Incorporating Biometric And Mobile Systems In Social Safety Nets In Sub-Saharan Africa

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Abstract - This paper measured poverty and corruption in Sub-Saharan Africa and modelled a biometric/mobile solution for curbing corrupt practices in social safety programmes. This is against the backdrop that efforts to better the lives of the vulnerable groups - unemployed, rural poor, women and persons with disabilities - are being frustrated by corruption in social security schemes mounted by various government to cater for these groups. The fallout is that planned benefits don't get to the target audience, precipitating conflicts and social tensions. Even more worrisome is that this segment of the society becomes easy recruits for social menace like kidnapping, terrorism, vandalism, prostitution, among others. Using Nigeria as case study, the study applied biometric system for the documentation and authentication of social safety net beneficiaries so that only genuine persons get the social benefits. Equally, mobile applications and devices are integrated for disseminating information about planned and released social packages from government ministries, departments and agencies (MDAs) to the target audience. The research resulted in an integrated Information and Communication Technologies (ICTs) design that substantially mitigates corrupt practices in social safety nets.

Keywords - Biometric system, Corruption, ICT, Mobile System, Poverty, Social safety net , Vulnerable groups

1. Introduction

The economy of Africa encompasses trade, industry, agriculture, and human resources of the continent. In 2012, approximately 1.07 billion people were living in 54 different countries in Africa. Africa is a resource-rich continent though many African people are poor. In March 2013, Africa was identified as the world's poorest inhabited continent. Sub Saharan Africa, in particular, is expected to reach a gross domestic product (GDP) of $29 trillion by 2050 but its income inequality will be a major deterrent in wealth distribution (Oliver, 2013).

There is a general consensus that African countries need social security systems that would prevent people from acting desperately before they can make meaningful progress across the socio--economic spectrum. This is against

the backdrop that there cannot be harmony without security. A coordinated and holistic social security system that will not only protect its citizenry from economic and social risks but also help in reducing the high rate of poverty on the continent. Social security places responsibility on the state to protect and provide for the individual when he is unemployed, or losses his job as a result of occupational injury, accident , when he or she grows old and when a woman is on maternal leave or economically challenged, just to mention a few. The state of vulnerable groups like women, persons with disabilities, and the thousands of unemployed youths on the continent underscores the fact that all challenges that have impinged on successful implementation of social security system for several decades need to be urgently addressed. Over time, Information and Communication Technology (ICTs) have proven to be useful in scaling upward the productive capacity of people either directly or indirectly. The economic productivity it induces brings about development and social transformation. The bottom line is that in the face of economic prosperity and social transformation, people find social ills unattractive and the continent is the better for it. Whereas directly ICTs provide skills, empowerment, jobs and income for the underprivileged and help secure their socio-economic future, it has also found relevance in entrenching accountability, transparency, probity and equity in initiatives that touch on the vulnerable groups. This study examined the strategic roll of biometrics and mobile technology in this regard.

Biometrics refers to metrics related to human characteristics and traits. Biometrics authentication (or realistic authentication) is used in computer science as a form of identification and access control. It is also used to identify individuals in groups that are under surveillance.

Biometric identifiers are the distinctive, measurable characteristics used to label and describe individuals (Jain et al., 1999): They are often categorized as physiological versus behavioural characteristics (Jain et al., 2012).

Physiological characteristics (Figure 1) are related to the shape of the body e.g. fingerprint, palm veins, face recognition, DNA, palm print, hand geometry, iris recognition, retina and odour/scent. Behavioral characteristics (Figure 2) are related to the pattern of behaviour of a person e.g. typing rhythm, gait (walking mode), and voice. Some researchers have coined the term behaviometrics to describe the latter class of biometrics.

FIGURE 1. BIOMETRIC IDENTIFIER - PHYSIOLOGICAL

FIGURE 2. BIOMETRIC IDENTIFIER - BEHAVIOURAL

More traditional means of access control include token-based identification systems, such as a driver's license or passport or passport, and knowledge-based identification systems, such as a password or personal identification number (PIN).

Since biometric identifiers are unique to individuals, they are more reliable in verifying identity than token and knowledge-based methods; however, the collection of biometric identifiers raises privacy concerns about the ultimate use of this information (Jain et al., 1999), (Weaver, 2006). Biometrics introduces new security procedures.

Cutting-edge biometric security devices include fingerprint readers, retinal eye scanners and hand geometry readers.

FIGURE 3. BIOMETRIC SOLUTION ARCHITECTURE

Unlike keys, cards or number sequences, biometric security readers provide access control that cannot be transferred. A person must be physically present at the point of identification in order to gain access (Figure 3).

A mobile system is an arrangement that comprises mobile operating system that operates a smartphone, tablet, PDA, or other mobile device. Modern mobile operating systems combine the features of a personal computer operating system with other features, including a touch screen, cellular, Bluetooth, Wi-Fi, GPS mobile navigation, camera, video camera, speech recognition, voice recorder, music player, near field communication and infrared blaster.

According to ITU, mobile communications and technology has emerged as the primary technology that will bridge in the least developed countries. As evidence, countries in Africa have recorded magnificent growth in using mobile phones to access the Internet. A case in point: In Nigeria, 77% of individuals aged 16 and above use their mobile phones to access the Internet as compared to a mere 13% who use computers to go online. This unfolding scenario in developing countries will bridge the digital divide between least-developed countries and developed countries (Figure 4) although there are still hiccups in making these services affordable.

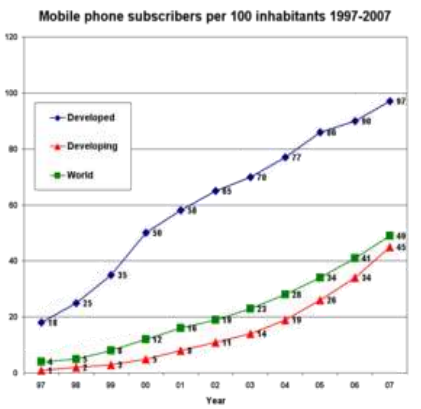

FIGURE 4. MOBILE PHONE SUBSCRIBERS PER 100 INHABITANTS GROWTH IN DEVELOPED AND DEVELOPING WORLD BETWEEN 1997 AND 2007 (SOURCE: ITU)

The use of mobile phones as key component of Information and Communication Technology for Development (ICT4D) initiatives has been successful as the widespread distribution of mobile telephony has made it possible for poor people to have easy access to useful and interactive information (Languepin, 2010). In India, for example, the total number of mobile phone subscriptions reached 851.70 million in June 2011, among which 289.57 million came from rural areas, with a higher percentage of increase than that in urban areas. This unprecedented growth of affordability and

coverage of mobile telephony services has underscored its importance not just as a means of two way communication but that of ease-of-access to information as well.

A social safety net is a strategic intervention aimed at empowering the socially vulnerable so that they will apply their minds productively for developmental purposes. According to Paime (1992), there is a correlation between security and survival. Whereas survival is an essential condition, security is viewed as safety, confidence, free from danger, fear, doubt, among others. Therefore, security is 'survival-plus' and the word 'plus' could be understood from the standpoint of being able to enjoy some freedom from life-determining threats and some life choices (Booth, 2007). Therefore, making available social safety nets is a developmental agenda that channels the energies of economically challenged people into national development.

2. Information and Communication Technologies for Social Security (ICT4SS)

This study examined the ongoing Boko Haram insurgency in Nigeria and acknowledged the sect has been recruiting members of the vulnerable groups for nefarious activities in Nigeria (Table 1), particularly as suicide bombers who detonate Improvised Explosive Devices (IEDs):

TABLE 1. ENGAGEMENT OF VULNERABLE GROUPS IN BOKO HARAM INSURGENCY

SN	Vulnerable Group	Insecurity mission
1.	Persons with disability	Used as suicide bombers to detonate IEDs
2.	Unemployed young women	Used as suicide bombers to detonate IEDs
3.	Unemployed young men	Engaged as foot soldiers for gorilla welfare and as suicide bombers

Nwagboso (2012) examines the security challenges in Nigeria and the extent to which the insurgencies of different militia groups as well as the prevailing internal insurrections across the country have adversely affected the Nigerian economy. The Nigerian experience is a reflection of security threats across Africa as are highlighted in Table 2

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TABLE 2: SELECT SECURITY THREATS IN AFRICA

SN	Security threat	Period	Country
1.	Ethnic cleansing	April - June 1994	Rwanda
2.	Civil War	1989 - 1996, 1999 - 2003	Liberia
3.	Arab Spring	2011 - 2012	Egypt
4.	Arab Spring	2011	Tunisia
5.	Arab Spring	2011 - to date	Libya
6.	Civil War	1991 - 2002	Sierra Leone
7.	Niger Delta crisis	1999-2007	Nigeria
8.	Jos crisis	2001- to date	Nigeria
9.	Civil War	2013- to date	South Sudan
10.	Militia uprising	2013 - to date	Central African Republic
11.	Boko Haram crisis	2009 – to date	Nigeria

On the other hand, Information and communication technologies (ICTs) include any communication device—encompassing radio, television, cellular phones, computer and network hardware and software, satellite systems and so on, as well as the various services and applications associated with them, such as videoconferencing and distance learning. This research study revealed that the application of ICTs in the field of social security has popularized the concept of Information and Communication Technologies for Social Security (ICT4SS) as both a developmental agenda and academic discipline.

Information and Communication Technologies for Social Security (ICT4SS) refers to the use of Information and Communication Technologies (ICTs) in enhancing the socioeconomic wellbeing of the poor, disable, unemployed and vulnerable women. The theory behind this is that more and better information and communication usage in social safety nets furthers the development of a society. The concern is less on e-readiness and more on the impact of ICTs on development. Additionally, there is more focus on the poor as producers and innovators with ICTs (as opposed to being consumers of ICT-based information).

After a study of the role of technology as a tool for development and social transformation over decades of economic evolution, the author tabulated findings as follows:

TABLE 3: ECONOMIC EVOLUTION AND TECHNOLOGIES USED

Economic phase	Period	Technology Used
1st phase (Industrial revolution)	1770 - 1850	Water-powered mechanization
2nd phase (Kondratiev wave)	1850 - 1900	Steam-powered technology
3rd phase	1900 - 1940	Electrification of social and productive organization
4th phase	1940 - 1970	Motorization and automated mobilization of society
5th phase	1970 - to date	Digitalization of social systems

Despite the potentials of ICT4SS for development, social transformation and improved security, developing countries far lag developed nations in computer use and internet access/usage as shown in Fig. 5. Studies have shown that, on average only 1 in 130 people in Africa has a computer while in North America and Europe 1 in every 2 people have access to the Internet. 90% of students in Africa have never touched a computer.

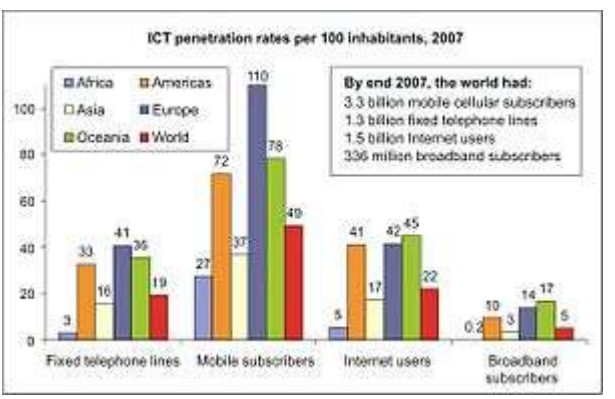

FIGURE 5. GRAPH OF ICT PENETRATION PER 100 INHABITANTS BY INTERNATIONAL TELECOMMUNICATION UNION(ITU)

As laudable as ICT interventions in social protection are, there is need for greater surveillance to curb unwholesome practices that may prevent the vulnerable groups from enjoying the dividends the schemes are meant to deliver. In this paper, the author proposes a biometric system for capturing and validating the particulars of would-be

beneficiaries of the scheme as antidote to tackling the corrupt practices.

In next section, various direct applications of ICT are studied. Under Related Works, a number of case studies in this field are analyzed. The succeeding section, Proposed ICT Solution, presents the proposed biometric system design. In the second to last section, Discussion, the study analysis the proposed system. The last section, Conclusion and Further Work, wraps up this research paper with details about further work on the proposed solution.

3. Direct ICT Interventions in Socio-Economic Empowerment of Vulnerable Groups

There are various direct applications of ICTs that have empowered the less privileged across Africa (Table 4):

TABLE 4: EMPOWERMENT OF THE LESS PRIVILEGED ACROSS AFRICA VIA ICT INITIATIVES

SN	Country	Government Initiative
1.	Nigeria	e-wallet system for providing information about distribution of agricultural inputs to rural farmers using mobile technology. So far, 12 million farmers have benefitted from the scheme.
2.	Gambia	The telecentre application used to disseminate information on development issues such as agriculture extension, health, and education to poor communities.
3.	Mali	Wi-Fi antenna set up in Mali to relay information to the rural areas.
4.	Ghana	Satellite Internet access via VSAT under the Ecamic Project is used to make information available to the rural poor.
5.	Uganda	Charging mobile phone from car battery is to enable the less privileged to keep their mobile phones alive for information access.
6.	Burundi	Use of mobile telecommunications and radio broadcasting to fight political corruption in Burundi.
7.	Tanzania	Study shows the use of mobile phones has impacted rural living in the following ways (Bhavni et al., 2008): entrepreneurship and job search, easy access to information, correcting market inefficiencies, transport substitution, disaster relief, education and health, social capital and social cohesion.
8.	Kenya	Study identified innovation in mobile technologies for development (Masiero, 2013), in particular the success of M-PESA mobile banking which impacts on sectors like m-

		agriculture and m-health.
	Ethiopia	Evidence from Ethiopia indicates that farmers use mobile phones for interactions but may feel reluctant to call individuals whom they have never met personally, which restrains the usability of mobile phones in regions with limited transportation options (Matous, 2014).

According to the literature, the livelihoods of the following vulnerable groups have been greatly enhanced by ICTs (Deepak, 2012; Watkins, 2012; Motes, 2014; Maier (2007):

- People with disabilities
- Rural farmers
- Women empowerment
- The unemployed

4. Corruption and Poverty Perceptions Indices

Transparency International, the global coalition against corruption, says the Corruption Perceptions Index 2013 serves as a reminder that the abuse of power, secret dealings and bribery continue to ravage societies around the world.

The Index scored 177 countries and territories on a scale from 0 (highly corrupt) to 100 (very clean). Although no country has a perfect score, about two-thirds of countries scored below 50 and African countries are reputed for falling within this bracket. This indicates a serious, worldwide corruption problem.

The world urgently needs a renewed effort to crack down on money laundering, clean up political finance, pursue the return of stolen assets and build more transparent public institutions.

To underscore corruption levels in Sub-Saharan Africa, the study statistically modelled corruption prevalence in select countries (Table 5) whose social security schemes were examined in this work.

TABLE 5: CORRUPTION RANKINGS OF SELECT AFRICAN COUNTRIES (SOURCE: TRANSPARENCY INTERNATIONAL - HTTP://WWW.TRANSPARENCY.ORG)

SN	Country	Year 2013 Score (over 100)	Ranking (out of 177 countries)
1.	Nigeria	25	144
2.	Gambia	28	127
3.	Mali	28	127
4.	Ghana	46	63
5.	Uganda	26	140
6.	Burundi	19	172
7.	Tanzania	33	111
8.	Kenya	27	136

On the other hand, The Global Multidimensional Poverty Index (MPI) Interactive Databank presents data on acute poverty in 108 developing countries around the world. It is a measure of poverty and human development and ranks for multidimensional poverty and destitution. After connecting Tables 5 and 6, it became apparent that there is a strong link between corruption and poverty in Africa and by extension, insecurity.

TABLE 6. POPULATION IN MULTIDIMENSIONAL POVERTY (SOURCE: OXFORD POVERTY AND HUMAN DEVELOPMENT INITIATIVE (2014) GLOBAL MULTIDIMENSIONAL POVERTY INDEX DATABANK. OPHI, UNIVERSITY OF OXFORD

SN	Country	MPI Poor (%)	Destitute (%)	Population living on less than $1.25 per day (%)
1.	Nigeria	20	30	65
2.	Gambia	58	0	30
3.	Mali	88	0	50
4.	Ghana	17	8	25
5.	Uganda	50	25	30
6.	Burundi	40	40	80
7.	Tanzania	43	22	65
8.	Kenya	45	0	43

5. Related Work

The deliberate use of communication to facilitate development is not new. The essence of ICT-for-development (ICT4D) is to make use of this ongoing transformation by actively using the enabling technology to improve the living conditions of societies and segments of society. Social transformations over time such as industrial revolution had culminated in an interplay between enabling technology, desired guiding policies and strategies, and resultant social change (Freeman and Louçã, 2002; Schumpeter 1939; Perez, 2004). This three-dimensional interplay has been depicted by Hilbert (2012) as a cube shown in Fig. 6 in tandem with the Schumpeterian school of thought. Put in another fashion, the three factors enabling socio-economic transformations are technology (infrastructure, generic services and capacities/knowledge), social services (education, health, business, government) and policies (regulation and incentives). When ICT practices are applied in a regulated and incentivized manner to scale up productivity in the social sectors, we have improved social services variants like e-government, e-business, e-health and e-education catalyze transformation, development and social security.

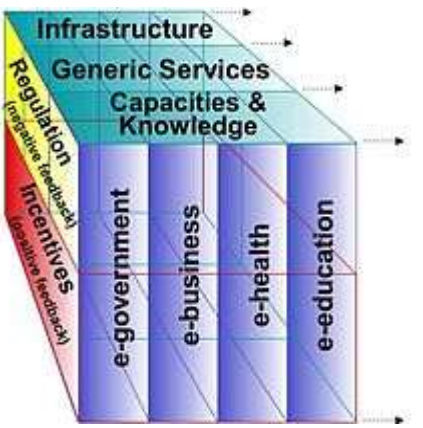

FIGURE 6. ICT4D CUBE (SOURCE: HILBERT, M. 2012. TOWARDS A CONCEPTUAL FRAMEWORK FOR ICT FOR DEVELOPMENT)

Many development partners and researchers have leveraged on the ICT4D cube framework to impact positively on the livelihoods of the vulnerable groups in Africa - the poor, unemployed, women and the disabled using ICT. For that purpose they initiated various ICT policies, programmes and projects (Dymond and Oestermann 2004; Languepin, 2010):

- International Telecommunication Union (ITU)
- World Bank
- Catholic Relief Services (CRS) ICT4D Conference
- ICT4D in Africa
- Mobile Technologies Providers

After careful analysis of existing case studies, the author observed with concern that none fulfilled all of the following criteria:

- a study that highlights social security initiatives by African governments as a matter of deliberate policy.
- a current study on corrupt practices inherent in social protection schemes in Africa.
- a study modeling an integrated biometric/mobile system for curbing corrupt practices in social security initiatives.

This study thus proposed a new model that fulfilled these criteria. Whereas the underlying logic is to ensure the deliverables meant for the vulnerable groups get to them, the strategy is integration of biometric enrolment and verification system and mobile devices into social security schemes.

As seen from above direct applications, the integration of ICT in the drive to empower the less privileged adds significant value to socio-economic transformation and indirectly offers social protection

for this segment of the society. Notwithstanding, governments across Africa still mount social security schemes as a matter of deliberate policy to impact positively on the same set of people and ICT plays vital role. When mainstreamed in social protection efforts, ICT safeguards numerous government social security schemes from abuse owing to corrupt practices. In Burundi, for example, it is popular to use mobile telecommunications and radio broadcasting to fight political corruption. This study revealed further that deliverables of social safety nets such as conditional cash transfer and free medical care for the vulnerable groups are being diverted by unscrupulous elements for personal gains. Even when benefits are delivered, they are in less than budgeted measure. Hence, there is need to integrate a biometric system and mobile devices into such schemes for validating genuine beneficiaries as well as disseminating information to them on the release and allocation of resources by government agencies. The following session outlines a blueprint for the electronic design of a social safety net.

6. Proposed ICT Solution

Nigeria accounts for about 25% of Africa's population and remains the most populous black country in the world. The researcher considered that social security initiatives in Nigeria are, to a reasonable extent, quiet representative of trends on the continent. On analyzing select social security schemes in Nigeria, a table (Table 5) was developed to highlight various governments' social security schemes.

TABLE 5. SELECT SOCIAL SECURITY PROGRAMMES IN NIGERIA (SOURCE: OKEWU'S FIELD SURVEY, 2014)

SN	Code Name	Government	Type	Target	Commencement date	Status	Supervising ministry
1.	SURE-P (Subsidy Reinvestment Programme)	Federal Government	Safety-net tagged Community Service Scheme (CSS)	Women, disabled and unemployed	2012	Take-off stage – capacity building and empowerment of women, unemployed youths and disabled. Stipends and seed money offered.	Ministry of Labour and Productivity
2.	National Social Insurance Trust	Federal Government	Social insurance	All categories	1961	Passive – the common man is yet to feel its impact	Fed. Min. of Labour & Productivity

	Fund						
3.	Social Security	Ekiti State	Social pension	The elderly – 65 years and above	October 2011	Functional – beneficiaries receive monthly stipend of 5,000 naira	State Ministry Labour, Productivity and Human Capital Development
4.	Project Comfort	Cross River	Safety Net – conditional cash transfer	Poor (vulnerable) households	2012	Functional - beneficiaries receive monthly stipend of 5,000 naira	State Ministry of Social Welfare
5.	*Agba Osun*	Osun State	Social pension	The elderly – 65 years and above	November 2012	Functional - beneficiaries receive monthly stipend of 5,000 naira	Office of the Governor
6.	National Health Insurance Scheme (NHIS)	Federal Government	Social protection	All ages	1989	Passive – the common man is yet to feel its impact	Fed. Min. of Health
7.	Project Hope	Cross River	Safety Net – free health care services	Women and children under 5 years	2012	Functional – 7 local governments receiving free health care	State Ministry of Social Welfare

From the above table it is observed that the downtrodden are clearly targeted by the various governments for delivery of social benefits like free medical care, conditional cash transfer, among others. Hence, the author proposed a biometric system that captures beneficiaries' information and validates same at the point of disbursing the benefits with a view to curtailing the activities of fraudsters who intend to divert same for selfish purposes.

While designing the biometric verification system, the following were taken into cognizance (Ndeh-Che, 2008; Okewu, 2013):

- Engagement of Systems Integrator that:
  - possessed a deep understanding of, and the resources for, the analysis, design, development, deployment and maintenance of the systems and processes

for the social security programme.
  - demonstrated proven track record of outstanding work in the area of biometric enrolment and verification, as well application development, deployment and integration.
- The systems integrators would:
  - integrate reliable systems for identifying and registering eligible beneficiaries,
  - setup systems to support delivery of benefits, accounting for benefits, and monitoring and evaluation of the Social Benefit Scheme.
- Effort should be geared towards production of systems, processes and human resource requirements which will serve as an information platform; and as a service delivery medium for all stakeholders.

Systems integrator firms are saddled with the provision of systems integration services as needed by the government. They will assist government in the conceptualization, analysis, design, development, and deployment and maintenance of information systems that will ensure effective and secure management of the benefits scheme including, inter alia, (a) enrolment system for bona-fide beneficiaries, (b) biometric identity management and verification, (c) ID card production, and (d) system for the accounting of benefits.

On considering the above guidelines, the work outlined the following as procedures of the proposed biometric/mobile design (Okewu, 2013):

1. Software and services for development and deployment of biometric enrolment system and training of technical personnel and provision of technical support during verification and enrolment effort – Personal and biometric data were captured and stored in a relational database system. Human error could be mitigated by using state-of-art forms processing systems, whilst time-tested biometric approach shall eliminate multiple enrolments of the same individual. During the exercise, beneficiaries will also have their supporting documents scanned, converted into e-forms and archived in a document management system. Support team will be on ground throughout, in order to ensure that the enrolment

exercise runs smoothly. After the initial phase of the verification and enrolment exercise, continuous verification and enrolment will continue to ensure that new potential beneficiaries are properly verified and registered. Figure 7 and Figure 8 highlight enrolment infrastructure and enrolment process respectively.

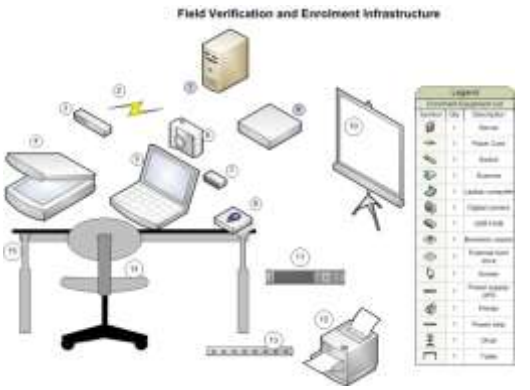

FIGURE 7. THE ENROLMENT INFRASTRUCTURE FOR AN ENROLMENT CENTRE

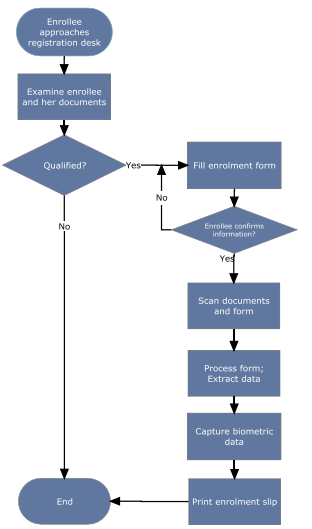

FIGURE 8. THE ENROLMENT PROCESS

2. Systems integration for biometric enrolment database and identity management system –After field enrolment, the various biometric enrolment databases from enrolment centres, the scanned documents and the e-forms, are consolidated in a central database. To avoid duplicate enrolments across enrolment centres, an Automated Fingerprint Identification System (AFIS)

should be deployed. An identity management system can be set up, based on the consolidated database, to provide identification services. Figures 9 and 10 respectively model a consolidated view and the consolidation process.

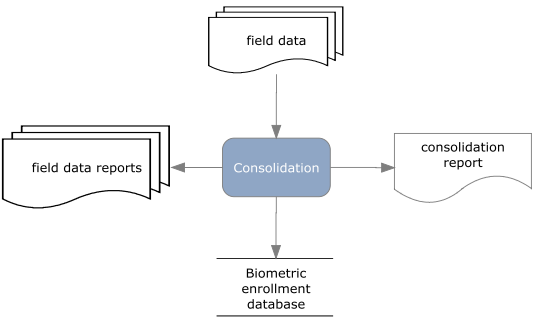

FIGURE 9. CONSOLIDATED VIEW

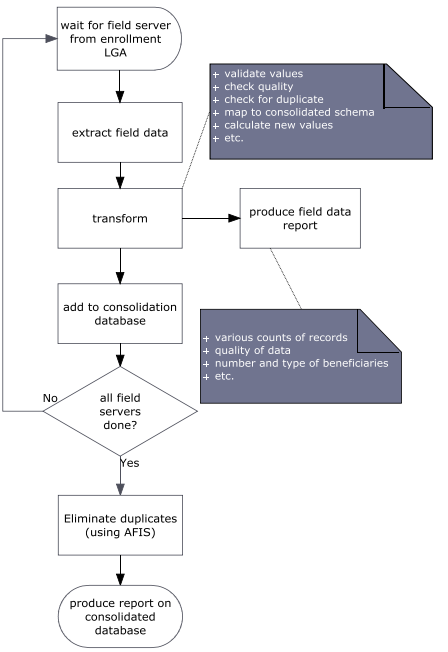

FIGURE 10. CONSOLIDATION PROCESS

3. Systems integration for ID card production, card acceptance devices and identity verification system – A likely outcome of the exercise is the production of authentic identity card (ID card). Beneficiaries can be provided with secure smart ID cards as proof of eligibility to receive benefits. Each card contains biometric information

to verify the beneficiary on location, as well as other data as may be decided from time to time by the government. In the absence of the ID card, verification will still be possible over a remote connection to the central identity system. A production station should be set up for the design and production of the smart ID cards. The ID cards and ID card verification systems should be deployed at strategic locations (e.g. Benefits Stations) to prevent abuse of the scheme. Figure 11 shows a typical card printing infrastructure just as Figure 12 presents an ID card-enabled verification process. In the event a beneficiary has no card, he/she can still be verified remotely using finger print as captured in Figure 13**.**

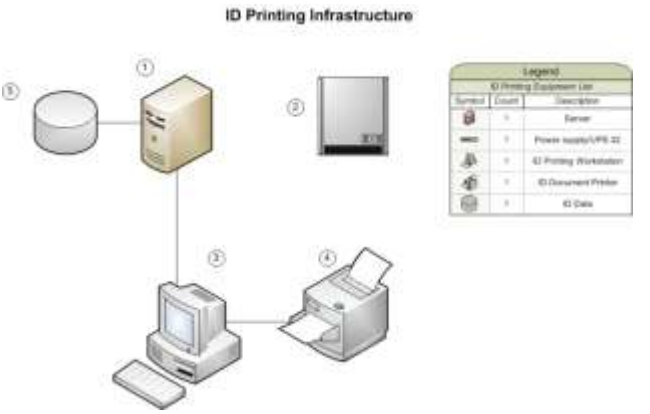

FIGURE 11. CARD PRINTING INFRASTRUCTURE

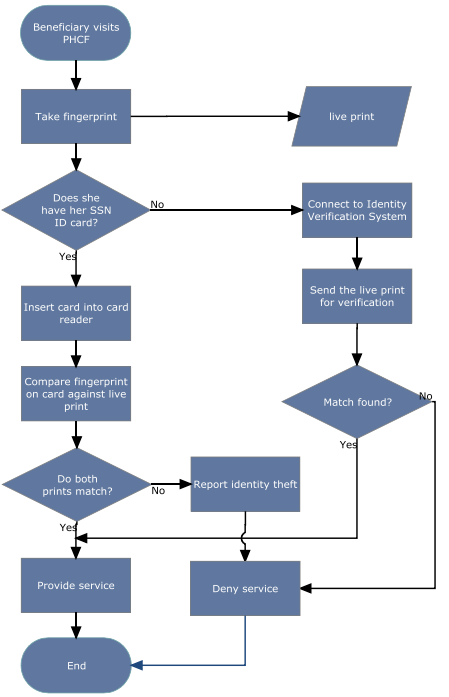

FIGURE 12. ID CARD VERIFICATION PROCESS

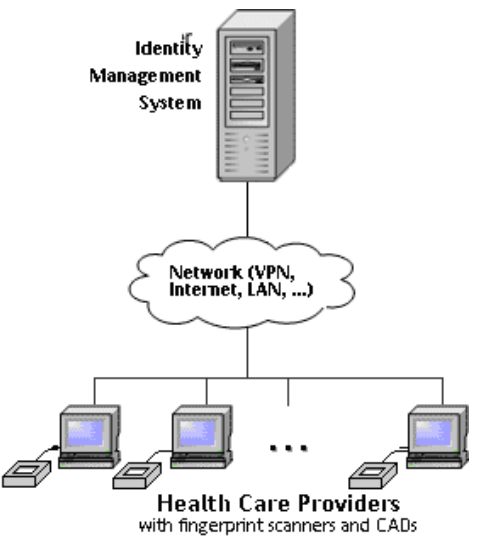

FIGURE 13. IDENTITY VERIFICATION PROCESS

4. Software and services for development and deployment of Benefits Accounting System – In order to ensure proper management

of benefits accruing to citizens under any social safety net, system integrators should partner with the government to develop a benefits administration system. This system will be custom-built to suit the specific requirements of the respective social safety net programme.

5. Technical and End-User Training – The need for adequate capacity building cannot be overemphasized. System Integration firms should provide comprehensive capacity building services to ensure that all human resources participating in the social protection programme are able to carry out their roles and responsibilities. Training categories could include i) Enrolment Officers, ii) Identity Management System Administrators, iii) Benefits Administration System End Users and iv) Benefits Administration Support Personnel.

6. Ongoing Support and Maintenance – To ensure smooth running of all systems deployed, the system integrator will provide ongoing support and maintenance services to the government.

The system integration firm should deploy a multi-disciplinary team of professionals and support personnel, working over a stated period to complete and roll out the systems for the scheme. Emphasis should be placed on the engagement of a reputable firm to assist the government in realizing its vision of delivering social welfare packages such as free health care for, and financial assistance to the under-privileged. References of track record of successfully delivering expected project outcomes in similar engagements for other clients should be taken into cognizance. The firm should understand the challenges, possess the skill sets and emphasize client collaboration. Modalities should be put in place to guarantee fruitful working relationship between the firm and government.

The proposed solution will succeed if the following measures serve as guidelines (Nde-Che, 2008):

- Establishment of a uniform, clearly defined and objective criteria for determining eligibility for the scheme
- Collection of realistic baseline data on poverty for target setting
- Establishment of realistic targets and timeframes
- Establishment of a comprehensive Monitoring & Evaluation (M&E) Framework for all aspects of the scheme
- Sensitization of beneficiaries and stakeholders
- Institutionalizing transparency, accountability and good corporate governance in the scheme from the onset.

- Proper identification and registration of beneficiaries using the latest advances in identity management technologies
- Adoption of a holistic approach to achieving scheme objectives
- Reuse of data and resources from complementary initiatives such as census data and images and Roll Back Malaria initiative

7. Discussion

This study revealed that mainstreaming ICT in rural Africa makes inroads into development and hence can curb social tensions and crisis. However, poor ICT infrastructure, cultural inhibitions, lack of proper disposal/recycling facilities, illiteracy, et al. are challenges confronting Information and Communication Technologies for Social Security (ICT4SS). Notwithstanding, vital lessons have been learnt from implementation of various ICT pilot programmes for the vulnerable groups and these have culminated in the following recommendations (Batchelor, 2003):

- Involve target groups in project design and monitoring.
- When choosing the technology for a poverty intervention project, pay particular attention to infrastructure requirements, local availability, training requirements, disposal and technical challenges. Simpler technology often produces better results.
- Existing technologies—particularly the telephone, radio, and television—can often convey information less expensively, in local languages, and to larger numbers of people than can newer technologies. In some cases, the former can enhance the capacity of the latter.
- ICT projects that reach out to rural areas might contribute more to the MDGs than projects based in urban areas and hence should be prioritized.
- Financial sustainability for ICT-for-development initiatives should be factored in.
- Projects that focus on ICT training should include a job placement component.

8. Conclusion and Further Work

Though the social safety net is a new concept in Africa and indeed in Nigeria, it has come to stay. Countries like Zambia, South Africa, Libya and Egypt have edged in social security programmes for citizens. There is need for the above biometric design to be developed for implementation in Nigeria. Secondly, for external and general validity of this model, it has to be tested in other African countries. As Africa joins the league of continents whose

governments' execute ICT-driven socially responsible programmes for need-based citizens, it will gather lost confidence from citizens with far-flung expectations. And more importantly, idle minds will be engaged productively hence mitigating the chances of such citizens being indoctrinated and used as foot soldiers for fuelling crisis.

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