

**Information and communication technology application
in national meteorological services Agency**

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1. Abstract

National Meteorological services Agency (NMSA) collects data, using telephone, Single Sided Band (SSB) radio, postal service and satellite communication systems. The Agency also uses Global telecommunication system (GTS) to exchange Meteorological data with World meteorological Organization (WMO) members' countries. As the communication technology is rapidly changing, to meet world standard, NMSA has tried to computerize meteorological data using different databases. The Agency attempt, have been made to implement climate database management system (CDBMS) using a VAX, computer, with about ten terminals for data entry in 1980's, Magnetic tape had been used to store the data. However, due to outdated of this machine all the data collected and organized had been lost. After the failure of this, NMSA has implemented another software, which is called CLICOM (climate computing) software that developed by WMO member countries. This software has been used but failed due to lack ownership, as there was no ownerships or responsible agency for its sustainable development and updating with current technology ...At present until we get sustainable, effective and efficient system. NMSA is forced to use Microsoft excel software for data entry and processing and organizing, however, to alleviate the problems the agency has taken different measures, among them preparing the following different projects to request finding agencies

- Climate database management system project proposal
- ICT policy formulation
- ICT capacity building
- Web site Development
- LAN/WAN implementation to connect its Regional office Bureau's

The Agency has also faced problems due to turnover of trained manpower, this also creates problem in services delivery. I think this is not only specific to our agency, so it needs Comprehensive solution at all level of the country.

2.Introduction

Meteorological services require among other things, consistent, accurate and reliable data, information and their timely exchange among appropriate stakeholders. The accuracy of the service given by the meteorological office is intuitively dependent on the accuracy and the timing of the information collected and processed. Meteorological data are huge in volume and are in different formats; numeric, symbolic, descriptive, graphics, satellite imageries etc. The information is also disseminated in different form raw data, processed data, regular weather report, special weather report, different bulletins (Climatology, Hydrology, Agro-meteorology), Satellite based rainfall and vegetations reports and, published and unpublished research works. Data are observed and recorded from all over the country (more than 700 stations currently operational With different climatic variables or elements) on selected hours of a day on a regular basis, and collected through eleven regional meteorological offices within the country. These data could be used in the real time for forecasting purposes or to be archived either manually or in electronic format for research and climatologic purposes. Diversified means of communications are being employed to exchange these data including telephone, SSB radio, post, etc. Nevertheless, the manual manipulation, store, retrieval and exchange of such huge data are difficult. . However these huge data must be computerized, retrieved and transferred and secured for easily accessible

In the national move towards the implementation of the government policy to reduce poverty and enable the country to food-sufficiency, the role of meteorological service grew up. Demands from policy makers, researchers and investors for meteorological services are diversified and reached to its highest level. To satisfy these increasing and diversified needs, the present manual and backward meteorological information handling system is totally inefficient. Further, the government determined to give meteorological service as close to the users as possible by decentralizing its services. To fully exploit the decentralization scheme and provide a service that cope up with the national demand of poverty alleviation, implementation of comprehensive Information and communication technology (ICT) system is a necessity.

3.The role of Information and communication technology in National Meteorological Services Agency (NMSA)

The time we live is an Information age. In this era, information and communication technology plays decisive role in our day-to-day life. Further, any modern service needs efficient utilization of this technology for its effectiveness and productivity. The science of meteorology is known for being pioneer user of this technology right from the birth of it. Due to the vastness of the data collected, processed and analyzed for meteorological services and by the virtue of the service being never abide by political boundary, necessitated for the field to utilize the state of the art technology in the field of information and communication technology as Global Telecommunication System (GST) early its ages and still continued to use with complementary of internet. Therefore, for efficient and effective exchange of data among the regional meteorological offices and with the head office, and also to all customers of meteorological services, computer networking with in and among regional offices are of paramount importance. Further, by utilizing one of the services of the Internet, the World Wide Web, we have to disseminate our services to the general public at its locality. NMSA services are diversified in terms of products and users. Services that are helpful for public safety (safeguarded the public from the harmful effect of weather and climate) may be disseminated free of charge. Such information is highly demanded by the general public at large and is required to reach to many hands. These are ideal for web site dissemination. To get others NMSA services /products/, such as weather forecasting, climatological data and satellite information need to have sustainable

ICT for user communities. The users can range from local to worldwide space wise in diversified socio-economic sectors. These services can be uploaded on the Internet according to the agency's metrological delivery policy. Further, NMSA disseminate raw and processed meteorological data. Information about the details of these data (metadata: availability of data, their quality, spatial distribution, format, cost etc.) can be put on the web page so that users can get sufficient information about the data without visiting our offices. In fact, users can even get the data from Internet after fulfilling the necessary requirement. Web site helps to improve the awareness of the public on the science of meteorology in general and the services of NMSA in particular. It further encourages the public to utilize our forecasting reports and also helps us to get feedback on the service we render from a wider range of users

In a general sense, Information and Communication Technology can facilitate

- Meteorological data and weather information exchange
- Access to learning tools
- Access to software tools
- Publication of research activities
- Access to advanced centers with appropriate products for specific applications
- Easy to store and retrieve huge data effectively and efficiently

4. Problem faced in the development of the computerizing huge climate data

NMSA needs computerized system, networking, trained manpower and standardized guidelines as to how to handle meteorological data and information (collect, process, archive, computerize and exchange). Attempts have been made to computerize meteorological information in a required manner

4.1 Problem faced in Climate Data Base System

Different attempts have been made to implement climate database management system (CDBMS) here in the National Meteorological Services Agency (NMSA). The first attempt of CDBMS was using a VAX Mainframe computer with about ten terminals for data entry. Magnetic tapes had been used to store the data. Database IV had been used as a database software to organize the climate data. With a failure of the VAX machine, all the data collected and organized had been lost. All attempts to recover the data from the tape had been unsuccessful.

Following the failure of the above system, CLICOM (climate computing software which had been developed by world Meteorological organization member countries) has been used to organize climate database in both standalone and network platform. However, this also has not been successful, due to lack of updating with the fast and advanced technologies as there is no responsible Agency to update. This also complements with lack of trained manpower and sustainable support on the system.

At present, climate data entry, processing and organization are carried out on Microsoft Excel software on a stand-alone platform. Since Ms-Excel is not suitable for the purpose of climate database management system, it is difficult to get required services as much as fast. It is not far from manual as it accepts what is keyed in it. It has no quality control system by itself for variety of weather elements

4.1 Problem faced getting trained man power in ICT

. We also need qualified, trained and dedicated ICT staffs and organizational structure that could sustain the system. Without qualified manpower in ICT, all the efforts in this direction will never have sustained result and will be futile. Getting trained manpower in ICT is difficult since salary is not attractive compared with non-governmental Agencies

4.2 Lack of appropriate Policy in Information communication technology (ICT)

Having Good ICT policy can contribute for the following condition

- Standards for data entry, processing, quality control, archiving and exchange among different departments within the head office, between the regional meteorological offices and the head office and, also among regional offices in both manual and electronic format.
- Set standard for data security and backup (both manual and electronic) procedure standards, disposal procedures.
- Set standards for ICT manual, set software and hardware purchase, update and installation standards.
- Set the criteria and procedure to enable disposal of computer hardware and software. Standardize web page documents.
- It encourages electronic metadata and defines the required manpower.
- Defining a clearly responsibility of manual and electronic data handling, have book/library collections in ICT.
- Standards for the computer hardware and software supports, Internet access and utilization standards. However, it is always difficult to guess what the next technological development might be but it is much easier to identify new uses of existing technology.

. 5.solution

National Metrological services Agency must have

- **Installed client/server based modern Climate Database Management System (CDBMS) and other application software in the head office and regional meteorological offices.**
- **Effective exchange of meteorological data among departments and regional offices and efficient utilization of ICT resources will be ensured.**
- **Increased efficiency and consistency in NMSA services**
- **Data rescue work**, which includes the transfer of long-year climate data collections from hard copy (both digital and analogue) to soft copy.
- To **facilitate efficient data exchange** among the eleven regional meteorological offices within the country as well as at the international level.
- To **facilitate timely supply of raw and processed data** to users of diversified category.
- To **acquire a clear ICT policy and guidelines** that support efficient meteorological services dissemination.
- To **set standardized for all ICT infrastructure and services** at the regional and federal level.
- To **set standards** for a manual and electronic data entry, processing, quality controlling, archiving, security and backup as well as data exchange at regional and federal level.

5.1 Build the capacity of the ICT staffs at federal and regional level

To enable them to develop and run comprehensive and sustainable ICT system, which in turn enable efficient and effective meteorological services at all required levels.

To have Skilled, Well-trained and qualified staffs that could properly manage and run all the systems (Network, Database, qualified System administrator, Network administrator, Database Administrator, Web Page Administrator, system Analyst and Programmer). Also all computer users will be well trained to the extent of proper utilization of the ICT infrastructure.

6.recommendation

The final use of information communication technology assists National meteorological services agency (NMSA) to bring fast collection, transition, storage, retrieving and securing data management and dissemination.

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