

## HUMAN CAPITAL AND DEVELOPING ECONOMIES: BENEFITS AND SOLUTIONS FOR POLICY-MAKERS

Tin Pofuk

University of Primorska, Faculty of Management, Slovenia  
tin.pofuk@fm-kp.si

Klemen Kavčič

University of Primorska, Faculty of Management, Slovenia  
klemen.kavcic@fm-kp.si

### **Abstract:**

Globalization and IT technology have enabled both companies and individuals in developing countries a quick and thorough access to the latest technological breakthroughs that allow them to make the first and, arguably, most difficult steps in economic development. The purpose of this paper is to a) explain the conditions that are making this possible, b) highlight the benefits of a faster and deeper sharing of knowledge in developing economies and c) to propose several solutions to policy makers to fully grasp and make use of emerging synergies. In this paper we examine 3 cases: a) off-grid LED lighting and electricity, b) mobile telephone usage and c) internet access. We have found out that these, along with several other innovations, greatly enhance the human capital of developing societies, with 3 types of benefits: a) immediate benefits – by raising the quality of life, b) mid-term benefits – by providing a better access to education and therefore career opportunities and personal development, and c) long term benefits – by creating a wealthier and more knowledgeable society. This simple sharing of knowledge, thus, allows for more economic participation and development, which, in turn, strengthens the benefits further enhancing the development of human capital. The paper then proposes several solutions to local policy-makers, which will allow them to create and/or maintain the conditions for the local economies to grow; making therefore best use of the virtuous circle that develops between the sharing of knowledge, human capital, and economic development.

*Keywords: human capital, knowledge, developing economies, technology*

## 1. INTRODUCTION

When the latest IT technologies come to mind, such as LTE internet, tablets or mobile phone apps, we always seem to connect them to leisure activities that youngsters in developed countries will be using, or as novelties which will very soon fade in oblivion. However there is much more potential to these technologies; in this paper we will examine their potential for raising the quality of life and empowering individuals, companies and civil society in developing countries by allowing a fast and cheap shearing of knowledge.

There are many powerful innovations that could enable it, but for the purpose of this paper, we are going to examine three cases, which we deem most promising: a) off-grid LED lighting and electricity, b) mobile telephone usage and c) internet access. These technologies should be viewed as a single element, working together, and generating a virtuous circle between the sharing of knowledge, human capital, and economic development.

The purpose of this paper is to a) explain the conditions that are making this circle possible, b) highlight the benefits of a faster and deeper sharing of knowledge in developing economies and c) to propose several solutions to policy-makers to fully grasp and make use of emerging synergies.

## 2. CONDITIONS

Although the conditions that are enabling the spread of technology in developing countries are many, we believe that *affordability* is one of the most important ones. The cost of computers and technology has decreased dramatically over the years. According to data collected by the United States Bureau of Labor Statistics the prices of “personal computers and peripheral equipment” has been decreasing steadily by an average yearly rate of almost 12 percent in the period 2006-2013 (Bureau of Labor Statistics, 2014). Nelson et al. (1994) has reported an even greater yearly decrease in the prices of what we can now consider the beginnings of computers and IT technology, if we take in consideration the immense increase in quality.

The basic components of computers and IT technology can be broken down to hardware and software. Though both hardware and software are being produced around the world, we have pinpointed two regions or groups of countries which are the most important producers (provided that we are considering developing countries). These regions are: East Asia (specifically the People's Republic of China) for hardware, and both international and local companies for software.

According to Amity et al. (2007) China's exports have recently started switching from low added-value goods such as textiles, apparel or footwear to high added-value goods such as electronic machinery, office machines and especially telecommunications, with the latter representing almost a sixth of all manufacturing exports. Chinese exports have risen more than tenfold over the last 15 years and this increase in worldwide supply has been, and still is, putting downward pressure on the prices of these goods. The paper finds that the fact that “China's rapid export growth has been accompanied by falling export prices implies that consumers around the world have benefited from lower prices” (p. 41). This includes of course also consumers in developing countries.

The other important component is software. The biggest player worldwide in this sector is India. Its growth has also been spectacular, growing at an annual rate of about 50 percent through the 90's (Nicholson et al., 2001). Other international giants such as Facebook or Twitter are also important, but we have to recognize the importance of many more small local companies which are developing innovative and creative software to suit their needs. We are going to examine some examples later in the text. Today's developing economies in Asia and Africa can build on these low-cost high-quality solutions. We are going to examine three case studies to exemplify these exciting new possibilities: a) off-grid LED lighting and electricity, b) mobile telephone usage and c) internet access.

### 2.1 Off-grid LED lighting and electricity

We possess 5 basic senses – touch, hearing, taste, smell and sight. The latter is, arguably, the most important for our day to day activities. The eye has millions of light-sensitive cells that detect visible

light, which creates electrical stimuli and transmits it to the brain for processing. It comes to no surprise therefore that light is essential for our lives.

The use of artificial lighting has a very long history, since human activities don't stop at night, starting with candles and open fires thousands of years ago and culminating in today's super-efficient LED lights, yet about 1.2 billion people in many parts of the world still don't have electricity, and therefore modern lighting (Pope, 2012). This, in turn, has a negative effect on their productivity – less light means less working hours, less study hours and, arguably, fewer hours to bond and relax.

In addition to the lack of lighting, many communities also lack modern quality of life boosting inventions such as refrigerators, stoves, AC units, PCs, fans and the like. An important shift is on the way however, with the invention of very efficient off-grid LED lighting. In fact, *greater efficiency* in general has also enabled many items to be used, not just lighting. Mobile phones, super-efficient refrigerators or ventilators may soon be common even in the most remote of communities.

This shift would not only improve lives allowing for modernity, but could also save money. Over a decade, the average poor family is estimated to spend almost US\$2,000 on energy expenditures, including lighting. But even though a lot is paid for it, the poorest fifth of the world receives only 0.1 percent of the lighting benefits. By replacing inferior lighting (such as kerosene-based systems), with a vastly superior and cheaper home solar system a family could get access not only to light, but also electricity to power cell-phones, fans, computers, maybe even televisions, for an estimated cost of US\$300 (Pope, 2012).

## 2.2 Mobile telephone

Mobile phone usage has traditionally been thought of as an amenity exclusive to the developed world. That's hardly the case anymore, with mobile phone usage booming in developing countries. In fact, the number of mobile phone subscriptions has risen from around a billion to more than 6 billion in the period 2000-2010, and the *majority* of these subscriptions are in *developing countries* (World Bank, 2012).

Mobile phones are used not just for calls and texting, but other necessities as well. Perhaps the most known usage in developing countries is mobile money. Mobile money is an innovative payment service which allows its customers to transfer money quickly and securely to another mobile phone user far away. A bank account isn't necessary, just an account with the mobile service provider. The account is secure, PIN-protected and supported 24/7 by a service. A recent article by the Economist mentions that in 2012 there were 20 countries with 10 percent or more of the population using mobile money services, and out of those, 15 were African countries. In Kenya, Sudan and Gabon half or more of the adult population used mobile money (Mobile money in Africa, 2012).

Kenya's Safaricom for example, the country's largest mobile service provider which supports a mobile money service called M-PESA, offers a good explanation on the reasons why money transfer is useful and who are its users. The most common users are urban senders and rural recipients and the most common reason for a money transfer is the *payment of school fees*, according to Morawczynski et al. (2009). This case exemplifies our thesis: *innovative technology is helping boost the quality of life of people in developing countries by easing the burden of education*.

In fact, the mobile phone has revolutionised the way individuals, SMEs, farmers, and informal traders interact and operate in the African continent. Mobile revenue is now equivalent to 3.7 percent of GDP in Africa, which is more than three times its share in developed economies (Manyika et al., 2013).

Finally, we must not forget that modern mobile phones are basically small computers, designed to use millions of applications through the internet, which is the last case we are going to examine.

## 2.3 Internet access

Internet access in developing countries is becoming ever more present and important. The rise in internet connection has been astonishing in Africa. The penetration is currently estimated at 16 percent but rising strongly, considering that just the previous year it was at 11 percent. This trend is likely to be continued in the future (Manyika et al., 2013).

Internet is vital not only because it allows for connection, but also because it enables the use of a virtually endless number of applications and programs available for computers, tablets and phones. A growing field in developing countries for example is “mobile” health, i.e. the use of mobile technologies to support clinical care at a regional, community and individual level. IT-related solutions are for example networking (e.g. SMS or instant messaging), web surfing, e-mail lists, web-based data entry or web-based learning with online courses (Kahn et al., 2010).

Another field is applications that cater for the business users, such as Mozambique’s moWoza company. MoWoza is a mobile phone marketplace platform that allows informal traders to access information such as price-related information, to order and pre-pay inventory, to receive delivery status notifications and to access credit on their mobile phones. MoWoza also improves the livelihoods of women by empowering them to trade efficiently and transparently, as well as helping foster the business activities in their communities (moWoza, n.d.). Also, digital technology has the capability to provide access to banking services to more than 60 percent of the African population, and enabling more than 90 percent to use mobile wallets for daily transactions or remittances by 2025 (Manyika et al., 2013).

The level of iGDP (internet’s contribution to GDP) is very high for some developing countries such as Senegal and Kenya, at 3.3 and 2.9 percent respectively. It can be compared to Germany’s 3.2 or Canada’s 2.7 percent of iGDP (Manyika et al., 2013). In a baseline scenario by the same paper, Africa’s iGDP could grow to at least 5 percent of GDP, matching that of leading economies such as the United Kingdom. However, if the Internet achieves an impact on the same scale as mobile telephony in Africa, iGDP could account for as much as 10 percent of total GDP by as early as 2025 and amount to US\$300 billion.

In conclusion, the examined three cases (and countless other innovations) are lending an essential helping hand to developing countries to achieve their true potential. Their detailed benefits will be examined in the next chapter.

### 3. BENEFITS

All of the examined examples are exceptional because they make *knowledge* and *learning accessible* to a very broad number of people. As we have seen, this is achieved chiefly by dramatically lowering, or even eliminating completely, the costs associated with learning. Internet-based learning platforms also allow for certain socially disadvantaged groups to receive an education.

We will examine sex, time and religion and customs first. Women tend to be less advantaged than men in most societies. The key to raising education levels and human capital lies in empowerment. The FAO (Food and Agriculture Organization) stated in a very recent article that by providing women with the right tools and knowledge (e.g. moWoza), women are crucial in eradicating hunger and ensuring food security. It is also important to understand that by raising woman’s welfare, the welfare of the offspring is increased as well (Empowerment is key to eradicating hunger, 2014).

The FAO brings also to light the importance of radio and remote communications in rural areas, and women. Radios tend to be a powerful engine of social change in Africa, encouraging women to talk about and become active in solving problems (such as marital issues or war-related problems) and improving food production. In the DRC’s South Kivu province for example, such a group of radio-empowered villagers had taxes raised on useless sugarcane production, allowing the fertile land to be turned to fruit and vegetable production (Community listeners’ clubs, n.d.).

Then there is the question of time. Too many young people in developing economies may lack the physical time to commute to school, either because the school is too distant or because they have to assist with family chores or perform other informal work (Decreasing child labour, n.d.). But if cheap solar-powered tablets and Wi-Fi-networks were available, along with teacher-provided online contents, we believe that it would provide a valuable support in the learning process, i.e. pupils could study when they have the time, instead of being tied to school hours.

There is also the question of culture and religion. Many societies tend to be fairly conservative – especially women are denied education and empowerment. Culture can also play a negative role – for example the members of lower castes in Indian society are also denied personal development based

solely on their origin. IT-based content could help empower such people, by allowing them to educate privately.

Michaelowa (2002) outlines a curious aspect of the benefits. It seems that teacher satisfaction is a very important issue on student achievement in Africa, one of the variables affecting teacher satisfaction being school equipment “in particular concerning prestigious items such as electricity” (p. 10). We can therefore rationally include items such as computers, tablets, internet access and the like in this variable. The paper also states that there is very limited evidence for the effectiveness of costly measures, such as higher salaries or academic qualifications, citing more effective and less costly measures such as better equipment to have a greater impact. This point is controversial, but we have to remember the sheer lack of any kind of amenities – premises, textbooks, pens, and even basics such as a blackboard and chalks.

Manyika et al. (2013) finds also that many schools could soon access the world’s best educational content on cheap and affordable tablets or e-books. Teachers will benefit from more effective training and students with better content. It also estimates that technology-related productivity gains in education could reach US\$30-70 billion in Africa in the near future. This will enable governments to achieve more with their education budgets and provide “millions of students with the foundation for a better future” (p. 10).

In fact, Edejer (2000) has summed it up nicely, saying “knowledge has been portrayed as a good that is available to the global public and as something that is not diminished after being used by an individual, and once provided it has been seen as difficult to restrict to a single individual or a group. Advances in information and communication technologies make the global distribution of this good seem effortless. The technology, specifically the world wide web, enables information to be made available to multiple users the instant it is produced. Anyone can use it, whether an ordinary woman living in a village or a high ranking policymaker” (p. 797).

The benefits of these innovations are countless. We have found out however that they can be arranged chronologically in: a) short-term benefits: by raising the quality of life, b) mid-term benefits: by providing a better access to education and therefore career opportunities and personal development, and c) long-term benefits: by creating a wealthier and more knowledgeable society.

### **3.1 Short-term benefits**

All of the examined innovations and many more can raise immediately the quality of life. Mobile phones can enable people to communicate at low costs across great distances, can save lives by enabling a call to an ambulance or provide instructions for self-treatment. The internet will help reduce transaction costs and bring financial services to people located in remote areas, as well as better communication and learning possibilities for farmers, who could access expertise and information on everything from weather, crop selection, and pest control to management and finance. As we have seen, market access would also be improved, yielding better prices for the produce.

### **3.2 Mid-term benefits**

Here we classify all benefits that may enhance human capital and development by enabling people to receive a better education and therefore career opportunities and personal development. We also think that these mid-term benefits, and the following long-term ones, are the ones that have the capability to really develop human capital.

In fact, human capital can be thought of as the sum of all investments a person has made, both in and for himself. It includes knowledge (both formal and informal learning), competences, occupational choice, mobility, etc. All of these are used to produce an economic return with labor. It is hard to think of forms of human capital which someone can acquire as finished goods; instead a person must participate in the creation of his own human capital (Ben-Porath, 1967).

These mid-term benefits might also work indirectly by helping people for example to find better employment, save money, achieve a higher or better education or providing their children with education, etc. As we have seen, internet access can enable pupils to study when they have time or to

access better teaching materials, increasing their chances to have a higher education. Informal learning and skills, such as informatics, languages or general culture, ever more important, are also made readily available.

A mixed short and mid-term benefit is health access, which we have examined before. Internet, along with mobile phones will enable greater use of remote diagnosis, treatment, and education. Of course, this is only half of the impact, with the far greater broader social and economic impacts of improved health outcomes. By 2025 technology-related benefits could range US\$84-188 billion in Africa (Manyika et al., 2013).

E-commerce, already strong in Africa for example, could account for 10 percent of retail sales in the continents' largest economies, or US\$75 billion in annual revenue by 2025 (Manyika et al., 2013). It enables companies can stay in contact with the customers, to use social media for promotion, to use free CRM programs and much more, all helping with long-term growth and development, not just survival.

### 3.3 Long-term benefits

All of the aforementioned innovations and related benefits contribute over time to create a wealthier and more knowledgeable society, by creating and maintaining the virtuous circle that develops between the sharing of knowledge, human capital, and economic development.

We believe that one of the most important achievements of these innovations is the availability of *time to spare*. Societies have never achieved great innovations and development in times when most of the population had to work just in order to survive. It is only in richer societies that we find a large proportion of the population able pursue an education, precisely because richer societies, having satisfied all their basic needs, can start dealing on a significant scale with life changing elements, such as education, sciences, arts, etc.

The industrial revolution exemplifies this. For two million years, people have lived at a very low, but constant level of material well-being and development. It is only after the industrial revolution though, that development could really flourish, because an ever larger percent of people could use their time in a more productive, education-oriented manner.

The internet especially, has an impact not only on society, but also on how a society is governed. The internet, along with the IT industry, computers, and the like, can act as a strong lever which can "improve transparency, [and] provide citizens with access to information" (Manyika et al., 2013, p. 11).

## 4. POLICIES: SUGGESTIONS AND RESULTS

The government is exactly where we want to continue our discussion. The duties of a successful government are to organize the way a society works by setting rules, providing order, protection and public services. Traditionally, many governments have adopted an authoritarian posture, serving their own interests rather than serving their people. This is especially true for developing economies. The reasons are numerous, but we place corruption and a limited flow of knowledge at the very top.

Many proposals to developing economies' leaders have been made by various authors; however we believe that e-government has not been given the importance it deserves. If implemented properly, we believe that e-government is a true game-changer in the way communities interact with their governments and indeed among themselves. E-government could be a game-changer because, provided that enough communication flow and knowledge sharing is generated by the technology-based solutions we have examined, governments' often vast powers could be curbed. Civil society could have a much stronger voice (e.g. the role of social media in the Arab Spring) and corruption levels could be lowered dramatically.

When we talk about e-government we have in mind a situation where most, if not all, documents, laws, news and communications are available online to the people. Also, the internet should be used like a bridge to allow for conversation and an exchange of knowledge between the people and the

government, for example with blogs or web pages where anyone can voice their concerns on a specific topic. In fact, we believe that in such a system the inefficiencies of a parliamentary form of government with high levels of corruption which is prevalent for developing countries, would be greatly reduced by allowing for a form of self-government, in which not only the government, but also the people can actively participate in debates and decision-making (Backus, 2001).

We believe that the benefits could be huge. In fact it was estimated for Africa alone that direct technology-related productivity gains in government might be worth US\$10-25 billion by 2025 (Manyika et al., 2013). The indirect gains, created by empowerment and decreased corruption are very difficult to estimate, but are likely to be enormous.

It is also important to notice that simply copying developed countries' e-government policies is not going to be enough. Instead, the different initial institutional, cultural, and wider administrative contexts must be considered to achieve maximum results. Local conditions have to be studied thoroughly instead of oversimplifying the issue. In many instances e-government has failed in African countries, but it would be wrong to think that such projects are simply destined to fail in Africa or in other developing regions. Although e-government in African (and other developing) countries still lags far behind developed countries, this should be considered more as a failure or lack of capacity in general, instead of a problem with such projects per se (Schuppan, 2009).

As a good argument in support of our statement, Leo (2013) writes that many issues judged as most pressing for developing countries, are not judged as such by foreign countries and agencies that fund aid to these countries. Studying reports made by the Afrobarometer public attitude, Leo (2013) suggests that Africans appear overwhelmingly concerned about four interrelated issues: a) jobs and income, b) infrastructure, c) enabling economic and financial policies, and d) inequality. These four issues have accounted for roughly 70 percent of survey responses since 2002. All of these trends hold across rural/urban, gender, and other demographic lines without any major differences. He also states that foreign aid money very often funds projects that are not those that the Africans themselves desire. This, and many other issues, could be alleviated by the inhabitants' participation in the decision-making process.

Another critical suggestion to policy-makers is to invest in infrastructure, or rather in *smart infrastructure*. In Africa for example, infrastructure-related concerns – such as power, roads, and water – have witnessed the largest increase since 2002 among all issues. Roughly, one-in-five inhabitants raise it as their most pressing concern (Leo, 2013).

Often traditional solutions might not be applicable though, because of a lack of funds or an insufficient return on investment. For example, many remote villages cannot be reached with a traditional power grid. In this case, it is better to resort to smart, innovative solutions, such as a small power plant serving just that village or maybe personal solar power plants. Also, because of the high consumption rates worldwide the cost of coal and copper, which are the basic ingredients of conventional grid power, are soaring. At the same time the costs of solar panels and LEDs, are diminishing constantly. Pope (2012) has also stated that the best chance to provide everyone with electricity, especially in remote poor places, is with the use of off-grid cheap innovative solutions. It makes all the more sense, considering the fact that coal and copper prices are most likely going to raise even further in the future because of economic development, and have a negative environmental impact.

Among infrastructure-related issues, we would also like to point out internet access. We believe that special offers should be made, targeting remote settlements or villages individually, offering to build internet access. We believe that in this case the costs would be reduced substantially. The same concept might be used also in cities, for example targeting city blocks.

Even “cheap” solutions might not be cheap enough though. For example, as we have seen Pope (2012) estimates that a home solar system designed to power not only light, but also cell-phones, fans, or computers costs around US\$300. We believe though that many, if not most, of individuals or families in developing countries don't have such savings or are otherwise simply unable to make such a payment up front, therefore adequate state, company or NGO-funded micro-financing schemes should be adopted.

We believe that the government should generally promote and use projects to connect SME's, the local population and the government – government in its entirety, such as schools, health clinics, police, etc. It is paramount that these projects include the development of the internet and communications.

Also, we feel that a very effective suggestion in general would be the inclusion of NGO's in addressing problems and finding solutions. A similar suggestion has been made by Manzoor et al. (2007) stating that NGO's can provide useful insight into generic issues and complement the tracking and analysis.

## 5. CONCLUSIONS

We have seen that new technologies have a giant effect in developing countries. It is not just the developed world that benefits from them. Instead the biggest results can actually be achieved by developing economies. In fact, in developing regions, new technologies have many parallels with education. Elementary education, basics such as reading and writing, increase human capital the most, while successive education raises this level at an ever smaller pace. In the same way, *simple technologies* come with the most *substantial benefits*.

The recent worldwide economy boom, caused by reforms and mass demand has lowered the prices of many goods, including technology. Development of cheap hardware and local software is having an enormous effect in developing countries. While the hardware is mostly made in East Asian countries, the software is often either locally-sourced or international (such as Facebook or Twitter). Either way, it is used *by locals* (companies, NGO's and individuals alike) to address *local issues*.

We have found out that we can layer the benefits according to time, and have identified three types of benefits: a) *immediate benefits* – which raise immediately the quality of life, b) *mid-term benefits* – which provide a better access to education and therefore career opportunities and personal development, and c) *long-term benefits* – which create a wealthier and more knowledgeable society. Technological innovations have immediate benefits, which foster mid-term ones, which in turn cause long-term ones. We have found out that there is a virtuous circle created by technological innovations – they allow for knowledge sharing and better learning, increasing human capital – which creates development.

Most if not all of the solutions for policy-makers are available, it is just important to have the will to use them in practice. We believe that emphasis has to be put on e-government, infrastructure and NGO's to achieve maximum impact.

In conclusion, we believe there is an unstoppable push towards universal knowledge and education in all regions of the world. If the right steps are taken, developing countries have a chance to develop quickly and efficiently, using previously unavailable IT and technology based solutions for maximum impact.

## REFERENCE LIST

1. Ahmed, M., Saleh, A. K., Nurul, I. K., & Romij, A. (2007). Access to education in Bangladesh: Country analytic review of primary and secondary education. *CREATE*.
2. Amiti, M., & Freund, C. (2007). China's Export Boom, *Finance & Development*, 44, 3, pp. 38-41.
3. Backus, M. (2001). E-governance in Developing Countries. *IICD Research Brief*, 1.
4. Benajmin, L. (2013). Is Anyone Listening? Does US Foreign Assistances Target People's Top Priorities?. *CGD Working Paper 348*, Washington, DC: Center for Global Development.
5. Ben-Porath, Y. (1967). The production of human capital and the life cycle of earnings. *The Journal of Political Economy*, 352-365.
6. Bureau of Labor Statistics. (2012). *CPI Detailed Report*. Retrieved from <http://www.bls.gov/cpi/cpid1401.pdf>
7. Community listeners' clubs empower rural women and men. (n.d.). *FAO*. Retrieved March 11, 2014 from <http://www.fao.org/in-action/community-listeners-clubs-empower-rural-women-and-men/en/>
8. Decreasing child labour through promoting decent rural employment. (n.d.). *FAO*. Retrieved March 11, 2014 from <http://www.fao.org/in-action/decreasing-child-labour-through-promoting-decent-rural-employment/en/>



9. Edejer, T. T. T. (2000). Disseminating health information in developing countries: the role of the internet. *BMJ*, 321, pp. 797-800.
10. Empowerment is key to eradicating hunger. (2014). *FAO*. Retrieved March 11, 2014 from <http://www.fao.org/zhc/detail-events/en/c/214683/>
11. Kahn, J. G., Yang, J. S., & Kahn, J. S. (2010). 'Mobile' health needs and opportunities in developing countries. *Health Affairs*, 29(2), pp. 252-258.
12. Manyika, J., Cabral, A., Moodley, L., Moraje, S., Yeboah-Amankwah, S., Chui, M., & Anthonyrajah, J. (2013). Lions go digital: The Internet's transformative potential in Africa, *McKinsey Global Institute*.
13. Michaelowa, K. (2002). Teacher job satisfaction, student achievement, and the cost of primary education in Francophone Sub-Saharan Africa. *HWWA Discussion Paper*, 188.
14. Mobile money in Africa: Press 1 for modernity. (2012). *The Economist*. Retrieved March 2, 2014 from <http://www.economist.com/node/21553510>
15. Morawczynski, O., & Pickens, M. (2009). Poor people using mobile financial services: observations on customer usage and impact from M-PESA. *CGAP*.
16. moWoza. (n.d.). Retrieved March 14, 2014 from <http://www.seedinit.org/awards/all/2013/801-mowoza.html>
17. Nelson, R. A., Tanguay, T. L., & Patterson, C. D. (1994). A quality-adjusted price index for personal computers. *Journal of Business & Economic Statistics*, 12(1), 23-31.
18. Nicholson, B., & Sahay, S. (2001). Some political and cultural issues in the globalisation of software development: case experience from Britain and India. *Information and Organization*, 11, pp. 25–43.
19. Pope, C. (2012). How solar power can help the billion people without electricity. *The Guardian*. Retrieved March 9, 2014 from <http://www.theguardian.com/environment/2012/jan/05/solar-power-billion-without-electricity>
20. Schuppan, T. (2009). E-Government in developing countries: Experiences from sub-Saharan Africa. *Government Information Quarterly*, 26, pp.118–127.