jobless is the central tenet of breaking the cycle of intergenerational poverty and inequality cycle that besets South Africa. Statistics South Africa (2016) has identified unemployment followed by the education levels of the population are the two key drivers of poverty in South Africa. Using analyses conducted on the 2001 and 2011 Censuses and the 2016 Community Survey it was found that all indicators of poverty tend to decrease where the population is employed. Furthermore, those living in poorer socio economic conditions suffer from lower levels of education in those particular communities. The result of the Statistics South Africa study, shows that the impact of unemployment’s weighted contribution to poverty has grown to above 50% in 2016 from 33% in 2001, whilst the years of schooling has decreased from 16% to 11% in 2016. The severe effects of unemployment point to the tremendous urgency in fostering conditions for employment creation in the country.
Figure 6: Contributors of weighted indicators to poverty

Source: Statistics South Africa (2016)

Employment creation is one of the most significant channels through which growth translates into sustainable poverty reduction. Furthermore, employment represents one of the primary means through which the broader objectives of human development can be pursued (Heintz & Pollin, 2008). Decent jobs can take South Africa citizens out of poverty and strengthen the link between economic growth and aggregate poverty reduction.

Using the narrow definition of unemployment which excludes discouraged job seekers (of which there are many in South Africa), the unemployment rate has consistently grown over the past decade. In 2015, the narrow definition rose above 25% in South Africa. As such this high and increasing levels of unemployment has led to long-term unemployment for many, the skills base has been eroded and the social exclusion is on the rise leading to greater levels of poverty and inequality. According Hongbo et al. (2016), the labour force participation rates among women and youth are also declining together with a declining employment intensity of growth, together with stagnant real wages, poses a challenge of promoting inclusive and sustainable economic growth, employment and decent work for all (United Nations, 2015). These factors reduce the likelihood of the long-term unemployed re-entering the labour market unless an employment targeting initiative is introduced by the country to target these challenges.

A low-wage job can bring dignity and opportunity to improve skills. The South African government should consider implementing a targeted wage subsidy policy to improve income levels although this alone will not result the unemployment challenges in the South Africa. The country also requires skills in key sectors such as agriculture and service delivery that will promote investor confidence in the country. Public Private Partnerships are options to be investigated that can find strategies to provide incentives for the unemployed to access new jobs.

2.3.2. South Africa’s Position in the Knowledge Economy

A review of the international Knowledge Index using the Knowledge Assessment Methodology of the World Bank helps put into perspective South Africa and the BRICS position within the Knowledge Economy. Considering the levels of Innovation, Education and ICT in the countries, we are
able to determine how effectively these countries contribute to the knowledge based economy. Furthermore, when we consider these country’s employment levels and which sectors their work force contribute to, we are able to identify where shifts required in these economies to be more involved in the Knowledge Economy. If we compare the performance of the BRICS and African countries against Sweden, a leading economy on the knowledge scale, we can clearly identify some concerning trends. Although the accuracy of the World Bank data is debatable, the data raises questions on where resources within the BRICS should be directed to allow these countries to act more competitively. For example, despite India’s growing Internet access, the country’s ICT Index scores poorly compared to Sweden and the other BRICS which underlines the majority of the population that still have poor access to this service despite the large percentage gains in recent years. A similar trend exists within the education sector which specifically applies to South Africa and China which are recognized for poorly performing education systems. Furthermore, when we compare countries with a strong Education performance but weaker development in Innovation and ICT such as Cuba, we note that singular focus on Education does not ensure competitiveness in the Knowledge Economy (World Bank, 2012). Thus a multi-pronged and balanced strategy which targets Innovation, Education and ICT access, is required to improve the BRICS ability to compete.

Furthermore, workforce participation in the relevant sectors is vital to move the economy towards the knowledge space. Although, greater participation in the service sectors alone does not automatically introduce a country to the Knowledge Economy, we note the services sector however is the gateway space that countries need to develop. Thus there is a need to reduce the dependence on the agriculture sector and improve industry and services sector development with a greater emphasis on developing services sector. For example in India we find only 31% of the population are employed within the Services sector although the sector contributes to more than half of the country’s GDP (World Bank, 2015). The critical issue which affects South African and India is the large scale of unemployment in the country. This, combined with the poor education levels of the country leads to the majority of the population getting excluded from contributing to the knowledge economy. The majority of the population is thus stuck in a survivalist trap, simply concentrating on finding their next meal.

Table 1: Knowledge index and sector participation in the economy

<table>
<thead>
<tr>
<th>Country</th>
<th>Knowledge Index 2012</th>
<th>Innovation Index</th>
<th>Education Index</th>
<th>ICT Index</th>
<th>Employment Rate 2014</th>
<th>Agriculture (Employ / Contrib to GDP)</th>
<th>Industry (Employ / Contrib to GDP)</th>
<th>Services (Employ / Contrib to GDP)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sweden</td>
<td>9.63</td>
<td>9.74</td>
<td>8.92</td>
<td>9.49</td>
<td>59</td>
<td>2/1.4</td>
<td>29/26</td>
<td>68/72</td>
</tr>
<tr>
<td>Brazil</td>
<td>6.00</td>
<td>6.07</td>
<td>5.84</td>
<td>6.08</td>
<td>65</td>
<td>15/5.2</td>
<td>30/24</td>
<td>52/70</td>
</tr>
<tr>
<td>Russian Federation</td>
<td>6.69</td>
<td>6.89</td>
<td>7.09</td>
<td>6.08</td>
<td>61</td>
<td>7/4.2</td>
<td>38/35.8</td>
<td>54/60</td>
</tr>
<tr>
<td>India</td>
<td>2.94</td>
<td>3.97</td>
<td>2.26</td>
<td>2.59</td>
<td>52</td>
<td>50/17.8</td>
<td>26/30.1</td>
<td>31/52</td>
</tr>
<tr>
<td>China</td>
<td>4.46</td>
<td>5.12</td>
<td>4.11</td>
<td>4.16</td>
<td>68</td>
<td>3/9.2</td>
<td>-42.2</td>
<td>-48</td>
</tr>
<tr>
<td>South Africa</td>
<td>5.47</td>
<td>6.92</td>
<td>4.51</td>
<td>4.98</td>
<td>39</td>
<td>5/2.5</td>
<td>32/29.5</td>
<td>62/68</td>
</tr>
<tr>
<td>Botswana</td>
<td>3.50</td>
<td>4.34</td>
<td>2.58</td>
<td>63</td>
<td>63</td>
<td>-2.4</td>
<td>-39.2</td>
<td>-58</td>
</tr>
<tr>
<td>Cuba</td>
<td>4.19</td>
<td>5.05</td>
<td>7.93</td>
<td>2.34</td>
<td>55</td>
<td>19/5</td>
<td>21/20.5</td>
<td>54/74</td>
</tr>
<tr>
<td>Kenya</td>
<td>2.88</td>
<td>3.87</td>
<td>1.49</td>
<td>2.6</td>
<td>61</td>
<td>-30.3</td>
<td>-19.5</td>
<td>-50.4</td>
</tr>
</tbody>
</table>

Source: World Bank
3. Promoting Digital Inclusion

3.1. Unequal Internet Access

Considering the challenges of the inequality and poor education standards which affect the country, we also find limited access to ICT services in the country. As highlighted in Figure 7 as at 2011, 65% of households in the country do not access the internet. Reasons for the lack of connectivity relate to the high unemployment, lack of disposable income, the high costs of acquiring access via cellphone networks or via broadband services. The primary means of accessing the internet locally is via a cellphone. An analysis of the household goods possession from Census 2001 and 2011 and the Community Survey of 2007, highlights the growing trend of communicating via a cellphone (nearly 90% in 2011) and the simultaneous decline of landlines in households.

![Figure 7: Households with access to the internet, 2011](image)

![Figure 8: Households with household goods](image)

A review of the Internet World Statistics, differed from the results of the Census in identifying that 61% of the population accessed the internet (Internet Live Stats, 2015) and that 33 million users individually accessed the internet locally. The data source also noted the extremely high numbers of users in China, India, Brazil and Russia. There are similarities amongst the impediments affecting access to the internet in India with South Africa, that needs to be further analysed. There is an expected explosion in the number of users accessing the internet in India in the near future. McKinsey and Company expect 330 million internet users in India by the end of 2015 (McKinsey&Company, 2013). McKinsey notes that the changing behaviour of the public are converging with those in developing countries as well the growing base of ICT exports in the country.

The World Bank’s assessment of Internet users identified 49% of the population with access to the internet as at 2014. The data also highlighted Brazil’s access at 57.6%, Russia at 70.5%, India at 18% and China at 49.3%. Each of the countries have experienced strong growth in the number of users in the 10 years from 2005 to 2014 as highlighted in Table 2 with the strongest growth experienced in the Russian Federation. However, the level of access is much lower than those found in the leading countries such as those the Baltic Region, the United Kingdom, Japan or the United States.

![Table 2: World bank, BRICS internet users](image)
McKinsey and Company have noted that the developing world shares 4 barriers when accessing the internet, these include an incentive to access the information on the internet, unaffordable internet access, a lack of digital literacy and a lack of mobile Internet coverage or network access (McKinsey&Company, 2014). Each of these issues ring true for South Africa and are consistent with the results of the General Household Survey (GHS) of 2014 (Statistics South Africa, 2014a). GHS 2014 identified the 2 major reasons for not accessing the internet were a lack of interest and a lack of knowledge of the internet. The McKinsey study identifies that in order to improve internet penetration, a multidimensional strategy needs to be employed which is not only focused on improving the infrastructure access but also targets softer issues related to literacy and interest. McKinsey identifies 5 trends that point to the vast growth in internet penetration in India. These trends include an expansion of the mobile networks, greater urbanization, a decrease in device costs, the growing middle class as an increase in relevant content for the masses of the Indian population.

When considering that the majority of internet users in South Africa access the medium via a mobile phone and considering the high cost of purchasing a smart phone compared to the monthly income available to the majority of the population, access to such technology is extremely unaffordable. From the McKinsey study of 2014, it was noted that the cost of purchasing a smart phone amounted to $291 (USD) (see Figure 10) and considering that 74% of the SA population earn slightly more ($314) than that amount on a monthly basis, it becomes clear that such technology is truly only available for a select few (McKinsey&Company, 2014). In addition, the cost of 500MB of either prepaid or postpaid data also amounts to a substantial percentage of the income of poor South Africans (approximately 7% of income for those earning under $312 per month). Interestingly when reviewing the data from India we note a much lower cost of data as compared the remaining BRICS countries. The underlying reasons for these low data rates needs to be investigated further. McKinsey and Company state that a major reason for high data costs is due to the multiple data connections and transfers required in the ICT value

<table>
<thead>
<tr>
<th>Country</th>
<th>Internet Users</th>
<th>Mobile Users</th>
</tr>
</thead>
<tbody>
<tr>
<td>China</td>
<td>49.30</td>
<td>40.78</td>
</tr>
<tr>
<td>India</td>
<td>18.00</td>
<td>15.61</td>
</tr>
<tr>
<td>Russian Federation</td>
<td>70.52</td>
<td>55.29</td>
</tr>
<tr>
<td>South Africa</td>
<td>49.00</td>
<td>41.51</td>
</tr>
</tbody>
</table>


Figure 9: Reasons for not having internet access

![Reasons for not having internet access at home](image)

Source: (Statistics South Africa, 2014a)
chain. This involves undersea cabling, satellite linkages, national local cabling, cellphone networks and local WIFI networks (McKinsey&Company, 2014). Thus the infrastructure costs required to enable this connectivity are transferred to consumers. In review of the World Bank data of 2011 sourced from the International Telecommunication Union (ITU) and analysed by the Oxford Internet Institute, it is noted that the cost of annual broadband subscription in South Africa amounts to 2.5-10% of per capita income which further indicates how such services are out of reach of poor South African citizens. Individuals from low income communities are not aware of the benefits that accrue to internet access and are therefore highly apathetic towards technology that is beyond their financial means. To improve these low levels of ICT access, efforts are required to tackle the extreme levels of income inequality as well to convey the message to those in these communities of the benefits on offer when accessing such technologies.

In light of these challenges affecting South Africa, access to ICT services are limited and do not reach the majority of the country. An analysis of internet connectivity using South Africa’s Census 2011 results, one finds the digital divide clearly expressed along lines of monthly household income, Urban/ Rural divisions and employment status. Furthermore, as at 2011, only 50% of households were headed by an employed person, we understand the challenges of poverty and inequality in the country are closely linked to employment. As highlighted in Table 3’s grouping of Census 2011 data, one can clearly identify that the Urban/ Rural divide conveys that greater numbers access the internet in Urban areas, although there are a greater number of people that are not connected to the internet in these areas. Furthermore, a similar trend exists when we compare households that live in formal or informal housing. The highest percentage of internet users are found amongst the employed (above 40%), whilst those that are unemployed or are discouraged work-seekers are much less likely to access the internet (slightly greater than 20%). Similar trends exist amongst those with low household income and unemployment in terms of internet access habits. However, in households that earn above $1249 per month, 82% of these households access the internet. Furthermore, when we review where the bulk of spending by poor households is directed towards their housing, transport and food (approximately 65% of their income).
The remaining 35% of income is spent on other household necessities. Considering that the average poor household by South Africa’s standards earns $14.47 a month, it is clear that internet access expenditure is beyond their means.

Table 3: Analysis of Census 2011 - Internet access demographics

Source: (Statistics South Africa, 2011)
3.2. Government Subsidised Initiatives: Eg: ICT in SA Schools

Considering the unaffordability of personal internet access for the majority of poor individual in the country, state subsidised initiatives are most appropriate to catalyse the provision of social services. This section reviews the provision of state sponsored ICT services in SA schools.

The South African government has endeavoured to roll out computers across schools in the country, although it has stopped short by declaring it a national norm and standard to have such facilities (Department of Basic Education Republic of South Africa, 2013). The government has recognized the following benefits that accrue from the correct use of such technologies in school:

- For school administration – making it faster, more efficient, and more manageable.
- For communication – among and beyond the school community.
- For supporting teaching and learning – including:
  - Make learning more interactive
  - support for a range of teaching and learning practices;
  - specialised support for learners with special needs;
  - as an energiser of both learners and teachers;
  - as a lever for on-going professional development and for change in teaching and learning practices.
  - Individualise and customise the curriculum to match learners’ developmental needs as well as personal interests;
- As a community outreach/social responsibility strategy.

A key goal within the South African department’s e-Education policy of 2004 was to ensure that all learners are ICT-capable by 2013. The intention was that learners would “be able to use ICT confidently and creatively to develop the skills and knowledge they need both to achieve personal and economic goals and to participate effectively as a member of the global community” (Pasensie, 2010).

To achieve this goal, the country has rolled out various projects in the different provinces such as the Khanya Project in the Western Cape which targeted every educator to be ICT-capable and has rolled out equipped computer laboratories to 1102 schools as at 2009 (Bradley, 2013). However, despite these endeavours and the spending directed to computer laboratories, we are faced with a situation as at 2015, where we find 67% of ordinary public schools do not have access to such facilities and with some provinces experiencing close to 90% of schools without computer infrastructure (see Figure 13). This limited access to these services is reflected in the budget structure of the Education provincial departments which does not have a dedicated programme for the implementation of E-Education. As highlighted by the Financial and Fiscal Commission, the budget allocations to support this rollout were not predictable over the past 7 years which suggests that the provision of these services is not a priority (Financial and Fiscal Commission, 2015). Whilst over R375 million has been dedicated to the function over the past 7 years, there was a decline in spending in communication services and a sharper decline in the provision of learner and teacher support materials (see Figure 12). These trends are indicative of the national government setting a policy without the necessary efforts made at a provincial level to implement the policy. To date the government has not prioritized this implementation as it has considered schools with access to basic services such water, sanitation and electricity a greater priority.
A study by the Africa Institute of South Africa (AISA) in 2012, reviewed the implementation of ICT as a means to enhance education in schools. The study considers the benefits identified in the implementation of such tools as well recommendations to improve the manner it is currently utilized. Some of the challenges faced locally and the benefits found as raised by AISA (Mdlongwa, 2012) involved the following:

<table>
<thead>
<tr>
<th>Challenges</th>
<th>Benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>• When learner enrolled in subjects that enabled computer literacy, local universities did not recognize the value of the programme and learners believed enrolling in the subject provided them little empowerment.</td>
<td>• ICT access improved the standard of work</td>
</tr>
<tr>
<td>• The adoption of mobile communication platforms, fostered the use of ‘SMS language’ which was found to corrupt their language skills and increase poor spelling and grammar.</td>
<td>• Learners were independently producing knowledge, once they were initially guided correctly by teachers.</td>
</tr>
<tr>
<td>• ICT resources offered by schools were limited. Where schools had access to computers, they often lacked access to the Internet or the numbers of computers provided were insufficient</td>
<td>• Communication between learner and educator was easier and faster</td>
</tr>
<tr>
<td>• Older teachers have struggled to adapt to new technologies effectively and are unqualified to teach ICT related subjects</td>
<td>• Learners acquire new skills using Microsoft tools</td>
</tr>
<tr>
<td>• Expensive computers were often targets of thefts in poorer communities.</td>
<td>• Information access is simplified</td>
</tr>
<tr>
<td>• Network management tended to be an issue, as administrators were often not dedicated to a school and were off-site, therefore faulty machines or password issues rendered a</td>
<td>• Learning is found to be fun and interesting</td>
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<td>• Data projector were found to be visually stimulating</td>
<td>• Administrative tasks were found to be simpler</td>
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<tr>
<td>• Learners to could practice more using online applications such as MathsBuddy</td>
<td>• Using computers for Teaching (2003)</td>
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AISA recommended that to promote the use of ICT in schools the following should be done:

- Government should fund the training of teachers and equip those with the necessary skills required to utilize ICT tools
- Educators should be more open to using such tools
- School governing bodies should look to adopt such tools.
- Computer literacy classes need to be recognized at tertiary institutions or further developed to meet the standards required for such institutions.

A paper presented at the “Towards Carnegie III” conference at the University of Cape Town highlighted the issues related to the poor use of ICT in classrooms where we find the tools are not utilized to their full capacity (Ndlovu & Lawrence, 2012). It was found that teachers in these schools use ICT tools to merely transmit subject content rather than to enhance learning. Some of the findings suggested within this study raising the following concerns:

- Teachers require ICT pedagogical training which would assist the teacher to integrate such tools into their subject teaching. Current training focuses on ICT basics and does not focus on the pedagogical aspects. It was noted that teachers struggle to innovatively use the skills they acquire in basic trainings to ensure ICT use is more effective.
- To improve the quality of the lesson offered, the selection of the technology should be based on how and when it will be used as the lesson progresses, and not on what looks exciting to the learners. Therefore, when introducing an ICT tool to the classroom, the following objectives must be considered
  - Is it a situating tool: does the learner experience the context and event of the item they are learning?
  - Is it a constructive tool: does the tool enable the learner to manipulate the information and use to construct new forms of knowledge for themselves?
  - Is it a communicative tool: does the tool/system enable teacher-learner, learner-learner communication outside of the classroom.

If the above objectives are met, ICT development and incorporation in schools can have various advantages; however, the incorporation of E-Learning is only feasible when there is sufficient content used to supplement a lesson plan. E-learning should not be used as a replacement for classroom teaching. It has also been found that the majority of teachers are not equipped to use digital education tools. In addition, due to the internet connectivity issues a requirement for South Africa are innovative solutions that and materials that can work offline. The following facilities and innovations have been pioneered in South Africa.

3.3. ICT based employment opportunities for the low skilled unemployed

Together with using ICT based services and tools to promote the reach and quality of education services for those in the schools, a crucial requirement is to find available means to promote the employability of the large unskilled or low-skilled unemployed in South Africa. From 1996 the post-apartheid government in South African adopted employment targeting policies such as Reconstruction and Development Programme (RDP), Growth Employment and Redistribution (GEAR), Accelerated and Shared Growth Initiative-South Africa(ASGISA), New Growth Path (NGP) National Youth Policy
(NYP) and National Development Plan (NDP). However, despite the rollout of these programmes, unemployment is still very high. The unemployment rate has increased from 23.2 percent in 2008 to 26.6 percent.

Labour intensity can be increased through the programmes such as Expanded Public Works Programme (EPWP) and in agricultural sectors such as farmers. These generate a large number of jobs in South Africa even if it is a temporary or seasonal job but people gain experience, especially in EPWP. Even though these programmes provide jobs for a short term, they aim beyond providing short-term employment they also attempt to prepare people for permanent or longer term employment through skills programme and work experience. The limitation of this programme is that the types of employment that are generated are largely manual without with little application in the products and services sectors which are greatly needed to be competitive within the Knowledge Economy.

Sunkara, Tapio and Rao (2015) in a review of ICT based training programmes in Papau New Guinea noted the widening digital divide in employment opportunities as there is a greater demand for high-skilled resources and a demand for unskilled labour such as cleaning services, with reduced opportunities for progression within an organization. Mid-level clerical positions within organisations have declined leading to a shortage of intermediate positions that provide opportunities to progress into more productive job roles. There is a crucial need to bridge the gap between the skilled and unskilled workers in the labour market. Sunkara et al. argue for the rollout of ICT tools to promote vocational skills development. Whilst private access to ICT services is limited to the poor due to the high cost of internet connectivity, public ICT facilities provide greater opportunities for the underprivileged to gain access to such training. Sunkara et al. argue for the following range of services:

- Providing public ICT access at libraries and communities centres
- Offer ICT skills training programmes at such facilities
- Offer vocational training programmes via ICT
- Promote ICT based employment opportunities targeted to disadvantaged youth
- Promote public-private partnerships that provide companies incentives to source employees from publicly-funded training schemes.

Sunkara et al. (2015) contend that publicly funded post-secondary organisations should provide technical and vocational training courses as well as small business management courses that target niche areas of demand in the particular community. The call for ICT based vocational training was supported by the International Youth Foundation (2013) which also noted the need to broaden the reach of ICT based employment opportunities and to expand the training on soft-skills and ICT skills. The International Youth Foundation also argued for exposing the youth at earlier ages to ICT based programmes in schools.

### 3.4 Promoting Financial Inclusion

75% of the South African adult population was banked as at 2014 which is a major increase from the 46% of the population that were banked in 2004. The majority of the unbanked are found in the rural areas or are unemployed (FinMark Trust, 2014). Traderoot Technologies notes that the biggest hurdle to obtaining a bank account is the high state of fees when opening an account and then transacting from such an account. These fees are unaffordable when you consider the bulk of the population (22 million) earn less than R3000 a month (Traderoot technologies thought leadership, 2014).
The major success stories that helped decrease the number of the unbanked in South Africa are the options for Person-to-Person (P2P) mobile payments and mobile Point of Sale devices that promote transactional card banking payments to happen anywhere as long as the payment terminal is GPRS equipped (Traderoot technologies thought leadership, 2014). Another strong innovation in banking in East Africa and South Africa is the adoption of the text based mobile phone banking facility M-PESA which allows users to deposit, withdraw, and transfer money (Ismail & Masinge, 2012).

The reason attributed for this high growth is due to the strong increase in the number of mobile phones across the country. The long standing barrier that was overcome by P2P mobile payments was scrapping the need for proof of residence to open a bank account and replacing the requirement with a link to the client’s cell number instead. Once the bank account is activated, the user’s mobile phone becomes the channel for engaging with available services, such as money transfer, airtime purchase and electricity top ups (KPMG South Africa, 2013).

Figure 14: Increase in the number of banked in SA

Source: Finmark Trust 2014

Deen-Swarray et al. (2013) studied informal business in Uganda, Tanzania, Rwanda and Kenya and noted that the majority of those in the informal economy chose to use cash as the primary means of doing business. Whilst the majority of businesses had access to mobile phones, access to computers and the internet via an alternate means was almost non-existent. Deen-Swarray argued that mobile technologies provide the best opportunity to expose banking to the informal market. One of the primary reasons which impeded the adoption of formalized banking was the cost of the services available and the requirements for formal arrangements such as permanent addresses, identification documents and tax-registration. Due to the non-adoption of formalized banking, the customer is unable to develop a transaction record hence limiting their chances of obtaining further financial services from banks. Mobile banking is viewed as the stepping stone needed to move informal business to more formalized arrangements. As the main impediment identified by Deen-Swarry is the high cost of transaction fees, the author argues that banks should revise their fee model and move away from transaction fees and consider fees related to financial intermediation.

A study by Ismail and Masinge (2012) sought to identify the impediments to banking the poor in South Africa. The authors argue that the factors motivating the poor to adopt formalized banking arrangements differ from middle and upper income people and are not well understood by the corporate banks. They identified four key factors which limits the adoption of banking:

- Are mobile phones a risky medium for processing one’s finances? Do poorer individuals perceive risk differently?
- What factors influence a poorer customer to trust mobile banking
- Do the banks truly understand the cost-factors vs. the benefit of the service to low income individuals?
• Do poorer individuals have sufficient knowledge to use mobile technologies and how do they perceive the ease of use when choosing to adopt mobile banking

3.5. Lessons from the BRICS

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<th>Programme</th>
<th>Detail</th>
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<td>E-Learning in China</td>
<td>Adoption of e-learning in China’s Higher Education Segment as highlighted in the Ambient Insight report highlights the manner online education can provide greater access to tertiary education (Adkins, 2015). Despite South Africa’s high school dropout and low pass rates in the math and science fields, the number of students that actually successfully pass high school and qualify for higher education are not absorbed sufficiently well into the Universities. For example, out of the 112200 applications received by the University of Johannesburg, only 10500 students were placed at the university in 2015 (Magubane, 2015). This trend is widespread across universities and indicates a need to absorb the learners that qualify for such institutions but due to the high demand, are not able to access such institutions. E-Learning programmes provide an avenue not fully utilized in the country. Whilst the challenge of internet connectivity remains in the country, providing an alternate means for developing the youth is worth investigating. A wider selection of programmes are required especially in the online vocational short courses (Laurence, 2016).</td>
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<td>Knowledge Squares in Brazil</td>
<td>The government funded rollout of laptops (One Laptop Per Child programme) in Rio de Janeiro and the introduction of ‘Knowledge Squares’ are interesting projects that are useful in South Africa’s context. The intention of the Knowledge Squares are to democratise access to education and training (Jung, 2014). In addition to setting up the Knowledge Square, free transport is offered to assist in accessing these stations. The squares provide extensive opportunities for digital inclusion and enable job creation through the new opportunities such as job applications that could be made via these centres (Jung, 2013). Thus the square increases the populations internet access, assist the youth in accessing information and assists with employment creation. Each of these functions are critically needed in South Africa.</td>
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<td>Tailored ICT Solutions communities in India</td>
<td>Keniston and Kumar discussed that policy makers should make should avoid suggestions of introducing a laptop into every village, as one cannot discount the obvious concern that issue such as basic human rights should be addressed before excessive funds are disbursed to large scale ICT rollouts. Keniston and Kumar advocated for tailoring the deployment of ICT projects to the specific needs of a community which allows them to act more effectively. ICT systems should build on an assessment of needs as defined locally instead of deploying a one-size fits all approach (Keniston &amp; Kumar, 2003).</td>
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<td>Digital Mobile Libraries in India</td>
<td>India plans to introduce 1 million digital books to the doorsteps of common citizens. The Internet– enabled digital library will promote literacy. It will make use of a mobile van with satellite Internet connections. The van will be fitted with printers, scanners, cutters and binding machines for providing books in bound form to end users.</td>
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<td>Expert Call Centres in India</td>
<td>Various call centre initiatives such as the Bhoomi Project or the Kisan Call Centre have been adopted across the rural areas of India which provide an opportunity for farmers to connect to experts or graduates to consult on issues of agriculture</td>
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or general rural development. Such consultations contribute to better crop yields and farmers receiving a much higher return on their crops (Bansode & Patil, 2011).

4. Conclusion

In order to bridge the digital divide in South Africa and move the economy into the Knowledge Economy, the enabling factors for this shift must be supported and developed such as education, employment and internet infrastructure costs. The key issues that must be addressed are:

- Reduction of Poverty and Inequality in the Country
- Improved levels of education completion with greater emphasis on the quality of the education output.
- Promotion of employment especially in the Industrial and Services sectors.
- Absorption of the unemployed in the short and medium term whilst paying attention to the longer term requirements
- Introduction of ICT based vocational training
- Reduction of Internet Services Costs in the mobile and fixed line spaces

The key question that emerges when searching for alternatives to promote digital inclusion is asking whether spending money on ICT related services could be better spent on developing the population’s access to basic human rights. It emerges from various studies that a multi-pronged approach is required. To shift towards the knowledge economy, the enabling factors must be developed but a shift in culture and mindsets is also required. The creation of innovation culture must be established across the BRICS. Flagship innovation projects across the BRICS could be investigated that could be used to pull the economies forward and inspire the current and future generations to work in such fields.

There is a need to break the current cycle in South Africa that continues to feed the workforce with unskilled, uneducated labour. The underlying reasons that pull learners out of the school system need to be addressed. With greater numbers completing school, there is then a need to address the low quality of the school system. The value of mathematics and sciences needs to be instilled in learners. ICT project in the education space have found creative ways to foster this development, with Video Conferenced teaching as a manner to connect far-flung learner to expert teachers or to use ICT tools to help learners grapple with key math and science concepts in the elemental phases.

There is a need to for the development of experts in the BRICS whilst also a need to absorb the current majority of unskilled labour in South Africa in the short term. The promotion of vocational training could help involve these people within the industrial economy which could lead to a gradual shift into the service space.

Through the upskilling of people, efforts must be made to encourage digital literacy, such that the disconnected can start to see the value of ICT development. Thus when ICT spaces are developed, greater numbers will start to effectively use such facilities.
5. References


