

**ONLINE AND FORWARD - ASSESSING TECHNOLOGICAL
APPLICATIONS FOR SOCIAL EMPOWERMENT IN
DEVELOPING COUNTRIES**

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ABSTRACT

Technological applications in the areas of Big Data Analytics, Information Communication Technology and the Internet of Things are rapidly growing across the world. These areas of technology have the scope for an increasing number of applications that can tackle the issues that exist in developing countries with respect to poverty, access to resources, lack of literacy, and other such issues. Several organizations and corporations are implementing technologies in the developing world, to address issues in a wide variety of sectors. It is therefore crucial to assess the challenges that may arise with respect to implementation, and to ensure that there is equality in access so that the increased interconnectivity ensures the progress of marginalized sections of society. This paper will examine the various applications for social empowerment, and the advantages and disadvantages of the same. The paper will then pose policy recommendations based on this assessment, and highlight several issues that governments, organizations and civil society must take into account whilst implementing such technological applications.

Keywords: Technological applications, Social Empowerment, Big Data Analytics, Information Communication Technology, Internet of Things

INTRODUCTION

With increased globalization and rapid growth of technological applications, it is crucial to acknowledge that such technologies need to be harnessed for the benefit of developing countries where more marginalized communities face issues such as discrimination, lack of access to education, the brunt of wars and political instability, lack of access to basic services such as sanitation and healthcare, etc. For example, nearly one-fifth of the children in the developing world remain unvaccinated each year (CISCO, 2016). Nearly one billion people in the world lack access to safe drinking water, while some two billion have inadequate access to sanitation

facilities (CISCO, 2016). Growth in agricultural productivity over the last fifty years has been much slower in the developing regions of the world, in part due to large capital costs (The Economist, 2015).

Therefore, technology and innovation can be used in these countries to uplift such communities and bring about social and economic empowerment. Information Communication Technology, Big Data Analytics and the Internet of Things are already being integrated into several development projects around the world, and it has been recognized that there are wide ranging applications for technology for gender empowerment, the economy, education, and healthcare in developing countries, especially to ensure accessibility to resources in rural areas.

This paper will highlight the applications of technology for social empowerment, and examine the unique role that technology plays in the developing world. The paper will then pose policy recommendations with respect to the challenges that emerge during the stages of conception, planning and implementation of these applications in the developing world.

BACKGROUND

A thoroughgoing liberalization and commercialization of media over the last decade in many parts of the world has led to a much more democratic, dynamic, crowded and complex media landscape. This is opening up new spaces for public debate and civic engagement, particularly in the field of radio; and to a more commercial, advertising driven media where information and power divides within developing countries between rich and poor, urban and rural are growing (Deane et al, 2003).

Over the last decade, the media in most developing countries have undergone a revolution in their structure, dynamism, interactivity, reach and accessibility (Deane et al, 2003). This has had a profound impact on and for civil society in these countries, and very mixed implications for the inclusiveness and character of public debate, particularly in relation to the exposure of public and political debate to the voices, as well as the concerns and perspectives of the poor and marginalized in these societies for example through online petitioning, and social media campaigns. Independence, plurality and accessibility of the media constitute fundamental constituents of an environment that facilitates social change (Deane et al, 2003; Pew Research Center, 2014). The role of the media in fostering democratic inclusion, underpinning social and political change, economic development and empowering marginalized communities is well documented (Pew Research Center, 2014; Deane et al, 2003).

However, the liberalization and commercialization of media in developing countries has led to a transformation in the access to information. Despite the above mentioned benefits and growth

that has happened due to the media and the internet, There is a major and growing gulf between information accessible and relevant to the rich and the poor, the urban and the rural (Deane et al, 2003). Despite new media freedoms, the liberalized environment has led to a decline in both the inclination and the capacity of media to cover complex, contentious and technical issues such as those relating to globalization and poverty (Deane et al, 2003).

Therefore, it is key to note from a policy perspective that governments, civil society and social media and other media related corporations must work together in order to effectively counteract the negative effects and polarization and instead amplify the benefits brought about by increased interconnectivity in developing nations.

DISCUSSION

There are several applications for technology in developing countries. Firstly, social innovation and entrepreneurship has been found to be a key factor in the growth and increase in social mobility for various sections of society. In India for example, social entrepreneurship leads to a multiplier effect with respect to the employment of women, increasing household income and reducing the discrimination they face (Salovaara and Wade, 2018). In a study conducted in Palestine, the analysis revealed that the majority of women, whether in employment or not, did perceive a positive impact in terms of ability to gain economic empowerment (Rabayah, Arab American University). Only 41 per cent of women in low- and middle-income countries own mobile phones, compared to 46 per cent for men. Nearly two-thirds of women living in the South Asia and East Asia and Pacific sub-regions do not own a mobile phone. Rural women often lack access to health care, education, decent work and social protection (UN News, 2018). Mobile applications and access to technology, banks and the internet contributes greatly to the ability of women to participate effectively in society as equals.

Healthcare solutions in the form of remote diagnosis, telehealth applications, and mobile health technologies have led to increased awareness about diseases and medication, along with increased accessibility to the services of medical professionals (CISCO, 2016). Organizations are working to set up mobile phone systems to track births and provide healthcare information, using sensors to monitor the 'cold chain' delivery of vaccines to remote areas, and providing portable sensors to monitor health conditions in areas where there are no hospitals. Such mobile technology also allows for the provision of testing kits to rural areas (Howell, 2016; CISCO, 2016).

Access to financial services can be a path out of poverty, and technology has made great strides in creating economic sustainability. According to the World Bank, the number of "unbanked" adults dropped by 20 percent from 2011 to 2014, and developing countries had a 13 percentage

point increase in account ownership, mainly due to mobile money services (World Bank, 2015). This also ensures more technology for small businesses in these economies to obtain funding and loans, with increased access to banks (Howell, 2016).

Technological applications are also being used to improve sanitation facilities in developing countries as well. Currently, some of the most extensive uses of the IoT in developing countries are in projects where the objectives include the improvement of clean water delivery and/or sanitation (CISCO, 2016). In Bangladesh, a biosensor network of 48 manual arsenic sensors is being used to monitor water quality. In Jiangsu, China, water supply is being monitored by adding IoT sensor devices at key points to register data on water usage and flow rates. In India, Sarvajal has developed low-cost reverse osmosis technology to provide clean water in rural areas, as well as smart meters to remotely monitor the quality and quantity of water (CISCO, 2016).

Many companies have implemented initiatives to provide affordable technology to children in developing areas to help bridge the digital divide, and has increased the usage of the internet for educational purposes (Howell, 2016). The increase in internet accessibility has also increased access to Massive Open Online Courses, online degrees and opportunities for distance education. This is a cost effective way for people in developing countries to access information and educational services, especially in areas where such facilities are lacking. This also increases skill development in urban areas, and opportunities for people to increase their qualifications and productive abilities (Howell, 2016).

Technology and the increased use of social media has also led to improved engagement among the populations and citizenship, including forms of dissent against authoritarian governments. In recent years, high-profile protest movements have erupted in several emerging and developing countries, roiling, and sometimes overturning, the political status quo in Tunisia, Egypt, Turkey, Ukraine, Brazil, Thailand and other nations (Pew Research Center, 2014). Millions have demonstrated, and activists have pioneered new forms of online engagement. Opportunities for political participation also vary widely across these nations, depending on the frequency of elections, the development of civil society organizations, and the presence of a political environment that permits free expression (Pew Research Center, 2014).

Other applications have also been designed to improve resiliency of developing countries to natural disasters, and mitigate the effects of pollution and climate change. For example, climate models and disaster risk models can now be combined with satellite imagery of human settlement (such as night-time lights) to estimate economic exposure to risk (Ceola et al, 2014).

New sensor data also include unmanned aerial vehicles (“drones”) and spatially referenced (geo-referenced) video (CISCO, 2016).

Another application of the internet of things in the energy sector in developing countries has been the rapid adoption of off-grid solar panel systems that provide steady electrical power to low-income families. Challenges of grid availability, cost of service and frequent service interruptions plague on-grid electricity users across much of the developing world (CISCO, 2016). Across the developing world, wood and charcoal burning cook stoves are used extensively to prepare meals and provide a source of heat inside homes. The resulting indoor air pollution contributes to approximately 4 million deaths a year, out of the 3 billion people worldwide who utilize biomass to prepare their meals. As a result, a number of initiatives are in place to help lower income households use less polluting methods for meal preparation and heating in the way of improved cookstove projects (CISCO, 2016). For example, the US Government has supported a five-year “Global Alliance for Clean Cookstoves” which aims to achieve a goal of enabling 100 million homes to adopt clean and efficient cooking solutions by 2020 (CISCO, 2016). Sensors are playing a role in this initiative by helping measure the black carbon emitted by cookstoves in real-time, as well as monitoring and evaluating projects to disseminate improved cookstoves (CISCO, 2016).

Therefore, it is clear from the above sections that there exist several benefits to the implementation of technological applications for social empowerment in developing countries. The following section will conclude this paper by highlighting certain challenges that face developing countries that must be taken into account for the creation of effective technology policy.

CONCLUSION

It is important to note that in the context of developing countries, the introduction of technology and the consequences of globalization must not lead to the erasure of identities and must be inclusive, and sustainable. Therefore, unique solutions are required for the inclusion of technology in a manner that is tailored to the needs of developing countries.

Economic sectors and processes in developing countries are more labor-intensive and may lack supporting processes. For example, agricultural systems may not use technology-driven crop management, pest/ disease control or quality management systems (Macrothink Institute, 2013). The Macrothink Institute notes that the information requirements of productive systems in developing countries are likely to be very different from those in developed countries, meaning that monitoring systems for developing countries are likely to need different design requirements and technological frameworks (Macrothink Institute, 2013).

Lack of resources means that simpler, more cost-effective solutions may prove more effective in a developing country context. For example, using a wireless wide area network – WWAN – for communication could lower the cost, rather than other networks with high speed capabilities, where there is a low interference from analogue broadcasting channels (GSMA, 2013).

Connectivity may begin with essential applications only, which could be introduced initially on a small scale and might not always become fully integrated (CISCO, 2016).

More constrained resources and fragile environments may make populations in developing countries inherently more vulnerable to natural disasters. For example, the Red Cross believes “emerging technologies will play a particularly important role in amplifying efforts to facilitate community-level knowledge and health, connection, organization, economic opportunities, access to infrastructure and services, and management of natural resources”, and has convened a Global Dialogue on Emerging Technology for Emerging Needs of general relevance (CISCO, 2016).

From a policy perspective, it is also important to note that the same infrastructure that enables people to create, store and share information may also jeopardize their privacy and security. These same techniques can be used for large-scale and targeted surveillance. Abuse of these techniques could turn the ‘Information Society’ into the ‘Surveillance Society’, as identity management systems improve without parallel emphasis on anonymity and ownership of personal data (CISCO, 2016). For example, the implementation of the Aadhaar scheme in India had been touted as one which would improve access to resources, but has raised several privacy concerns (Shukla, 2018).

The implementation of applications must also take into account technological and human capabilities in developing countries, and must run parallel to training programs so that the people within these countries will be able to effectively use such technology in a manner that is suited to their unique requirements, ensuring the retention of their local identities and concerns (CISCO, 2016).

Cost effective and sustainable use is of great importance in areas of high population and high capital costs. Many of these technological applications may still prove prohibitive, for example, for individual small shareholding farmers. It is also important to take into account power requirements associated with such large populations (CISCO, 2018). From the perspective of governments in these countries, the introduction of Big Data Analytics or the Internet of Things would necessitate a collaborative approach between various regulatory departments, to ensure smooth implementation. There must also be an active participation of minority and marginalized

users within the policy making process of implementation of applications, all aspects of internet access, training, content development and system design and evaluation (Deane et al, 2003).

Given that the internet of things is the most rapidly growing sector of technology applications in developing countries, such countries should develop a comprehensive plan for its implementation in various sectors. Governments and policy-makers should work closely with industry, citizens, marginalized communities and other stakeholders to understand the issues involved. This policy should also consider how new systems can interface with pre-existing legacy infrastructure to protect and make full use of existing investments in infrastructure.

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