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ICT Innovations for Climate Change Communication and Public Awareness

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Abstract: ***Information and Communication Technology (ICT) is a combination of telecommunication technologies for information acquirement, storage, manipulation and dissemination. Timely communication of climate change to individuals is constrained by rapid access to reliable and accurate information as well as the capacity to assess, scrutinize and assimilate information from varied sources. Usage of ICT can reduce climate change risks by improving the productivity of communication and promoting public awareness of risks associated with climate change to individuals. This paper reviews related works to determine the ICT innovations that are popularly used on climate change communication and the ICT applications that have been development by National Aeronautics and Space Administration (NASA) regarding Climate Changes. Findings from the study revealed that Radio, Telephone, Internet Geographical Information System(GIS)are among the most used ICTs innovation for creating public awareness of climate changes to individuals. This study suggested the incorporation of Social media platforms as ICT technologies that can be used to communicate climate changes to people thereby improving their public awareness on its effect and consequences.***

Keywords: ICT, climate risk communication, public awareness

I. INTRODUCTION

A. Information and Communication

Technology (ICT) is a significant aspect in organizations, institutions, governments, education, community services and all other parts of human life. ICTs comprises of computing technologies for information gathering, retrieval, manipulation, storage and dissemination. Presently, there are wide ranges of computing devices, commercial intensive and artificial intelligence software, communication media, and networking infrastructure that enable data gathering, manipulation, processing, and sharing of information and communication among human and computers.

Several sectors such as organizations, governments and education now use ICTs to increase their performance. ICTs are also used in saving lives and wealth of community by providing an effective way of communicating and alerting people about disasters such as that of climate change. Climate change is a global change in climate patterns which is attributed to the high level of atmospheric carbon dioxide generated by fossil fuels. There is increasing recognition of the potential impacts of climate change in cities. Climate change may affect urban economic activities and services through destroying vital sectors and services such as agriculture, health, building, energy, water supply and sanitation. ICTs now comprises of many growing applications that are made available through an enlarging number of devices and mediums (Balaji, 2007). This is increasingly the case in development and climate change adaptations. In fact many projects are now being funded that leverage ICTs to alleviate poverty, empower communities through communication, and early warning of natural disasters strike (Ospina and Heeks, 2010).

The use of ICT devices has tremendously increased in both rural and urban areas. One of the popular and trending ICT devices is the Mobile Phone. Ownership of this device transcends not only geographical zones but also socio-economic boundaries and has changed social interactions, business and trade.

In large swathes of Africa, mobile phones are frequently used to update users on market prices for goods, to allow them to pay bills, and to keep in touch with family and friends (Aker and Mbiti, 2010). The adoption of these devices has been staggering: in 2000, 16 million people in Africa had mobile phones, in 2011, that figure had risen to 500 million, and by 2016, that figure is expected to double to 1 billion (USAID, 2014). With this widespread usage of ICT devices, it is important to optimize the utilization of ICTs in saving lives and properties of both public and governments from the risk of climate change. This paper reviews related works to determine the ICT innovations used for climate change communication and proposed alternative ICT technologies to be used for creating public awareness regarding climate change.

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II. RELATED WORKS

Cities sectors are interrelated, and therefore, a failure in one sector (e.g., in the case of extreme weather events) could lead to significant effect or overall economic loss for a country or region (GTZ, 2009). Studies revealed that the floods and windstorms that occur in Asia between 1996 and 2005 caused over 70,000 deaths, with an estimated economic loss of around US$ 190 billion. A large part of this loss was caused by poor and adequate ICT infrastructures (Montz, B. et al. 2017).

Similarly, rapid urbanization and population growth can degrade the impacts of climate change in cities. The Department of Economic and Social Affairs of the United Nations (UNDESA), has estimated that by 2050, about 70% of the world's population is expected to live in urban areas and over 60% of the land projected to become urban by 2030 is yet to be built. This high concentration of population and economic activity makes cities particularly vulnerable to climate change (UNDESA, 2014).

The effects of climate change will be felt by cities with varying degrees of intensity. Climatic changes may occur in forms such as variation in rainfall or temperature patterns which could have impact on sectors such as agricultural production, food supply, water supply, health and disease proliferation in cities.

Some countries are already facing the devastating impacts of climate change characterized by droughts, frequent floods and diminishing water resources (Okaka, 2009). Climate change information is therefore important in order to bridge the awareness - action gap (behavior change) (Okaka, 2009).

III. METHODOLOGY

This paper is aimed at investigating the ICT innovations that are used to create public awareness of climate change. It also reviews some applications that are developed by NASA on climate changes. In the paper, eight (8) Journal papers were reviewed in order to analyze ICT technologies in climate risk communication. Three (3) NASA's Climate Applications were also analyzed in terms of their uses. Finally, other ICT innovations were proposed that can be used for creating awareness to the public about climate change. The research methodology flow is given in figure

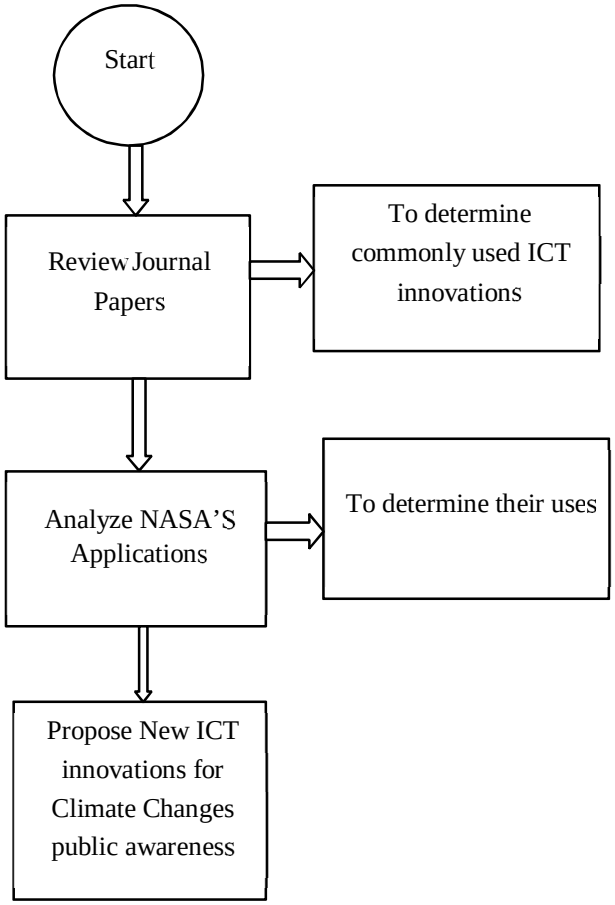


Figure 1: Research Methodology Flow

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IV. RESULTS

The results for the study are given in the subsections below.

A. ICT Innovations used in Public Awareness of Climate Risks and Changes

There is a wide range of commercially viable, versatile, and proven ICT innovations that are playing vital roles in communicating climate risk to individuals. Table 1 gives the results of the ICTs used in the papers reviewed. The results revealed that Radio, Telephone GIS and Internet are among the most used ICT innovations for creating climate change public awareness.

Table 1: ICT tools for Public Awareness to Climate Changes

S/N	PAPER	ICT INNOVATION USED IN CLIMATE RISK COMMUNICATION AND PUBLIC AWARENESS
1	Role of ICT in modern Agriculture	Meteorological stations and Global information system
2	Role of ICT in Climate Change Monitoring- A review study of ICT based climate monitoring services	Geographical Information System (GIS), Wireless Sensor Networks, Mobile Technology,
3.	Disaster Management , Developing Country Communitie s & Climate Change: Role of ICT	Radio, television, Satellite radio, Telephones, Cell broadcasting, SMS, Satellite Remote sensing, Wireless ad-hoc mesh network with GPS, Internet and e-mail, GIS.
4.	Innovative ICT public awareness campaign strategy to communicat e environment al sustainability in Africa	Publication/Print Media(Newspapers, newsletters, magazines) , Electronic media (radio, television, internet, phone), interaction or discussions(workshop, family talk) and entertainment (dance groups, theatres.
5.	Information and Communicat ion Technologie s and Climate Change Adaptation in Latin	Mobile (Verbal conversation and SMS), Mobile(Voice SMS), Radio, Television, Internet.
8	Planting the knowledge seed adapting to climate change using ICTs concepts, current knowledge and innovative examples, Building communicati on oppurtunities BCO Alliance, 2009	Remote Sensing

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B. NASA Mobile Applications for Climate Change

Several applications were develop by NASA to communicate climate changes to individuals. The applications reviewed in this paper are given in Table 2.

Table 2: NASA Mobile Applications

S/N	Name Application	Uses
1.	Weather	The Space Weather App allows users to view Solar Coronal Mass Ejections minutes after an event occurs.
2.	NASA's Earth	The App allow users to visualize the recent global climate data from Earth Science satellites, including surface air temperature, carbon dioxide, carbon monoxide, ozone, and water vapor as well as gravity and sea level variations.
3.	NASA visualization Explorer	The App displays the coolest stories about NASA's exploration of Earth, the sun, moon, planets and universe. A new story is released every other Monday.

V. PROPOSED ICT INNOVATIONS FOR CLIMATE CHANGES PUBLIC AWARENESS

Although there are various ICT technologies for improving public awareness of climate changes such as those described in Table 2. Nowadays larger number of world populations is on social media platforms i.e.

Facebook, Twitter, WhatsApp and Instagram which makes it one of best medium for broadcasting information and acquiring public attention. This study therefore proposes the use of the following Social Media Platforms:

A. Facebook Pages: Organizations responsible for communicating the climate changes risk should deploy the use of Facebook page, so that the public can follow them to get the latest information regards to the climate change.

B. Twitter account: Currently, twitter is the world best media for discussion and having public views on topics, it works with hash tags and normal tagging to make a particular topic trend in the world, and hence it can be utilized in communicating climate risk and public awareness. Bodies responsible can create twitter account to be used in discussing the issues related to climate change.

C. Instagram page: Instagram for business is meant to be used by SMEs to advertise and promote their products. This can be applicable to the process of reducing the risks of climate change by promoting the issue so everyone using Instagram can be able to see it regardless to whether he is following the concern body or not.

VI. CONCLUSIONS

Climate Changes can pose several consequences such as flood and draught that may affect important sectors of the economy like agriculture. Proper awareness of these changes to individual in due time may help mitigate the effects. ICTs are now employed in climate changes awareness due to their widespread usage and effective dissemination of information to a large number of individuals. This paper investigates the ICT innovations that are used in climate change public awareness as well as mobile applications that have been developed in relation to climate changes. The findings revealed that Radio,

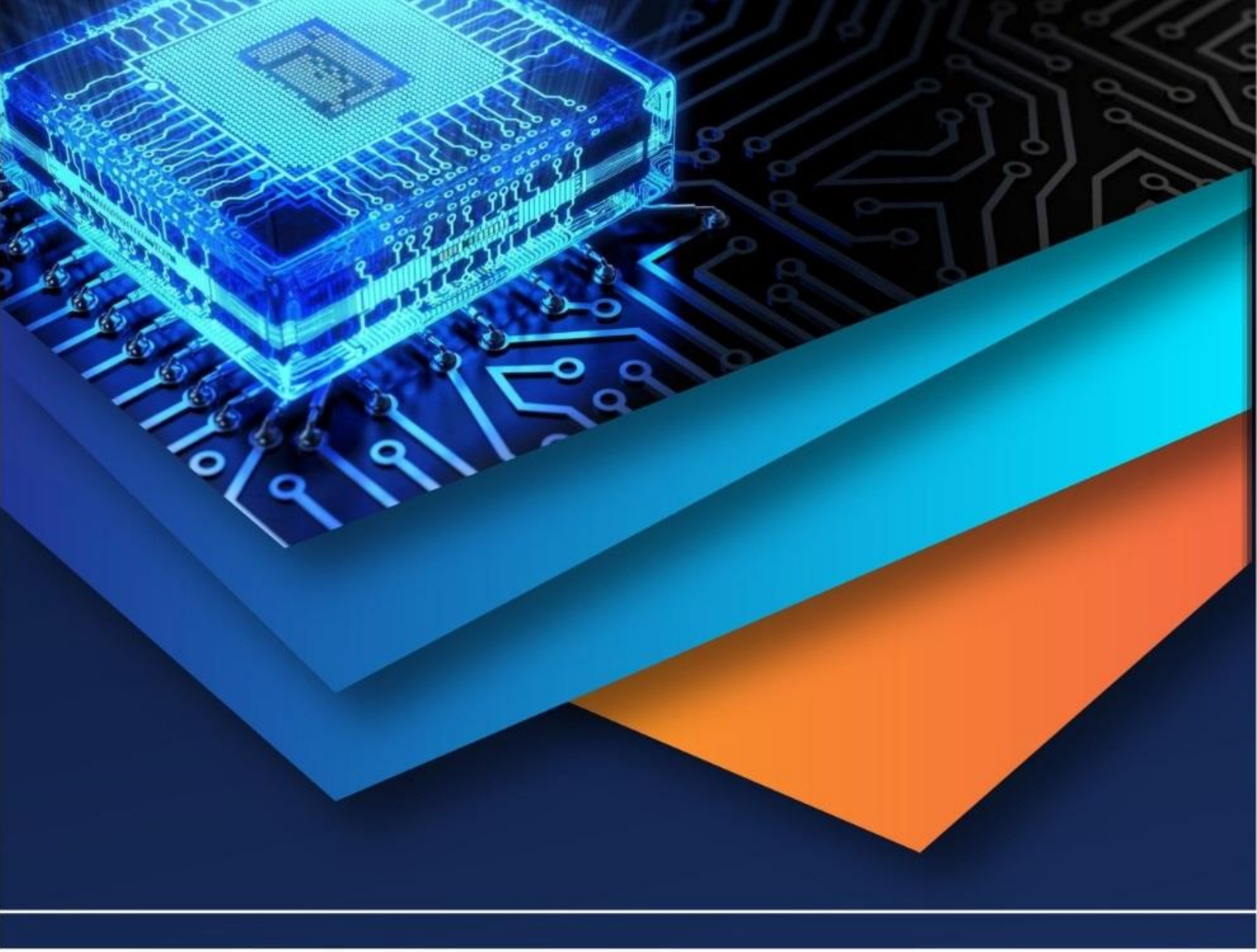
Television, Internet and GIS are among the most used ICT innovations for creating public awareness. This study proposes the incorporation of social media platforms such as FaceBook, Twitter and Instagram in creating public awareness of climate changes to individuals.

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