

Information and Communication Technology Platforms Deployment: Technology Access Reaches South African Rural Areas

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Abstract: The purpose of this paper is to ascertain how robust ICT Platforms can provide rural communities with access and use of ICTs. The Platform contributes to the creating of an inclusive information society and a thriving knowledge economy in South Africa. One government (Department) utilised ICT Platforms as instruments for achieving their mandate of providing quality ICT infrastructure and to facilitate establishment of rural enterprise and industries. From 2014 – 2016 the Department partnered with CSIR, as their implementation partner, to roll out the solar-powered ICT Platform to 14 sites in seven South African provinces where rich data was gathered. This research is underpinned by the notion of ICT for development. Qualitative approaches for data collection which included face-to-face interviews, observations, telephonic and questionnaires were used. The results show that successful deployment of ICT Platforms need involvement of all stakeholders including community leaders, trained champions and users of technology.

Keywords: Information and communication technology; education, development, Platform, monitoring and evaluation, digital divide, knowledge society and information society.

1. Introduction

The National priority with regards to access to information and communication technologies by all South Africans has been accelerated by the adoption of the National Development Plan 2030. South African National Census of 2011 showed that 64.8% of households had no access to Internet (Stats SA, 2012). In 2012 one South African national department (the Department) and CSIR-Meraka, a unit of the Council for Scientific and Industrial Research, signed a memorandum of agreement to provide ICT Platforms (Platforms) to some rural areas across the country in order to address this problem of access. These Platforms were designed to make a fundamental difference to computer literacy and associated skills in Africa (Smith et al 2006 & Herselman et al 2010). Platforms were based on principles similar to those demonstrated by the Indian project called the Hole in the Wall whose objective was to show that minimally invasive education (MIE) is a viable form of education (Stillman *et al* 2012, Mitra, Dangwal et al., 2005).

In 2013 work commenced on the first phase under the Department's school connectivity programme. This paper is based on the 2014 second phase work called solar-powered container Platform. The first phase did not utilise solar-power. The Department identified sites for deployment based on their mandate of addressing the triple challenges of poverty, inequality and unemployment which are predominant in our rural areas. From six

provinces, the following areas were identified for deployment of container ICT Platforms: Ebenhaezer, Luwamba, Vukuzakhe, Marapyane, Sokhulumu, Devon, Wupperthal, Moretele, Verdwaal, Tswelopele, Dannhauser, Matlakeng, DonDonald and Sedibeng (see Fig.1 map below). In operationalising the Platform, the champions, whose duties included among others up-keep of the Platform site, assisting the community with printing and photocopying and troubleshooting were identified and trained even though these Platforms were intended to provide unsupervised and unstructured form of learning.

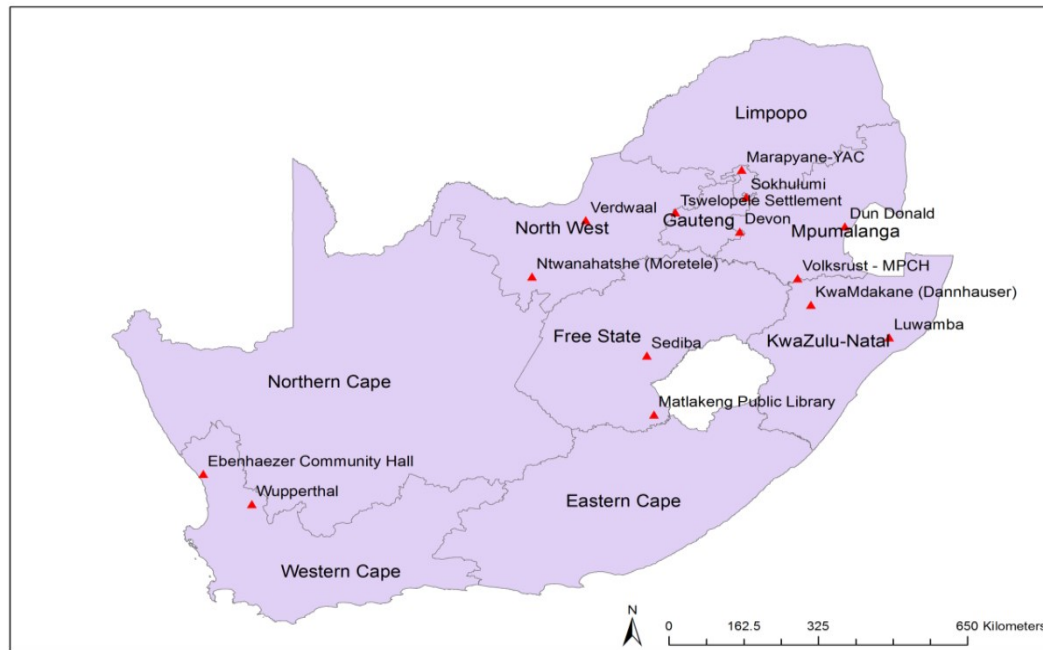


Fig. 1: Map showing the sites of deployed ICT Platform

2. Objectives

The container Platform project rolled out ICT Platforms for the following purposes: (i) As information and communication resources; (ii) As learning centres; (iii) As access points to ICTs; (iv) As practical tools for development; and (v) As a tool for bridging the digital Divide.

Therefore, the purpose of this paper is to ascertain if the implementation of Platforms in the 14 areas achieved the intended purpose of access, usage and maintenance. The study is further explained in more depth in the “Final Consolidated Monitoring and evaluation report (March 2016)” (2016 Consolidated report).

3. Methodology

Both qualitative and quantitative data were collected from the 14 sites (Ebenhaezer, Luwamba, Vukuzakhe, Marapyane, Sokhulumu, Devon, Wupperthal, Moretele, Verdwaal, Tswelopele, Dannhauser, Matlakeng, DonDonald and Sedibeng) where containers Platforms were deployed. “Quantitative methods involve the process of collecting, analysing, interpreting and writing the results of a study” (Creswell, 2014). Creswell indicates that at the core of the qualitative approach is the space it creates for comments by the researcher about their role and strategies they used. These methods support our research paradigm because of their flexible use, particularly with technology, while allowing future developments. Each Platform contained a remote software agent that enables to monitor the status of each site and report back to the FMS monitoring system. In

addition telephonic interview, site visits, observations and face-to-face interviews were carried out.

Data extracted from Pandora FMS monitoring system included user and tablet registers which shows a log of how many tablets were used daily and actual access of content provided by the Platform, user suggestions and feedback forms that shows the experience of the user and Platform online/offline status logs. Pandora FMS can be used to monitor the availability and performance of equipment in a remote destination from a central location to ensure all devices are ready for use (Pandora FMS, n.d). Data was collected intermittently for a period of two years from September 2014 to March 2016 through the Pandora FMS system and was extracted on the 1st of October 2015 and 13th of November 2015 with the purpose of reporting on the progress of the Platform on a quarterly basis.

The results were interpreted using the Microsoft Excel spreadsheet. As part of interpretivism the hermeneutic circle was utilised to assist with triangulation of data and results.

4. Technology Description



Fig.2: Three Terminal standalone ICT Platform (2015)



Fig. 3: Solar-powered container Platform (2015)

The ICT Platform started as stand-alone (as in Fig 2 above) and evolved to a solar-powered housing (as in Fig 3 above) and the focus of the study, which provided people access to computers, mobile tablets and Wi-Fi. The accessories to the Platform included printers, and photocopier. The Platforms provided both cached, 90 Gigabytes of content and direct Internet in public places with the purpose of offering free 24-hour access to the technology to underserved, poor populations (Stillman et al., 2012). The content included educational resources such as: Physics Education Training, simulations, past exam papers, Astronomy, Space Technology and a link to Mindset Videos, books on among others Agriculture, cookbook collection etc. The container Platform's content is accessible without connecting to the Internet but by directly engaging with the ICT terminal or via Wi-Fi enabled devices such as a tablet, laptop or smartphone (Walton & Johanson, 2012).

5. The Platform Within ICT4Development Context

Providing reasons for implementing ICT projects in rural areas to people who can barely read and write is a daily challenge for many people. Governments, civil societies and business are investing heavily in ICT infrastructure while other interested parties want justification for this huge capital investment (UNCTAD, 2011). The reasons for prioritising

ICT applications for the poor in developing countries according to Heeks (2008) include: (i) the moral argument; (ii) assisting poor people to get rich and be able to buy goods and services provided by their rich counterparts; and (iii) bridging the digital divide in the 21st century where economic, social and political life will be mainly digital.

It's important to realise that ICT4D goes beyond infrastructure and access which are just inputs but are the starting point in attempting to understand ICTs' contribution to development. ICT upsurge is on the back of the Internet which revived the interest in how ICTs might be utilised to advance the well-being of the people of the developing countries (Heeks, 2008). However, the big problem is measuring ICT impact of government interventions in the deployment of and access to ICT by the intended recipients. "The particular rationale for ICT4D specifically to be evaluated derives in part from the large and growing levels for investment noted above" (Heeks, 2010). The role of ICT is crucial in leveraging potential of supporting wider strategies of social inclusion, economic efficiency and global competitiveness (Warschauer, 2004 & UN-ECOSOC, 2006). The problem of measuring ICT impact lies in its forever and fast changing nature and its diversity (UNCTAD, 2011). In terms of academic robustness ICT4D's lacks strong theoretical base (Flor (2012). According to UNCTAD (2011) ICT impact is complicated by: (i) a number of different ICTs, with different impacts in different contexts and countries; (ii) general-purpose nature of some of the ICTs with their indirect impacts; and (iii) demonstrating causality.

Heeks and Molla (2009) propose an ICT value chain as a basis for any ICT impact assessment which includes: precursors and proceeds to inputs, deliverables, outputs, outcomes and development while indicating that the last three are related directly to impact. The model covers elements relating to (i) Readiness: is "the systemic prerequisites for any ICT4D initiative; both the foundational precursors that we might conceptualise mainly at the national level such as ICT infrastructure, skills and policy". This entails inputs feeding into any initiative such as money, labour, political support: (ii) Availability: Emphasises the implementation of an ICT4D initiative which will ultimately turn whatever inputs into actual ICT deliverables. The concern here is with locations of telecentres, ICTs (PC, Mobiles), and software applications, among others: (iii) Uptake: Emphasis goes beyond access and more towards the actual usage of the ICT technology. This is interwoven with the issues of sustainability of the initiative in the long run: and (iv) Impact: is defined in terms of three sub-elements of (a) Outputs relating mainly to the change in behaviour such as new communication patterns, new actions and transactions, etc.; (b) Outcomes attributable to costs and benefits; and (c) Development impacts which are quite broad and include the contribution the intervention made to the development goals.

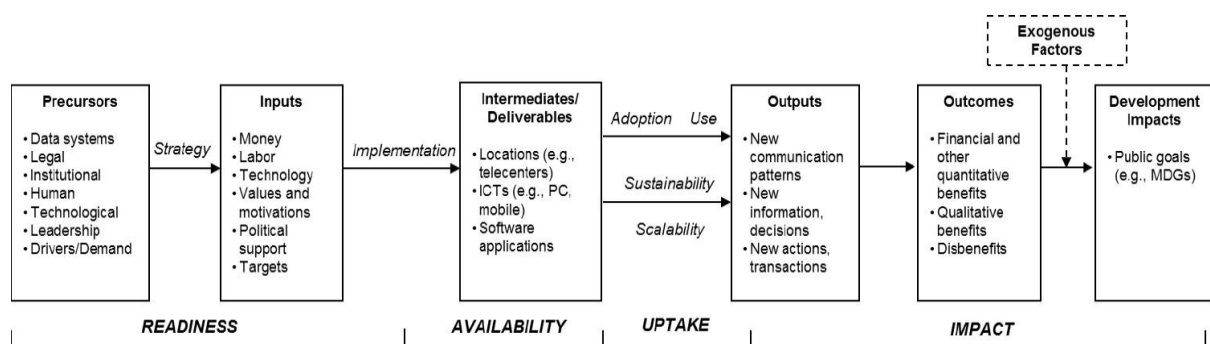


Fig 5: Heeks and Molla (2009)' ICT value chain

6. Results and Analysis

The purpose of this study was to find out if the deployment of ICT Platforms could actually achieve the intended objectives of access, usage and maintenance. The following results will attempt to show if these objectives were achieved: *Pandora FMS system results:*

The Pandora results carried from 12 sites show that in October 2015 nine sites had been operational at all times and three were offline for more than three months. In November two sites were back online while one was still offline for another four months

6.2 Site Visits and Observation

The results as indicated in figure 5 below were derived from 12 of the 14 sites visited. Champions opened 10 sites and two sites were opened by community members. Tswelopele and Verdwaal were not opened as champions did not keep keys.

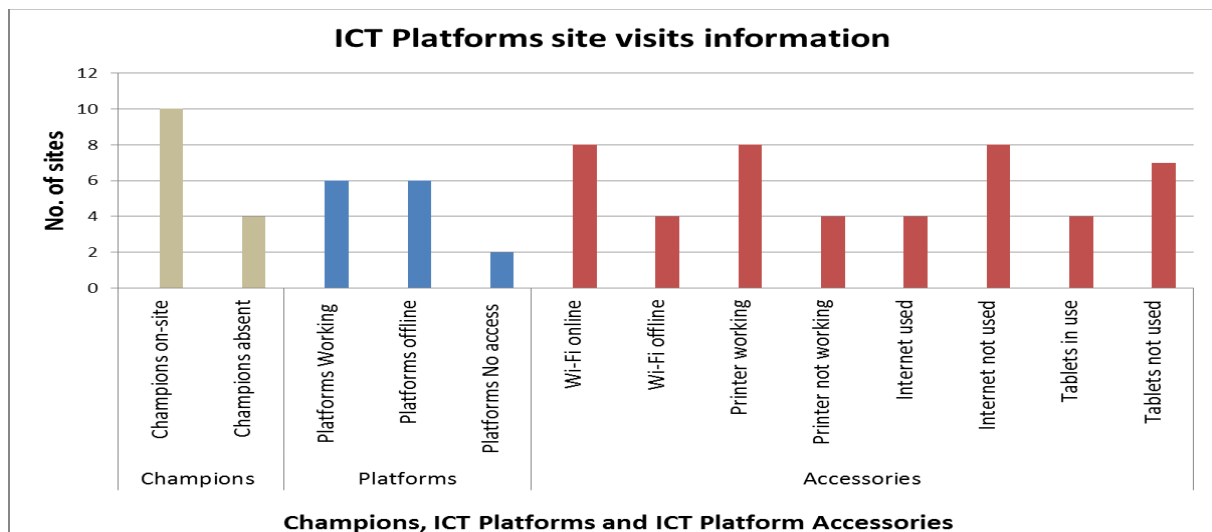


Figure 5: Show the functionality of the platform and its accessories based on observations Observation of ICT Platform accessories:

The following results were obtained from the interviews and observations: (i) Wi-Fi and printers were working at eight out of 12 sites; (ii) Internet was available at four out of 12 sites; and (iii) Tablets were available and in use and at seven sites the stringent security measures made tablets difficult to use.

6.3.1 Interviews with Champions:

The interview results of the champions during the site visits and over the telephone were similar. According to the champion, Platforms were used by elderly people to: (i) access information and make photocopies; and (ii) Look for jobs, photocopy, type and print curriculum vitae. While younger people and scholars used Platforms to send and receive emails, skype, watch and download music videos and YouTube movies, connect to Wi-Fi, play games, etc.

6.4 Face-to-Face Interviews:

Interviews with site user:

Most users interviewed stated that they taught themselves how to type and use Platforms. They valued the role of champions and deemed them helpful, supportive and non-judgmental. The following are some of the ways in which users used Platforms: (i) To search for information from the Internet; (ii) To keep up to date with current affairs; (iii) To play games; (iv) To email friends and family when necessary; and (v) For sourcing information for homework.

Interviews of community representatives:

Community members interviewed expressed similar views as those stated by most champions. They worried more about the long term sustainability of the Platform and addressed this by ensuring that (i) such services as printing and photocopying are nominally paid for by users instead of waiting for the Department to replenish them. For example, this took place at Tswelopele; and (ii) Community relevant content such as information on substance abuse, teenage pregnancy, HIV/AIDS, agriculture, enterprise development, etc. was available.

6.5 Observations of Non-Use of Platform and Its Accessories:

The reasons for lack of Platforms usage and their accessories were both technical and non-technical according to the champions.

The non-technical problems include:

(i) Champions not showing up for the audit because they were not yet appointed by the Department; (ii) expired champion's contracts with the Department; (iii) champion living too far and not consistently coming to their sites; (iv) champions not keeping site keys; (v) clarity on who managed the Platform between champions, community leaders or premises managers; (vi) Platforms inaccessible to public because they were housed in locked up premises such as schools, municipal buildings, etc.; (vii) where Platform accessories such as printers and tablets were main attractions to the site; (viii) where tablets were consistently locked up in storage; and (ix) where community leaders were not involved with the sites.

Technical problems include among others:

The identified technical problems included (i) machines needing to be repaired; (ii) Wi-Fi not always working; and (iii) Internet not accessible, (iv) the technical help-desk not reachable from time to time for troubleshooting where champions could not assist.

7. Discussion of Results

The following discussion of the results of the ICT Platform is grounded on the aforementioned ICT4D precepts. The ICT value chain proposed by Heeks and Molla (2009) were put in mind when analysing the results. Successful Platform sites were those where champions were dedicated to their work. In cases where there was a strong community presence and ownership champions felt motivated, supported and took their work seriously. ICT initiatives are successful where they are seen as "an integral part of community infrastructure" (Day & Cupidi, 2004). The ICT4D value chain model by Heeks and Molla is used to analyse and uncover if the Platform had achieved its intended objectives. This model covers elements relating to readiness, availability, uptake and impact of the Platform and to see whether the project achieved objective.

Readiness, relates mainly to policy, infrastructure and digital divide, one can look at the implementation of Platform by the Department. Gichoya (2005) refers to e-Readiness as the government's ability to enhance and improve its administrative functions. The Department provided the necessary infrastructure, i.e. the ICT Platform in this case, based on the communities' needs of access to computer technology and information.

Availability: refers to supply, implementation and design of the ICT system. For this reason as part of the implementation of these Platforms the Department identified suitable locations, supplied the ICT Platforms, appointed, trained and deployed champions. It is important to select sites known to the community to be stable institutions like libraries, schools, museums, etc. (Holmes (1999).

Uptake: With regards to demand and usage Platforms were deployed and made accessible to different communities and users adopted them with excitement. Excitement

can only be seen where users were properly prepared for the deployments meaning “informing the users about changes that will occur in their job and how they will work differently” (Macome, 2002).

Impact: Regarding the Platform and its impact the concern is with the outputs, outcomes and development contribution. However, this study was concerned with the utilisation of the Platforms and their benefits as information and learning resources. With regard to outputs it is clear that new communication patterns emerged as users became proficient in the use of the platform. Social influence was created with some users encouraging others, especially the youth, to use the Platforms. The use created new capacities. These capacities are inevitably associated with the ability and use of ICT (Department of Communications, 2014). Many community members, regardless of their ages and gender had access to the Platform and learned on their own how to use these technologies.

The Impact in terms of outcomes shows that benefits were accrued by users as they became knowledgeable users of these Platforms and their content. Lowther et al. (2008) have signified the importance of what suitable usage of ICT can do in raising educational quality and connecting learning to real-life situations. Community members learned to use these Platforms on their own. This shows that learning is an ongoing activity which challenges learners and communities to seek new sources of knowledge (Weert & Tatnall, 2005).

7. Recommendations

Having gone through the results and seen where some improvements could be made the following recommendations are made:

- An updated framework/guideline for selecting sites is required which also includes consultations with the community to eliminate inaccessibility of Platforms because they are housed in lockup premises.
- To avoid the continuous absence from the site, champions must be selected from the community where these Platforms are deployed.
- For these types of projects there is a need to strengthen community ownership and participation by reaching out to other interest groups and organisation beyond the community of Stakeholders.
- There is a need to market and raise awareness of the ICT Platforms and their services through community radios, dispersing of printed materials and community meetings.
- A maintenance policy needs to be established for the ICT Platform.
- The Department needs to ensure that there is a clear deployment process in place with assigned responsibilities, regular progress monitoring at sites and reporting requirements.

8. Conclusions

The study shows that the deployment of technology alone is not enough but the role played by community leaders, trained champions and users of the technology is vital. The project was successfully implemented and it provided access to the ICT technology to many South Africans who are now part of the information society. The Platform changed lives of some rural people and broke down the wall of isolation by providing easy access to the Internet and more educational content. The Platforms were also seen by the communities as practical tools for development and bridging the Digital Divide.

Although there were challenges in the implementation of the Platform, it is evident increased usage is seen where there is availability of trained champions who understand their role. It did not matter much to the communities whether the champions were not

intended to teach them to use the technologies but just their presence encouraged the use of these Platforms.

The results also show that maintenance is at the heart of a well-functioning ICT Platform. The results seen here show that none working Platforms such as broken machines, un-replenished photo-copying paper or toner-cartridges could lead to a failure of well-intended ICT4D project.

The sustainability of this solar-powered container Platforms is dependent on these three issues of access, usage and maintenance. It is our hope, therefore that this paper has contributed to the body of knowledge within ICT4D and created awareness about the things to avoid and those to consider when initiating these projects.

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