Application of Information and Communication Technology (ICT) in Human Induced Crisis Management: The case of Nigeria.

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Abstract
The prevalence of religious and political unrest in Nigeria and suchnegative outcomes as the killing of targeted groups of people, destruction of property,political and social unrest, and adverse economicimpacts for the affected communities should represent one of the primary rationales and motivations for the adoption and development of Information and Communications Technologies (ICT) for such critical functions as building awareness, early warning and crisis managementby the government towards preventing and responding to crisis in Nigeria.Not to underestimatethe problem, crisis prevention and management should constitute a significant part of any developmental framework. Unfortunately, religious and political unrest and other human induced catastrophes are commonplacein Nigeria, where information flow is comparativelyslowbecause of limited ICT infrastructures and/or lack of ICT skills to prepare for and respondto crisis in ruralcommunities. This research focuses on identifying the role of ICTs in crisis prevention and management within organizations & communities in Nigeria and proposes some strategies for Government-led initiatives to make this a reality.

Introduction

Analyzing various transcripts of the June 28, 2013 unrest in Jos, it is clearthat there has been a recurrence of crises in Jos, Nigeria resulting inheavy loss of human life, property damages and an economic stalemate. It has become apparent the need to deploy ICTsfor crisis management: welfare and event logistics,to momentarily move people, information and material assets forsafekeeping. Analysis of the datashowsthat Federal government agencies simplyuse radio and local TV in such emergencysituations in an attempt to put the population in a state of readiness for crisis management. These available media channels: TV, Radio, and to a limited extent, mobile phones, are used mainly in reactive mode in response to acrisissituation. There is very low or next to no utilization of available computing and internet-basedcapabilities. There are many reasons for this low utilization of computing/internet technologies. For one thing there exist very limited operational capability for these technologies; limited ICT skills and connectivity predicaments. An even more pressing reason, we believe, is the lack of appreciation of the special role these technologies play in knowledge management and communication. Against this backdrop, this paper seeks firstly to shed insight on the critical role that ICTs can play as astrategic tool for education and communication to reverse

vicious cycles at the root of crises in Nigeria. We will then propose some strategies for leveragingavailable ICTs to this critical function of crisis management. An obvious oneis the need forthe Nigerian government topartner with ICTsfirmsin order to increase the available technology infrastructure and advance the nation's telecommunication sector. Thisshouldaddresssuch problemsaspoor ICT infrastructure, short radio and TV signals, limited internet connectivity, accessibility and availability in Nigeria,and various trainings to strengthen and promoteawareness and use of ICT across the country.

The purpose of the study

The purpose of thisstudy is to examine the use of ICTs as an intervention measure for crisis prevention and management in Nigeria: specifically as regards questions ofmass education, readiness and rapid response to human induced and other crises in Nigeria. The analysis will also focus on the enablers and barriers to ICT use especially in humanitarian logistics for emergencycare in Nigeria.

Some Key Research Questions

This study will examine the answers to the following research questions:

RQ1: What influence can ICTs have in reversing the upward trend of crises in Nigeria?

RQ2: *What types of ICTs if any are commonly used to avert, prepare for and respondto crises?*

RQ3:What are the barriers or enablers to these commonly used ICT systems?

RQ4: What are some plausible strategies to leveraging ICTs for impactful intervention?

Frequency of Unrest

The frequency of Human Induced Crises(HICs) such as religiousunrests, political killings, kidnappings, attacks on law enforcement personnel and property destructions are on the increase today in Nigeria (NISER, 2012). Each time oneturns on the news or reads the newspaper, depictionsof various crisesmay take up to70% of the coverage.Anincrease in the number of such incidencescan be attributed toseveral factors;including but not limited to,economic and social marginalization, political power struggles, greed and egocentrism, poor leadership, rapid urbanizations and religious intolerance. Irrespective of the type of crisis the end results tend to be the same in the affected areas such asNorthern Nigeria and the Niger Delta:loss of life and property, economic downturn, military occupations that often create tensions with the population due to imposed restrictions in movement and communications, etc. Unfortunately, the poorer communities are the most vulnerable to such catastrophes due to a variety of socio-political, cultural and economic factors which compel them to live in disaster prone areas (Benson et al., 2001). Unexpected calamites in Nigeriatend to disproportionately favor the poor by interrupting their revenue/income flows, reducing personal assets, and destroyinglives and essential public infrastructure.

According to NISER (2011), the Plateau State ranked first with about 79 percent of the population affected by HICs between 1999 and 2011.The same report showed that Bauchi State came second while Borno, Kaduna and Kano States occupies third position.Today, Borno State ranks number one followed by Yobe State and Adamawa State. The case of Adamawa State is rather one of *culprit by association* as its inclusion in the States of Emergency arises largely from its proximity to the top two States associated with violence

today.Some estimates have it that these human-induced catastrophes have killed more "*innocent*" people than the Nigerian civil war of 1967 to 1970(Akinadewo, 2011).The increase in the frequency and number of HICs in Nigeria today, the immeasurable suffering and unlimited damages caused in terms of life and property as a consequence, the pressure that is brought to bear on affected populace and the long run effect of such catastrophes trigger the need for both preventive and adaptive intervention measures. Tools for information gathering are essential in preparing for and responding to tragedies when they occur.

As a result, the use of information systems in vulnerable communities for advanced mitigation of or in readiness for such situations is a key functionthat stakeholders involved in crisis management must consider. The use and application of ICTsin the affected communities in the event of such crisis is crucial; reliable communication in the 24 hours that follow an incident can make all the difference in saving lives and protecting property (Newport et al., 2003).

Therehas been an increasing spike of violence threatening lives and properties stemming from religious and political unrests that stretches from the North-Eastern states of Borno, Yobe and Adamawa to the Central Nigerian States of Bauchi and Plateau, specifically the city of Jos that remainsa boiling point. These would be the crucial areas of focus for deploying ICTs in an intervention effort at preventing or managing crises.

The significance of the study

It is envisaged that the findings of this study will raisepublic awareness about the levelof ignorance and lack of access to vital and timely information relating to such volatile situations. We will survey the type of ICT systems available and actually being used in these areas, the problems encountered in using them, and the nature of ICT infrastructure in Nigeria as a whole and additional opportunity for exploiting ICT capabilities to this difficulty. This study shouldmake a contributionon current studies on the role of ICTs in crisis prevention and management such as emergencyrelief for developing countries. It is also hopedthat the study will raise awareness on the key roleof ICT in such crises management efforts across Nigeria.
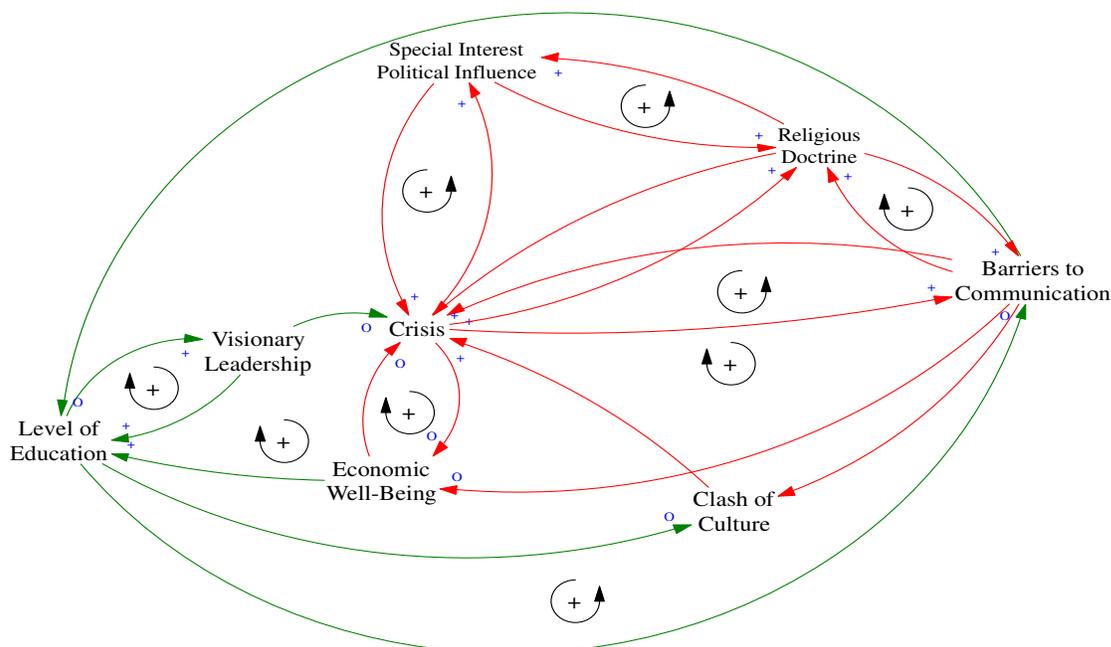

Fig. 1: Influence (Causal-loop) Diagram of Impacts on Crises in Nigeria

The Dynamics of Crises in Nigeria: Influence Factors & their Impacts

The causal-loop (or influence) diagram shown in Fig 1 depicts typical influence factors and their interactions for a typical crisis situation in Nigeria. The dynamics of problem situations such as this isdefined by influences tied in feedback loops, which can be either positive or negative. The known behavior over time for a positive loop of influences is to create growth or decay of some sorts while negative feedback loops typically work to bring a situation to some form of equilibrium or balance. Where negative and positive loops interconnect, as is the case depicted, the positive loops will work to create growth or decay as before whereas the negative loops tied to these will work to slow or arrest such growth or decay. The growth or decay that a positive loop creates in a dynamic problem situation such as this can represent either a virtuous cycle or a vicious cycle depending on whether the outcome is desirable or undesirable. Looking at the diagram, several causal factors lie in paired vicious cycles with *Crisis* such as *Economic Well-Being*, Religious *Doctrine*, *Special Interest Politics* and *Barriers to Communication*. One or a combination of these vicious cycles will explain the escalation of crisis conflict once it has started. To arrest the ill-effects of these vicious cycles we need the calming or balancing influence of a negative feedback loop or a mechanism to turn such vicious cycles into virtuous ones. Negative feedback loopswill help dampen any escalating growth or decay created by the any of the interconnecting positive loops with Crisis. A *virtuous cycle*can be spurred to run from *Barriers to Communications* through *Level of Education*or *Economic Well-Being* or even *Clash of Culture*and back through *Crisis* to *Barriers to Communication*. For example, the important reinforcing relationship between ICTs and ease of communication,due to increasing*Level of Education*. Introduction of ICTs as a mechanism for removing the communication barriers and raising the education level will therefore create a re-enforcingvirtuous cycle with *Level of Education*that adds to the strength of the negative loop to counter the combined influence of any vicious loops linked with *Crisis*. This will represent, perhaps,the single most important point of leverage for this intractable problem. So the answer to our first research question lies in how effectively ICTs can be used to limit communication barriers and raise the level of education of the masses.

Technology Acceptance Model (TAM)

Over the years there have been tremendous developments and advances in hardware and software capabilities, but the question of underutilization of these ICT systems has been identified as a major factor underlying the productivity paradox from organizational investments in information technology (Sichel, 1997). One of the theories that best explains common ICT use is the technology acceptance model (TAM). This theory (and others)has been confirmed by Meso et al. (2005) as important in any comprehensivestudy that has to do with assessing the impact of ICT and its use. Current research uses the TAM to describe the widespreaduse of ICTs. The theory has its roots from the Theory of Reasoned Action (TRA) which specifies two beliefs, perceived usefulness and perceived ease of use, as determinants of attitude towards IT use (Davis et al., 1989). The model captures the users'*perceived usefulness* and *perceived easeof use*, of the ICT system and from these two views can obtain the intent to use the system. TAM theorizes that an individual's desire to use an ICT system is determined by two beliefs: *perceived usefulness* and *perceived ease of use*. According to the model, perceived usefulness is the extent to which a person believes that using the ICT system will improve his or her job performance, while perceive ease of use has to do with the impression that using the system will be free of effort. Perceived ease of use of any ICT system influences the perceived usefulness. The TAM is an instrumental tool, used to measure an information system because it captures the user's perceived usefulness and perceived ease of use of the system and drive the intent to use the system (Venkatesh & Davis, 2000).

Methodology

To achieve the aim of this study, we have chosen aquantitative research approach. A total sample of 10 government agencies and 12 organizations was selected within Jos that aredirectly or indirectly involved with fighting, turmoil and crisis management or developmental issues in one form or the other. In total, 20 questions were administered to these selected organizations by mail, internet, telephone and self-administration and 93% responded to the questionnaire. After analyzing the data collected, it was easy to conclude that HICsoccurs in Jos, Nigeria on regular bases causing lots of damages hence the need for ICT use in business and humanitarian logistics to move information and material assets. Results showed that the Federal government agencies employ only radio and local TV for emergency preparedness. Radio, TV, mobile phones are used primarily in reactive mode, for crisis responses, while the internet and computer technology, landline phones and fax had a very low usage rate or sometimes are not used at all. The reason for the limitedor missing usage of these other ICTs was due to problems such as limited knowledge, skills and connectivity predicaments encountered by the government agencies, businesses and individuals in an attempt to use ICT related technologies. Against this backdrop, this paper proposesseveral recommendations thatshouldimprove the level of ICT use if implemented.

ICT Utilization

ICT was defined by the Information Technology Association of America (ITAA) as "*the study, design, development, implementation, support or management of computer-based information systems, particularly software applications and computer hardware*." The above definition simply emphasizes the use of computers, software and hardware to process, convert, transmit, store, protect, and securely retrieve information in real-time.Stair & Reynolds (2010) defines IT as "*a series of interrelated components that collect, manipulate, store, and disseminate data and information and provide a feedback mechanism to meet an objective*".For the purposes of this study, Stair & Reynolds (2010)'s definitionwill be our working definitionmainly because of the ICT tools emphasized, such as; mobile& fixed phones, the internet, computers, television & radio sets. ICT has become the most significant factor in determining the success of any emergency logistic management Harrison & van Hoek, (2005). In a crisis situation, ICT comprisesthe data, information, method of communicating, reporting system and storage because it focuses more on mediums of communication, such as the cell phone networks, and satellite technology, which tie various activities together facilitating information flow in real-time.Infrastructural and Operational ICT uses have to do with how security and other emergency workers utilize these tools to facilitate information sharing, coordinate work activities, environment monitoring, data transmission and daily operational decision making.

ICTs&HIC in Nigeria

In Nigeria, security and emergency response units have largely worked in reactive mode, and with minimal use of ICT tools, due to organizational culture, or because it is unavailable and /or lack of training on ICT tools. Our influence model has demonstrated, albeit qualitatively, re-inforcing positive feedback loopstyping *Barriers to Communication* to *Economic Well-Being*, *Clash of Cultures* and *Level of Education*; and through any one of these 3 influences to *Crisis* and back to *Barriers to Communication*.We also explained earlier that positive loops can be either *vicious* (as in driving the increasing growth of a crisis) or *virtuous* (as in working to increasingly drive down a crisis). The question then is how to turn these potentially vicious cycles into virtuous ones. The augmented Influence Model in Fig 2 shows how introduction of ICTs and its impacts on increasing the *Level of Education* and curbing *Communication Barriers*will work to turn all those vicious cycles into virtuous ones.
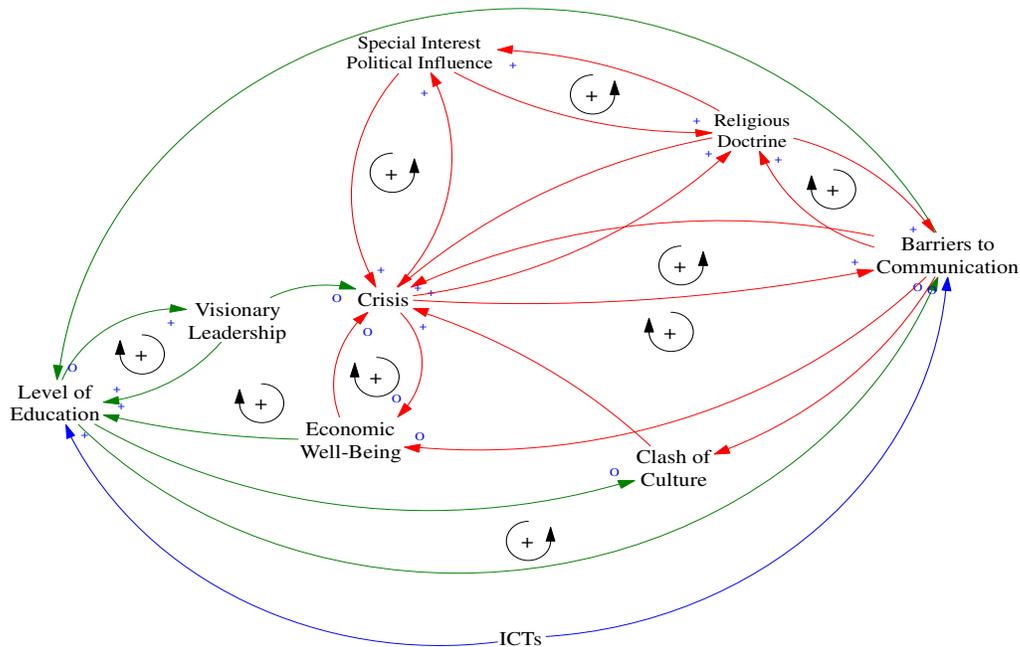
Fig. 2: Influence (Causal-loop) Diagram of Impacts on Crises in Nigeria

According to Tomasini and Van Wasserhove (2009), Crisis management is a combination of insight and response, where insight addresses the tactic put in place that permits the implementation of a successful reaction to HIC. HIC awareness simply the means of deployment of reaction mechanisms to meet issues that society has not been able to mitigate (Tomasini & Van Wasserhove, 2009). In other words, planning ahead of time would help Nigerian communities reactmore promptly, and understand what to focus on before, during and after every HIC.This study believes that advanced preparation effectively reduces the long-term threat to property and life.ICT can be an effective tool for crisis management when implemented and used properly because information systems allow emergency response to be extra agile as HIC issues develop. Analyzed survey respondents showed99% would use ICT tools to prepare for and during HIC in their communities; while only 1% said they would use other means to reach people and security agents. In an attempt to understand which ICT tools the people are likely to use during an HIC, 98% of the respondents identified cell phone for information dissemination while 2% opted for radio.The research believes that these ICT tools can be used to sensitize the public on the dangers of HIC, determine its spread and mitigation procedures.The findings conform to the research believe that the use of phone, radios and other ICT tools are indispensable for information dissemination during HIC.

Conclusion

The main objective of this study was to investigate the use of ICT in heighteningawareness and responding to HIC in Nigeria. To achieve this objective, some key concepts were isolated, such as; Human induce crisis, ICT tools and uses, and crisis management (awareness and response)and an influence diagram and a frame of reference was developed around these concepts, upon which empirical survey data was collected and analyzed.Survey findings showed the need to share information and use of ICT by federal and state security agencies in HIC management. For Nigeria to make effective use of ICT for crisis management, the challenges that have been illustrated above have to be addressed. If addressed and properly implemented, information and communications technology has enormous potential, not just for information dissemination,

but also for sustained economic growth and social development. Without a doubt, ICT across all sectors would be essential foundation upon which the Nigeria economic recovery will occur. To ensure success, it is necessary for the government to overrule politics, understand ICT power and address organizational culture and management practices in Nigeria. Particularly, all parties responsible for successful technology plans, legal, regulatory and ICT body must endeavor todevelop policies tofacilitate successful implementation.

References

Akinadewo, G.(2011) The Nigerian Civil War. Retrieved August, 2012 from
http://www.compassnewspaper.org/index.php/columnist/51-gabriel-akinadewo/5536-nigerian-civil-war-2011-

Davis, F. D., Bagozzi, R. P., & Warshaw, P. R. (1989). User acceptance of computer technology: A comparison of two theoretical models. *Management Science*, 35, 982-1003

Harrison, A. & van Hoek, R. (2005). Logistics Management and Strategy, second edition, Prentice Hall.

Hicks, R.C., Dattero, R. & Galup, S.D. (2006). "The five-tier knowledge management hierarchy", *Journal of Knowledge Management., Vol*. 10 No. 1, pp. 19-31.

Mbarika, V., Jensen, M & Meso, P (2002). International Perspectives; Cyberspace Across Sub-Saharan Africa, Communications of the ACM, vol. 45, no. 12.

Meso, P., Musa, P & Mbarika, V (2005). Towards a model of consumer use of mobile I information and communication technology in LDCs: the case of sub-Saharan Africa, *Information Systems Journal* **15**, 119–146.

Perry, R.W, & Lindell, M. K. (2003). Preparedness for emergency response: guidelines for the emergency planning process; Disasters, Vol. 27 No.4, pg.336-50

Newport, K.G. & Jawahar, G.G.P. (2003). "Community participation and public awareness in disastermitigation", Disaster Prevention and Management: *An International Journal, Vol*. 12 No. 1, pp. 33-6.

NISER (2012) Inequality, Poverty and Proposals for Improving Greowth Impacts-paper N0 9 Retrieved August, 2013 from http://www.niseronline.org/index.php/major-research- activities

Sichel, D. (1997). A Theoretical Extension of the Technology Acceptance Model: Four Longitudinal Field Studies Management Science Vol.46, No.2, Feb., 2000 http://www.jstor.org/stable/2634758

Stair, R.M., & Reynolds, G.W. (2011). *Principles of Information Systems 10*th Edition Cambridge, MA: Course Technologies

Tomasini, R. & van Wasserhove, L (2009). "Humanitarian Logistics" Palgrave Macmillan.

Venkatesh, V & Davis, F. D. (2000). A Theoretical Extension of the Technology Acceptance Model: Four Longitudinal Field Studies: *Management Science*, Vol. 46, No. 2, pp. 186-204