Czech University of Life Sciences Prague

Faculty of Economics and Management

Department of Management and Marketing

Bachelor Thesis

How a natural disaster impacts tourism and how technology helps in disaster response.

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CZECH UNIVERSITY OF LIFE SCIENCES PRAGUE

Faculty of Economics and Management

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How a natural disaster impacts tourism and how technology helps in disaster response

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Objectives of thesis

To examine the impact of natural disasters on tourism in Nepal, with a particular focus on the use of the Internet of things (IoT) during emergencies.

To explore the factors that influence tourists on decision-making during emergencies, including the type of information they seek and the channels they use to access it.

To identify how disaster management can benefit from recent advances in technology and communication in promoting the recovery of tourism destinations.

Proposal to develop low-fidelity (Lo-fi) prototype for mobile application in emergency communication & destination management during emergencies.

Methodology

To achieve the objectives, The research will be based on theoretical and practical parts.

The theoretical part will be based on Literature review where a comprehensive review of the existing literature on the impact of natural disasters on tourism will be conducted. This will include a review of academic journals from different sources, including Internet sources, books, journals and so on.

The practical part will be divided into two different segments: qualitative and quantitative methods.

A survey questionnaire will be conducted for the quantitative method and semi structured interviews will be performed for the qualitative method. Questions will be based on how natural disasters affect tourism plans, and how the Internet of Things (IoT) contribute to disaster response and preparedness.

Based on the outcomes derived from these methods, a low-fidelity (Lo-fi) prototype for mobile applications will be developed as a demonstrative solution, offering suggestions for practical utilization.

The proposed extent of the thesis

Approx 40-50 pages

Keywords

Tourism, Disaster, Destination perceptions, Technology, Emergency Communication, Mobile application.

Recommended information sources

Derham, J., Best, G. and Frost, W., 2011. Tourism in Turbulent Times: A Crisis Management Approach to Natural Disasters. In CAUTHE (21st: 2011: Adelaide, S. Aust.) (pp. 1036-1039). Adelaide, SA: University of South Australia. School of Management.

Fotis, J., Buhalis, D. and Rossides, N., 2012. Social media use and impact during the holiday travel planning process. In Information and communication technologies in tourism 2012 (pp. 13-24). Springer, Vienna.

Ritchie B.W., Campiranon K.,(2014), Tourism crisis and disaster management in the Asia-Pacific, CABI Publishing, 284pp, ISBN-13 : 978-1780643250

Yang, L., Yang, S.H. and Plotnick, L., 2013. How the internet of things technology enhances emergency response operations. Technological Forecasting and Social Change, 80(9), pp.1854-1867.

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Prague on 26. 11. 2023

Declaration

I declare that I have worked on my bachelor thesis titled " How a natural disaster impacts tourism and how technology helps in disaster response." by myself and I have used only the sources mentioned at the end of the thesis. As the author of the bachelor thesis, I declare that the thesis does not break any copyrights.

In Prague on 11.30.2023   Sudip Kharal

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I would like to thank and express my gratitude to my supervisor, Ing. Richard Selby, Ph.D., for his help, direction, support, and sound counsel during my thesis. His knowledge and experience have been extremely helpful in directing the shape of this study.

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How a natural disaster impacts tourism and how technology helps in disaster response.

Abstract

This study focuses on the impact of natural disaster on tourism in Nepal and the use of the Internet of Things (IoT) in emergency situations. This research aims to identify the factors that influence travelers' decisions and actions during times of crisis. It focuses on how Internet of Things (IoT) helps disaster management and restore tourism destinations. The research employs a mixed methodology that combines theoretical and practical approaches. The theoretical component comprises an extensive literature analysis that includes books, scholarly journals, and online resources to evaluate how disasters affect tourism. Both quantitative (survey questionnaires) and qualitative (semi-structured interviews) methodologies are used in the practical phase. These techniques seek to comprehend how natural catastrophes affect travel plans and how the Internet of Things contributes to disaster relief.

Ultimately, the study will result in proposing a type of (IoT) simple mobile application prototype, offering practical suggestions based on the research findings for effectively managing tourism during emergencies.

Keywords: Tourism, Disaster, Destination perceptions, Technology, Emergency Communication, Mobile application

Jak přírodní katastrofy ovlivňují cestovní ruch a jak technologie pomáhají při reakci na katastrofy.

Abstrakt

Jak přírodní katastrofa ovlivňuje cestovní ruch a jak technologie pomáhají při reakci na katastrofu.

Abstrakt

Tato studie se zaměřuje na dopad přírodní katastrofy na cestovní ruch v Nepálu a na využití internetu věcí (IoT) v krizových situacích. Cílem tohoto výzkumu je identifikovat faktory, které ovlivňují rozhodování a jednání cestovatelů v době krize. Zaměřuje se na to, jak internet věcí (IoT) pomáhá při zvládání katastrof a obnově turistických destinací. Výzkum využívá smíšenou metodologii, která kombinuje teoretické a praktické přístupy. Teoretická složka zahrnuje rozsáhlou analýzu literatury, která zahrnuje knihy, odborné časopisy a online zdroje, které hodnotí, jak katastrofy ovlivňují cestovní ruch. V praktické fázi jsou použity jak kvantitativní (dotazníkové šetření), tak kvalitativní (polostrukturované rozhovory) metodiky. Tyto techniky se snaží pochopit, jak přírodní katastrofy ovlivňují cestovní plány a jak internet věcí přispívá k pomoci při katastrofách.

Studie nakonec vyústí v návrh typu prototypu jednoduché mobilní aplikace (IoT), která na základě výsledků výzkumu nabídne praktické návrhy pro efektivní řízení cestovního ruchu během mimořádných událostí.

Klíčová slova: Cestovní ruch, katastrofa, vnímání destinace, technologie, komunikace při mimořádných událostech, mobilní aplikace.

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1 Introduction:

Natural disaster always turns out to be fatal for the tourism industry. Tourists and planners sometimes lose their lives whilst the service providers go through huge losses for loss of property and capital. Technology and software programming advancement has lessened the loss in the tourism industry in many parts of the world.

In recent years, the tourism industry has increasingly turned to mobile devices as a means of enhancing emergency communication and management during crises. The use of mobile devices, including smartphones and social media platforms, has facilitated real-time information sharing and improved communication between tourists and local authorities during emergencies. The thesis portrays the wide spectrum of technological advancement to reduce risk by utilizing technology, management information systems, and geographical information systems.

The literature review of the thesis will contribute to the existing body of knowledge on the impact of natural disasters on tourism and the use of technologies in emergencies communication and management in the tourism industry. The findings will provide insights into the effectiveness of mobile devices in promoting the strength of tourism destinations in the face of natural disasters, as well as recommendations for the effective use of such tools in emergency communication and destination management in the tourism industry.

2 Objectives and Methodology

2.1 Objectives:

To examine the impact of natural disasters on tourism in Nepal, with a particular focus on the use of the Internet of things (IoT) during emergencies.

To explore the factors that influence tourists on decision-making during emergencies, including the type of information they seek and the channels they use to access it.

To identify how disaster management can benefit from recent advances in technology and communication in promoting the recovery of tourism destinations & destination management during emergencies.

2.2 Methodology:

To achieve the objectives, The research will be based on theoretical and practical parts. The theoretical part will be based on Literature review where a comprehensive review of the existing literature on the impact of natural disasters on tourism will be conducted. This will include a review of academic journals from different sources, including Internet sources, books, journals and so on.

The practical part will be divided into two different segments: qualitative and quantitative methods.

A survey questionnaire will be conducted for the quantitative method and semi structured interviews will be performed for the qualitative method. Questions will be based on how natural disasters affect tourism plans, and how the Internet of Things (IoT) contribute to disaster response and preparedness.

Based on the outcomes derived from these methods, a low-fidelity (Lo-fi) prototype for mobile applications will be developed as a demonstrative solution, offering suggestions for practical utilization.

3 Literature Review

3.1 Natural Disaster and Tourism:

In simple terms, a natural disaster is a sudden and terrible event in nature that occurs without pre information causing serious damage to life and properties of the individuals, eco system and environment. Natural disasters are powerful in its own right, they do not discriminate in terms of where they strike and how much destructive they cause. With all the human technology that exists today, scientists are only able to monitor conditions to predict the occurrence of natural forces and its intensity (Tuladhar, 2016). Natural disasters diversely affect life, property, livelihood, or industry habitually resulting in permanent changes to human societies, ecosystems, and environment.

The definition of Tourism varies source by source and person by person. There is no exact definition of tourism. According to (UNWTO, 2008), Tourism is a social, cultural, and economic phenomenon which entails the movement of people to countries or places outside their usual environment for personal or business/professional purposes. Tourism is an activity which cuts across conventional sectors in the economy. It requires inputs of a social, cultural, and environmental nature, in this sense it is often described as being multi-faced (Lickorish, 1997).

Tourism is vital for the success of economies around the world. Tourism increases the economy's revenue, generates jobs, improves the country's infrastructure, and provides opportunity to gain experience about cultural and interchange between outsiders and natives (Yehia, 2019). The growth of tourism has been stimulated by general improvements in leisure time combined with increased flexible income for many people which has helped people to escape from work routine and engage in holidays, whether domestically or internationally

Travelers usually select travel destination with the intention of seeking some recreation, However, the presence of natural disasters or the occurrence of emergency situation in a tourist spot, made travelers to find alternate options to enhance the

benefit they obtain from tourism activities. Natural disasters have negative influence on transportation and communication infrastructure, which discourages tourists from travelling due to physical access challenges caused by infrastructure damage (Huang, 2002).

3.1.1 Historical Analysis:

Natural disasters are sudden and catastrophic events that cause serious economic and human losses. Natural disasters such as Earthquakes, floods, cyclones, storms, wildfires, volcanic eruption, and landslides have shaped the Earth's landscape over many centuries. When a disaster strikes local, federal, and state government needs an organized strategy, skilled workforce, Volunteering hands and accessible data in order to manage the response. Yearly millions of people around the world die and cause devastating effects to our community because of the natural disasters like floods, wildfire, hurricanes, and earthquakes.

Disasters and other forms of crises can lead to a reduction in visitation to the affected area. Disasters have two sets of causes. (The World Bank, 2005) The first set is the natural hazards themselves, including floods, drought, tropical storms, earthquakes, volcanoes, and landslides. The second set comprises the vulnerabilities of elements at risk- populations, infrastructure, and economic activities that make them more or less susceptible to being harmed or damaged by a hazard event. According to (CRED, 2023) Emergency Event Database (EM-DAT), 387 natural hazards and disasters were recorded worldwide, resulting in the loss of 30,704 lives and affecting 185 million individuals.

Figure 1: Total deaths per decade worldwide (1900-2020)
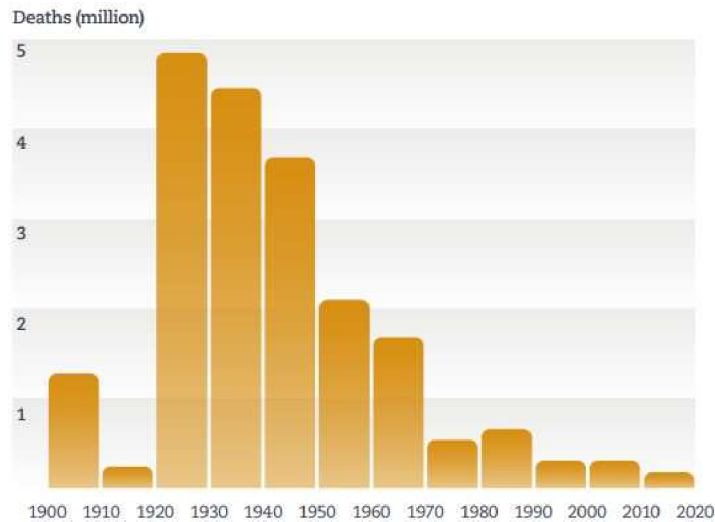
Deaths (million)

Source: EMDAT Report (CRED, 2023)

In Figure 1, The disaster mortality toll per decade for over 12,000 weather-related incidents is shown Between the 1920s, when there were 4.84 million deaths, and the decade of 2010–2020, when there were just 0.17 million deaths, Figure A shows a 96% drop in mortality. But this tendency does not go back to the 1920s, and the decline would only be 30% if the 1910s were used as the baseline comparison period (0.25 million deaths). The occurrence or non-occurrence of mega disasters, which can result in death tolls ranging from tens of thousands to several million per event, explains this variability.

3.1.2 Economic Impact:

The Travel industry has the greatest effect on the economy of wherever of the world. Primarily, the tourism industry plays a crucial role in creating employment opportunities. The increase in number of employed individuals generates income and enhances their quality of life. It also encourages people to establish new business in rural areas, thereby boosting production. In urban areas, it fosters investment and the development of infrastructure, all of which contribute to economic growth in the country. Tourism industry has changed a lot since its inception period. Along with the tourism, a lot of associated activities are also growing simultaneously to boost the tourism sector. The tourism industry is working in a

competitive environment, and to sustain in that environment they have to perform better. Performance in terms of service provided, service improvement, feel good- factor and value for the money. (Naqvi, 2021).

Figure 2: The 10 biggest natural disasters worldwide by economic damage from 1980 to July 2022(in billion U.S. dollars)
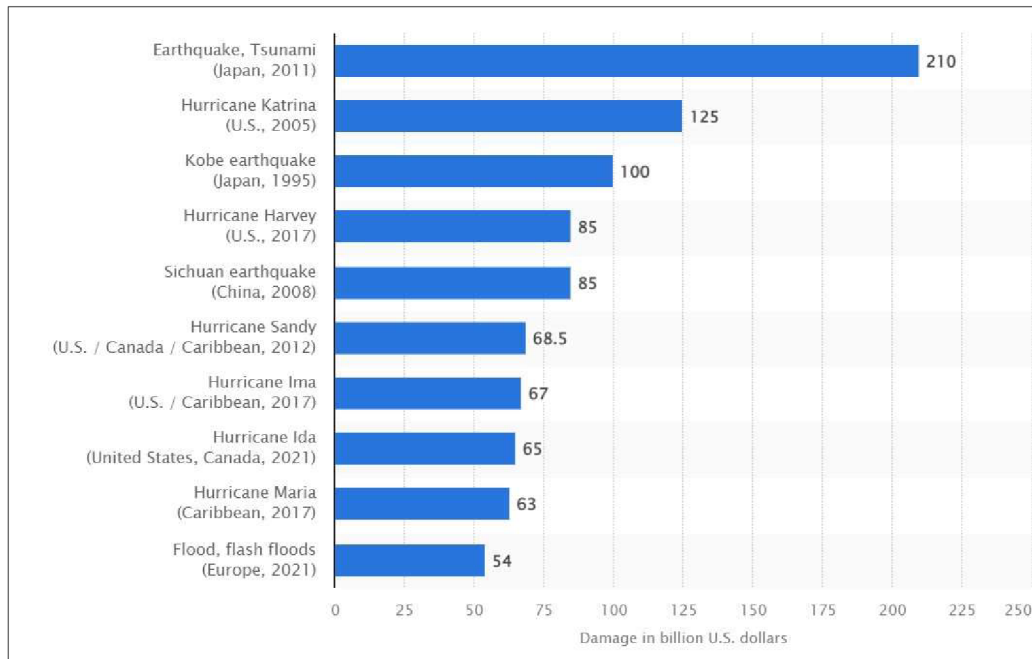
Source: Statista 2023

In recent years, Natural catastrophes are occurring more frequently and with greater intensity, which has led to a serious loss of life and the damage of property. In Figure 2, we can notice that the destruction caused by natural disasters economically worldwide from 1980 to July 2022. The 2011 Japanese earthquake and tsunami that followed resulted in the worst economic damages, totalling 210 billion dollars. There was a nuclear accident in the region when the tsunami struck the Fukushima nuclear plant. The second was Hurricane Katrina, which hit the Gulf Coast of the United States in 2005 and mostly impacted the states of Louisiana and New Orleans. The 2004 Indian Ocean earthquake and tsunami had the greatest death toll in terms of people killed.

Natural disasters are likely to disrupt short-term economic activities as a result of the direct and indirect harm they cause. (Hochrainer, 2009). The direct harm comes in two forms: (a) the loss of human capital, which includes human fatalities, disabilities, or injuries, and (b) the loss of physical capital, which involves damage to buildings, factories, and infrastructures. These direct losses can lead to further loss of labour wages and a decline in expected production output, whether it's in agriculture or industry. The lost wages in subsequent reduction in expected production may indirectly impact on the country's economic growth, as the wages would impact on the country's GDP after the occurrence of disaster. (Noy, 2007).

3.2   Tourism In Nepal:

Nepal is located in Central Himalaya in between China and India with an area of 147,181 square kilometers and home for 29.1 million people as per census 2021. Nepal is a mountainous country, Forth-firth of land area of Nepal is covered by hills and mountains. The highest point of the country is Mount Everest (8,848m) while the lowest point is the Terai plain in Kechana in Jhapa (60m) which makes the country's geography more diverse. Tourism is the main Livelihoods of Nepal after agriculture. Nepal is famous for its scenic beauty, Mountains, and ancient and historical importance.

Figure 3: Topographic map of Nepal
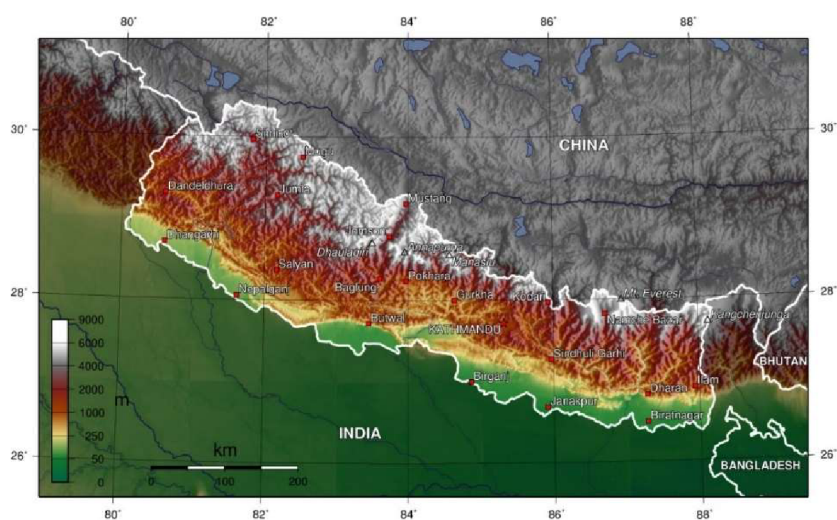
Source: (Mapsland, 2023)

The geographical Location of Nepal seems to be both the gift and curse by the nature. At one point the scenic beauty attracts many tourists which flourish the tourism industry of Nepal, and it seems to be the gift of nature to Nepal but contradictory to it, the geographical location (the Indian and Eurasian plates squeezing Nepal resulting in earthquakes followed by blizzards and avalanches, landslides etc.) (Ramesh Raj Kunwar, 2015). On the graph below it is possible to observe the number of international visitors in millions.

Figure 4:International Tourist Arrival in Nepal
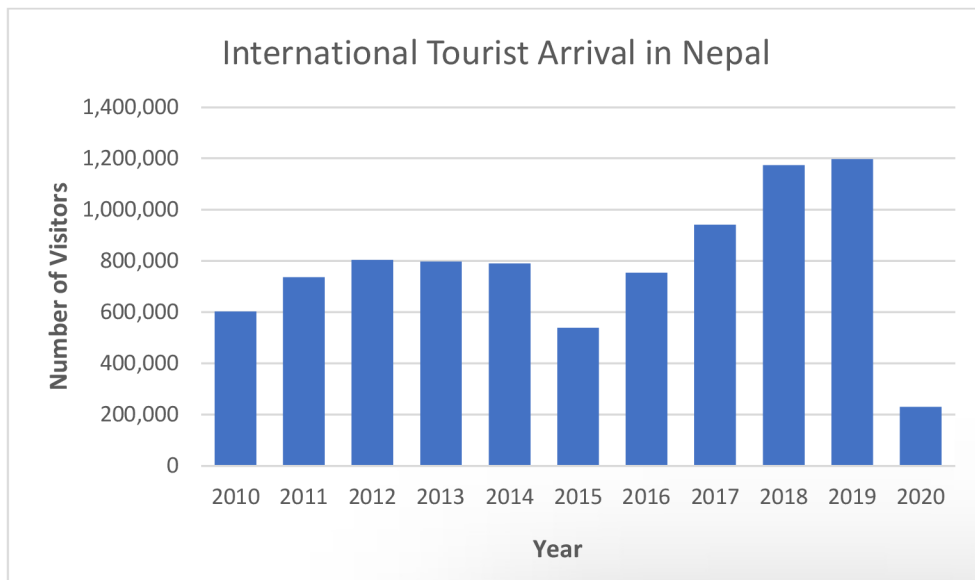
Source: (Government of Nepal, 2020)

On the graph above, it is possible to observe the International Visitors from all over the world to visit Nepal from the year 2010 to 2020. In the period of 10 years the number of Visitors increased by 2 times from 600. Thousand visitors in 2010 to 1.2 million in 2019. The change of trend can be observed in the year 2015 where Nepal was hit by the deadliest earthquake which brought the considerable damages to the tourist destination and change in visit plan of the tourists. After two years of the disaster recovery, it began to keep the pace and increased to have maximum number of visitors in the year 2019 and right after the year the number was decreased gradually to the lowest number in the decade due to the Covid 19 pandemic all over the world.

3.3 Natural Disasters in Nepal:

Nepal is among the top ten countries worldwide most affected by climate disasters in the past two decades with 0.82 fatalities per 100,000 inhabitants and 0.39% losses per unit GDP. (Eckstein David et al., 2021). The climate in Nepal varies with its topography and altitude. Due to the combination of rugged topography, active tectonic process and intense monsoon rain have made this fragile environment vulnerable to diverse types of hazards and disasters. (Shrestha, 2019). Yearly, Nepal is facing multiple natural hazards such as flood, earthquake, landslide, windstorm, hailstone, wildfire, drought, Glacier Lake outburst floods and avalanches. The 1934 Bihar- Nepal Earthquake, 1998 Udaypur Earthquake and the 2015 Gorkha Earthquake were the most devastating earthquake in Nepal during last 80 years.

3.4 Internet of things (IoT) in Nepal disaster response:

Nepal is a small developing nation in South Asia. Over the past few years, technology has played an increasingly important role in driving and innovation across various sectors of Nepali society. There are numerous advantages provided by IoT for disaster response and crisis management in Nepal.

While the Nepal Earthquake 2015, left many Nepalese people in need of necessities such as food, water, and shelter, IoT and mobile applications were used as a means of donation and contribution to the relief efforts. The availability of mobile applications such as Khalti, ESewa, and Fone Pay, among others, allowed people to donate money quickly and easily. using their mobile devices. This was particularly useful for individuals who were unable. to physically contribute to relief efforts due to location, injury, or other reasons. Research by (Kim, 2016) found that mobile applications significantly increased the amount of donations received during the relief effort following the earthquake. According to a press release from (NASA Homeland, Security, 2015), the device called FINDER (Finding Individuals for Disaster and Emergency Response) which uses microwave-radar technology to detect heartbeat of victims trapped in wreckage was deployed supporting search and rescue operation during earthquake in Nepal and was able to save four lives.

Moreover, Technology like mobile applications provided transparency in the distribution of aid and ensured that the intended beneficiaries received donations. In addition, advancement in technologies has been useful in search and rescue operations.

3.5 (IoT) Internet of things:

The internet is a globally connected network system that facilitates communications and data services through a vast collection of private, public, business, academic and government networks (Rouse, 2023). It was Invented by the Advanced Research Project Agency (ARPA) of the U.S government in 1969 and was first known as the ARPANET. The internet has been used for networking on a day-to-day basis either by e-mail or in making available resources to the emergency rescue community.

Over the past few years, the Internet of Things (IoT) has become an essential part of human life. IoT is a system of Inter-connected devices that are capable of collecting and exchanging data in real- time by using embedded sensors (Asghari et al., 2019). The internet of things is transforming physical items into an ecosystem of information shared between wearable, portable and even implanted devices, enriching our lives with modern technology and data. The basic idea of IoT is to enable a variety of objects around us, such as smart phones, electronic tags (RFID), sensors, tablet computers and other equipment to connect with each other (Castellani et al., 2010).

IoT creates opportunities to expand touristic service quality by offering greater access to accurate real-time information, which in turn helps raise the efficiency, effectiveness, service and maintenance of products and services (Cranmer et al., 2022).

3.6 IoT applications in disaster Response:

We cannot reject the existence of disaster but somehow, we can prepare ourselves from its vulnerability and save the lives. Disasters such as fires, floods, earthquakes, civil war, or terrorist attacks may cause crisis situations. Regardless of the origin, crisis situations are

often accompanied by uncertainty of how the disaster will develop, a rapid pace of response operations, and the possibility of serious loss of human lives and property if not responded to properly (Lili Yang, 2013). IoT devices reduce the need for constant physical monitoring, helping to eliminate the need of short- staffed emergency departments to maintain physical oversight while effectively identifying urgent needs, saving costs, and ensuring accurate, timely responses (Powers, 2023). There are so may practically uses of the IoT devices till this day, some of the most important applications are described below:

Crisis communication: One of the most crucial factors for a rescue operation is effective communication. Without effective communication it is hard to collect data of the victims and rescue operations could be delayed. So many IoT devices are developed in the field of communication. In the event of an emergency, such as a vehicle accident, cardiac arrest, allergies, or robbery, IoT technology allows for a quick reaction time. Before a crowd builds around a traffic accident, an ambulance arrives on time, allowing victims to get immediate care. Paramedics can provide quick care by using smartphones apps or emergency contact notes. That draws up basic medical contact of the victim such as blood group, allergies & close family contact.

Search & Rescue: Flood and Earthquake are the most re-occurring and devastating disasters in the world. So, it is important to have a detection system monitored and observed. The intended system, which is based on IoT technology, provides real time flood and earthquake analysis, allowing authorities to monitor flood and earthquake occurring areas. Big earthquakes cause buildings to collapse on themselves and obstruct safe escape routes. The longer the victims are held captive, the less likely they are to survive. Advanced radar technology helps rescuers to discover lives forms hidden by physically obstructive material like walls and building remains. Therefore, the use of IoT devices that use radio frequency (RF) detection and range technologies to rescue people trapped in areas that are undetectable to the naked eye.

Aerial surveillance: Aerial surveillance is one of the important inventions of IoT. If the search area is too big while doing the search and rescue operation only human efforts may not be quick so aerial surveillance through drones and helicopters with thermal imaging

cameras helps in detecting missing person around the jungle or in some disaster affected places either in day or night. Similarly, if the disaster is too bad and the airway in the area is not operating, drones are also being used in delivering medicines and equipment's which can carry things faster than traditional air routes, it also added the benefit of keeping more workers out of potentially risky areas and helps in conducting rescue and relief operations remotely.

Radar Systems: Natural disaster mitigation can only be successful if precise information on the predicted frequency, type, size, and magnitude of dangerous events in given area is acquired. Rainfall is a key contributor to natural catastrophes such as flooding, landslides, and flash floods. Rainfall monitoring is one of the most important concerns to address to avoid disasters. Several nations, including Japan and United States, have developed, and studied X- Band Polarimetric Radar Technology for disaster preparedness efforts. Disasters are not only natural but also human- made or human-induced disasters such as nuclear accidents, War. Several countries have installed Missile Defense System in order to avoid a missile attack. The radar and satellites send signals to the personnel if it detects the launch of enemy missiles and tracks them.

3.7 Tourist Decision Making During Emergencies.

Tourism is making an increasingly considerable contribution to the sustainable development of the world economy, but its development is susceptible to a series of disaster events (Haiyan Ma, et al., 2020). Natural disasters affect tourist travel patterns and tourist characteristics in socio- economic aspect as well as results in change of the tourist behavior. Generally, tourism is an activity for pleasure and to get oneself out of a busy and hectic life. It is essential to restore confidence to a level where awaiting visitors consider that disruption has been reduced and their holiday investment of time and money is secured. Tourist behavior and destination choice has always been a central issue in the tourism management literature (Papatheodorou, 2001). People try to escape out of their normal lives towards diverse cultures and environments which act like a magnet. Besides disasters, political instability of a destination could also lead to affect tourist decision. Tourism is a

discretionary activity that is incredibly vulnerable to political stability. Even major natural disasters such as earthquakes, hurricanes or floods do not tend to have the magnitude of impacts as that associated with political instability (Morakabati, 2008).

3.7.1 Influence of Information sources:

Information available to individuals has a significant impact on travellers' decision making, especially while choosing a travel destination (Zheng Xiang, 2008). As Information is the lifeblood of the travel industry, effective use of It is crucial. In tourism consumer's behaviour has always been influenced by developments in Information Communication Technologies (Buhalis, 1998). Tools, such as search engines, have become a dominant force that influence travellers access to different tourism products. Social media is another platform that has changed the dynamics of online communication, and mobile apps have created new locales for information search, facilitating information search in guiding travel decisions (Xiang, 2012).

Social media tools are used throughout the travel planning process and after holidays for experience sharing. Influence from social media, particularly in reputational areas, will strongly affect final decisions in holiday plans (John Fotis, 2012). According to (Xi Yu Leung, 2019), various social media platforms have major impacts on both business and consumers. Not only do they help in business management, but also are capable of changing customers attitude and behaviours.

3.7.2 Perception of Risk:

A risk is the chance of something happening that will have a negative effect. People are becoming more aware of travel concerns and safety in recent years. Tourism risk perception is a quantitative assessment of tourism security. Tourist perception of how safe a destination has a significant influence on their choice of destination, and they are primarily concerned of natural disasters (Ritchie & Campiranon, 2014). Destination risk perception of tourists

directly affects tourists purchase intention (Fangnan Cui, 2016). The perception of risk varies across tourists, and it is a major component of the decision- making process for evaluating destinations (Paul Brunt, 2000). Tourists usually choose to postpone traveling, go to a less risky location, purchases trip insurance or cancel the trip in order to avoid risks. Tourists uses a variety of rationalization strategies to justify a decision to risky destination (Natan Uriely, 2007).

3.7.3 Disaster Management:

Any disaster can be hazardous to human life and property as a result, it can affect the entire community and the whole nation as well. A disaster management is a process dealing with the organizing and management of the resources and responsibilities for the prevention of further damage which an event can possess in various phases of the disaster management. cycle. According to research conducted by (Derham, et al., 2011), it was recommended that tour operators should provide with relevant information's on understanding dealing with crisis management strategies which could reduce the impacts a crisis may have on a destination.

The media is an important aspect in communicating information concerning a crisis or disaster to various publics (including tourists) and are also important in restoring confidence in an organization or destination when a crisis or disaster is entering in the long-term recovery or resolution phase.

4 Practical Part

4.1 Research Process

At the initial part of the research, the author developed a theoretical framework for natural disaster affecting tourism plans, influencing factors and the use of technology during disaster response. The practical part of the study focuses on How natural disaster affects tourism plans and use of technologies during disasters. The Research method for this study will involve a mixed-methods approach that combines qualitative and quantitative research techniques. In this section the author covers the following topics:

- The author made a survey based on natural disasters affect tourism plans and technologies used by visitors during their travel.
- The author conducted a semi-structured interview with frequent travellers to clear out bias from survey data.
- Proposal of a mobile application prototype.

4.2 Survey:

4.2.1 Method and Procedure:

The survey questionnaire consists of three segments consisting of a total number of thirteen (13) questions. The first segment asks demographic information to the participants about their Gender, age, and level of education. The second segment has questions regarding their travel interest, about how often they travel, whether they have experienced disaster before during their travel and if they were aware of any Internet of Things (IoT) based technologies used during the disaster and their significance. Lastly, Segment three consists of questions, what kind of information do tourists seek during a disaster and where do they search for it, with regarding, their experience opinion of surveyors about what specific features or functionalities they would like to see in a mobile app built to assist tourist during travel and emergencies was asked with an open-ended response.

The survey was conducted from 20th of August to 25th of November 2023. The result from the survey was collected using an online questionnaire from google survey that was opened

for everyone, the survey was shared across various social media platforms such as Facebook, travelling groups, email, and WhatsApp with the aim of collecting maximum response. The participants were anonymous due to the privacy reason, and the survey was conducted in a voluntary form. For the survey sample size of 700 individuals were targeted from different group of people from different regions of Nepal. out of which 205 responds were successfully received.

4.2.2 Result and Discussion:

As mentioned earlier, the survey was conducted among various groups of people. The expected number of respondents were 700, however we manage to collect only 205 individuals' samples. For the first segment of questions regarding their gender and age and level of education shows that most of the respondents are male 53.17% and of age ranging between (25-34) and in terms of education level, most respondents have bachelor's degree 40.97% followed by high school 28.78%.

In the second segment of questions, the responses from 205 participants revealed interesting patterns in their travel frequency to different parts of Nepal for tourism. A significant portion, comprising 41% (n=85), indicated that they occasionally visit various parts of Nepal for tourism. A notable 27% (n=56) of respondents reported traveling very often. On the other hand, 19% (n=38) mentioned that they travel rarely. The remaining 13% (n=26) did not engage in travel at all.

These statistics provide a diverse snapshot of the participants' travel habits, ranging from occasional to frequent visits, with a notable portion traveling rarely and a smaller group abstaining from travel altogether. Understanding these variations in travel frequency adds depth to the overall perspective on tourism patterns in different parts of Nepal among the surveyed participants.

In terms of awareness about Internet of Things (IoT) related to natural disasters, among the 205 respondents, 65% (n=134) were aware of the existence of IoT-based services or technologies used during such events, while the remaining 35% (n=71) were not aware.

Figure 5: Count of awareness about Internet of Things (IoT) related to natural disasters.
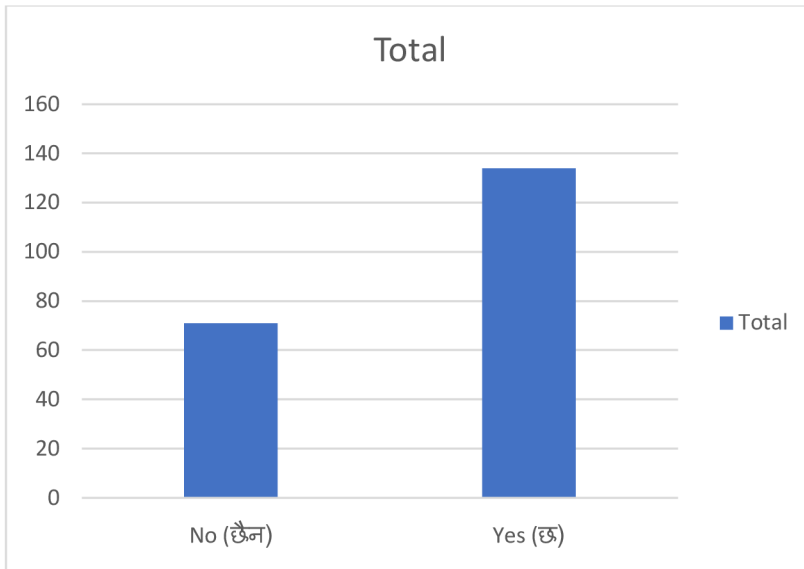
Source: Own work

Regarding preferences for receiving information during natural disasters, out of 205 respondents, 66% (n=136) were interested in receiving safety instructions through IoT-based technology. Additionally, 10% preferred information about evacuation routes, 9% seek emergency contact information, 8% were interested in weather updates, and 6% chose none of the options.

Figure 6: Count of During a natural disaster or emergency situation, what type of information are you most interested in receiving.
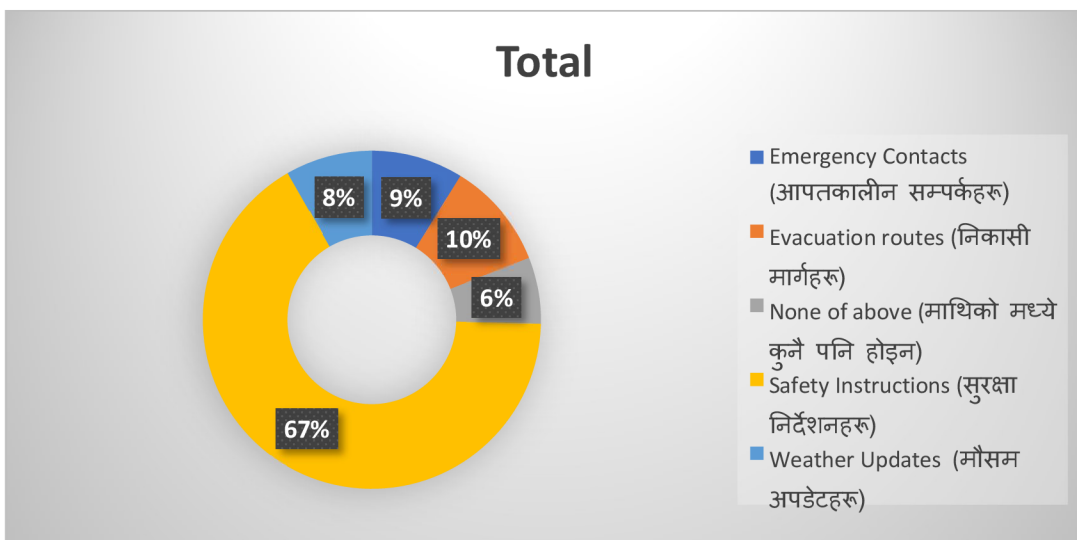
Source: Own work

In terms of communication preferences while traveling, a significant majority, 68.78% (n=141), preferred receiving emergency notifications through SMS/text messages on their phones. This was followed by 16% (n=33) preferring mobile apps, 8% (n=15) opting for social media platforms, and 3% (n=5) choosing local news channels.

Figure 7: Count of How do you prefer to receive emergency information's while traveling.
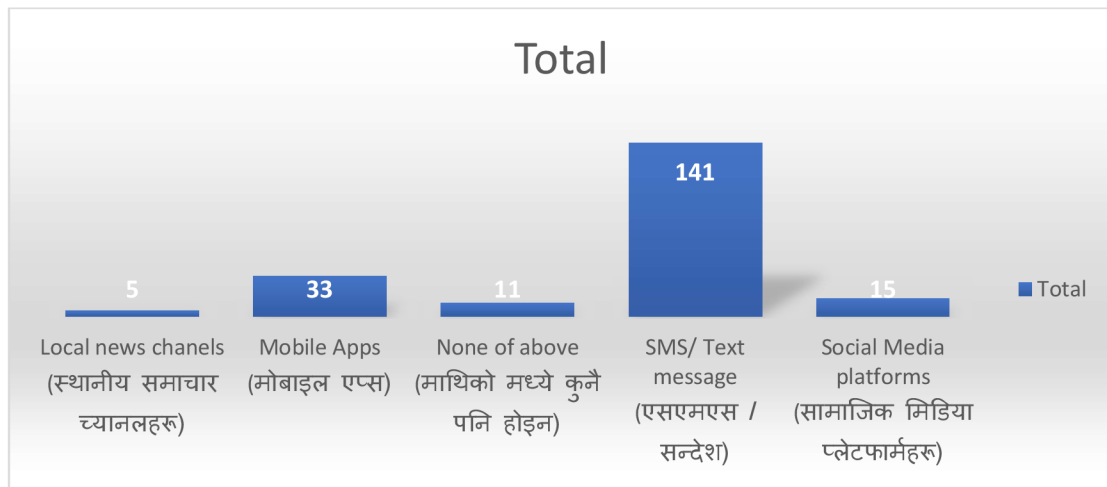
Source: Own work

When assessing the satisfaction and perceived effectiveness of IoT-based technologies during natural disasters, 36% (n=73) of respondents believed there would be a highly significant impact, 35% (n=71) were neutral, 24% (n=49) were very satisfied, and 6% (n=12) expressed dissatisfaction.

Source: Own work

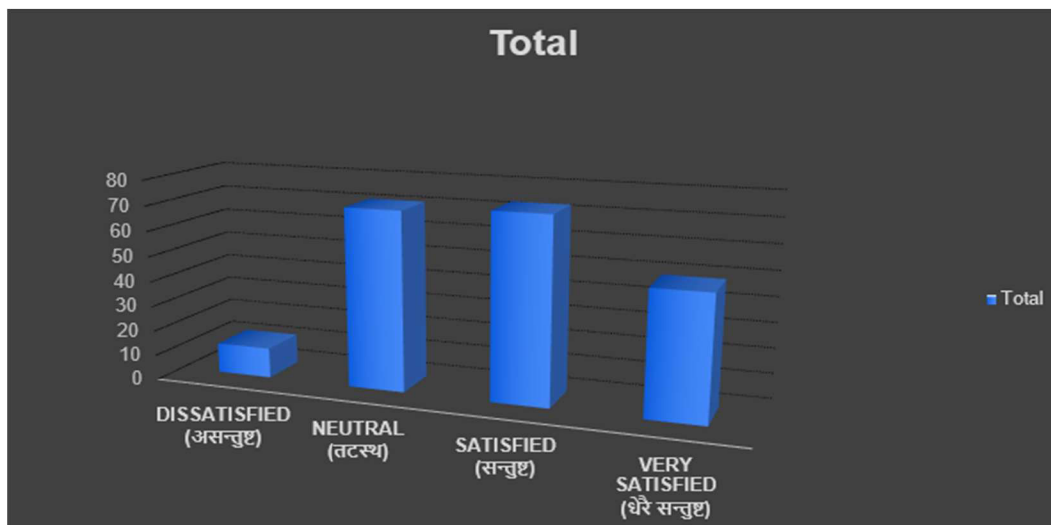Regarding the role of technology in the recovery of tourism destinations after natural disasters, 35% (n=71) of respondents suggested that improving communication and alerts should be prioritized, followed by 24% (n=50) advocating for the promotion of safe travels and the use of tourist safety apps.

An open-ended question about recommendations for features on mobile applications designed for tourists generated various responses, including offline maps, real-time alert systems, language translators, SOS functionalities, live chat, and other suggestions that could assist tourists during emergencies.

Based on these findings, a low-fidelity (Lo-fi) prototype for a mobile application has been developed as a practical solution, incorporating suggestions from the survey results to enhance the effectiveness of IoT-based technologies in aiding tourists during natural disasters

Based, on the outcomes derived from these methods, a low-fidelity (Lo-fi) prototype for mobile applications is developed as a demonstrative solution, offering suggestions for practical utilization.

4.3 Semi- Structured Interviews:

A semi-structured interview is a conversation where one person, the interviewer, asks questions to get information from another person. Qualitative research, which focuses on understanding experiences, has become more important. Interviews are a common way to collect information for research (Longhurst, 2003).

To conduct this interview, The author started by reaching out to individuals who had visited Nepal as tourists. The author explained the purpose of the research and how the interviews would be conducted, ensuring that their identities would remain confidential. This approach helped the author gain a better understanding of their experiences.

During the interviews, the author integrated Mindfulness-Based Stress Reduction (MBSR) classes into the research process. To achieve this, the author crafted a set of open-ended questions that aligned with the research objectives and existing literature. The five participants, each from diverse backgrounds, provided valuable insights into their experiences with MBSR classes, allowing the author to delve into the depth of their perspectives. the author took meticulous notes, focusing on themes relevant to the thesis goals to ensure unbiased results.

In the end, the semi-structured interviews proved to be instrumental in gaining a profound understanding of the participants' experiences. This method enabled the author to explore how technology is utilized during disasters and its potential to aid tourists in disaster-prone countries like Nepal.

4.3.1 Opinions from Interview:

Decision making process during travelling plans and influencing factors:

Participant C (name withheld for privacy reasons) *Interview data 3*: whose identity is kept confidential for privacy reasons, emphasized that safety is their foremost concern when planning travel. Participant expressed that while an earthquake outside their intended travel area might not disrupt their plans, ensuring personal safety is crucial. They mentioned a proactive approach, stating they gather substantial information both before and during their travels to make informed decisions.

In a similar way, Participant D (name withheld for privacy reasons) *Interview data 4:* whose identity is also protected for privacy, shared their strategy for ensuring a secure travel experience. They highlighted the importance of finding a reliable travel agency at their destination to stay updated on current tourism conditions. Participant D expressed a reliance on the agency's knowledge to navigate potential risks effectively.

These insights from participants align with the findings of the survey question 9, where 66% (n=136) of respondents prioritized safety instructions, and 36% emphasized weather updates as the information they are most interested in receiving. This highlights a common thread among participants regarding the significance of safety-related information in their travel decision-making process.

Information during emergency:

Participant C, (name withheld for privacy reasons), shared their approach to gathering information while traveling. According to *Interview Data 3:* Participant C (name withheld for privacy reasons) stated, "I would first talk with the locals in the area to know better information about the place." This highlights the importance of engaging with local communities to gain authentic and firsthand knowledge about a destination.

On the other hand, In *Interview Data 1*: Participant A, (name withheld for privacy reasons), expressed a preference for receiving real-time information via SMS/Text messages due to its easily accessible nature around different geographical locations." This aligns with the survey question "How do you prefer to receive emergency information while traveling?" where 68.6% (n=150) of the 205 respondents indicated a preference for SMS/Text messages.

These insights underscore the diversity in individuals' information-seeking strategies while traveling, with some relying on direct interactions with locals for insights, while others prioritize the convenience and accessibility of real-time information through technology, particularly SMS/Text messages.

Significant of having IoT during natural disaster:

Participant B, (name withheld for privacy reasons) with IoT-based technologies. In Interview *Data 2*: they expressed, "I am satisfied with IoT-based technologies; however, I would recommend including more features that can help users be more confident in the technology they are using." This suggests an overall positive sentiment with room for improvement and a desire for additional features to enhance user confidence.

In contrast, Participant E (name withheld for privacy reasons), expressed dissatisfaction with existing IoT technologies. According to *Interview Data 5:* Participant E stated, "I am not satisfied with the IoT that exists because when I was facing natural disasters and trying to use it, I was having a network problem in the geographic location. I would recommend having better connectivity so that users can easily access the IoT provided." This highlights the critical issue of network connectivity affecting the usability of IoT technologies during emergencies and emphasizes the need for improved connectivity to ensure effective use.

These diverse perspectives from participants underscore the importance of not only addressing the current functionalities of IoT technologies but also considering factors like user confidence and network connectivity to enhance overall satisfaction and usability in real-life scenarios, particularly during natural disasters.

Effectiveness of technology and communication for tourist safety and recovery of tourism destination during or after a natural disaster.

Participant D (name withheld for privacy reasons) expressed a positive view on the potential of technology, particularly in the context of a vulnerable country like Nepal facing unexpected situations. According to *Interview Data 3:* Participant D stated, "I think technology can be a game-changer for a vulnerable country like Nepal to overcome unexpected situations by providing real-time information and predicting future events. People can use technology for communication and alerts so that it can help them be in contact with their family members and friends in situations of natural disasters, including safety evaluation and mapping."

Moreover, Participant D shared a personal experience during their visit to Nepal, where their government introduced them to an application designed for emergency communication for citizens travelling outside of their country. This application played a crucial role in providing assurance of safety by sending a warning message for their people to avoid risk or not to visit ongoing disaster locations. Participant D expressed the belief that a similar technology approach could be beneficial for tourist safety and the recovery of tourism destinations.

This participant aligns the survey question number eight and stated in figure 5 above, that impact of technology in crisis situations, emphasizing the importance of real-time information, prediction capabilities, and communication tools for both local residents and tourists.

Suggestions for mobile application designed to assist tourist:

Interview data 5: These suggestions from participants highlight diverse perspectives on the features that would enhance the functionality of a mobile application designed for tourists, particularly in the context of natural disasters:

Participant A (name withheld for privacy reasons): Offline Facilities

Suggested incorporating offline facilities in the application, such as mapping routes to the nearest airport, hospital, shelter, and marking dangerous areas. This recommendation emphasizes the importance of providing essential information even when connectivity is limited.

Participant B (name withheld for privacy reasons): Language Translation

Proposed the inclusion of language translation facilities to facilitate communication with locals and emergency contacts. This feature recognizes the significance of overcoming language barriers, especially in emergency situations.

Participant C (name withheld for privacy reasons): User-Friendly Design

Emphasized the importance of a user-friendly application that caters to individuals with different abilities. This recommendation underscores the need for inclusivity and accessibility in the design to ensure usability for a diverse user base.

Participant D (name withheld for privacy reasons): Emergency Alerts

Highlighted the crucial nature of emergency alerts, indicating that quick and relevant notifications would be paramount for travellers. This aligns with the emphasis on real-time information and the importance of keeping users informed during critical situations.

These varied suggestions underscore the multifaceted nature of considerations when designing a mobile application for tourists, especially in the context of disaster management. Incorporating offline capabilities, language translation, user-friendly design, and prioritizing emergency alerts collectively contribute to creating a comprehensive and effective tool for travellers in challenging situation.

4.4 Proposing Mobile application for travellers in Nepal:

Nepal's stunning natural landscapes and vibrant culture make it a popular tourist destination. However, the region's geography also brings vulnerabilities to natural disasters that can threaten tourist safety. Nepal is an underdeveloped country in South Asia. There are numerous development projects happening in Nepal and Telecommunication is one of them. According to the research by (Taylor) the number of mobile cellular subscriptions in Nepal is over 38 million in 2021. Despite the growth in number of users in Nepali telecommunication industry, people face several challenges. One of the most significant challenges is the lack of adequate network in rural areas of the country. When disasters strike, tourists face higher risks due to their lack of familiarity with local resources, language, and protocols. Access to timely information and emergency aid is critical but often lacking - a gap that can cost lives.

In order to address these issues a mobile application consisting of all the information for tourist, offline mapping and emergency communication features as an innovative solution is proposed.

4.4.1 Implementation:

There are several different types of prototypes, ranging from low- fidelity (Lo-fi) to high-fidelity (Hi-fi). Prototypes can be classified as digital, or paper based. Fidelity refers to the level of details and functionality built into a prototype (Pacheco, n.d.).

In application designing process we will start with the low fidelity (Lo-fi) which is called sketching. Lofi prototypes are fast in making and low cost. Sketches helps to visualize the core idea of a project. It represents how the user interface would look like and how it could work.

4.4.2 Lo-Fi Prototype:

Prototypes are widely recognized to be a core means of exploring and expressing designs for interactive computer objects (Stephanie Houde, 1997). Prototyping is an essential part of product development in many companies. The prototype of the mobile

application for tourist visiting Nepal is designed using a digital prototyping tool for digital project called Figma. Figma is a collaborative web application for interface design. It is one of the most popular platforms for UI design for websites and mobile applications.

A. Home Tab:

Use Cases:
- o On going disaster information
- o Map view

Figure 9: Low-fi Prototype (Home Tab)
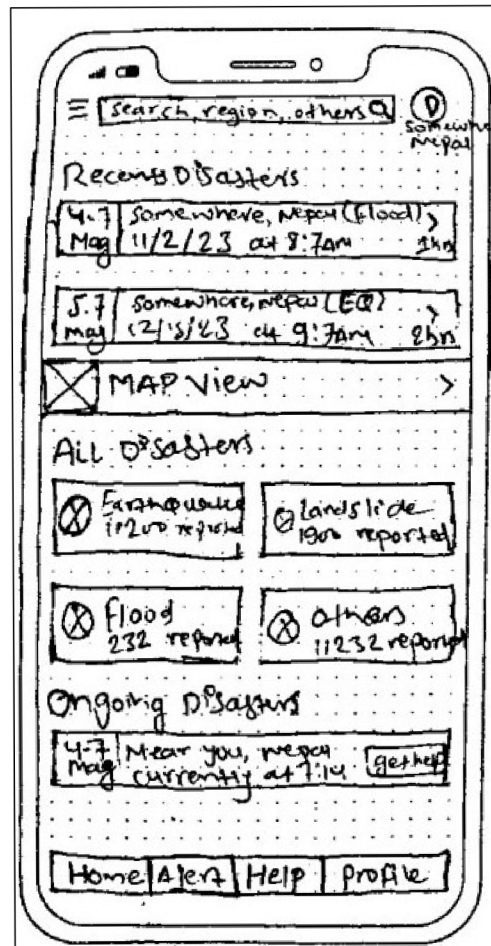
Source: Paper Sketch (own sourced)

Scenarios: In the home tab the user will see the screen displaying real-time information on on-going disasters. A search button to select the region of interest is added on the top. Additionally, a map view button is added, where user will be able to see the marked location of ongoing disaster places and places nearby.

B. Map View Tab:

Use Cases:

- o Search area
- o Map with indication

Figure 10: Low-fi Prototype (Map View Tab)
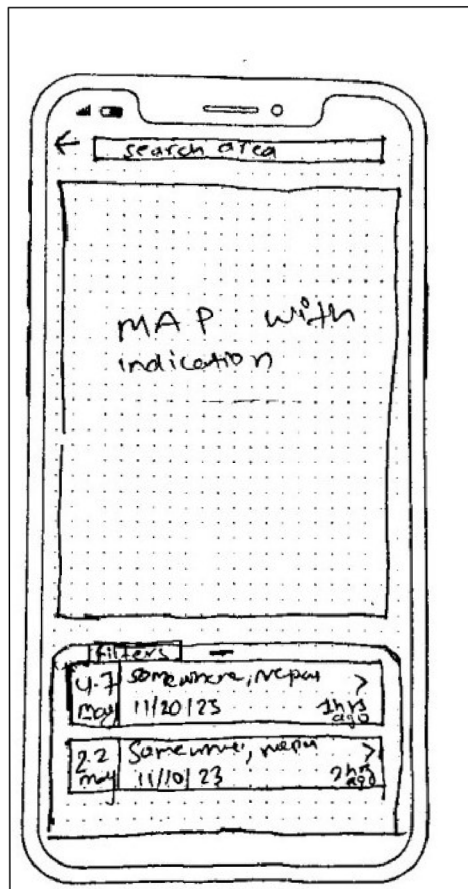
Source: Paper Sketch (own sourced)

Scenarios:

In the Map view tab user will see the screen displaying an overall map with on ongoing disaster locations. A filter button to select the region of interest is added on the bottom where detailed information of disaster & damage will be displayed.

C. Detailed view of disaster Tab:

Use Cases:

- o Map of exact location
- o Damages information

Figure 11:Low-fi Prototype (Detailed view of disaster Tab)
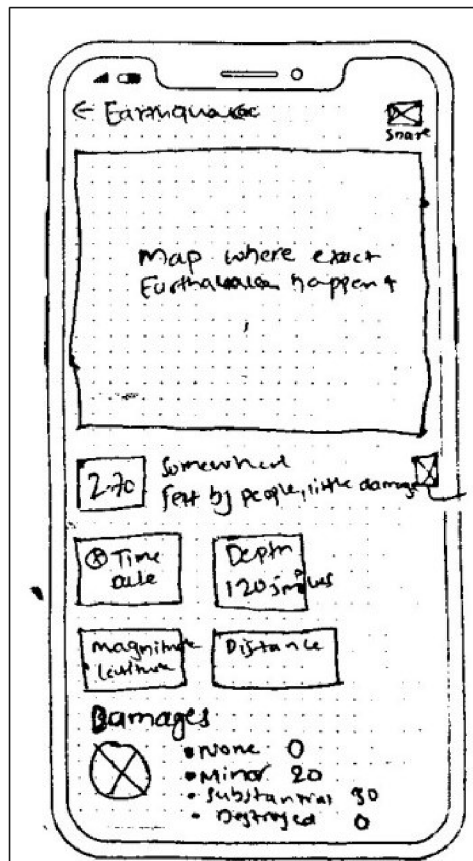
Source: Paper Sketch (own sourced)

Scenarios:

In the Detailed view of disaster tab user will see the screen displaying map with exact location of disasters. A Text field with details of damage will be displayed below.

D. Contact/Help Tab:

Use Cases:
- o Contact information
- o Live chat
- o Nearby Support
- o Location sharing

Figure 12: Low-fi Prototype (Contacts/Help Tab)
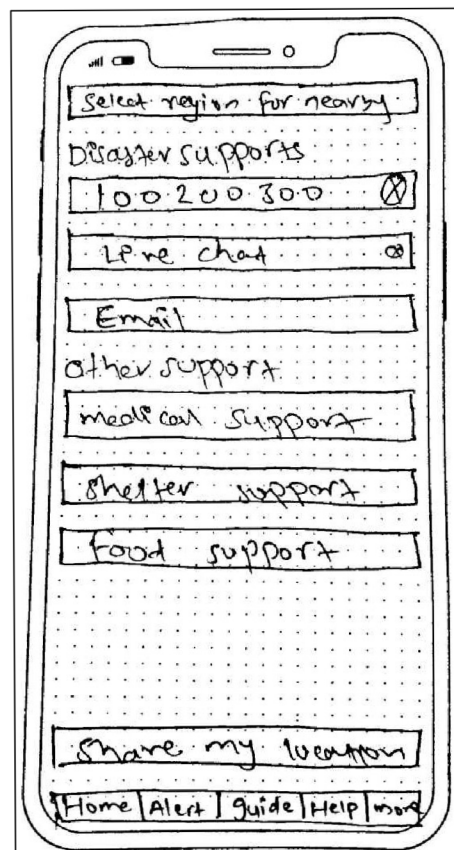
Scenarios:

In the Contact/help tab of disaster tab user will see the boxes displaying contact detail such as toll-free number, Live chat, email to retrieve and forward information's. The system also displays other support functions such as nearby medical support, shelter support and food support to show the information on map. Furthermore, a "Share My Location" button has been added which enables users to send their real time location to their friends and family stored in their contact.

E.   All Alerts Tab:

Use Cases:
- List of all disaster
- Disaster Alerts

Figure 13: Low-fi Prototype (All Alerts Tab)
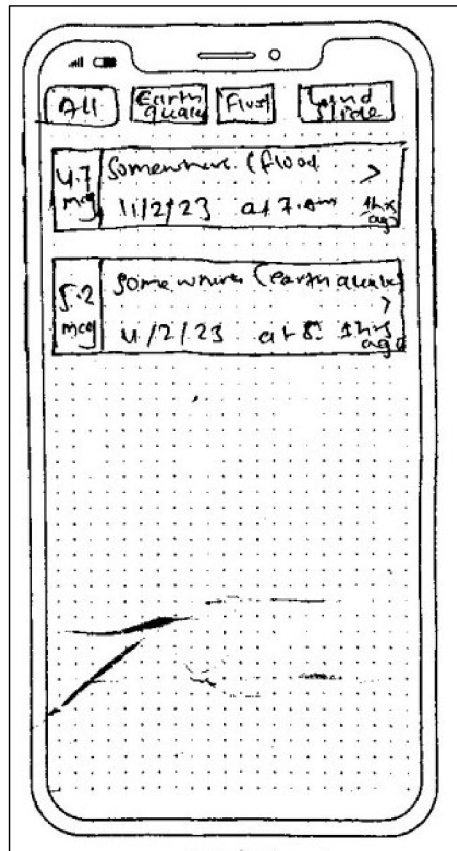
Source: Paper Sketch (own sourced)

Scenarios:

In the All Alerts of disaster tab, users will see the screen displaying list of disasters, The list will encompass a diverse range of disasters, providing users with an understanding of potential risks and ongoing events. The user can access detailed information clicking on each specific scenario, which will offer timely information including severity, location, and warnings to avoid such areas.

F. Safety Guidance Tab:

Use Cases:
- o Safety information
- o Guidance
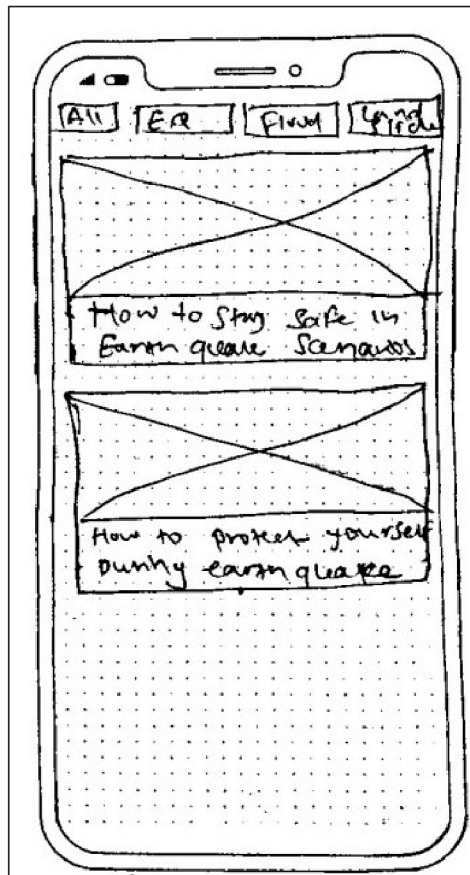
Source: Paper Sketch (own sourced)

Scenarios:

In the All Alerts of Guidance tab, users will see the screen displaying safety advice and information for a different emergency scenario. This feature will be very helpful for the one who has never experienced disaster before, with the help of information, they could save and prepare themselves effectively during emergency situations.

As shown in above sketch, the mobile application for tourist visiting Nepal has different navigation menus which are linked with related functionalities and services of the application. The primary functions i.e., Disaster alerts, Support System, Safety Guidance, and through direct mobile are discussed below:

4.4.3 Application design:

The main objective of this project is to provide necessary information to the travelers and assistance during emergencies through local map guidance. This application could be beneficial to tourists who are travelling alone by themselves and also to those who are new to their holiday destination. The user can get real time information through the application without costing them anything. In order to get the better understanding

Before the designing process the problem, solution and key features of the application were analyzed which are listed below:

Problem:
- Nepal's vulnerability to natural disasters like earthquakes, landslides threaten tourist safety.
- Disasters amplify risk for tourists unfamiliar with the region, language, and resources.
- Lack of timely information and emergency aid makes tourists highly vulnerable, costing lives.

Our Solution:
- An intelligent mobile app that acts as a personal safety companion for tourists in Nepal.
- Provides real-time disaster alerts and location-specific emergency information.
- Enables quick communication with first responders and loved ones.
- Leverages GPS, geological data, and machine learning to detect emerging threats.
- Delivers life-saving seconds to act through alerts.
- Ensures accessibility and ease of use, even in high-stress situations.

Key Features:

- Instant disaster notifications and weather alerts.
- Emergency contacts directory and SOS signalling.
- Live chat support to nearby authority and disaster support and location sharing

- Maps with nearby shelters, hospitals, and resources.

- Safety instructions and region-specific travel advisories.

- Translation features to bridge language barriers.

- Offline accessibility of critical data when networks are down.

- Simple, intuitive interface optimized for emergencies.

- Maps navigation and escape route mapping.

- Tools to request essential emergency services like medical aid.

- Option to notify loved ones of the user's real-time status.

In order to get a better understanding of how this application will fulfill the needs of travelers, Persona will analyze the solution. Creating personas involves in-depth research, including user participation and data analysis. These personas are often given names, ages, and characteristics to make them relatable to the design and development process.

Persona 1: Adventure- Seeking Traveler

Name: Suhi

Age: 30

Background: Suhi is an adventurous traveller from Singapore who loves exploring new destinations. She's planning a trekking expedition in the Himalayas of Nepal and is excited about the cultural experiences the country offers.

Needs and Goals:

- Suhi wants to ensure her safety while exploring Nepal, especially in the remote areas prone to natural disasters.

- She seeks real-time alerts about weather conditions and potential hazards.

- Communication with local authorities or emergency services is crucial for her peace of mind.

How the App Helps:

- The app provides real-time disaster alerts, weather updates, and access to local emergency contacts.

- It allows Suhi to quickly connect with nearby authorities and disaster support teams through live chat.

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- The translation feature helps her communicate with locals in case of language barriers.

Persona 2: Negative persona. This user never uses our application.

Name: Martin

Age: 42

Background: Martin is a farmer from the United States who is an occasional traveller. He has a limited tech proficiency.

Needs and Goals:

- Martin prefers to plan travel based on his previous experience and follows traditional way of information gathering.
- Martin is concerned about privacy issues.
- Seeks reassurance through direct communication with locals.

How the App Helps:

- The app could Incorporate a hotline feature for direct communication with local authorities.
- Offer tutorials or assistance for users with limited tech proficiency.

To try out the working model of the Tourist safety application, just click on the link provided: https://rb.gy/nlpjs9. This link will take you to the Figma web application, and it does not require log in or any account to access it.

4.5   Limitation of the application:

Despite the proposed application for tourist safety application offers a comprehensive solution, it has certain limitations. Dependency on technology and network infrastructure is one major limitation. In remote areas where there is high risk and frequent natural disaster

occurs, access to reliable network connectivity may be limited or non-existent. This could hinder the apps real time functionality, reducing effectiveness when it is needed most during emergencies. Additionally, the success of the application heavily relies on the accuracy of the data sources, including geographical information and real time alerts. If these data sources are not updated on a regular basis, it may compromise the app's ability to provide timely and precise information to users. Furthermore, the app's performance depends on users' adoption and engagement, which can be impacted by the things like language barriers and the levels of technology related literacy among individuals as well as the culture difference of accepting digital solution during emergencies. In order to guarantee the application's reliability, it will be essential to address these constraints.

5 Conclusion:

The research was conducted to determine the impact of natural disaster on tourism industry with a special focus on leveraging the Internet of Things (IoT) during emergencies. The objectives of the thesis were carefully followed, starting with an analysis of how natural disasters affect tourism and IoT functions in emergency scenarios. Additionally, the study also examined how tourists make decisions in emergency situations, including what information they look for and how they obtain it.

It was found that if the tourist destination is damaged and deteriorated, it discourages people from travelling to a particular place as well as creating dilemmas in decision making process. Tourists are concerned about their safety and real time information is crucial. The practical aspect of the research was addressed using both qualitative and quantitative methods which helped to get a well-rounded understanding of the topic. According to the survey result, majority of respondents were about Internet of Things (IoT) related to natural disasters,65% (n=134) were aware of the existence of IoT-based services or technologies used during such events. In terms of preferences of receiving information while traveling, a significant majority, preferred receiving emergency notifications through SMS/text messages on their phones and through mobile application as demonstrated in figure 6 above. Furthermore, author found out that IoT can help improved communication and alerts to facilitate the recovery of tourism destinations before or after natural disasters followed by crowdsource support and fundraising which can also help the government and locals to overcome the situations.

The purpose of mobile application is to provide information for tourists, offline mapping, and emergency communication features as an innovative solution. Lo-Fi sketch of the application is presented as an initial step of the application designing process. In order to get the better understanding of the objective of the application persona has been created which demonstrates needs and goals of a user and how this app can help in real life. According to the Survey results and Interview questionnaire feedback multiple features are included in the application.

Based on the result of the study, this mobile application designed for tourist visiting Nepal provides the necessary benefits from the services available in the app. It has the potential to be effective in the future.

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7   Appendix

: Summary of Survey results

1.   What is your age? तपाईको उमेर कती हो? *

Answer:

16-24	25-34	35-49	Above 50	**Total**
73	91	34	7	205

2.   What is your gender? तपाईको लिङ्ग के हो? *

Answer:

Male	95
Female	109
Others	1
Total	**205**

3.   What is your educational Level? तपाईको शैक्षिक स्तर के हो? *

Answer:

Elementary (प्राथमिक)	10
High School (उच्च विद्यालय)	59
Bachelor's Degree (स्नातक डिग्री)	84
Master's Degree (मास्टर डिग्री)	38
Doctorate (डाक्टरेट)	13
None (कुनै पनि छैन)	1
Total	**205**

4. How often do you visit different parts of Nepal for tourism? *
पर्यटनका लागि नेपालका विभिन्न ठाउँमा कति घुम्नुहुन्छ ?

Answer:

Very Often (प्रायजसो)	56
Occasionally (कहिले काहिँ)	85
Rarely (विरलै)	38
Never (कहिल्यै पनि)	26
Total	**205**

5. Have you ever experienced a natural disaster while visiting? *
के तपाईंले भ्रमण गर्दा प्राकृतिक प्रकोपको अनुभव गर्नुभएको छ?

Yes (छ)	118
No (छैन)	87
Total	**205**

6. Were you aware of any Internet of Things (IoT) -based services or technologies *
used during the natural disaster? (e.g., real-time weather alerts, emergency
notifications)

Yes (छ)	134
No (छैन)	71
Total	**205**

7. How Significant do you think of having IoT during natural disaster?
तपाईलाई प्राकृतिक प्रकोपको समयमा इन्टरनेट उपकरणहरू हुनु कतिको महत्त्वपूर्ण छ जस्तो
लाग्छ?

Highly significant (अति महत्त्वपूर्ण)	121
slightly significant (थोरै महत्त्वपूर्ण)	56
Neutral (तटस्थ)	23
Not significant at all (खासै महत्त्वपूर्ण छैन)	5
Total	**205**

8. During a natural disaster or emergency situation, what type of information are you   *
most interested in receiving?
प्राकृतिक प्रकोप वा आपतकालीन अवस्थाको समयमा, तपाईँ कुन प्रकारको जानकारी प्राप्त गर्न सबैभन्दा बढी चासो राख्नुहुन्छ?

Safety Instructions (सुरक्षा निर्देशनहरू))	136
Weather Updates (मौसम अपडेटहरू)	17
Emergency Contacts (आपतकालीन सम्पर्कहरू)	18
Evacuation routes (निकासी मार्गहरू)	21
None of above (माथिको मध्ये कुनै पनि होइन)	13
Total	**205**

9. How do you prefer to receive emergency informations while traveling? *
तपाईं घुम्न जाँदा आकस्मिक सूचनाहरु कसरी प्राप्त गर्न रुचाउनुहुन्छ ?

SMS/ Text message (एसएमएस / सन्देश)	141
Mobile Apps (मोबाइल एप्स)	33
Local news chanels (स्थानीय समाचार च्यानलहरू)	5
Social Media platforms (सामाजिक मिडिया प्लेटफार्महरू)	15
None of above (माथिको मध्ये कुनै पनि होइन)	11
Total	**205**

10. In your opinion, how can technology and communication tools be employed   *
to facilitate the recovery of tourism destinations after a natural disaster?
तपाईंको विचारमा, प्राकृतिक प्रकोप पछि पर्यटन गन्तव्यहरू पुन: प्राप्ति गर्न प्रविधि र सञ्चार उपकरणहरू कसरी प्रयोग गर्न सकिन्छ?

Improved Communication and Alerts (सुधारिएको सञ्चार र अलर्टहरू)	71
Crowdsourced Support and Fundraising (क्राउडसोर्स समर्थन र कोष सङ्कलन)	34
Promoting safe travels & Tourist Safety Apps (सुरक्षित यात्रा र पर्यटक सुरक्षा एपहरू प्रवर्द्धन)	50
Map Information for Safety Evaluation (सुरक्षा मूल्याङ्कनका लागि नक्सा जानकारी))	33
I am not aware (यसबारे म अनभिज्ञ छु)	17
Total	**205**

11. Please rate your level of satisfaction with the effectiveness of IoT-based technologies in providing emergency information and assistance during the disaster. *

कृपया प्रकोपको समयमा आपतकालीन जानकारी र सहायता प्रदान गर्न IoT-आधारित प्रविधिहरूको प्रभावकारितासँग आफ्नो सन्तुष्टिको स्तरलाई मूल्याङ्कन गर्नुहोस्।

Very Satisfied (धेरै सन्तुष्ट)	49
Satisfied (सन्तुष्ट)	73
Neutral (तटस्थ)	71
Dissatisfied (असन्तुष्ट)	12
Total	**205**

12. Do you think IoT for example. mobile app offering immediate updates, safety tips, * and aid during natural disasters when you're traveling would be beneficial to you?

तपाईलाई लाग्छ, उदाहरण को लागी नेपालमा यात्रा गर्दा प्राकृतिक प्रकोपका बेला तत्काल अपडेट, सुरक्षा टिप्स र सहायता प्रदान गर्ने मोबाइल एप तपाईंको लागि फाइदाजनक हुन्छ?

Yes (छ)	189
No (छैन)	16
Total	**205**

13. What specific features or functionalities would you like to see in a mobile application designed to assist tourists during emergencies in Nepal? (Open-ended response)

आपतकालीन अवस्थामा पर्यटकहरूलाई सहयोग गर्न डिजाइन गरिएको मोबाइल एपमा तपाइँ कुन विशेष सुविधाहरू वा कार्यक्षमताहरू हेर्न चाहनुहुन्छ? (खुल्ला प्रतिक्रिया दिनुहोला)

Response:

49 responses

offline facilities
Safety measures and evacuation alerts
Location based emergency services, or special instructions regarding the area of interest.
Safety
Real time alert system
Multiple local languages
प्रयोगकर्ता मैत्री
Tracking
It should offer support in many languages

Weather forecast summary, Safety Check Points, Guide Information, and contour topography map
Give real time news updates, safety information, evacuation routes, pre-travel safety alerts
Weather forecast summary, Safety Check Points, Guide Information, and contour topography map
Give real time news updates, safety information, evacuation routes, pre-travel safety alerts