

Tourism Disaster Management through Chatbots as an Alternative Tool of Communication

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Abstract | Information and Communication Technologies has revolutionized the hospitality and tourism sector. Artificial Intelligence (AI) and Machine Learning Technology (MLT) are widely popular and can be of assistance to reduce the impact of disasters by providing accurate, brief, and updated information. It also facilitates predicting and executing plans in managing crises to lessen losses. Chatbot can store the data and assist during Disaster Management and Risk Reduction. Dealing with an uncontrollable event in the tourism industry is challenging. AI-powered Chatbots support reporting emergencies and help access information for making decisions in the tourism industry. AI chatbots in disaster management improve the perceptive of all phases of disasters and are reliable for safety aspects in tourism. They may be readily available and accessible to the users and responders to handle emergencies in tourism. This conceptual study aims to explore the existing chatbots in tourism and disaster management sector. SWOC analysis is carried out to identify tourism chatbots' strengths, weaknesses, opportunities, and challenges to do further research in developing chatbots in tourism combining disaster management elements. The SWOC analysis figured out a detailed picture of tourism chatbots in finding the gap for the present scenario. From the study, we found the tourism chatbots are not provided with essential disaster management details. Therefore this study throws light to the existing literature for developing a tourism and disaster management combined chatbots. The SWOC analysis implies the need of combo development of tourism chatbot with disaster management.

Keywords | Disaster risk reduction and management, tourism, Information and Communication Technology, artificial intelligence chatbots, SWOC analysis

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1. Introduction

Disaster management is a multifaceted and challenging situation (Curnin, 2015) with a well-made structure to manage and reduce disasters' risks and impacts. It is critical to execute a method that can handle the disasters accurately, on time, efficiently, and effectively through every phase of disaster management. The data can be stored using AI Technology for disaster prevention (Zhang, 2019), detection (Shi et al., 2020), risk reduction (Izumi, 2019), disaster management (Sakurai & Murayama, 2019), early alarming (Kinaneva et al., 2019) and decision-making support (Belhadi et al., 2022). Chatbot is a human-computer dialog application (Jia, 2003) operated by natural language via text or speech and a digital unit technology development, used in business (Ko et al., 2018; Kushwaha & Kar, 2020; Heo & Lee, 2018; Thomas, 2016; Selamat & Windasari, 2021) tourism (Ukpabi et al., 2018; Nica et al., 2018; Clarizia et al., 2019; Chrysovelidis, 2020); Sano et al. (2018); Madhu & Ravindra (2022)), medical fields (Divya et al. (2018); Rosruen & Samanchuen (2018); Soufyane et al. (2021); Safi et al. (2020)) and disaster management (Tsai et al. (2021); Tsai et al. (2019); Kosugi & Uchida (2019); Boné et al.(2020); Ouerhani et al. (2020); Tsai et al.(2021); Hwerbi (2020); Chen et al. (2019)). Chatbots have been for personal assistants (Pham, 2018) and information facilitators (Tavanapour & Bittner, 2018). Information and Communication Technology have a major role in many sectors and industries (Vimala, 2015). Tourism industry improved with technological support by tourism communication using of ICTs (Perinotto et al., 2018) and introduced various chatbots to assist customers by providing information in the hospitality and tourism sector. The application of AI in tourism industry can provide the services personalized and automated to make travel feasible (Thazhathethil et al., 2021); also provide variety in tourist experience (Soares et al., 2017) that

is essential for tourism (Rodrigues & Lourenco, 2017). Crisis are the unpredictable events (Freedman, 2002) that affect and impact tourism destinations, marketing, tourists (Abdula, 2019). Chatbots support the customers with the latest, accurate information (Chung et al., 2020) regarding their queries in the tourism industry (Zumstein & Hundertmark, 2017). In recent world, ChatGPT developed by OpenAI (2022) is celebrated, for the quick, huge implications in variety of fields (Van Dis et al., 2023) and detailed responses in variety domains of knowledge. ChatGPT is revolutionizing (King & chatGPT, 2023), advances users understanding (Biswas, 2023) and act as a human accompanying bot interacts through conversations is possible to answer for every clarification. It improves discovery and search, create content, provide information services and generate metadata to the users (Lund & Wang, 2023). Hence, chatbots can be used for alternative communications to put resources and help survivors find the emergency services (Mutch, 2014) they need.

Therefore, tourism chatbots that provides travel-related and disaster handling-related information could help customers to find information on travel services and emergency conditions. This study had undergone a SWOC analysis which investigates the strengths, weaknesses, opportunities and challenges of the existing travel and tourism chatbots. Following introduction part, an extensive review of literature, methods, details of chatbot in tourism and disaster management, SWOC analysis, theoretical and managerial contributions, conclusion and future research are carried out.

2. Theoretical Framework

The tourism industry is vulnerable to disasters, and managing disasters is significant in developing tourism resilience and recovery (Becken, 2014). Disaster management in tourism can oc-

cur in the prevention, mitigation, response, and recovery phases (Ritchie, 2008). Rosselló et al. (2020) mentioned that disasters and uncontrolled events are one of the major influencers of destination choice of tourists and the destination's decision makers can create disaster management decisions according to the disasters. Disasters have negatively impacted the performance of tourism (Rindrasih, 2019) and disaster communication is complicated to set up and biggest challenge in responding to disasters (Manoj et al., 2007) but even though it is important to deploy communication network in disaster areas (Gomes et al., 2016) in tourism destinations. Tourism destinations would have some history of experiencing disasters and only few destinations have proper plans in disaster management for uncertainties (Faulkner, 2001). Chan et al. (2020) describes that the contributions of tourism to all disaster phases is significant and different, it functions mainly with safety, emergency evacuation and accommodation. Xu and Grunewald (2010) proposed a framework for the disaster management to effective disaster mitigation and resilience. Tourism disaster management involves major four steps such as mitigation, preparedness, response and recovery. And disaster planning for tourism depends on the analysis of previous disaster planning studies and research (Ritchie, 2008). Disaster Risk Reduction Report by UN Environment Programme highlights the role of local authorities and private sector in educating residents and tourists to manage to disasters (UNEP, n.d.). Tourism destination communities have significant role in all phases of disaster management (Granville et al., 2016). Tourism destinations need to create knowledge systems to deal with disasters and crises in pre-crisis stage, during crisis and post-crisis stage (Mistilis & Sheldon, 2006). Chan et al. (2021) describes tourism industry must be prepared for disasters, communication barriers to be overcome, and post recovery to lead to sustainable tourism development. Also, pointed out the role of local stakeholders in tou-

risms disaster management. And tourism specific action plans could improve the awareness and preparedness to disasters (Hughey & Becken, 2016).

Information Technology (Djoumessi et al., 2022) and accurate communication among disaster affected communities shall be effective in disaster management to reduce the risks (Lowrey et al., 2007). Proper, instant and effective communication leads to disaster risk reduction (Fathollahzadeh et al., 2022). Dao and Lim (2022) highlighted about the importance of risk communication during the COVID pandemic. Chatbots are knowledge disseminators (Liu, 2020) in which all actions must inform and taken fast. Their application to disaster support is unknown to the scientific community (Amalia & Suprayogi, 2019). Chatbots are used in numerous areas, such as customer service (Følstad & Skjuve, 2019; Adam et al., 2021; Nordheim et al., 2019; Rossmann et al., 2020), automation (Mondal et al., 2018; Hildebrand & Bergner, 2019), and education (Bavaresco et al., 2020; Winkler & Söllner, 2018; Hwang & Chang, 2021; Pérez et al., 2020). A chatbot is a learning-based technology (Adamopoulou & Moussiades, 2020) that answers queries and different associated information through text conversations with users (Boné, 2020). The chatbot is a human-computer dialog structure operated through natural language via text or speech (Cahn, 2017). The tourism industry has developed with technological support (Pease et al., 2007) and introduced various chatbots to assist customers by providing information to them (Calvaresi et al., 2021). According to Salesforce (2019), 80% of business customers and 64% of travelers look ahead travel operators to respond on time. And the 64% of the travel service providers use AI chatbots for solving complex queries. 80% of them agree that chatbots are more effective than humans. Chatbots also support the customers with the latest; accurate information regarding their queries in the tourism industry (Buhalis & Cheng, 2020); (Kasinathan et al., 2020) and developed a combination

system of Geographic Information System (GIS) to hold up resources allocation in the disaster response phase (Thomas & Ertugay, 2007). Calvarresi et al. (2021) introduced crowd sourcing to assist Government to pass through a filter of disaster responses and social media for crisis mapping platforms on natural disasters. Through chatbots, data analytics and, robotic method automation, high-quality information can be distributed to the population to overcome the crisis (Chan & Tsai, 2019). People use technological systems like apps, websites, or chatbots for decision making to resolve disaster management and implement them to provide emergency management of disasters (Tsai et al., 2019). A chatbot can allow intermingling to humans and helping to acquire the data they need (Cheng & Jiang, 2020). Decision-makers depend on messaging apps and other technology to correspond and connect with others for improving disaster prevention practices (Ma & Wu, 2020). This dialogue system at emergency assists in the selection, utilization, and process of data accurately and efficiently (Haldén & Yao, 2020). Chatbot with digital platforms provides interactive communication among platforms and users to offer information (Amalia & Suprayogi, 2019). Chatbot performs several tasks as a digital unit (Okonkwo & Ade-Ibijola, 2020) and auto responder (Amalia & Suprayogi, 2019) to connect numerous services. Chatbot features are shaped as an automatic and first responder related to an information center where specific issues are made available. Chatbots are explained to perform customized suggestions (Han et al., 2021), and recommendations amplify translation which puts up customers' trustworthiness and loyalty (Yu, 2021). They gather information (Adamopoulou & Moussiades, 2020), attain feedback (Grové, 2021), and deal with complaints (Zhang, 2023). Chatbots empower travelers through enhanced accessibility to instant connectivity (Smutny & Schreiberova, 2020) and information along with their undisturbed journey with custom-made services and more remarkable expe-

riences (Jenneboer, 2022). Automating queries saves time (Mittal, 2021) and records the communication with users; they suggest insights that bring up a personal touch to customers (Brandtzaeg & Følstad, 2018). Chatbots are a model of customer-centric services 24/7 (Damij et al., 2022) and can transform and answer questions (Paliwal et al., 2020). Responses are efficiently automated in chatbots and employ fundamental requests for information (Adamopoulou & Moussiades, 2020). It reduces overheads and manages connection and association with humans (Youn & Jin, 2021). Travel agencies can offer customized responses to increase customer satisfaction. And they have made a remarkable shift - text-based to voice-enabled- to improve customer engagement (Ho, 2021) in this competitive world. Chatbots are skilled at transforming and fulfilling visitor expectations and satisfactions (Orden-Mejía, 2022). Chatbots assist in tourism customer engagement for sales, support, and development strategies (Rajaobelina & Ricard, 2021). And allow government agencies to assemble data (Androutsopoulou, 2019) from various sources, systematize information according to practical needs, and allocate information regularly. Chatbots of natural language understanding, corpus based, contextual based, supervised, task-oriented dialogue system, retrieval based, intent based, RNN based, RL based are the state-of-the-art and future research direction chatbots (Luo et al., 2020; Almansor & Hussain, 2020).

Chatbot was also developed to perk up the effectiveness of administration in mine safety actions during natural disasters (Tsai, 2021). It was by reducing time consumption and labor in urgent information delivery and rescue situations. The extensive use of technology, smart phones, and messaging applications resulted in conversational agents, which has been a way out for various troubles in the industry. Chatbots explored in business area, covering sub-areas such as shopping, sales, e-commerce, and air travel booking (Hu et al., 2018). Becken & Hughey (2013) provided lite-

rature support for the importance of disaster risk reduction in tourism. Tsai & Chen (2011) established a model for disaster risk assessment for Taiwan tourism industry. Damij & Bhattacharya (2022) proposed a framework for the post-disaster mental-health support from AI chatbot. Staegemann et al. (2022) mentioned the significance of chatbots in providing relevant information in disaster management situations. National Science and Technology Center for Disaster Reduction (NCDR) and 'LINE Taiwan' developed a chatbot including 30 public alerts, and hydrology, covering severe weather conditions, events, and further issues (Tsai, 2021) which uses 'line' account providing notifications on major disasters in the area. Moreover, give directions on landslides, send notifications and notify users on landslides and other events. Chatbot has been created to enable disaster decision-makers to recover both real-time and static information straight in natural language by improving the ability of inquiry analysis (Tsai, 2021). Boné et al. (2020) introduced DisBot chatbot, a Portuguese Chatbot uses social media information to hold up society and first-responders in a disaster situation to develop the population's resilience and decision-making. This chatbot summarize data and notify crisis stakeholders in an automatic and trustworthy means, to improve resilience and assist in decision-making in emergencies. The Chatbot circulate pertinent information to the users. Further, implemented a Flood AI chatbot of micro services-oriented design (Indrayani et al., 2020) and each module acts as a self-directed service, suggesting stakeholders' information concerning flood awareness and response. Disaster management and chatbots are booming do research areas and open to innovative contributions, showing many opportunities (Ivanov, 2019). Chatbot enables interactive communication among customers and platforms, demanding knowledge and capacity for specific information. University of Washington implemented a chatbot which request emergency section about housing, medical care,

food and physical safety to combat COVID-19. AI-powered chatbots can speed up understanding natural hazards from different sources, analyze vast amounts of data and develop immediate and reactive measures for disaster risk reduction (Chan, 2019).

This study provides information on the tourism and hospitality chatbots and disaster management chatbots. It evaluates the role of AI chatbots that can be utilized for an alternative communication for tourism in managing disasters, especially in emergencies (Kasinathan, 2020). Chatbots are communicators' that convert' text to speech, speech to text, and the analyzers that provide information for user queries accordingly. The expected performance of chatbots influences intentions for using chatbots, the habit of chatbot uses social impact, and humankind behavior (Ivanov & Webster, 2017). Chatbots' informational, interactivity, and empathy influence and forecast tourist satisfaction (Kankanamge et al., 2019). Some chatbots can even analyze the tone pitch to identify the problem's urgency or situation (Kapucu & Garayev, 2011). This way, they can prioritize emergencies and help more people effectively during disasters. There is an opportunity to create an AI-powered chatbot that can communicate disaster-linked information (Ahmady & Uchida, 2020) and tourism-associated information even though a limited number of tourism chatbots provide helpline options to the users.

The major objectives of the study are to understand the concept of chatbots in disaster management and tourism; to find out the main existing chatbots on disaster management and tourism; also to propose a framework incorporating disaster management and tourism information which provides decision-support information in crisis situations. Moreover, chatbot facilitates the helpline option and provides emergency information on Government decisions, steps to follow during crises, weather conditions, alerts, and destinations' vulnerability to assist the users in critical situations.

It develops the practice of responding in an emergency. So, disaster-linked and tourism-associated information combined with chatbots for destinations, hotels, flights, or car hire and emergency provide users with a secure and fearless engagement in tourism disaster management. Chatbots consisting of information about tourism services and disaster management allows the users and rescue team to communicate and manage disasters. All chatbots in tourism for disaster management can answer people who need help or emergency rescue services.

3. Methods

This study is conceptual in nature. The data for the descriptive study are collected through secondary sources such as articles and websites. Scopus, ProQuest, Google Scholar databases are selected to gain relevant literatures for the search terms, 'disaster management', 'tourism', 'artificial intelligence', 'chatbots', 'SWOC analysis'. The chatbots and online booking platforms existing in tourism and disaster management were studied to gain in-depth knowledge on this field. Furthermore, SWOC analysis is provided to give insights on the development of chatbots with disaster management details.

Working of Chatbots

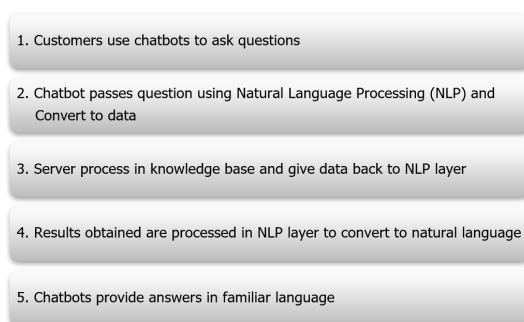


Figure 1 | Working of the Chatbot
Source: Own elaboration

Chatbots developed in Travel and Tourism Industry

Expedia, Skyscanner, and Booking.com are existing platforms that provide hotels and flights recommendations and bookings to provide a simplistic familiarity to the user. The first communication between chatbots and online booking platforms in the tourism industry facilitates information on hotels and customer care (Lin et al., 2018). AI chatbot application named Sam provides travel assistance focusing mainly on business travel; to manage their travel itineraries, including alerts, flight delays or cancellations, and calculates expenses. Hipmunk, an online platform offers services to plan the trip. Mezi provides users with flight information, recommendations, and hotel availability. SnapTravel is a hotel booking technology users can utilize to book hotels. HelloGBye, Austin startup, allows users to communicate with chatbot through text, voice or commands. In HelloGBye, users can type or vocally give requests, and the bot will respond to flights and hotel services in 30 seconds.

Table 1 is regarding the information of existing tourism chatbots and online booking platforms. It describes each platform's founding year, founder, the travel aspect or component provided and the features. From the table it is clear that, they are providing information on accessibility or transportation, accommodation, attraction, amenities travel planning, travel itineraries details to the users. And also Sam is only providing the weather details to the users. The mentioned chatbots and booking platforms are recently developed and have a good access by the users that provide automated services to the customers. Furthermore, they have not facilitated users with the emergency or disaster management details. Therefore, this is the area of research where the authors throw light upon to the existing literature and Fig. 3 is the conceptual framework of this review paper that contributes to the service providers and developers to provide emergency details. And also this can be applicable to the new developing and existing chatbots.

Table 1 | Existing Travel and Tourism Chatbots

Chatbots & Online booking platforms	Year	Founder	Aspect	Features
Skyscanner	2016	Skyscanner flight search engine	Accessibility Accommodation	<ul style="list-style-type: none"> Offering low and affordable information on flights, car hire, and hotels. Suggestions to the users based on their location Find out popular destinations for the users Comparing flight prices Over 100 million (2018) users Redirects to the website for flight booking Alerts on price variations and often information on travel tips
Expedia	2016	Expedia.com	Accessibility Accommodation Amenities Travel planning	<ul style="list-style-type: none"> Easy to use and interact with immediate response to find a hotel Facilities to search for a hotel and bookings (check-in date, location, number of guests, and length of stay). Owns about 200 travel booking sites of hotels, flights, and car rental companies Followed by 5.9 million on FB Around the globe, 84% of travelers depend on Expedia kind of online agencies for travel planning and booking
HelloGBye	2012	Austin startup	Accessibility Accommodation Travel planning	<ul style="list-style-type: none"> Provides information both in text and voice for travelers and professionals In 30 seconds, chatbot can solve customer flight or hotel requests and queries. Quickly offers to adjust travel planning of the professionals and travelers well.
Sam	2017	FCM Travel Solutions	Attraction Accessibility Accommodation Amenities Weather	<ul style="list-style-type: none"> Smart Assistant for Mobile is an intelligent travel assistant that provides information on destinations, location directions, restaurants, and itineraries. Sam communicates to the users on flights, destinations, weather updates, and car hire through multiple platforms.
KLM	2017	KLM Royal Dutch Airlines	Accessibility	<ul style="list-style-type: none"> KLM Royal Dutch Airlines introduced chatbot powered with AI technology help for ticket booking with immediate and accurate information Trained with more than 60000 questions with answers Gives responses for FAQs, travel tips, and airline requirements Facilitate flight booking, confirm booking, and make payments. The information provided is helpful, professional, and user-friendly It gets 1,00,000 mentions and 15,000 conversations per week. 40% of increase in user communication and interaction. 100% case volume increase and AI itself carried out 50% of user interactions.
Booking.com	2016	Booking.com	Accommodation Amenities Accessibility	<ul style="list-style-type: none"> Travel queries such as date, arrival, departure, transport facilities, payment Available on different platforms to answer users' questions on accommodation Responsible for providing information on cancellation, parking, and internet requests Automatically respond to 30% of queries, and for other unsolved questions, bot take support from the service team and add them directly into the conversation. Handle 50% of the post-accommodation queries of the users Information are 100% transparent, updated, and accurate
Ask Disha	2018	IRCTC	Accessibility	<ul style="list-style-type: none"> IRCTC developed a voice-enabled chatbot to provide customer service and engagement Supports to give information in various regional languages Can respond to customers' questions 24*7 with the ability to multitask, high-quality customer experience, and satisfaction Almost 3000 queries are handled by this chatbot daily. Inquiries and status on the reservation, refunding, cancellation, PNR, and even tourism products are available through Ask Disha.
Hipmunk	2010	Facebook Messenger and Slack	Accessibility Accommodation Travel planning	<ul style="list-style-type: none"> Support with automated travel planning advice Customer services and information for flights, hotels, and so Help in planning trips and make reservations
Mezi	2015	American Express	Accommodation Accessibility Travel Itinerary Amenities	<ul style="list-style-type: none"> Provide texts and images for travelers, professionals and travel agencies Information on flights, hotels and amenities

Source: Ivanov, 2019; Lin et al., 2018; Melián-González et al., 2021; Middleton, 2013; Mydyti & Kadriu, 2021; Ngui, 2020; Orden-Mejía & Huertas, 2021; Pérez-Soler et al., 2019; Sofmen, 2018; Insidettravel.news, 2018; Hospitalitytech, 2019; Chatbotguide.org, n.d; Venturebeat, 2016; Emerj, 2019

Disaster Management Chatbots

Table 2 | Existing Disaster Management Chatbots

Chatbot	Aspect	Features
SPeCECA	Assistance on disaster emergency management	<ul style="list-style-type: none"> The chatbot for emergency assistance Assists victims to help in emergencies. This chatbot is an intelligent assistant providing human-like communication that supports emergencies. It has two phases that give critical information and send real-time alerts on emergencies.
Ask Diana	Water-related management	<ul style="list-style-type: none"> Chatbot system used for water-related disaster management Accessing disaster data and efficiently building up corresponding responses Deals with enormous data and helps manage such data to the chatbot users and decision-makers The chatbot comprises a database, user-friendly mechanism, and intuitive user interface. It provides information on weather, preparedness, operational activities, recovering measures and give suggestions for the users. Ask Diana is a simple and easy communication platform for water-related disaster management.
Flood	Flooding communication & knowledge	<ul style="list-style-type: none"> System for knowledge and communication on flooding. Improves community preparedness using text and voice by providing relevant data, especially on flooding. It makes easy access in flood maps, data, conditions, forecasting to the customers in handling floods. Also, Flood AI Chabot is connected with other applications in providing services to the users. As with human interaction, chatbots make conversations with needed information dealing with floods. It helps in response and awareness with a comfortable communication platform.
MyGov Corona Helpdesk	COVID-19	<ul style="list-style-type: none"> Chatbot for COVID-19 management Developed by Natural Language Processing(NLP) and cloud It was developed to provide updated information on COVID-19. Users can interact with the chatbot to clear their queries and presently chatbot have two crores of users. This chatbot even gives information on vaccination, the latest updates, advice, and authentic news on COVID-19 to reduce coronavirus risk. It eradicates fake information and spreads awareness on COVID-19.
DisBot	Decision making and community resilience	<ul style="list-style-type: none"> First Portuguese-speaking disaster support dynamic knowledge chatbot use social media knowledge to improve decision-making and resilience. Improves and generates responses for decision-makers and the community. It creates situational awareness, emergency contacts, and procedures on disaster management to the first responders and citizens by providing exact information.
Rescue.io	Disaster management and rescue procedures	<ul style="list-style-type: none"> Provides multi-channel communication to first responders.
GetJenny	COVID-19	<ul style="list-style-type: none"> Corona information chatbot uses facts and figures from various sources to provide COVID-19 up-to-date information This chatbot is monitored and updated twice a day.
Direct Relief	Disaster relief assistance	<ul style="list-style-type: none"> Handle more than 6000 requests in a time of fewer than 60 seconds for disaster management situations. It provides quick response and assistance to relief organizations in managing disasters. It redirects customers in disaster relief procedures. Chatbot can answer complicated questions and be available 24/7 as a live person in dealing with disasters relief stages
VSoft	Disaster management knowledge and communication	<ul style="list-style-type: none"> AI-Powered Chatbot coordinates between response groups and helps provide updates about the current situation.
WEA (Wireless Emergency Alert)	Natural disaster management/ Emergency crises management	<ul style="list-style-type: none"> In any suspected terrorist activity that is going to occur or in the case of any natural disaster or if any emergency arises, FEMA can send WEA messages. An AI-powered chatbot is an intelligent management solution capable of accumulating critical information and assisting seamlessly. Disaster management chatbots can transform how international humanitarian organizations respond to large-scale disasters.
Twitter COVID 19	COVID-19 measures	<ul style="list-style-type: none"> The potential to respond to natives' needs for information related to COVID-19 in Central Java province revealed Twitter's chatbot to implement government policy.

Source: Amalia & Suprayogi, 2019; Calvaresi, 2021; Haptik.ai, 2020; Tsai et al., 2019; Ouerhani et al., 2020; Tsai et al., 2021; Bone et al., 2020.

Travel and Tourism chatbots

The adoption of chatbots in the tourism industry strengthens competitiveness and provides

recommendations for implementing other tourism chatbots (Melián-González, 2021). Automation, social presence, and habit positively influence tou-

rism chatbot usage intentions (Middleton, 2013). The community has a growing interest in tourism chatbots (Mydyti & Kadriu, 2021) that reduce and simplify the interaction between chatbots and users. Tourism chatbots can automatically process user requests and even value users' privacy and confidentiality (Ivanov, 2019). Usually, chatbots in the tourism industry are related to airlines, hostelry, travel agencies, parks, medical tourism, culture and heritage sites, and other sub domains (Mydyti & Kadriu, 2021). Moreover, it achieves customer appreciation for being more concerned than human agents (Ngui, 2020). Users are enhanced with a personalized travel and quality experience from tourism chatbots. More of the tourism and travel chatbots provide services in hotel forecasting effectively. It also saves time from the recurring tasks and responsibilities (Orden-Mejía & Huertas, 2021). Chatbot lends a hand and facilitates users' requests throughout their journey in pre-arrival, during, and post phase of hotel. Tourism chatbots are available 24/7 with instant response and support for customers' requirements regarding travel-related services (Park et al., 2021). Tourism chatbots are not affected by the risks relating to employees. Travel and tourism chatbots provide travel-related services in accommodation, accessibility, attraction, amenities, and weather from the reviews collected. Most of the chatbots developed from the data show that they facilitate information and assistance regarding accommodation and accessibility. For the last decade, all the accommodation, accessibility, and attraction chatbots made significant growth and development in the tourism field. Nevertheless, still lack emergency aspect is missing in all studied chatbots. The helpline is provided for the users; however, an emergency aspect combining the forecasting, alerts, and response contacts could help users deal with crises in a destination. Researchers studied that tourism chatbots strengthen the industry because more customers can explore tourism through chatbots. Hence, tourism chatbots are accessible

and interactive to the users. Furthermore, this factor is the opportunity to combine disaster management aspects in tourism chatbots to deal with disasters. Chatbots are accessible to the customers, and this opportunity provides to deal and engage with emergencies in tourism.

SWOC analysis of tourism chatbots

SWOC analysis is a strategic planning technique to recognize a project' or business's strengths, weaknesses, opportunities, and challenges. It also helps to determine the external and internal factors that affect and influence achieving the objectives. A SWOC analysis of tourism chatbots has been carried out from the studies. Analysis shows the strengths, weaknesses, opportunities, and challenges of tourism chatbots, and it identifies the challenges and competitive factors of tourism chatbots. This SWOC analysis evaluates the internal strengths and weaknesses and external opportunities and challenges of developing tourism chatbots. It helps in converting the weakness into strengths and challenges into opportunities for technological advancement and enhancement in the tourism industry. Strengths of the tourism chatbots show the uniqueness of chatbots that create benefits over others, and weaknesses of tourism chatbots explain their disadvantages over others. Opportunities of the tourism chatbots illustrate the elements and factors explored to make advantages. Also, challenges are often the aspects that cause and affect the troubles and problems in developing chatbots in the tourism industry. Tourism chatbots providing information on accommodation (for eg: Snaptravel) are user-friendly with access to a lot of information regarding booking in adjust with a budget and previous search to find hotels all around the world (Pérez-Soler et al., 2019). Even Expedia chatbot offers clear and short answers for customer queries, high security on users' information, and a refined user interface

layout. JAPAN Trip Navigator 2, a tourism chatbot, has increased interaction with humankind; by giving keywords, they can help access information and offer sufficient details, including events and news. Tourism chatbots are more accessible to the personalized services provided to the users. They can be available 24/7 with updated information with fast responses to the questions raised by the customers. A real agent is required for other services as only limited services are provided by tourism chatbots. Moreover, sometimes, giving irrelevant and inaccurate answers to the requests is not convenient for users to use these tourism chatbots (Pérez-Soler et al., 2019). Also, by the limited input, interactivity may reduce the malfunctioning of tourism chatbots. JAPAN Trip Navigator 2 only provides information for the Japan area and recommended places. Financial, Socio-technical risks and tasks show the disadvantages of developing and maintaining tourism chatbots. Even they cannot handle very complex data systems in the

process. Also, they have no disaster management element for dealing with disasters in tourism. A chatbot encompassing the tourism elements and disaster management aspects provides users an opportunity to deal with disasters. The booming tourism industry is the foremost opportunity for tourism chatbots to develop and create an identity of their own. Technological development and advancement improve the chance to expand the features and attributes of tourism chatbots. Already present digital generation is much fond of technological advancement and enhancement; with the help of marketing and promotional activities, tourism chatbots facilitate reaching a larger audience to get familiar with tourism chatbots. Tourism chatbots cover huge market share globally, and these prospects would help them enlarge the process of providing information to the users of the tourism industry.

<p>Strengths:</p> <ul style="list-style-type: none"> • Interactive communication platform • Automatic request process • Empathetic consideration to users • Available 24/7 • Save time and less effort • Instant response and support • Hold up in travel planning and related services • Personalized and quality services • More tailored assistance and information • Informative to the users • Data handling in an efficient and effective way • Low knowledge barriers • Alternative role of the human agent • Greater convenience • Customer satisfaction • Not affected by employee associated risks • Tangible economic benefits 	<p>Weaknesses:</p> <ul style="list-style-type: none"> • Financial investment in the implementation of chatbots (Chatbot design, development, performance, and maintenance are time-consuming & high cost) • Requirement of high technological knowledge and Socio-technical task (Model, data collection, complaint, strategies, storage, protection, identification, classification and representation) • Not always cooperative for elderly users • Chance of data handling and error • The incapability of processing complex data, lack of creativity and personal touch • Require private information on complaints handling & may lead to misuse • Lack of disaster management aspect
<p>Opportunities:</p> <ul style="list-style-type: none"> • Booming travel and tourism industry • Technological development • Huge market share • Marketing and promotional activities • Develop and implement tourism chatbots, includes disaster management aspects • Establish single point of communication system provides information on travel related and emergency related. 	<p>Challenges:</p> <ul style="list-style-type: none"> • Technological competition • Challenges relating to users, providers, and system • Quick outdated of rule-based chatbots • Required minimum IT literacy level to use tourism chatbots • Only structured interaction (No humankind feelings) or interactions • Loss of jobs • Acceptability of population • Different perception levels of users • Fail to satisfy simple requests of users

Figure 2 | SWOC analysis of tourism chatbots
Source: Own elaboration

Furthermore, tourism chatbots can facilitate the aspect of developing disaster management information to cope with the disasters in tourism destinations. Also, the technological development and competition among service providers are tourism chatbots' most prominent challenges to explore. Without innovative ideas, tourism chatbots cannot develop in the tourism industry. Analysis shows that tourism chatbots are more reliable and instant information provides for the users. Even though, tourism chatbots are lacking in providing the emergency details to the users. Development of disaster management combined tourism chatbots facilitates customers to search the tourism information and disaster management details as well.

Assessment of existing tourism chatbots

Table 3 | Evaluation of tourism chatbots

Tourism Chatbots & Online Platforms	Internet requirement	Tourism Component	Disaster management information element
Skyscanner Chatbot	Yes	Accessibility Accommodation	No
Expedia	Yes	Accessibility Accommodation Amenities Travel planning	No
KLM	Yes	Accessibility	No
Booking.com	Yes	Accessibility, Accommodation, Attractions, Amenities	No
HelloGBye	Yes	Accessibility Accommodation Travel planning	No
Sam	Yes	Attraction Accessibility Accommodation Amenities Weather	No, Weather updates
Ask Disha	Yes	Accessibility	No, Helpline
Hipmunk	Yes	Accessibility Accommodation Travel planning	No
Mezi	Yes	Accommodation Accessibility Travel itinerary Amenities	No

Source: Own elaboration

fore, during, and after disasters. It is a broad area where managing disasters is dominant and significant in every industry. However, the use of technology, especially AI-powered chatbots, is still emerging but even lacking in the field of tourism disaster management. However, disaster management in tourism improves authorities' decision-making and users' access to information. Hence using the chatbot as a data manager or data provider is a proven truth that has overall efficiency in managing the data, including tourism-related and disaster management-related information. From the reviewed studies, tourism-associated and disaster-linked information combined chatbots have not even emerged in the industry of tourism. Tourism chatbots exist for facilitating reservations, guidance, and information for travel-associated services. And even disaster management chatbots are created to provide disaster-connected details to the users. Tourists or visitors utilizing chatbot technology for exploring destinations anytime may face sudden emergencies or kinds of uncontrollable and unpredictable events. Therefore, such a kind of chatbots development could support the tourism industry, users, and stakeholders to react and respond in emergencies to deal with and manage crises. In these emergency conditions, visitors choose to utilize tourism disaster management chatbots to respond and make aware of the situation. It can accumulate information and assist in providing solutions to respond to disasters. And to give resources information and can help users to find emergency services.

Figure 3 is a substitute suggestive model for tourism policymakers and service providers to develop disaster embedded features in tourism chatbots to enhance decision support in emergencies. The conceptual framework could be a key factor to the action plan and an advancement tool for post-disaster tourism industry. Creating a chatbot relevant to disaster management and tourism information is an essential technological solution in the current post-pandemic period that enables

4. Results and Discussion

Disaster management is of actions implemented to minimize damage, risks, and impacts be-

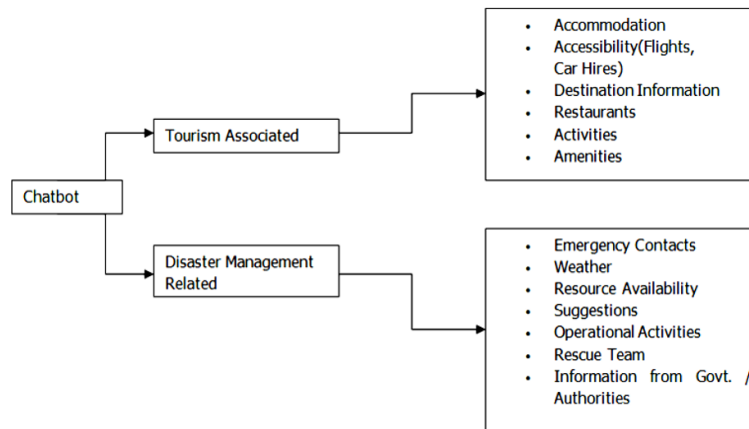


Figure 3 | Framework of the proposed concept of chatbot combines tourism and disaster management information
Source: Own elaboration

tourists and community to face challenges. The structure of the conceptual model is proposed in such a way to elucidate the considerable role of tourists' response in disaster situations. Tourists and community are important key players in tourism disaster management. Therefore, the conceptual model is constructed to provide essential information to tourists in responding to disaster in destinations with the operational activities and suggestions to act in response to any uncontrollable events and for post disaster scenarios. The chatbot is also a collective information system of weather conditions, climate change, resource availability, and other disaster management elements that connect the users with nature and environment to predict such events to react accordingly in tourism. It could raise awareness to the users and implementing such chatbots strengthens the institutional framework for managing disasters and its risks. The chatbot aims to improve the disaster knowledge and educate the tourists and community to practice in crisis. Developing such chatbot could help acquire benefits in the tourism industry to manage disaster risks for the users. It could help to analyze the status of safety available resources for the needy and combine disaster management data to respond accordingly to tourism disaster management. The chatbot can access the transparent information of Government and response

teams in handling disasters. Also, it facilitates rapid reach of knowledge in dealing with disasters in tourism without any communication gaps. In this context, all queries and requests may be automated for tourism disaster management. And chatbot even plays an alternative role of the human agent, to resolve users' questions to provide real-time information about the tourism industry. Such tools work round the clock, viz., 24/7 service with quick, updated, and accurate information regarding disasters with greater convenience and ease of communication to the customers spontaneously.

5. Theoretical and Managerial implications

Various chatbots have been developed and created to share up-to-date and accurate information with the end-users. Chatbots are formed in the travel industry, hotels, and the airline industry to make travel, planning, and booking much more effortless. Even chatbots are emerged in dealing with disasters too. Chatbots helps and provide much information in managing disasters before, during, and after phases. In tourism, chatbots can perform as an alternative communication in managing disasters. A single tip of communication comprises tourism and disaster management information provides a platform for the users to engage with

the crisis. This concept should be identified, developed, implemented, and recognized in the future. As customers use chatbots to engage in travel, each chatbot should present the users' emergency guidelines and supporting measures. Tourism is a sensitive sector and needs to react immediately to emergencies. Crises are sudden and unpredictable events. Without accurate and personalized information and interaction, people may feel insecure, fearful, and uncertain (Chan & Tsai, 2019). Significant interaction with the users engaging in tourism disaster management can help provide services and responses. The information on tourism industry chatbots only allows data to get knowledge and answer queries on travel-related services. Tourism chatbots can act as an alternative communication for handling disasters and help to develop resilience and reduce risks of disasters. Besides, customers' utilization, engagement, perception, and attitude merely influence the actual use of chatbots. The authorized involvement and access increase the reliability and dependence on the chatbots. Development of chatbot assists in reducing misleading or contradictory information spreading in crises. To overcome emergencies, personalized and high-quality dedicated information support is provided for the users. The users can rely on the information provided in the chatbot which would be accurate and does not lead to any mishandling of information.

Furthermore, out-of-date official information might divert from the latest relevant and appropriate communications in handling disasters. It results in adverse effects on tourism disaster management for the people and society. Consequently, to create a single point of interface of reliable and dependable resources of essential information that eases access and get to a broad audience. So, a reliable communication system should be introduced and developed to provide critical information to users in tourism disaster management. Authors throw light on dearth of tourism chatbots that provide emergency details so far, in this background

the service providers can design and plan to develop tourism chatbots with disaster features. It contributes to the tourism industry's technological development. In this new era of unprecedented emergencies, the new proposed chatbots will add value to the tourism development and society. The proposed frame work (Fig. 3) suggests the combination model of tourism and disaster embedded model.

6. Conclusion and Future Research

Many organizations take the help of chatbots to access decisive information or share generic notifications with the public. During Travel, any disaster could be mitigated if both the private and Government sectors of tourism join hands with the disaster management team to incorporate all the emergency contacts of the respective destinations. This chatbot could also carry information like charts and documents with safety measures and do's and don'ts in the particular situation. This chatbot should be equipped with a facility wherein familiar people who are traveling should be alerted for any disaster preparedness of that specific place in time. Also should be fitted with the immediate necessary information, like providing uninterrupted communication among response groups, delivering real-time updates and actions, recording incidents and route action plans to respective response teams. This, in turn, helps the government or response teams with transparent information. It also allows access to information faster, avoids communication and information gaps, resolves critical requests without waiting for a human agent, and offers agility to responsiveness by bringing disaster management data together. AI (Artificial intelligence) is already making its own identity in every field like health, business, tourism, or disaster management. Chatbots and AI have a significant role in dealing with such crises in the tourism industry. Even though developing chatbot with com-

plex data with greater efficiency is challenging in the tourism industry. That is, comprising information on disaster management in a tourism chatbot is complicated. However, still, technological development enhances the challenges into chances, so; this could be an opportunity for the tourism industry.

This study will recommend future research on work for developing chatbot based on tourism-related and disaster-linked information in the travel and tourism industry. The chatbot can be developed on two significant aspects: i.e. tourism and crisis management database. Tourism element is involved with travel-related services such as hotels, restaurants; car hires destinations details, and flights or the tourism components- accommodation, attraction, accessibility, amenities, and activities. Further, the disaster management aspect includes all the emergency services and information that can be provided in a particular area based on the user's location. It comprises of emergency contacts, suggestions and activities, weather and resources updates, and Government information. An empirical study with perception of visitors and service providers with effective model can be developed by future learners to assess the decision making of different stake holders.

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