Effective Disaster Management by Efficient Usage of Resources

Rajesh Sharma R[1], Akey Sungheetha[2], D Kavitha[3], P Anitha[4], Sreeja G[5]

[1,3,4,5] Department of Information Technology, Hindusthan College of Engineering and Technology, Coimbatore, India.
[2] Department of Information Technology, Karpagam College of Engineering, Coimbatore, India.

Abstract**—***Disaster Management can be merely defined as the organization and management of resources and responsibilities for dealing with all humanitarian aspects of crises, in specific preparedness, rejoinder and recapture in order to diminish the influence of disasters. But the affects of the disaster increases only when the information about the disaster is unknown and when the resources for the disaster management is not correctly used. Now there are several methods for forecast the disaster, But there are no any effective methods for handling the resources needed for both managing the disaster and also for rehabilitation purpose. Thus this paper proposes an application used for managing the disaster and handling the rehabilitation process. This application which deals with almost all the resources those are required for the management of disaster. This proposed application which is based on java programming language. This project also has a great scope of enhancement in future.*

Keywords—Humanitarian aspects, rehabilitation, response and recovery.

I. INTRODUCTION

A disaster is a serious distraction of the working of a community or a civilization involving widespread human, physical, economic or environmental losses and influences, which exceeds the ability of the affected community or society to cope using its own resources. Developing countries suffer the utmost costs when a disaster hits – more than 90 percent of all deaths caused by hazards occur in emerging countries, and losses due to natural disasters are 20 times greater (Gross Domestic Product in form of proportion) in developing countries than in developed countries. The research was targeted to natural disasters such as: slides, floods, tsunami, earthquakes, volcanic outbreaks, and landslides, rocks tumbling down, drought, dams rupture, forest fires, wind storms, cyclones. In order to avoid, or decrease considerable losses to a business, emergency managers should work to recognize and anticipate potential risks, hopefully decreasing their chance of occurring.

In the event that an emergency does occur, managers should have a plan prepared to mitigate the effects of that emergency, as well as to ensure the Business Continuousness of critical operations post-incident. It is essential for an organization to include procedures for determining whether an emergency situation has occurred and at what point an emergency management plan should be triggered. The first step for ensuring the security and justifiable development is to know about the disasters and its affects. Big natural disasters that are from a viewpoint of the protection and development of a human and its protected resources the most significant are not evenly placed in the world and they do not even occur regularly in certain areas nor evenly in time. Therefore, the basic questions connected with safety management are: - [AlexCruden, 2015/03/17]

- Why and where do disasters occur?
- Is it possible to control disasters at least in the sense of a directive of their occurrence?

Form these questions we are able to know the nature and potentials to happening disasters. The disaster prone areas should be in incessant investigation. With climate change and the potential for an increasing frequency of natural disasters around the world, it is expected that there will be increasing impact on the health of populations.

II. AFFECTS OF DISASTERS

The main affects of disasters are loss of life and property. There are thousands of people losses their life and a huge economic loss.

According to 2014 report and survey of United States of America, since 2010, 4.3 billon people have been affected by disasters, which claimed 1.3 million lives and cost $2 trillion in economic losses. Thus the management of disaster and handling of the disaster resources are very important in order to reduce the loss of life and property.

Fig.1: loss of life and property due to disaster around the world.

2.1 Management of disaster

Planned steps taken to minimize the effects of a disaster, and to be able to proceed to business continuitystage. The management of disaster which include:

- Disaster Anticipation
- Disaster Preparedness
- Disaster relief
- Disaster recovery

If these are managed and planned properly then the affects of the disaster can be reduced to the greater extent.The management of disaster also includes the management of resources such as [Alan Bates, 21/03/2015]:

- Troop management
- Transportation management
- Route management
- Database management
- Arms management
- Medical support management

III. EXISTING METHOD

3.1 Pre-incident training and testing

Emergency management plans and events should include the identification of appropriately trained staff members responsible for decision-making when an emergency occurs. Training plans should contain internal people, contractors and civil protection partners, and should state the nature and frequency of training and testing. Testing of a plan's effectiveness should occur regularly**[**Jaffin, Bob, 17, 2008].

3.2 Communicating and incident assessment

Communication is one of the key issues during any emergency, pre-planning of communications is serious. Miscommunication can easily result in emergency events escalating unnecessarily.

3.3 Mitigation

Personal mitigation is a key to national preparedness. Individuals and families train to avoid unnecessary risks. This includes acalculation of possible risks to personal/family health and to personal property, and steps taken to minimalize the effects of a disaster, or acquireassurance to protect them against effects of a disaster.

3.4 Preparedness

Preparedness focuses on preparing required equipments and events for use when a disaster occurs. This equipment and these procedures can be used to reduce susceptibility to disaster, to mitigate the impacts of a disaster or to respond more efficiently in an emergency**[**Buchanan, Sally, 2000].

3.5 Preparedness measures

Preparedness measures can take many forms ranging from concentrating on individual people, locations or occurrences to broader, government-based "all hazard" planning. There are a number of preparedness stages between "all hazard' and individual planning, generally involving some combination of both mitigation and response planning. Business continuity planning encourages businesses to have a Disaster Recovery Plan.

IV. DISADVANTAGES OF EXISTING SYSTEM

- Scarcity of resources for correct handling of disasters.
- Allocation of medical supports, troops, arms according to the effectiveness of the disasters is not that effective.
- The history of the disaster affected area is unknown.
- The geographical areas and easy routing to the affected area is unknown.
- The history and the details of the troop is not noted effectively.

V. EXISTING TECHNOLOGIES

5.1 *GIS and Remote Sensing in Disaster Management*

Remote sensing is the measurement or attainment of information about an object or phenomenon by a recording device that is not in physical or intimate contact with the object. In practice, remote sensing is the remote utilization (As from aircraft, spacecraft, satellite or ship) of any device for congregation information about the environment.

Thus, an aircraft taking photographs, earth observation and weather satellites, monitoring of a geographical area is important. In modern usage, the term generally refers to techniques involving the use of instruments aboard aircraft and spacecraft [University of pune,07/07/2015].

5.2 *Raspberry PI*

Raspberry pi which is a hardware which is used in sensor technology, used in American army for disaster management. The raspberry pi which is highly used in sensing the geographical areas. The raspberry uses the JAVA technology in it. The disadvantage of raspberry pi is the it is highly expensive [S.Prasad,2012].

Fig.2: Image of Raspberry pi

VI. PROPOSED METHODS

The proposed method which is a JAVA based application. The application which accepts the input from the sensors and then responds according to the range of the sensor values i.e. the effectiveness of the disaster. For example, GPS sensors system which is mainly used along with the smart phone technology.

This proposed method which is mainly used avoid the excessive cost to implement the usage of sensors along with the JAVA programming language i.e. the usage of RASPBERRY PI, the manual inputting method can be used. Therefore we can use the devices which detect the disaster and its measurements are taken and it is given as input to the java application. For example, **Seismometers** are instruments that measure motion of the ground, including those of seismic waves generated by earthquakes, volcanic eruptions, and other seismic sources. Records of seismic waves allow seismologists to map the interior of the Earth, and locate and measure the size of these different sources. Thus the seismometer value is given as the input to application and then all the resources can be calculated according to the input value, similarly the area of disaster affected is also given as the input to the application in order to know the population, history, geographical conditions, government, administration etc..

Then according to the range of values the application gives us the resources to be managed and handled. Resources that are managed by the proposed application are:

6.1 *Troop Management*

According to the range i.e. the effectiveness of the disaster the troop that is to be used for the rescue operation is calculated. This is used to accurately calculate the troop members needed for the rescue operation according to the population of the affected people.

6.2 *Medical Support*

This component also entails of all the details of the hospitals and the medical support that are available across the disaster affected area. This gives the details about the doctors, causalities available, special facilities in the hospitals etc.

6.3 *Arms Management*

This method also consists of the module to manage the arms that are required for the rescue operation. The arms are allocated according to the troop members and the effectiveness of the disaster occurred in the particular area.

6.4 *Rehabilitation Resources Management*

This method deals with the module that is used to manage the resources that are required for the rehabilitation purpose. The resources include the food, sheltering materials, basic medical support according to the population and effectiveness of the disasters.

6.5 *Maintaining the History*

The method also facilitates to maintain the history of the previous history of the troop, the person who lead the group, the success rates of the troop, failure rates, area they are served in, total members of the troop, level of arms used by the troop during previous rescue operations, loss of life etc., are maintain in order to select the best rescue team for the disaster.

6.6 *Maintaining the History of the Disaster Effected Areas*

This method deals with the history and geographical status and condition of the disaster affected areas. This is very much used in effectively handling the disaster. It also contains the details of population of the particular area. The area that can be selected by the user. The frequently affected areas are maintained with more details.

6.7 *Efficient Routing System*

The method which also consists of the GPS maps in order to accurately follow the correct route to the disaster affected area. It also shows the shortest path to safely reach the affected area. This helps to timing recovery of people to reduce the affect of the disaster. For example, the area affected by landslides, many of the roads is blocked, so this GPS map system used to direct the shortest path to reach the disaster affected place. Akey & Sharma introduced efficient gene selection approaches for selecting rout.

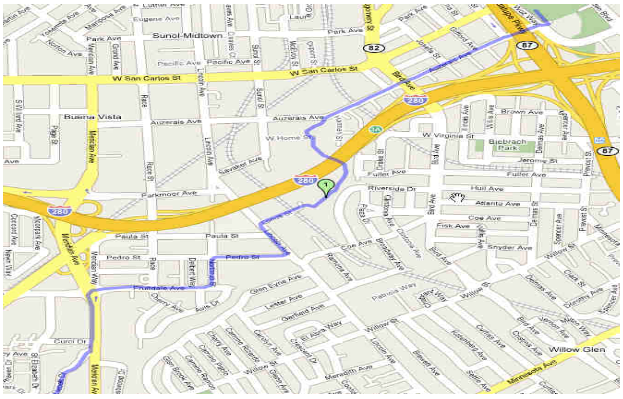

Fig.3: Image of GPS map routing

6.8 *Satellite Images*

This proposed method also has the storage of satellite images. These satellite images which are used to determine the geographical conditions of the particular area. It also contains the collection of images of previous disasters occurred in that particular area.

Fig.4: Satellite image of an island during disaster

VII. ADAVANTAGES OF THE PROPOSED METHOD

- Accurate details of resources are calculated, thus there is on any scarcity of resources.
- All the affected areas are identified, thus troop can reach to each and every part of the affected region.
- This method is much cost effective than the existing methods of managing the disasters.
- Satellite images are used for efficiently handling the disaster.
- This also facilitates to maintain and know about the history of previous disaster areas and troops involved in the rescue operation.

VIII. FUTURE ENHANCEMENT

Usage of Raspberry can be included in this application for better results. The raspberry pi may reduce manual interventions. The additional resources management can be added according to the future needs and requirements. The details of all forms of armed forces, disaster specialized forces, defense forces can be included for better management of disaster. The security should be ensured to secure the details of all the resources.

IX. CONCLUSION

Disasters are the events that have a huge impact on human and environment. Disaster are something which cannot be prevented but the disaster preparedness is in our hand. Disaster management which includes the government intervention and proper planning that includes the funding. This management application provides the opportunity to plan for, prevent and lessen the impact of disaster. The worst affect can be completely or partially by preparation, early warning and allocation of resources according to the need.

The government or the state community has to manage this disaster, thus this above proposed application which can be used to manage and know about various resources including the very important troops, transportation, arms etc., According to the effectiveness of the disasters. This also helps us to maintain the history of the disaster in that particular area and also to know the details of the troops. Thus we are able to calculate the success rate of the rescue operation. Thus implementation of this application which helps to efficiently handle and manage the disaster and rehabilitation works.

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