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MODERN TECHNOLOGY FOR FORECASTING NATURAL DISASTERS AND THEIR SIGNIFICANCE FOR HUMANITY

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Introduction. This article discusses about the definition and characteristics of disaster, their hidden causes and destructive impacts, and provides example of how humanity deals with such unforeseen circumstances using modern technology.

Main Definitions of Disaster:

Considered as one of the most oversimplified term, when it comes to disaster, people often refer to enormous-dangerous events which rooted from nature, which is true in the cases of volcano, earthquake or tsunami, but there is more to that. For a situation to be classified as 'disaster', that event must led to a critical interruption of human society, with negative impact toward human life, material, economic and environment, thus requires assistance from the government, who must come up with a flexible plan to overcome challenges, such as conducting rescue operation, recovery and prepare for the next disaster. If such event only cause small disruption to human society, does not affect other region, and the local authority are able to handle situation by themselves, then it would be more appropriate to categorized this as 'emergency', however, this does not imply that emergency can be taken lightly, as it can escalated to disaster, if overlooked [1].

Causes and Effects of Disasters in 21st centuries:

Disasters are divided into two categories, natural and man-made, natural disaster usually occurred in large scale and mankind rarely had control over them, some of the most common natural disasters are earthquake, which canlead to other disaster depends on the location such as volcanic eruption and tsunami, in addition, there are also floods, droughts, storms and wildfire. Man-made disasters are often caused byhuman, and usually related to system failure or accident from industrial zone, someof the most notorious man-made disasters were Chernobyl Nuclear Disaster and Bhopal Gas Tragedy. In 21stcenturies, researchers discovered that natural disasters will occur more frequently and severebecause of climate change, according U.S. Geological Survey (USGS), the rising global temperature increase heatwave and water evaporation, thus intensifyingthe heatwave and leads to

various disaster.Examples of climate related disaster are Cyclone Idai, which destroyed thousands of people and agricultural sector of Zimbabwe, Malawi and Mozambique in 2019, Cyclone Kenneth also attack Mozambique six weeks later. The Australian Wildfire at the start of 2020, born from extreme heat, razed the entire continent to the ground, which not only affect human, but also other species and ecosystem beyond recovery. The drought and flood in Africa and Asia are nothing new, but it has gotten worse due to excessive heat from rising sea temperature and level, making it impossible to maintain crops and livestock, forcing people to relocate and seeking humanitarian assistance. In addition to anincreasing frequency, economic damages from natural disaster are massive, with usually more 100 billion U.S dollars each year in the past decade [2,3,4,5].

Modern Disaster Prevention and Mitigation Technology:

Although unpredictable, humanity is working hard to predict, prevent and prepare for nature wrath. people have adapted existing technology for disaster uses, for example, aerial vehicles such as drones and helicopters, are being deploy by disaster-related organization to track down and dropping humanitarian aids to survivors in an inaccessible area. Geological and weather forecast agency work together with mobile phone provider in establishing a special SMS system or a mobile application which notify the people about disaster threat, these agencies also deployed advanced sensor and computer in order to make the prediction as precise as possible, three example of this technology is Trilogy Emergency Relief Application (TERA), developed after Haiti Earthquake in 2010 for survivors to directly contact the rescue team. The second is SHAKEALERT, an earthquake early warning system developed by U.S. Geological Survey, to provide fast and accurate information regarding the earthquake. The third is Project Serval, a mobile application which allowed the users to communicate in case of network signal blackout. Other interesting innovation that has proven useful in the hand of responder are FINDER, a portable heartbeat sensor device developed by NASA to detect human heartbeat 30 feet beneath the ground, a fire extinguisher ball which

snuff the flame immediately upon impact, and SpaceX's escape pod designed to rescue people stuck under water [6,7,8].

Conclusion:

Natural disasters are very powerful forces of nature, it does not choose time or location, destructive in many aspects and pose a danger threat toward civilization, therefore, they must not be taken lightly by any institution. That is why technology are needed, to combat an imminent threat, to calculate the risk, to ease the workload of rescue team, but most importantly, to save humanity.

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МНОГОКРИТЕРИАЛЬНЫЕ МЕТОДЫ ОЦЕНИВАНИЯ И ВЫБОРА УПРАВЛЕНЧЕСКИХ РЕШЕНИЙ

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В процессе принятия управленческих решений, лицо, принимающее решение, анализирует множество альтернативных вариантов, среди которых необходимо выбрать наилучший. Для осуществления такого выбора необходимо оценить эти альтернативы по различным критериям. Решить эту задачу помогают различные методы многокритериального оценивания и выбора.

На сегодняшний день разработано множество различных методов, которые помогают принимать конструктивные решения в условиях многокритериальности.

Рассмотрим один из возможных многокритериальных методов оценивания и выбора управленческих решений – метод анализа иерархий Томаса Саати [1] (далее по тексту – МАИ).