

CZECH UNIVERSITY OF LIFE SCIENCES PRAGUE

Faculty of Economics and Management

Department of Information Engineering



**Benefits and Barriers of mobile application use in
Nepal**

BACHELOR'S THESIS

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CZECH UNIVERSITY OF LIFE SCIENCES PRAGUE

Faculty of Economics and Management

BACHELOR THESIS ASSIGNMENT

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Informatics

Thesis title

Benefits and barriers of mobile application use in Nepal

Objectives of thesis

The main objective of the thesis is to analyze benefits and barriers of mobile application use among Nepalese people in the wake of the 2015 earthquake.

- To exam the benefits of mobile application use for disaster recovery and communication/crisis management.
- To conduct survey among selected groups of mobile application users in Nepal.
- To propose strategies and recommendations to overcome the barriers in the use of mobile applications for better community resilience to disasters.

Methodology

The theoretical part will be based on mixed methods research. I will design a questionnaire to conduct a survey and analyze the data which will be collected to gain an overview of how mobile applications have affected or enabled Nepalese citizens since the 2015 earthquake. I will also conduct several interviews as secondary data.

The proposed extent of the thesis

30-40 pages

Keywords

Mobile application, Nepal , Technology, Facebook, Viber, Tinder, Data privacy,

Recommended information sources

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Prague on 27. 04. 2023

Declaration

I declare that I have worked on my bachelor thesis titled "Benefits and barriers of mobile Application use in Nepal" 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 Date

15/03/2023

Asmit Subedi

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Benefits and barriers of mobile Application use in Nepal

Abstract

This thesis examines the impact of mobile applications on crisis management in Nepal after the 2015 earthquake. The study investigates the benefits and barriers of mobile application use for crisis management and analyses the impact of mobile applications on communication, mapping, donations, and information dissemination in Nepal. It also explores the relationship between mobile application use and consumer behaviour. The research methodology includes a survey, semi-structured Interviews and the data collected is analysed and discussed with the aim of conducting a SWOT Analysis. The study identifies the challenges of using mobile applications in Nepal for better crisis management, such as poor digital literacy, infrastructure development, data and security, linguistic factors, and investment. The thesis concludes that mobile applications have significant potential for improving crisis management in Nepal, but several challenges must be overcome to maximize their effectiveness. The study provides valuable insights into the use of mobile applications for crisis management in Nepal and suggests directions for future research.

Key words: Mobile application, crisis management, technology, Information dissemination, Data Privacy, Earthquake, Nepal

Výhody a bariéry používání mobilních aplikací v Nepálu

Tato práce zkoumá vliv mobilních aplikací na krizový management v Nepálu po zemětřesení v roce 2015. Studie zkoumá výhody a bariéry používání mobilních aplikací pro krizové řízení a analyzuje dopad mobilních aplikací na komunikaci, mapování, dárcovství a šíření informací v Nepálu. Zkoumá také vztah mezi používáním mobilních aplikací a chováním spotřebitelů. Metodologie výzkumu zahrnuje průzkum, polostrukturované rozhovory a shromážděná data jsou analyzována a diskutována s cílem provést SWOT analýzu. Studie identifikuje problémy používání mobilních aplikací v Nepálu pro lepší krizové řízení, jako je špatná digitální gramotnost, rozvoj infrastruktury, data a zabezpečení, jazykové faktory a investice. Práce dochází k závěru, že mobilní aplikace mají významný potenciál pro zlepšení krizového řízení v Nepálu, ale pro maximalizaci jejich efektivity je třeba překonat několik výzev. Studie poskytuje cenné poznatky o využití mobilních aplikací pro krizové řízení v Nepálu a navrhuje směry budoucího výzkumu..

Key words: Mobilní aplikace, krizový management, technologie, Šíření informací, Soukromí dat, Zemětřesení, Nepál

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1. Introduction

In recent year, the use of the mobile applications has enlarged in popularity in Nepal. Mobile applications have grown in importance for many Nepalese due to the greater obtainability of smartphones and the internet. Several industries implemented mobile application which includes finance, healthcare, education, transportation, and entertainment. There are benefits in many ways of using mobile applications in Nepal, which includes enhancing the accessibility of information, improved communication and networking, more straightforward access to products and services, and increased effectiveness in business and government operations.

However, there are also barriers that is preventing mobile apps from being commonly adopted and used in the country. The possibilities of mobile applications in Nepal is constrained by a lack of internet access and connectivity, low levels of digital literacy and technological proficiency, cultural barriers and social norms a lack of locally relevant applications, and other factors. to fully materialize, there are some barriers that must be overcome.

Given the significance of mobile applications for Nepal's development, it is very key to comprehend the benefits and barriers that associated with their use as well as suggest solutions. The purpose of this thesis is to comprehensively analyse the benefits and barriers to using mobile applications in Nepal after 2015 earthquake which was a destructive disaster that led to thousands of casualties and significant damage to infrastructure. In the aftermath of the earthquake, mobile applications emerged as important tools for crisis management in Nepal. This thesis examines the benefits and barriers of mobile application use for better crisis management in the wake of the 2015 earthquake. Overall, this main aim of this thesis is to present our knowledge and understanding of the use of mobile applications in Nepal and to provide the depth that may be useful to policy makers, practitioners and researchers working in this field.

2. Research Objectives and Questions

The thesis's main objective is to analyse the benefits and barriers of mobile application use among Nepalese people. Specifically:

-To examine the benefits of mobile application use in Nepal, especially in crisis management, and to know how these benefits can be maximized to improve response and recovery efforts in the wake of the 2015 earthquake.

-To identify and analyse the barriers to effective mobile application use in crisis management in Nepal, including issues related to infrastructure, technology, literacy, and cultural factors.

- To assess the current state of mobile application use in Nepal, particularly in the context of crisis management, and to assess the potential for further development and integration of these applications into disaster response and recovery efforts

- To propose strategies and recommendations to address perceived barriers to the use of mobile applications in crisis management in Nepal, including promotion of digital literacy, improvement of infrastructure and technology, and development of culturally appropriate applications.

-To examine the impact of mobile application use on crisis management in Nepal, and to assess the potential for these applications to enhance the effectiveness of response and recovery efforts in future disasters.

Our Study attempts to answer the followings questions:

1.What are the benefits of mobile application use for crisis management in Nepal during or after the 2015 earthquake?

2.What are the barriers to the use of mobile applications for crisis management in Nepal during or after the 2015 earthquake?

3.How to address the barriers and enhance the effectiveness of mobile applications for crisis management in Nepal?

This research will help how mobile applications will be beneficial for crisis management such as earthquake.

3. Methodology

Our study is based on two parts theoretical and practical.

The theoretical part will be based literature review about past and present status of mobile application in Nepal. Which will be prepared through different scientific journal publications and books.

Practical Part:

This study will use Mixed Methods Research, combining a survey and Semi-Structured Interviews of Nepalese citizens aim of conducting a SWOT Analysis. The survey will be distributed online, focusing on types, effectiveness, benefits, challenges, frequency, and assistance. Data will be analysed using statistical software, presenting descriptive statistics. Semi-Structured Interviews and SWOT Analysis will provide in-depth exploration and identification of strengths, weaknesses, opportunities, and threats. Data-driven suggestions will be made based on strengths and opportunities, with targeted interventions for weaknesses and threats. The use of both techniques ensures credible analysis, with online distribution increasing scope and generalizability.

4. Literature Review

4.1. General overview of Nepal after 2015 Earthquake

The 2015 earthquake that struck on Nepal left the nation devastated entirely. In addition to seriously damaging the structures, it also claimed numerous lives. Over 8 million individuals were badly impacted by the disaster, over 1.4 million required nutritional support and over 3 million required shelter, immediately according to the United Nations (2021).

After the earthquake, Nepali government, aid agencies, and foreign partners provided immediate assistance to those affected. These organizations assisted in relocating the affected people by giving food, water, and temporary housing. They also assisted in providing medical care for earthquake victims who needed it. With time, attention shifted from immediate relief to sustained recovery attempts. Efforts included rebuilding homes, schools, hospitals, and infrastructure. In some cases, this involved incorporating earthquake-resistant design features into new buildings and structures.

More than 70,000 families were still residing in temporary housing as of 2021 and numerous schools and medical facilities still required maintenance. The earthquake had a major effect on Nepal's business as well, especially the tourism industry. According to the World Bank, the earthquake caused a 50% drop in tourist arrivals in 2015, which had an effect on businesses in connected sectors like travel, lodging, and dining (Nepal G. o., 2015). Despite these difficulties, Nepal's recovery attempts have seen some encouraging progress. As an illustration, the Nepali government has worked to strengthen its capacity for disaster preparedness and reaction, and foreign partners have continued to support efforts at recovery and reconstruction.

4.2. Overview of Mobile application

The Mobile application is cited as a mobile app software tool that is programmed to run on a small handy device. Many operating systems for example Android, iOS, and others, support the use of mobile applications. With this application, people can use it for specific tasks. (Can, 2016) People can connect them to the internet for their daily importance where they want as it allows consumers to carry them in their hands. Due to the compatibility, mobile companies are making smartphones and feature phones with increasing computing power which allows the consumer to benefit from using most of the areas like in pcs. Although we're close to the operating systems like iOS and android we are using, chances are high we are not notifying of the specific technology software developers use in designing and developing processing to build an app (Dr. MD Rashedul Islam, 2010).

There are three types of apps that developers use in designing and developing:

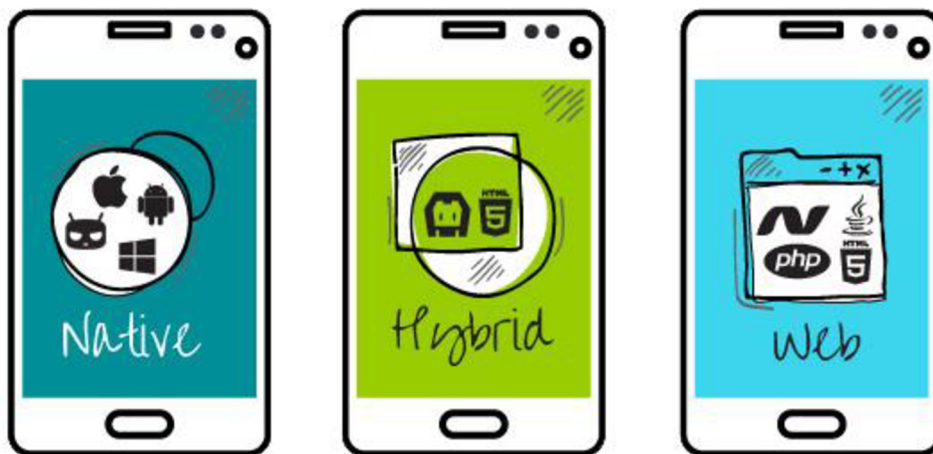


Figure 1 Types of mobile application

Source: UNDERSTANDING THE 3 TYPES OF MOBILE APPS: NATIVE, MOBILE, AND HYBRID, n.d.

4.2.1. Native Mobile Apps

Native app is a smartphone application developed specifically for a mobile operating system like swift for iOS and Java for Android. The app is developed within the mature ecosystem following the technical users and user guideline experience provided by the iOS itself like swipe gestures or alignment on the left side or the centre for the android and iOS. They offer fastest and most reliable and most responsive to the user. This type of app will have the look and feel consistent with the most other native apps which are built into the devices.

4.2.2. Hybrid Mobile Apps

Hybrid applications are at the core website package wrapped into a native wrapper like PhoneGap or others. They look and feel like the native app but ultimately outside the basic frame of the application they are powered by the company's website itself. Hybrid app also can use native functionality like a camera or GPS but via third-party plugins and a lot of code.

4.2.3. Web Application

Web application is a piece of software that can be accessed from a browser example IE, Firefox, or Chrome instead of directly from a device through an app store. Some examples of the web application are webmail, online calculator, online shops, social, media, etc. Mobile apps and web apps may have the same capabilities and appearance even though web functions similarly to an app we might download on a smartphone. But it is not the same. (Charter Global, n.d.)

4.3. Mobile Development Brief History of Nepal

Mobile development in Nepal is a comparatively new field given the growth of the country's mobile industry. The use of mobile phones has recently increased in Nepal, a developing nation with a populace of about 30 million. The first mobile phone company in Nepal was Nepal Telecom, which launched mobile phone service in 2004. Since then, several other wireless carriers have entered the market, including Ncell, Smart Cell and UTL.

In the early days of mobile development in Nepal, most mobile applications were developed by international companies and imported into the Nepalese market. However, there has been a rising trend among regional programmers to produce smartphone applications that address the requirements of the Nepalese market locally in recent years.

Hamro Patro, a Nepalese calendar application launched in 2010, was one of his first and most popular mobile apps created in Nepal. Hamro Patro quickly became popular among mobile his users in Nepal and is still one of the most widely used mobile applications in Nepal.

Since the launch of Hamro Patro, the number of mobile applications developed in Nepal has increased significantly. These apps include social media, entertainment, e-commerce, news, education, and health. The smartphone industry in Nepal has expanded, but there are still barriers for businesses to which need to be face. Which is Lack of funding, a shortage of developers with the necessary skills, and low public knowledge of mobile technology are some of these challenges. However, as cell phones increase in popularity there, the future of mobile growth in Nepal appears promising (The KD Blog, 2021).

4.4. Benefits of Mobile Application Use for Crisis Management:

Numerous advantages are provided by mobile applications for crisis management, such as quicker access to emergency services, accurate catastrophe alert information, efficient contact with authorities and rescue teams, and improved coordination between volunteers and aid organizations. Utilizing mobile applications during disasters can speed up reaction times, increase situational awareness, and facilitate effective resource allocation (Tatoimir, 2012). The use of mobile apps by citizens to report incidents and give officials feedback has increased community involvement in crisis management.

The Benefit of using mobile applications for disaster management in Nepal have been emphasized by numerous studies. According to (Bibek Koirala, 2018), mobile apps made it easier for volunteers and aid agencies to organize relief efforts and deliver aid to impacted communities on time. Joshi and Yadav (2016) found that mobile applications facilitated contact between authorities and citizens by providing real-time information on disaster alerts.

4.5. Barriers to Mobile Application Use for Crisis Management:

Despite having the advantages of using smartphone applications for crisis management, there are several obstacles that could reduce their efficacy. Significant obstacles to the use of mobile applications during disasters include poor network connectivity, limited access to mobile devices, and trouble using the applications (Bibek Koirala, 2018) As most mobile apps are created in English and are inaccessible to those who do not speak the language, language barriers can also be a major barrier (Koirala, 2018). Additionally, the efficacy of mobile applications may be hampered by people's lack of confidence in their veracity and accuracy. When using mobile apps during disasters, citizens might be worried about their data privacy and security (Alok Joshi, 2016)).

4.6. Impact Of Mobile Applications in Nepal after 2015 earthquake.

According to a report shared by Nepal Telecommunications Authority (NTA) there are more than 36 million mobile phone users in Nepal as of mid-January 2022, which is surprisingly more than the total population of the country which has increase by 14.6 million in the past two years. Data suggest that there are users who have multiple internet subscriptions which brings more users than the population. (Nepal Telecommunications Authority, 2022). The Nepal earthquake of 2015 was a catastrophic occurrence that resulted in extensive destruction and fatalities. After the earthquake, mobile apps were crucial to crisis management efforts.

4.6.1. Communication

The role of mobile applications in enabling communication between disaster victim was crucial Because the earthquake severely damaged communication networks, making it difficult for families to communicate with their loved ones. Despite the disruption and making it challenging for disaster victims to contact their loved ones. Mobile applications such as Facebook and Viber provided alternative means of communication, which played a significant role in facilitating communication and providing a sense of comfort during the crisis. (Koirala, 2018). According to a study by the International Federation of Red Cross and Red Crescent Societies, mobile apps were effective for real-time communication during the 2015 Nepal earthquake, allowing disaster victims to share and receive crucial information. The use of mobile applications for communication was hampered by issues like disrupted communication networks and restricted access to electricity (IFRC., 2015).

4.6.2. Mapping

Mobile applications have been helpful in disaster response efforts for mapping and tracking resources. Following the 2015 earthquake in Nepal, various mapping tools were used to locate survivors, assess damage, and allocate supplies to those in need, with studies suggesting that mobile mapping apps have the potential to significantly enhance disaster response efforts and save lives.

Rescuers and aid workers were able to locate the earthquake-affected areas and make appropriate plans for their reaction with the help of mobile applications like Google Maps and OpenStreetMap. These tools also assisted users in locating secure routes and avoiding dangerous locations (Ahmed Ahmouda, 2018).

4.6.3. Donations

While the earthquake left many Nepalese people in need of necessities such as food, water, and shelter, 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 FonePay, 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 (Sharma, 2017) found that mobile applications significantly increased the amount of donations received during the relief effort following the earthquake.

Furthermore, mobile applications provided transparency in the distribution of aid and ensured that donations were received by the intended beneficiaries. In addition, mobile applications were useful in tracking the progress of relief efforts and keeping donors informed about how their contributions were being utilized. The research by Karki et al. (2017) highlights the importance of transparency and accountability in the distribution of aid during disaster response, and the use of mobile applications helped to ensure that these standards were met.

Overall, the use of mobile applications for donation during and after the 2015 earthquake in Nepal was instrumental in facilitating relief efforts and aiding those in need. The ease of access, transparency, and accountability provided by these applications helped to increase the effectiveness and efficiency of the relief efforts.

4.6.4. Information dissemination

Journalists shared information and pictures about the earthquake and its repercussions using mobile applications like Facebook, Twitter, Viber, and Instagram. This aided in increasing public knowledge of the crisis and motivating people to give to and participate in relief efforts. Overall, mobile applications played a crucial role in crisis management efforts in Nepal following the 2015 earthquake. which helped people to communicate with each other, coordinate between the rescuer and relief efforts, and helped raise funds for those affected by the disaster.

4.7. Mobile application and consumer behaviour

Consumer behaviour in recent years has been significantly affected by mobile applications. Consumers are using mobile applications more frequently than before for many reasons, including shopping, entertainment, socializing, and more, thanks to the proliferation of cell phones and the internet that exists.

The area of shopping is where mobile apps have the biggest effects on consumer behaviour. Customers can now use smart devices like phones, tablet etc. that provide a seamless user experience to explore and buy goods online from the comfort of their homes. Due to this, as more customers choose to buy online using mobile applications, traditional brick-and-mortar retail has changed. In terms of information access, mobile applications have also impacted consumer behaviour. Consumers can remain informed and up to date on the most recent developments in numerous fields thanks to the abundance of mobile applications that offer information and news updates which has made it possible for customers to make more informed choices about their daily activities and theirs's purchases.

Because they allow connections and interactions between people that were previously impossible, social media apps have had a significant impact on consumer behaviour as well. Social media platforms are now used by users for news, entertainment, and social

interactions, making them a significant component of many people's everyday lives. However, the increasing use of mobile applications has presented challenges for consumers. As mobile applications collect and keep massive amounts of personal data, concerns over data privacy and security are becoming more prevalent. Some consumers encounter challenges, such as a lack of knowledge and skills or a unreliable internet access. In general, mobile applications have had a significant effect on consumer behaviour, enabling greater convenience, access to information, and social connectivity. However, they also present issues that must be resolved to ensure that everyone has an equal opportunity to use and access them.

4.8. Summary of Theoretical Framework

The literature analysis Benefit and barriers of mobile application use in Nepal for better crisis management following the earthquake in 2015. Effective communication with authorities and rescue teams, quicker access to emergency services, accurate information on disaster warnings, and better coordination between volunteers and aid organizations are just a few of the many advantages that mobile apps have brought to crisis management. To ensure that more Nepalese citizens can utilize these tools in future disasters, however, issues like poor network connectivity, restricted access to mobile devices, and trouble using the applications must be resolved. Future studies should concentrate on formulating plans to get around these obstacles and find improvements to the efficiency of mobile apps for crisis management in Nepal.

5. RESEARCH METHODOLOGY

5.1. Research Process

Before starting the research, the author developed a theoretical framework for how mobile applications can be effective in managing crises during and after the 2015 Nepal earthquake. The author used internet sources and talked to friends who work in IT sector

in Nepal and have experience with mobile applications through Facebook, WhatsApp, and Phone. This helped the author build a strong foundation for the research.

The author conducted online research and consulted with experts working in this field for more than 9 years with different Mobile application development in Nepal to gain insights into the mobile application landscape, following which the author designed a survey questionnaire. To reduce errors in processing the questionnaire, the author conducted a pilot study, which is a condensed version of a larger study and a crucial method for testing theories or hypotheses. The pilot study helped determine the feasibility of the survey questionnaire. Once necessary modifications were made using the pilot study, the author used a sample technique to simplify and clarify the questionnaire further. This approach aimed to identify shared traits among the target population for the survey method.

Concluding survey questionnaire designed on Google Drive, which was sent to respondents through social media channels like Facebook, email, and Viber. Respondents submitted their answers using the provided Google Drive link, making the process quicker and simpler. Google Drive was used to collect and manage the responses. The author will be discussing the specific methods and techniques used in the research process in the following subtopics.

5.2. Survey

The survey consists of 13 questions designed to gather quantitative data on the use and effectiveness of mobile applications for crisis management during or after the 2015 earthquake in Nepal. The participants were instructed to furnish their responses via the designated Google Drive link after the distribution of the survey questionnaire across diverse social media platforms such as Facebook, email, and Viber, with the aim of expediting and streamlining the process. The survey starts with basic demographic questions such as age, gender, and education level. The next question asks if the participant has used any mobile applications for crisis management during or after the 2015 earthquake in Nepal, followed by a question on the types of mobile applications used.

The effectiveness of the mobile applications used is assessed in the next question, which asks participants to rate the effectiveness of the mobile applications they used for crisis management. The benefits of using mobile applications for crisis management are then evaluated through a question where participants can choose from a set of options. The challenges faced while using mobile applications for crisis management are also assessed through a question with a set of options to choose from.

The frequency of mobile application use during or after the 2015 earthquake in Nepal is assessed through a question that allows participants to choose from a set of options ranging from several times a day to never. The next question asks if participants received any assistance or support through the mobile applications during or after the earthquake. Participants are then asked to rate their agreement with the statement that mobile applications are essential tools for crisis management during natural disasters like the 2015 earthquake in Nepal.

The likelihood of recommending the use of mobile applications for crisis management to others during natural disasters like the 2015 earthquake in Nepal is assessed through a question with options to choose from. Finally, participants are given the opportunity to suggest improvements for mobile applications used for crisis management during or after natural disasters like the 2015 earthquake in Nepal.

5.3. Sampling

According to Kumar (2019), sampling is an essential process in surveys where elements are selected from a target population for analysis. It helps to describe and understand the characteristics and attitudes of the population. Sampling is used to minimize the cost, time, and effort required for the survey of an entire population. Probability-based sampling is typically preferred over non-probability sampling due to the latter's susceptibility to errors. (Kumar, 2019)

In this study, probability-based sampling was used due to the difficulty of surveying the entire population of Nepal. A sample of the community was chosen to represent the target population's characteristics. Selecting the sample group involved considerations such as sample size, which is a difficult procedure involving various variables. The process of sampling should consider factors such as labour, money, and elemental variability. Finally, using a well-designed selection can enhance the study's results.

The sample size for the Nepal survey was determined to be 500 individuals, based on factors like those of the entire population. The sample group included retirees, workers, businessmen, educators, and students from different urban and rural regions. People who travelled from rural to urban areas were also included. A variety of ages were included in the sample size to enhance the survey's clarity and response quality.

The survey will collect data on mobile application types, effectiveness, benefits, challenges, frequency, and assistance, and will be analyzed using descriptive statistics such as frequencies and percentages. The Semi-Structured Interviews will complement the survey to provide a comprehensive SWOT Analysis.

5.4. Type of Frequency analysis

The frequency analysis above shows the distribution of answers to each survey question and is a descriptive analysis. The number and percentage of respondents who selected each response choice are displayed. The survey answers were arranged into a table or graph that shows the number and percentage of respondents who selected each answer option to produce the frequency analysis. To gain insight into the characteristics of the survey population and their answers to the survey questions, the data was then finally analysed and summarized.

5.5. Semi-Structured Interviews

Semi-structured interviewing is a low qualitative research technique that helps researchers to be flexible when examining a subject. This method involves asking open-ended questions and following up with further inquiries based on the respondent's answers. This method enables researchers to learn more about the interviewee's their's experiences, viewpoints, and experiences, which enables a deeper examination of the research topic.

The idea of implementing this research here was to better understand people's perspectives and experiences with mindfulness-based stress reduction (MBSR) classes. To achieve this, the author used semi-structured interviews. The author developed a list of open-ended questions and used follow-up questions based on the research objectives and literature review to learn more in-depth about facets of the interviewee's experiences. The semi-structured interview approach allowed author to obtain rich and detailed data on the participants' experiences with MBSR, including benefits and challenges.

To implement semi-structured interviews in this research, the author first identified potential interviewees through purposeful sampling, targeting individuals who had completed MBSR programs. They were then called by the author, who gave them an explanation of the study's goals, the interview's format, and the confidentiality of their answers. During the interviews, the author used active listening and empathic communication to encourage the participants to share their experiences and perspectives openly. The author recorded their responses and took notes to capture important points and themes.

Overall, the research's use of semi-structured interviews was essential to gaining a detailed grasp of the participants' MBSR experiences. Using this approach, the author was able to thoroughly investigate the research subject and gain insightful knowledge about the advantages and difficulties of taking part in the MBSR.

6. Results and Discussion

As was already stated in the section on study methodology, a survey was conducted among various working categories of people in various age groups. Expected number of respondents was 500, however, we manage to collect only 171 individuals' samples due to the limited timeframe of the survey. For the question regarding age, the frequency distribution shows that most of the respondents are male (56.14035088) and between the ages of 25-31 (29.8245614) In terms of education level, most respondents have completed high school (31.57894737%) or have an elementary education (19.88304094%), while (24.56140351%) have completed a bachelor's degree.

In response to the second part questions, 50.8% of respondents (n=87) reported using mobile applications for crisis management during or after the 2015 earthquake in Nepal. In terms of the types of mobile applications used, 14.61% (n=25) reported using disaster alerts, 14.03% (n=24) used emergency communication apps, 11.11% (n=19) used maps and location-based services, and 8.77% (n=15) used crowdsourcing and volunteer apps. 5.85% (n=10) of respondents reported using all of the above, while 45.61% (n=78) did not use any mobile application for crisis management.

Interview data 1:

The above results survey aligns with the finding 14.61% and 14.03% of the participants reported utilizing mobile applications for crisis management during or after the 2015 earthquake in Nepal. During an interview session, Participant No.4 (name withheld for privacy reasons) attested to the efficacy of mobile applications during the earthquake, stating, "I heavily relied on a mobile application during the 2015 earthquake as it provided real-time updates on earthquake alerts and helped me communicate with family members who were geographically distant." Of those who used mobile applications, 26.90% (n=46) reported that they were very effective, while 15.20% (n=26) reported that they were somewhat effective. 8.7% (n=15) of respondents reported that the mobile applications they used for crisis management were not very effective.

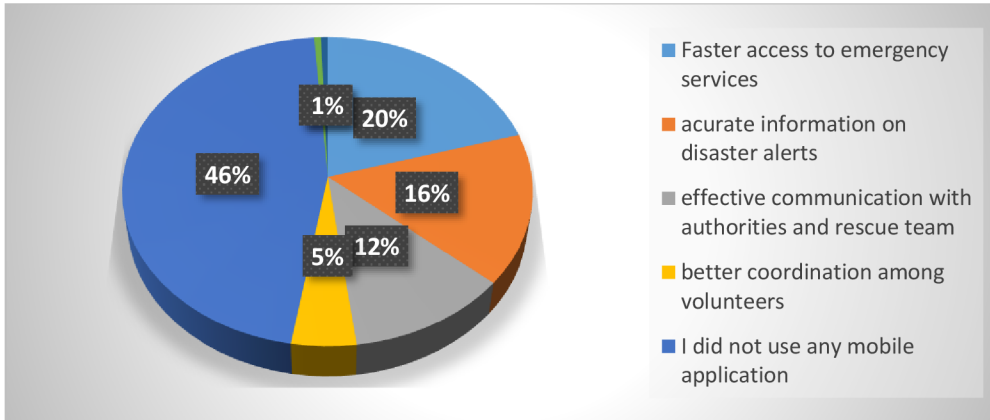


Figure 2 benefit of mobile application for crisis management 2015 earthquake in Nepal

Respondents who used mobile applications reported benefits such as faster access to emergency services (20.46%, n=35), accurate information on disaster alerts (15.78%, n=27), and effective communication with authorities and rescue teams (11.69%, n=20). However, 46.19% (n=79) of respondents who did not use mobile applications reported not experiencing any benefits, while 1.16% (n=2) reported that they did not find the mobile applications beneficial.

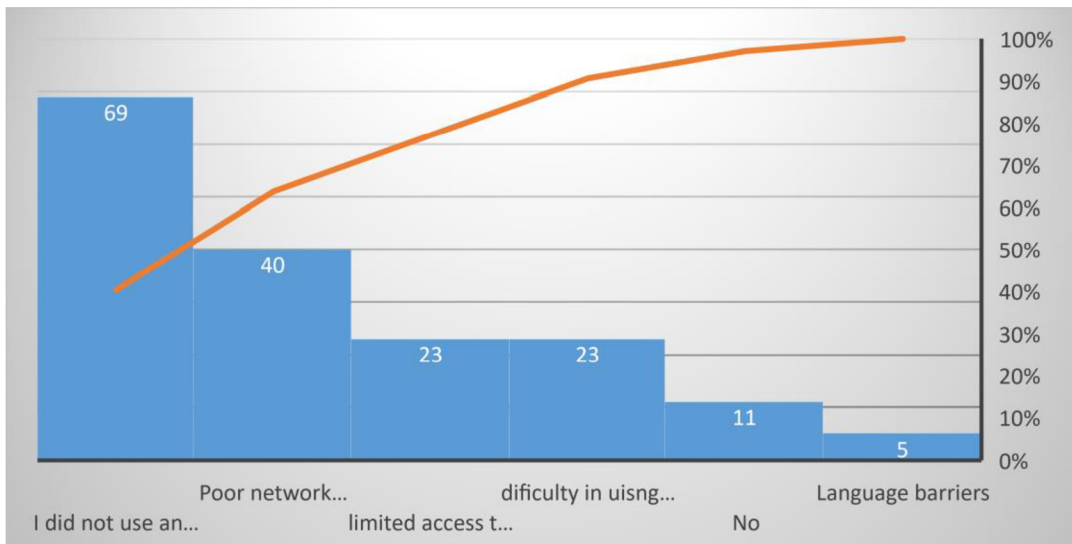


Figure 3 challenges faced while using mobile application for crisis management ins 2015 earthquake in Nepal.

Challenges faced by those who used mobile applications for crisis management included poor network connectivity (23.39%, n=40), limited access to mobile devices (13.45%, n=23), difficulty in using the applications (13.45%, n=23), and language barriers (2.92%, n=5).

Interview data 2:

According to the survey results, challenges faced by those who used mobile applications for crisis management included poor network connectivity, limited access to mobile devices, difficulty in using the applications, and language barriers. Participant feedback from an interview session aligns with the finding 13.45% difficulty in using the application, number shown in the figure 3 above, with Participant No.1 (name withheld for privacy reasons) Participant stated “The mobile application I used was not very user-friendly and often crashed, which makes me difficult to access important information during the crisis”

In terms of frequency of use, 26.90% (n=46) of respondents who used mobile applications reported using them several times a day, while 17.54% (n=30) reported using them once a day. 8.77% (n=15) of respondents reported that the mobile applications they used for crisis management were not very effective or not at all effective.

45.02% (n=77) of respondents reported receiving assistance or support through mobile applications during or after the 2015 earthquake in Nepal, while 40.93% (n=70) strongly agreed and 30.40% (n=52) somewhat agreed that mobile applications are essential tools for crisis management during natural disasters like the 2015 earthquake in Nepal.

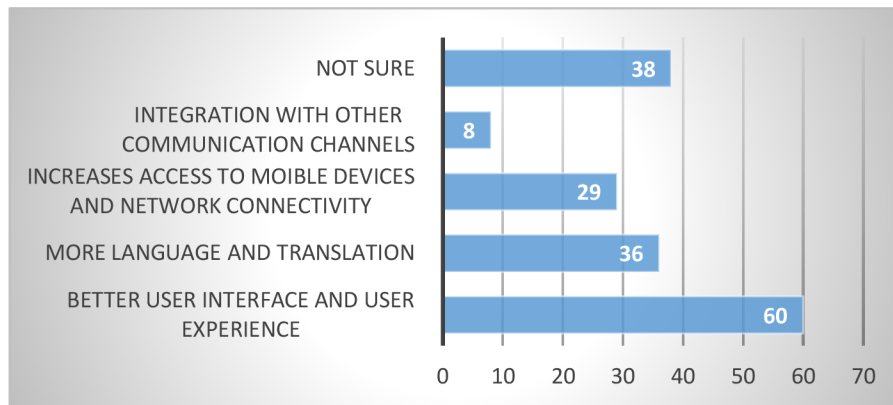


Figure 4 Improvement suggested for mobile application used for crisis management by users

Finally, 68.42% (n=117) of respondents would recommend the use of mobile applications for crisis management to others during natural disasters like the 2015 earthquake in Nepal, while 10.52% (n=18) would not recommend them. When asked what improvements they would suggest for mobile applications used for crisis management, 35.08% (n=60) suggested better user interface and user experience, 21.05% (n=36) suggested more languages and translations, and 16.95% (n=29) suggested increased access to mobile devices and network connection.

Interview data 3:

The response reflects the survey finding that 35.08% suggested better user interface and user experience, 21.05% (n=36) suggested more languages and translations, 16.95% (n=29) suggested increased access to mobile devices and network connection. During an interview session, Participant No.4 (name withheld for privacy reasons) stating, "I would like to suggest adding Nepali language option because I am not good at English and sometime It is confusing while using the Mobile application." During an interview session, Participant No.1 (name withheld for privacy reasons) stating, " I think there are a several of ways in which crisis management mobile applications can be enhanced. To make the application more understandable and user-friendly, for example, I would like to see improved user interface and experience and make sure people in places with poor connectivity or resources can still access and use these programs, as this can be a significant roadblock to efficient crisis management."

7. SWOT Analysis

Following the 2015 earthquake, the combination of descriptive statistics and SWOT analysis provided a data-driven and thorough analysis of the benefits and barriers of using mobile applications for crisis management in Nepal. The descriptive statistics supported the discovery of strengths, weaknesses, opportunities, and threats in the SWOT analysis by highlighting significant trends and patterns in the survey data. This method also made it possible to make data-driven suggestions based on the survey data's strengths and opportunities, while addressing the survey data's weaknesses and threats with targeted interventions. The use of both techniques increased the analysis's credibility because it was founded on real data rather than conjecture or anecdotal evidence.



Figure 5 SWOT

Overall, the Figure 5. SWOT analysis as well suggests that there is a potential opportunity for developing more effective mobile applications for crisis management during natural disasters, but there are also challenges that need to be addressed, such as poor network connectivity and limited access to mobile devices. The adoption and efficacy of mobile applications for crisis management during natural disasters may also be improved by initiatives to enhance user interface and experience, expand access to mobile devices and network connection, and provide more languages and translations.

7.1. Limitation

Every study project has restrictions that could influence the outcomes and how they are interpreted. It's crucial to keep this study's constraints in mind when analysing the findings. First, the 171-participant sample size might not accurately reflect the total population. Even though efforts were made to guarantee that the sample was inclusive and diverse, underrepresented groups might still exist. In simpler terms, some people in the community may not be impacted by the survey results. Additionally, the survey relied on people to report their own information, which could be influenced by their desire to fit in or impress the researchers. We can say that that some of the responses may not be entirely accurate or reliable. Thirdly, the survey's online nature may have limited the sample's variety by excluding people without internet access or those who find technology uncomfortable. Fourth, the survey's questions and response options might not have adequately captured the full variety of participant experiences and viewpoints, resulting in inaccurate findings.

In addition, the survey was done in the wake of the 2015 Nepal earthquake, so it might not be applicable in other crisis circumstances. This implies that the results might not be relevant in other situations. When examining the study's findings, it is crucial to be conscious of these restrictions. While the results offer insightful information about the advantages and difficulties of using mobile applications for crisis management in Nepal, caution should be exercised when extrapolating them to other contexts.

8. Discussion

8.1. Challenges of mobile application in Nepal for better crisis Management

Smartphones are widely used in Nepal. And the IT companies are investing in the mobile application to get maximum advantage of the surging demand in the country. However, compared to other developed countries Nepalese is still backward in this using this kind of technology according to (Kameke, 2022) 79 Percentage of the Nepal population resides in rural areas. This makes a big challenge for mobile application adoption in the country. Here are some other factors that could be challenges for mobile applications in Nepal.

8.2. Poor digital literacy

Although there is a big percentage of internet users in Nepal and it's growing. But there is still inequality exists in the country. The data suggest that more men use the internet than women. If we compare people living in the rural area who uses the internet far less than one lives in an urban area. The poor digital literacy rate is one of the major challenges for mobile applications in the country (Poor digital literacy hinders growth in Nepal, 2020).

8.3. Infrastructure Development

Without infrastructure development use of mobile is difficult. In the context of Nepal, we can't see common sense for its development. It requires huge economic investment to be a step ahead by looking at the present situation. The project made for the infrastructure development in the country gets chosen from the project level and based on political interest which is creating uncertainties for its implementation. Engineers who get selected from political interest are causing different difficulties and poor-quality work. Lack of advanced infrastructure people is still impacted from using mobile application in the different part of the countries.

8.4. Data and Security

Data and security are to keep and secure the digital data that the users require while using the technologies from hackers and illegal users. The program that is built for securing urgently or knowingly harm or lose the data is the data security system. Data and security are important parts of data management in mobile the application. In context of Nepal, it doesn't have data protection legislation in the country. Application that is build and used in the country users are experiencing data loss, unauthorized access, cybercriminal activities, and threats.

8.5. Linguistic factor

According to census 2011 there are 123 languages spoken in Nepal as the mother tongue. There is 44.6 percent of people who can read and write in Nepali which is the National language of the country. (Nepal Profile, n.d.) Most of the government school teaches student in the national language which students are poor in understanding the international languages like English. As most of the mobile application that is developing is in English people are lack behind using mobile application. Even the application that is being developed in the national Language is not enough to reach every person as it is one of the diverse language countries and it takes lots of investment for multilingual applications.

8.6. Huge Investment

As different mobile applications prices range varies. Still, it requires a big investment to make it secure and safe. Nepal is a developing country according to (What is the Average Salary in Nepal? (2022) minimum wage is 15,000 per month (115 USD). Many experts wish to leave the country even though they are experts in the field because of the wages. There are uncertainties between the developers and investors as it requires huge money and less to build the best and most secure mobile application.

9. Conclusion & Recommendation

The research has examined benefits and barriers of mobile application on crisis management in Nepal during or after the 2015 earthquake and how to enhance the effectiveness for mobile application in future. Based on the survey results, significant number of respondents (51%) used mobile applications for crisis management during or after the 2015 earthquake in Nepal. Also, many respondents did not use mobile applications at all. Among the respondents who used mobile applications during the earthquake, the majority found them to be effective and reported benefits such as faster access to emergency services, accurate information on disaster alerts, and effective communication with authorities and rescue teams. However, there were also challenges faced by users, such as poor network connectivity, limited access to mobile devices, difficulty in using the applications, and language barriers.

The survey results that showed a significant percentage of respondents who did not use mobile applications for crisis management during the earthquake, and among those who did not use them, the majority did not experience any benefits. This suggests that there is a need for more awareness and education on the use of mobile applications for crisis management, as well as improvements in the accessibility and usability of these applications.

Based on the literature review, survey results, interviews analysis & theirs' conclusion. This research has successfully answered the three of our research questions that has been included in the beginning of our research:

1. What are the benefits of mobile application use for crisis management in Nepal during or after the 2015 earthquake?

- Mobile applications for crisis management in Nepal during or after the 2015 earthquake provide several benefits, which included quick access to emergency services, accurate catastrophe alert information, efficient contact with authorities and rescue teams, and

improved coordination between volunteers and aid organizations. These mobile applications helped speed up the reaction times, increase situational awareness, and facilitate effective resource allocation during disasters. In general, the use of mobile apps in crisis management can remarkably improve the response to emergencies and help save lives. which highlights the importance of integrating mobile technology into emergency situation.

2.What are the barriers to the use of mobile applications for crisis management in Nepal during or after the 2015 earthquake?

- Despite the numerous advantages the barriers to the use of mobile applications for crisis management in Nepal during or after the 2015 earthquake were found to be poor network connectivity, limited access to mobile devices, difficulty in using the applications, and language barriers and there is also concern regarding the data privacy and security. From the study (Figure 3) poor network connectivity was the most common barrier faced by the user.

3.How to address the barriers and enhance the effectiveness of mobile applications for crisis management in Nepal?

-To address these barriers and enhance the effectiveness of mobile applications for crisis management in Nepal, Mobile applications for crisis management need to be more usable and accessible, additional education and awareness about their use are required. There are several ways to accomplish this, including working with mobile service providers, designing mobile applications with user feedback in mind, and offering users training and assistance.

The study concludes that although further development and awareness are needed to fully gain their benefits, mobile applications have the potential to be helpful tools for crisis management like 2015 earthquake in Nepal.

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Annex 1 Survey Design

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Benefits and Barriers of mobile application use in Nepal (नेपालमा मोबाइल एप प्रयोगका फाइदा र बाधाहरू)

Benefits and Barriers of mobile application use in Nepal (नेपालमा मोबाइल एप प्रयोगका फाइदा र बाधाहरू)

This survey will collect demographic information about the respondents, including age, gender, education level. The second section will include questions related to the benefits and barriers of mobile application use in Nepal for crisis management during or after the 2015 earthquake in Nepal?

यस सर्वेक्षणले उत्तरदाताहरूको उमेर, लिङ्ग, शिक्षा स्तर सहित जनसांख्यिकीय जानकारी सङ्कलन गर्नेछ। दोस्रो खण्डमा नेपालमा सन् २०१५ को भूकम्पको समयमा वा पछि संकट व्यवस्थापनका लागि नेपालमा मोबाइल एप्लिकेसनको प्रयोगका फाइदा र बाधाहरू सम्बन्धी प्रश्नहरू समावेश हुनेछन्?

* Required

1. What is your gender ? तपाईंको लिङ्ग के हो ? *

Mark only one oval.

- Male (पुरुष)
 Female (महिला)

2. What is your age? *
तिम्रो उमेर कती हो?

Mark only one oval.

- Under 18 - (१८ मुनि)
 19-24 (१९-२४)
 25-31 (२५-३१)
 32-38 (३२-३८)
 older (माथि)

3. What is your education level? तपाईंको शिक्षाको स्तर कति छ? *

Mark only one oval.

- Elementary (प्राथमिक)
- High School (उच्च विद्यालय)
- Bachelor Degree (स्नातक तह)
- Master Degree (मास्टर डिग्री)
- Doctorate (डाक्टरेट)
- None (कुनै पनि छैन)

4. Have you used any mobile applications for crisis management during or after the 2015 earthquake in Nepal? (नेपालमा सन् २०१५ को भूकम्पपछि वा पछि संकट व्यवस्थापनका लागि कुनै मोबाइल एप प्रयोग गर्नुभएको छ ?) *

Mark only one oval.

- Yes (हो)
- No (छैन)

5. What types of mobile applications have you used for crisis management during or after the 2015 earthquake in Nepal? (नेपालमा २०१५ को भूकम्पपछि वा पछि संकट व्यवस्थापनका लागि तपाईंले कस्ता प्रकारका मोबाइल एप्लिकेसनहरू प्रयोग गर्नुभएको छ?) *

Mark only one oval.

- Disaster alerts (कोप अलर्ट)
- Emergency communication (आपतकालीन संचार)
- Maps and location-based services (नक्सा र स्थान आधारित सेवाहरू)
- Crowdsourcing and volunteer coordination (क्राउडसोर्सिङ र स्वयंसेवक समन्वय)
- All above (माथिका सबै)
- I did not use any mobile applications for crisis management (मैले संकट व्यवस्थापनको लागि कुनै पनि मोबाइल अनुप्रयोगहरू प्रयोग गरेको छैन)

6. How effective were the mobile applications you used for crisis management during or after the 2015 earthquake in Nepal? *
नेपालमा २०१५ को भूकम्पपछि वा पछि संकट व्यवस्थापनका लागि प्रयोग गरिएका मोबाइल एपहरू कतिको प्रभावकारी थिए?

Mark only one oval.

- Very effective (धेरै भावकारी)
- Somewhat effective (केही हदसम्म प्रभावकारी)
- Not very effective (धेरै प्रभावकारी छैन)
- Not at all effective (पटकै प्रभावकारी छैन)
- I did not use any mobile applications for crisis management (मैले संकट व्यवस्थापनको लागि कुनै पनि मोबाइल अनुप्रयोगहरू प्रयोग गरेको छैन)

7. What were the benefits of using mobile applications for crisis management during or after the 2015 earthquake in Nepal? *
नेपालमा २०१५ को भूकम्पपछि वा पछि संकट व्यवस्थापनका लागि मोबाइल एप प्रयोग गर्दा के फाइदा भयो?

Mark only one oval.

- Faster access to emergency services (आपतकालीन सेवाहरूमा छिटो पहुँच)
- Accurate information on disaster alerts (प्रकोप अलर्ट मा सही जानकारी)
- Effective communication with authorities and rescue teams (अधिकारीहरू र उद्धार टोलीहरूसँग प्रभावकारी सञ्चार)
- Better coordination among volunteers and aid organizations (स्वयंसेवक र सहायता संस्थाहरू बीच राम्रो समन्वय)
- I did not use any mobile applications for crisis management (मैले संकट व्यवस्थापनको लागि कुनै पनि मोबाइल अनुप्रयोगहरू प्रयोग गरेको छैन)
- Other: _____

8. Were there any challenges you faced while using mobile applications for crisis management during or after the 2015 earthquake in Nepal? नेपालमा सन् २०१५ को भूकम्पपछि वा पछि संकट व्यवस्थापनका लागि मोबाइल एप्स प्रयोग गर्दा तपाईंले सामना गर्नुभएका कुनै चुनौतीहरू थिए? *

Mark only one oval.

- Poor network connectivity (कमजोर नेटवर्क जडान)
- Limited access to mobile devices (मोबाइल उपकरणहरूमा सीमित पहुँच)
- Difficulty in using the applications (अनुप्रयोगहरू प्रयोग गर्न कठिनाई)
- Language barriers (भाषा अवरोधहरू)
- I did not use any mobile applications for crisis management (मैले संकट व्यवस्थापनको लागि कुनै पनि मोबाइल अनुप्रयोगहरू प्रयोग गरेको छैन)
- No
- Other: _____

9. How frequently did you use mobile applications for crisis management during or after the 2015 earthquake in Nepal? नेपालमा २०१५ को भूकम्पपछि वा पछि संकट व्यवस्थापनका लागि मोबाइल एपहरू कति पटक प्रयोग गर्नुभयो? *

Mark only one oval.

- Several times a day (दिनमा धेरै पटक)
- Once a day (दिनमा एकपटक)
- A few times a week (हप्तामा केही पटक)
- A few times a month (महिनामा केही पटक)
- Never (कहिल्यै)

10. Did you receive any assistance or support through the mobile applications during or after the 2015 earthquake in Nepal? नेपालमा २०१५ को भूकम्पको समयमा वा पछि मोबाइल एप्स मार्फत कुनै सहयोग वा सहयोग पाउनुभयो? *

Mark only one oval.

- Yes (हो)
- No (छैन)

11. Do you agree mobile applications are essential tools for crisis management during natural disasters like the 2015 earthquake in Nepal? नेपालमा सन् २०१५ को भूकम्पजस्ता प्राकृतिक प्रकोपका बेला विपद् व्यवस्थापनका लागि मोबाइल एप्लिकेसन अत्यावश्यक औजार हो जस्तो लाग्छ ? *

Mark only one oval.

- Strongly agree (दृढतापूर्वक सहमत)
- Somewhat agree (केही हदसम्म सहमत)
- Strongly disagree (कडा रूपमा असहमत)
- Neither agree nor disagree (न सहमत न असहमत)
- Somewhat disagree (केही हदसम्म असहमत)

12. Would you recommend the use of mobile applications for crisis management to others during natural disasters like the 2015 earthquake in Nepal? नेपालमा २०१५ को भूकम्पजस्ता प्राकृतिक प्रकोपका बेला अन्यलाई संकट व्यवस्थापनका लागि मोबाइल एप प्रयोग गर्न सिफारिस गर्नुहुन्छ? *

Mark only one oval.

- Yes (हो)
- No (छैन)
- Not Sure (एकिन छैन)

13. What improvements would you suggest for mobile applications used for crisis management during or after natural disasters like the 2015 earthquake in Nepal? नेपालमा २०१५ को भूकम्पजस्ता प्राकृतिक प्रकोपको समयमा वा पछि संकट व्यवस्थापनका लागि प्रयोग हुने मोबाइल एपमा के सुधार गर्न सुझाव दिनुहुन्छ? *

Mark only one oval.

- Better user interface and user experience (राम्रो प्रयोगकर्ता इन्टरफेस र प्रयोगकर्ता अनुभव)
- More languages and translations (थप भाषाहरू र अनुवादहरू)
- Increased access to mobile devices and network connectivity (मोबाइल उपकरण र नेटवर्क जडानमा पहुँच बढेको छ)
- Integration with other communication channels (अन्य संचार च्यानलहरू संग एकीकरण)
- Not Sure (एकिन छैन)
- Other: _____

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