Strategic Use of Information and Communications Technology (ICT) in Disaster/Crisis Management in Kenya

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***Abstract:*-In this paper an attempt has been made to highlight the role of Information and communications technology in management of natural and man-made disasters in Kenya. In this age of technology, it is easier to manage natural and man-made disasters. The disasters outlined in this paper include floods, hurricanes, earthquakes, tsunamis, landslides, genocides, wars, workplace fires, and terrorism among others. Disasters can be managed using a number of features of Information and communications technology (ICT). ICT can be used in disaster prevention, mitigation and management. Advancements in ICT in form of radio, TV, telephone, SMS, satellite radio, sirens, cell broadcasting, drones, or the internet can help in a great deal in planning and reduction of hazards reduction measures. It is necessary for individuals and organisations have some degree of preparedness in terms of preparedness plans, early warning system, equipment and machinery that can be deployed for disaster response and mitigation.**

Key words: **Disaster management, Crisis management, application of Information and communications technology in disaster/crisis management, Risks of information and communications technology**

I. INTRODUCTION

Disasters affect humanity in many ways. This is mainly been in the form of natural and human made. According to UNISDR (2017) a natural disaster is defined as a major adverse event resulting from natural processes of the Earth; examples include floods, hurricanes, cyclones, tornadoes, volcanic eruptions, earthquakes, tsunamis, landslides, and other geologic processes. Human-made disaster is a disastrous event caused directly and principally by one or more identifiable deliberate or negligent human actions and this includes genocides, wars, workplace fires, terrorism, and cyber-terrorism.

Other organisations have conceptualised disaster as:

> *"A disaster can be defined as any occurrence that causes damage, ecological disruption, loss of human life, deterioration of health and health services on a scale, sufficient to warrant an extraordinary response from outside the affected community or area"* (WHO, 2002)

> *"A disaster can be defined as an occurrence either nature or manmade that causes human suffering and creates human needs that victims cannot alleviate without assistance"* American Red Cross (ARC, 2008)

Africa especially has suffered from natural and human made disasters mainly in the form of genocides, wars and other natural disasters ranging from floods to earthquakes which have cost many lives and loss of property. Kenya has recently been characterized by frequent floods, famine, human displacement, ethnic clashes and other catastrophes which have caused both loss of property and life. For example, the post-election violence of 2007/2008, collapse of buildings, terrorism and occurrence of famine and starvation of people have rekindled a public debate on the country's disaster management capacity, preparedness and responses systems. The strategic use of Information and communications technology (ICT) can potentially play a pivotal role in disaster prevention, mitigation and management. As ICT networks grow, and terrorist organizations usage of these networks and channels grow, the utility of these networks will increase.

Though we are writing to you on the strategic use of ICTs in Crisis Management, we would prefer to start from the use of ICT in disasters. Let us for the purpose of this paper borrow the definition of Crisis Management from the lucid form. Ambassador Daniel Stanffacher and Sanjana Hattotwa of ICT4Peace (UN, 2005) have described it.

> *"Crisis Management involves preparing, warning, supporting and rebuilding societies when natural or man-made disasters occur. It is a civilian and or military intervention in a crisis that may be a violent or non-violent with the intentions of preventing a further escalation of the crisis and facilitating its resolution. It is a process by which all individuals, groups and communities manage crisis in an effort to avoid or minimize their impact*."

This being said, it is obvious that there should be an effective flow of information in the process of effective disaster management. Effective Crisis Management relies on integration of emergency plans at all levels of government and non-government. It is evident that by no means, natural or man-made disasters can be fully prevented. Only the loss caused by these events can be prevented or minimized.

1.1 Uses of Information and Communication Technology (ICT)

ICT can be used to minimize this impact in many ways. Information and Communication Technology (ICT) reflects the convergence of internet, mobile and traditional media technology. These technologies have created new ways to transmit, gather, and analyze information, which is changing the world we live in. In the disaster mitigation and preparedness process, ICT is widely used to create early warning systems. ICTs allow for communication disintermediation. Through disintermediation, information now flows directly from person to person. Organizations can participate in disseminating information directly to the population, by enabling many-to-many communication. ICTs reduce the importance of the media for distributing messages (Merrick II, 2011). An early warning system may use more than one ICT media in parallel and these can be radio/community radio, TV, telephone, SMS, satellite radio, sirens, cell broadcasting, drones, or the internet. Open source crisis mapping platform, SMS, Twitter and Google Maps, could be deployed locally on a completely open source stack. *Usahidi* (witness in Kiswahili) an open source crisis mapping platform, was developed by Kenyan bloggers in response to the January 2008 unrest following elections in Kenya.

In the immediate aftermath of a crisis, special software packages built for the purpose can be used for activities such as registering missing persons, administrating on line requests and keeping track of relief organization or camps of displaced persons. In addition, Geography Information System (GIS) and remote sensing software/hardware are used effectively in all phases of disaster management. A spatial data infrastructure – a prototype web based system that facilitates spatial data collection, access, dissemination and usage for proper disaster management is a very handy tool.

Creation of a regional info system which is significant for assessing the damage and needs of all kinds is the action that is most dependent on the use of ICT. The data banks also save time since all of the information is gathered together and could be needed in coordination for the immediate action. Furthermore, communication is the key element in all of the phases in the process.ICT is significant for successful implementation of post disaster management. The use of information technologies is increasing yet there are some problems. The lack of data and the weaknesses of those that exist, failure of the managers to consider the needs of the users, the lack of organization, weakness of available software, deficient quality and the content of the information especially on the chaotic nature of world wide web.

The sensitive and creative use of technology can help nurture change processes that can lead to more peaceful and sustainable futures and avoid the pitfalls of partisan aid and relief operations. Providing for mobile telephony that give remote communities access to constantly updated weather and geological information and helping create endogenous early warning systems using local knowledge, using tele-centres to serve as repositories of information on emergency procedures and evacuation guidelines, coordinating the work of aid agencies on the ground ensuring the delivery of aid and relief to all communities, monitoring aid flows and evaluating delivery, creating effective mechanisms for the coordination of reconstruction and relief efforts, creating avenues for effective communication between field operations and warehouses based in urban centers, creating secure virtual collaboration workspaces that bring in both individuals and organizations across ethnic, geographic or religious boundaries, enabling centralized data collection centres that collect information from the field and distribute it to relevant stakeholders are just some of the immediate uses for technology.

II. ROLE OF ICT IN DISASTER MANAGEMENT

The role of Information and Communication Technology in Disaster Management is to catalyse the process of preparedness, response and mitigation, providing access to vital information on Disaster preparedness to citizens, use Geography Information System (GIS) based decision support system for planning and designing early warning system. It must also emergency communication for timely relief and response measures and to building Knowledge Warehouses to facilitate planning and policy making.

The Tsunami in the Andaman and Nicobar Islands in Dec 2004, the earthquake in Jammu and Kashmir, the floods in Assam and train blasts in Mumbai, earthquakes in Latur and Bhuj (Gujarat), Haiti earthquake, Japan earthquake, violence in Chad and Sudan, Egyptian uprising, and Libyan unrest among others have all been learning experiences.

There are many problems in the disaster management process which if addressed could help Kenya evolve ways of getting over them, some of them are:

-A Lack of understanding at the political level to produce a policy for sharing information and implementation of ICT standards.

-A lack of historic data to evaluate short falls in the last endeavors in order to avoid any repetition i.e. using historic data to learn lessons and better future efforts.

-Lack of trust amongst the uniformed and non-uniformed aid organizations.

-Turf battles between aid organizations.

There are a number of key factors that will contribute to the successful introduction of ICT into the field. Amongst them are; Mobility, Ruggedness, Flexibility, Simplicity and Sustainability. ICT for disaster management and recovery should be disaster agnostic. The most important factor in the success of ICT implementation within organizations is investment – not just financial and human resources, but also in terms of management support based on recognition of the

strategic importance of it. ICT only designed for crisis management in a stand-alone mode is unaffordable; therefore, partnership with business is a precondition for secure, sustainable and up-dated ICT solutions for crisis management. The cost of developing own ICT systems is enormous and this forces organizations to look very hard at what is commercially available right from the start.ICT solutions for crisis management should be based on open standards and commercially available solutions and not tied to a certain provider / manufacturer. Standardization of one frequency to be used exclusively for disaster/crisis management, this must be coupled with the availability of trans/receivers, able to transmit from and receive this frequency with emergency response units' cross agency.

III. INFORMATION AND COMMUNICATION TECHNOLOGY (ICT) AND DISASTER MANAGEMENT IN KENYA

The ability to anticipate disasters before they occur and to respond to them expeditiously and effectively in a well-coordinated manner requires, among other things, an efficient early warning system with state-of-the-art equipment for early warning system preventive action. The issue of preparedness is rooted in the question of what capacity exists in the country as a whole to effectively deal with natural and man-made calamities.

According to a UNISDR (2015) report any disaster of any kind is a developmental issue. Billions of people have been killed in disasters and the global average annual loss is estimated to increase up to US $415 billion by 2030.The devastation from the floods and landslides in many parts of the world in terms of displaced populations, loss of lives, destruction of property and the collapse of vital infrastructure clearly reflect lack of disaster preparedness worldwide. The consequences of natural and man-made disasters and the vulnerabilities to which populations are exposed can be mitigated if they are targeted proactively. In this context, ICT can play a pivotal role in disaster prevention, mitigation and management.

According to the Government of Kenya's (GoK, 2012) plan on national disaster management unit, disaster preparedness is viewed as one of the disaster management strategies which involves the preparation of an early warning system and consists of timely activities to minimize the effect of a catastrophe (GoK, 2013).

Enhanced capacity at the Kenya Meteorological Department and the Department of Resource Surveys and Remote Sensing (DRSRS), together with the involvement of private sector institutions in monitoring and forecasting changes in weather patterns and setting up floods early warning systems could, for example, tend to some useful preventive measures. The Department of Mines and Geology should be able to carry out studies and establish an early warning information system which should, for example, show all the areas in Kenya prone to landslides so that they are not used as sites for heavy settlements, roads and railway (GoK, 2013).

The Kenya Red Cross Society (KRCS), one of the largest humanitarian organizations in Kenya, has been at the forefront in disaster management in Kenya. In the recent past, the society has diversified and invested in the use of modern information communication technologies in addressing myriad disasters. The KRCS investment in ICT for disaster management has been achieved through the networking at the headquarters, regional and branch offices countrywide. The networking process has ensured, capacity building and cost reduction by enhancing radio network, improving efficiency, reporting and staff output through shared and distributed services over the Wide Area Network. The Unit also ensures reliable and secure infrastructure is in place, proper utilization and performance of ICT equipment as well as branch capacity building through deployment of ICT equipment.

IV. LIMITATIONS OF ICT IN CONFLICT TRANSFORMATION

Before using ICT for online conflict transformation strategies, there are five key attributes of online communication that must be taken into consideration:

Lack of physical communication cues - We cannot utilize the huge range of non-verbal cues we use during the course of conversation to discern if our audience is agreeing, disagreeing or getting uncomfortable. In cyberspace, we must explicitly ask for this information or proceed on potentially erroneous assumptions. MSN Messenger and online bulletin boards are not yet a replacement for people-to-people contact.

Potential impersonality of the medium - There is something about working in front of a monitor that is cold and detached from real world interactions. This could make online debate formal and stiff. Conversely, some people like the impersonality of online communication, and open up in ways they would otherwise not in real world meetings.

Time – The more time you have to think about your response, the more balanced it should be. On the other hand, issues may build up when unaddressed for a seemingly long time since in online conferencing the perception of time may differ from person to person.

Public vs. private spaces and perceptions - People have different tolerances of what they think should be "public" or "private." These differences need to be taken into account when choosing to deal with issues in public and/or private spaces.

Not everyone is a Byron or Shakespeare. Misinterpretation in online communication can be the result of inattention to details, ambiguous

sentences, or even the inappropriate use of the CAPS LOCK key.

Any individual, organization or government that wishes to employ ICT for conflict transformation, must be acutely aware of these considerations. Perhaps the most effective use of ICT thus far has been with Online Dispute Resolution (ODR). ODR takes place on an increasingly regular basis in countries like America, where in tandem with Alternative Dispute Resolution (ADR) techniques, ICT is used to settle litigation and to encourage out of court settlements of disputes. The transformation of complex ethno-political conflict will however not be entirely possible using ICT. ICT is no substitute for face-to-face negotiations to end protracted civil war. Trust building cannot be nurtured online between two or more parties who have been at loggerheads for decades. However, once that trust has been sufficiently established, and the peace process gains a momentum of its own, ICT can buttress moves on the ground to build bridges between communities and people.

Furthermore, ICTs can engender greater communal understanding by providing information of the 'other', dispelling falsehoods and misconceptions, and helping people-to-people contact. It will be interesting to see, for instance, how the Telecom / ICT Action Plan of the Governments augment other developmental activities and confidence building measures to help bring the countries through a comprehensive ICT infrastructure and telecommunications backbone.

V. THE FUTURE OF INFORMATION AND COMMUNICATION TECHNOLOGY (ICT)

Information and Communication Technologies(ICTs) are unlikely to bring about anything better than the best intentions of those who use them. While many look at modern technology as a panacea for old problems, unfortunately it appears that their power for enhancing transparency, imposing international accountability and fostering cooperation stretches only as far as the will of respective nation states bends to embrace and adopt them. This is especially the case where governments are only too aware that too much information in the public domain subverts attempts at illiberal undemocratic governance (very often the status quo)."The same Internet that has facilitated the spread of human rights and good governance norms has also been a conduit for propagating intolerance and has diffused information necessary for building weapons of terror."

ICTs are not used in a normative vacuum. Even assertions about the enhancement of democratic participation by ICTs must be tempered by a broader understanding of the power dynamic between an empowered public and those who wield authority. However, there is immense potential for the use of ICT in the exercise of development and nation-building. Even as ICTs help nations enter into the global 'information superhighway', so too does it render it an object of global scrutiny. ICT networks increasingly lend to the subversion of attempts of human rights transgressors to hide their deeds. Governments are realizing the futility of trying to block or filter information, and are instead beginning to work proactively to harness the potential of ICT for development.

The Durban Declaration (2002) on Racism, Racial Discrimination, Xenophobia and Related Intolerance, included an entire section dealing with "Information, communication and the media, including new technologies." This declaration recognizes the potential of ICTs as a positive instrument, along with the possible risks caused by their abuse. Participants expressed their concern at the use of the Internet for the dissemination of racist and discriminatory ideas and called upon governments to take action on these issues. However, they also recognized that "new technologies can assist the promotion of tolerance and respect for human dignity, and the principles of equality and non-discrimination." Hence the need: "to promote the use of new information and communication technologies, including the Internet, to contribute to the fight against racism, racial discrimination, xenophobia and related intolerance".

ICT is not a magic formula that is going to solve all our problems. But used wisely, it can help with peace and development, and build a world that is responsive to the needs and demands of its entire people.

The future for ICT in conflict and disaster management in Kenya lie in getting answers to the following guiding questions:

(i) Do ICT have a special role in promoting peace and if so, what is the future of ICTs in conflict and crisis management, what will be the priorities and challenges in coming years?
(ii) Can ICT be used in other ways, by other actors, to diffuse a situation leading to conflict, help end a conflict, or allow the stabilization of a post conflict situation?
(iii) How can we enable a greater degree of cohesion, transparency and accountability to processes of conflict transformation?
(iv) Can ICT augment existing stakeholder interventions, enable marginalized actors to participate more fully in peace building processes, empower grassroots communities, and bring cohesion to full-field peace building activities?
(v) Establishing computers and Internet connections is insufficient if the technology is not used effectively, if people are discouraged from using it or if local economies and patterns of access cannot sustain long-term application. How do we make sure that a strong political will supports these transformations?

VI. THE FUTURE OF ICT-CONTINUATION

One important application of technology is enabling communication and connection between people beyond their immediate environment. Modern communication technologies

such as live satellite broadcasting, the Internet or video cameras have the potential to create empathy and understanding on a global scale. Depending on how technology is deployed, can enable or disable public expression and elaboration of contending interests and give voice to the differences of identity, experience, values and histories that inform conflicts. Does this open up new possibilities for an international public sphere of understanding and solidarity?

How do we integrate ICT in enhancing the competency and professionalism of the international community in crisis management?

How do we improve inter-agency interoperability and collaboration within the international community (UN system, EU/EC efforts, etc.) to harnessing ICT for peace-keeping, conflict prevention and crisis management?

How do we promote information-sharing in places of conflict and/or crises?

VII. CONCLUSION

In conclusion we would like to quote a self-coined statement "The currency of power in the Twentieth Century was 'deterrence', the currency of the power in the Twenty First Century will be Knowledge and Information"

Future planning

- Encourage and consolidate knowledge networks
- Mobilise and train disaster volunteers for more effective preparedness, mitigation and response (National Youth service NYS, Scouts and Guides, Disciplined forces)
- Increased capacity building leading to faster vulnerability reduction.
- Learn from best practices in disaster preparedness, mitigation and disaster response

What is ICT? What can it do?

It is almost facetious to ask, given how much has been written on it, what ICT is. Though we may encounter it daily, and only realize its importance in its absence, ICT has been defined by different bodies as being, *inter alia:*

-A bridge between developed and developing countries
-A tool for economic and social development
-An engine for growth
-The central pillar for the construction of a global knowledge based economy and society
-An opportunity for countries to free themselves from the tyranny of geography

Often touted as the harbinger of a new world order, ICTs are now considered "a viable option for development policy where other needs, such as building roads and hospitals and providing drinking water etc. were considered more urgent."

ICTs are also considered an important tool to achieve the Millennium Development Goals (MDGs) of the UN.While most of these definitions capture the essence and the potential of ICT, they ignore major challenges facing developing nations like Kenya entering the 'information society' and 'knowledge economy'. Developing countries for instance, are racked by internal conflict, border disputes and are economically under-developed, socially fragmented and very often, politically weak.

There should be greater emphasis on the development of new technologies that can be used in preparedness, response, recovery, and mitigation of disasters. Disaster preparedness and awareness is the only effective way of mitigating the impact of future disasters.

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