

PAPER

Empowering Safety-Conscious Women Travelers: Examining the Benefits of Electronic Word of Mouth and Mobile Travel Assistant

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ABSTRACT

Male solo travelers tend to be more frequent and mobile compared to female solo travelers. This difference can be attributed to travel constraints and safety issues. Social media connects like-minded people and serves as an inspirational resource for deciding where to go and what to do. Numerous netizen travelers are actively sharing their journeys and experiences on their social media profiles. Exciting dining options, diverse locations, recommendations for restaurants, accommodations, and personal experiences are all shared on social media platforms. Millennials rely on electronic word of mouth (e-WOM) to form perceptions about a destination. Thus, the study aims to gain insights into the experiences of solo female travelers who are active on social media platforms. Sentiment analysis is performed on Twitter data by analyzing the latest and trending tweets, which helps in gaining valuable insights regarding the safety of women travelers. Furthermore, research is being conducted to analyze the positive aspects of the travel experience using the Experience Economy model, which provides opportunities for self-discovery and personal growth.

KEYWORDS

women solo travel, social impact of current and next-generation mobile technologies, real-world experiences, economy model, tokenization, sentiment analysis

1 INTRODUCTION

The digital transformation has revolutionized almost all sectors of life, including the social circle [1], [2], the IT sector [3], [4], educational methods [5], [6], [7], [8], the healthcare domain [9], [10], [11], and even the tourism industry [12], [13], [14], [15]. A smartphone is not just a means of communication and entertainment; it can also serve as a tool for personal safety and stress management [16], [17]. With technology

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empowering women, there has been a significant increase in the number of women traveling solo, according to a research report by Cox & Kings [18]. Research indicates that solo travel is the second most popular form of travel. This fact is supported by the statistic that 85% of the registrations for solo travel with Overseas Adventure Travel are made by women [19]. Although there is a growing interest in solo travel, a report from Klook Travel [20] states that 48% of women have concerns about traveling alone. Safety is their primary concern.

Women never enjoy the same mobility as men and are circumscribed by fear of violence and safety [21–22]. This fear-induced gender immobility will take a toll on learning opportunities, personal growth, adaptability, and self-discovery. With the growth of social media platforms, solo travelers have begun sharing their experiences. When discussing market research, social media could potentially be considered one of the most powerful tools for monitoring the thoughts of individuals [23–24]. Millions of people express their emotions, perspectives, and thoughts on X (formerly Twitter), one of the most popular social media [25] platforms, by tweeting about their daily lives. Electronic word-of-mouth (e-WOM) can influence tourists' perceptions and travelers' intentions [26]. Twitter continues to expand as one of the leading social media platforms, enabling users to express their thoughts, opinions, and sentiments about an event or incident through tweets. Thus, tweets can be classified as either positive or negative [27]. The current study analyzes tweets tagged with "women solo travel." Sentiment analysis provides insight into the experiences of women traveling alone. By analyzing sentiment within this issue, we can gain valuable insights that can help create safer and more inclusive travel experiences for solo female travelers. This analysis also acknowledges their strength, courage, and the transformative potential of their journeys. The tweets are also classified based on the 4E's of the experience economy model [28] to gain insight into travel experiences.

Sentiment analysis aims to collect information based on the polarity of emotions such as happiness, sadness, anger, and grief from Internet reviews and texts. Tweets are retrieved from widely used streaming services, such as X. Through the X Developer API, account information is gathered based on hashtags. The raw data includes names, locations, and tweets, which are fed into the system for sentiment analysis. The goal of sentiment analysis is to identify and categorize the sentiment expressed in textual data, such as reviews, social media comments, or travel blogs written by women traveling solo. Positive experiences encompass excitement, happiness, fulfillment, and favorable impressions of places, hotels, activities, and interactions with locals. Negative experiences encompass adverse emotions like fear, irritation, or disappointment, as well as unfavorable perceptions related to safety, discomfort, or instances of harassment or discrimination. Tweets expressing gratitude and admiration for instances when local residents, fellow travelers, and travel agencies provided assistance or made them feel safe can help empower hesitant female travelers to venture out and explore. The experiences shared on Twitter shed light on ways for hotel and lodge managers and travel assistants to improve safety and travel experiences for women traveling solo.

The paper's structure is as follows: Section 2 provides a review of the literature documenting the related work. Section 3 discusses the methodologies adopted for this study. Section 4 discusses outcomes. Section 5 is the final section.

2 LITERATURE REVIEW

Solo travel is an under-researched area, as stated by Otegui-Carles et al. [29], and especially after COVID-19, it is necessary to review the acquired knowledge to understand the relationship between gender and tourism. Research is focused on understanding the motivations, experiences, and constraints of women who travel solo. Jin et al. [30] suggested that Google Trends data showed a 59% increase in interest in solo travel in 2018, which surged to 230% in 2019 (Jin et al., 2018). However, the challenges related to constraints [31], motivation, safety issues [32], and the female experience [33] are still underexplored.

Splitwise [34] is a popular expense-sharing and budgeting app that allows users to split bills and track shared expenses with friends, family, and roommates. The app is free to use and is available on both iOS and Android platforms. The app offers a variety of features that simplify the management of expenses with others. Users can create groups for shared expenses and add bills and expenses to these groups, and Splitwise automatically calculates the amount each person owes. The app supports multiple currencies, making it ideal for travelers who need to split expenses in different currencies. Users can also establish recurring expenses, such as rent or utilities, and Splitwise will automatically calculate and divide these bills on a regular basis. Splitwise also provides a variety of budgeting tools, including the ability to set spending limits and track expenses over time. Users have the ability to create custom categories for tracking expenses, such as groceries, dining out, or entertainment. The app also offers detailed spending reports, enabling users to track their expenses and make necessary adjustments to their budgets. Overall, Splitwise is a versatile and user-friendly application that can assist users in saving time and money when managing expenses with others. It is particularly beneficial for college students or groups of friends on a budget, as it streamlines the process of dividing bills and monitoring shared expenses.

“The Best Budgeting Apps and Tools” by Wirecutter [35] is a review of various budgeting apps and tools available on the market. The article assesses the characteristics, advantages, and limitations of each app, considering factors such as user-friendliness, customization options, security, compatibility, pricing, and customer support. The reviewed apps include Mint, YNAB, Personal Capital, PocketGuard, and Acorns. The article also provides an overview of the various types of budgeting apps and tools available, including manual budgeting apps, automatic budgeting apps, and investing apps. The review process involved testing each app on various devices and platforms, as well as conducting interviews with experts and users to gain insight into their experiences with the apps. The article offers a valuable resource for individuals seeking to manage their finances more effectively. It helps readers make informed decisions about which app best suits their needs. The Voyage Travel app [36] offers multiple apps, with one of their most popular being Trail Wallet. This app is simple and easy to use, allowing users to track expenses on the go. Trail Wallet offers several key features, including expense tracking. Users can easily add expenses while traveling, assign categories and currencies, and track their spending over time. The budget planning features in the app enable users to set a daily or trip budget and receive alerts and notifications when they are close to exceeding it. The currency conversion option supports over 218 currencies and automatically converts expenses into the user’s home currency. The app synchronizes data across devices in real time, allowing users to access their expenses and budgets from anywhere. Users have the ability to create their

own custom categories, which makes it easy to monitor expenses for various types of activities.

Tripcoinapp.com [37] is a website for a mobile application called Tripcoin, which is designed to assist users in splitting expenses and managing costs while traveling with friends or family. The app enables users to create and join trips, add expenses, and track who owes whom. Some of the key features of the app include expense tracking, allowing users to easily add expenses, specify the payer, and identify who owes money for each expense. Group management enables users to create groups for each trip, making it easy for group members to track expenses. The cloud syncs data across devices in real time, allowing everyone to stay up-to-date on expenses and payments. Tripcoin is a useful tool for individuals seeking to manage expenses while traveling with friends or family. Its intuitive interface and powerful features make it an excellent option for individuals seeking to manage expenses while on the move. Sia et al. [38] offer a thorough review of the current status of mobile travel apps, including their intelligent features and challenges. The authors conducted a systematic review of literature published between 2010 and 2019, employing a well-defined search strategy and specific inclusion and exclusion criteria. The study identified 75 relevant articles, which were analyzed and synthesized to provide an overview of the key features of mobile travel apps, including booking and reservation services, location-based services, and social networking features. The study also identified several challenges facing the development and adoption of mobile travel apps, including concerns about data privacy and security, usability issues, and the necessity for effective marketing strategies. The study by Imtiaz et al. [39] examines tourists' perceptions of mobile travel apps and their interaction with these apps. The study utilizes a survey questionnaire to gather data from 270 tourists in Malaysia and employs structural equation modeling to analyze the data. The study assesses tourists' perceptions of the usefulness, ease of use, and enjoyment of mobile travel apps, as well as their intention to use these apps and their actual usage behavior. The results indicate that perceived usefulness and perceived enjoyment significantly influence tourists' intentions to use mobile travel apps, while perceived ease of use has a significant positive effect on both intentions to use and actual use behavior. Table 1 lists the contributions of the reviewed papers. The research gaps formulated are:

1. The analysis of the experiences of women solo travelers is an under-researched area [29], [30], [31]. It helps in identifying the intention of travel, the type of tourism that is in high demand, and provides a constructive framework for improving the areas where women travelers don't feel safe.
2. Mobile applications (apps) play a critical role in influencing travelers' decision-making and shaping their experiences. Therefore, there is a need for an app that integrates budget management, travel experiences, and plans for a solo female traveler [22], [18], [19]. There are individual budget tracking apps [35] and women's safety apps [16]. An application that caters to the tourism industry as a whole, especially for solo female travelers, is greatly needed.

The work aims to address these research gaps by first collecting data resources from X and analyzing them. The study aims to capture the sentiment of the experiences, travel intentions, and distribution of solo female travelers in India compared to international destinations. In addition, the work also aims to propose a travel app that is women-friendly, capturing their experiences and facilitating both their travel and budget planning.

Table 1. Comparison of related work

Paper	YoP	WST	EA	TIC	RF	ToTC	AP	EF	BS	DD
[29]	2022	✓	bibliometric review	✓	✓	×	×	×	×	×
[30]	2022	✓	interviews	✓	×	Museum Tourism	×	×	×	×
[31]	2022	✓	interviews	✓	South East Asia	×	×	×	×	×
[32]	2021	✓	Facebook	✓	×	×	×	×	×	×
[33]	2019	✓	interview	✓	Asia	×	×	×	×	×
[40]	2022	✓	interviews	×	Iranian	×	×	×	×	×
[41]	2023	✓	Survey Forms	×	Taiwan	×	×	×	×	×
[42]	2023	✓	Instagram & Twitter	×	Iranian	×	×	×	×	×
[43]	2023	✓	online surveys	✓	Indonesian	×	×	×	×	×
[34]	NA	×	×	×	×	×	✓	×	✓	×
[35]	2022	×	×	×	×	×	✓	×	✓	×
[36]	2022	×	×	×	×	×	✓	×	✓	×
[37]	2022	×	×	×	×	×	✓	×	✓	×
[39]	2022	All tourist	Survey	✓	Northern Pakistan	×	✓	✓	NA	✓
Our Work	NA	✓	Twitter	✓	✓	✓	✓	✓	✓	✓

Notes: Women Solo Travelers (WST), Experience Analysis (EA), Travel Intention Captured (TIC), Region Focused (RF), Type of Tourism Captured (ToTC), App Proposed (AP), Experience Feedback (EF), Budget Split (BS), and Destination Detail (DD).

Since X is a popular platform for trending topics, data is retrieved in various formats, including text, images, comments, and other media. The acquired data needs to be tokenized before conducting sentiment analysis. Once the data has been filtered, we classify the tweets by analyzing them according to a set of criteria. After classification, the outcomes are analyzed. These text records are then categorized as Indian or international. This information is categorized into areas such as education, entertainment, aesthetics, and escapism. These data are then further divided based on polarity and used for analysis as positive, negative, or neutral. The dataset is segmented during the data preprocessing step to facilitate classification. The tokenization process utilizes natural language to remove unnecessary tokens and foreign terms from the provided text. Sentiment analysis software is an essential component of any tourism study, as it can detect positive and negative sentiments in text. We utilize textblob libraries because they provide the polarity value when calculating the sentiment score of the text that is focused on a specific term. The objective of the paper is to understand the emotional experiences, identify safety concerns, enhance support systems, and improve the overall travel experiences of solo women travelers. Thus, it addresses the first research gap identified. Figure 1 illustrates the methodology proposed for the current study.

2.1 Discussion on X API's

Data collection is an important step in data analysis activities. X is one of the accessible sources for data collection. X users submit and communicate via messages known as tweets on the American social media platform X. Unregistered users can only read publicly accessible tweets, while registered users can compose, like, and repost tweets. X can be accessed programmatically through its APIs or via front-end apps for mobile devices or web browsers. X users submit and communicate via messages known as tweets on the American social media platform. Unregistered customers can only read publicly accessible tweets; registered users can compose, like, and repost tweets. X can be accessed through its APIs or through front-end apps for mobile devices or web browsers.

X unveiled X API v2 [44], which includes additional endpoints, a wide range of functionalities and features, and more data that can be accessed and analyzed. The X API enables programmatic access to X in innovative and advanced ways. The Streaming API, REST API, and Search API are the three data interfaces for X that are accessible to researchers seeking to query the service.

The search functionality of X's API is largely replicated by the REST API, which is a pull-based resource. While the Search API still permits some theoretical historical data collection, its practical application is severely limited. Within a week of being posted, data periodically disappears from the search system, and there is no reliable information about its completeness. The author has registered for a developer account to fetch the tweets. The appropriate keys and tokens are assigned after the developer account is created. These keys and tokens are then used to fetch data. Python has been used to collect data from X. Python libraries such as Tweepy [45] and OAuth handler [46] are commonly used by students, academics, and developers to connect with the Twitter API and extract data. The X API is connected using an API credential, a customer private key, API access, and an access private key. The hashtag related to the problem domain is used to gather tweets, and the most recent tweets from the past seven days are collected. The following steps were taken to gather the data:

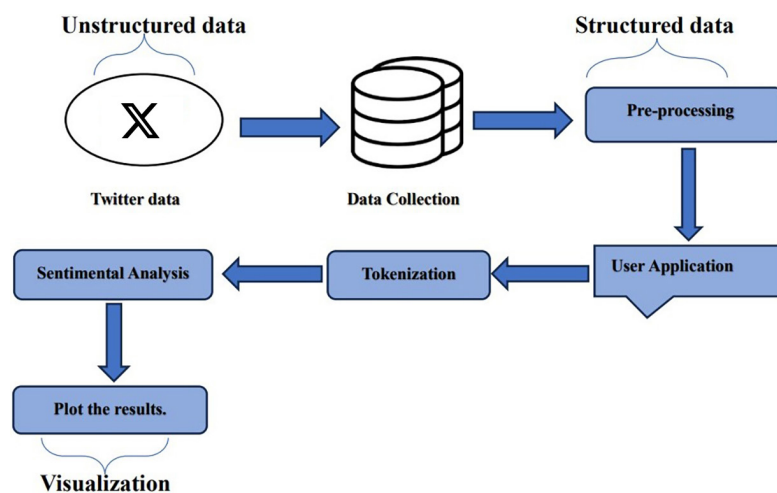


Fig. 1. Block schematic of the methods used for the proposed work

1. Create an X developer account: To utilize the X API, you must first create an X developer account and an application to get API keys and access tokens.
2. Install an X API library: To quickly communicate with the X API, install a Python library such as Tweepy.
3. Access the X search API: Using your API credentials and access tokens, use the Tweepy library to connect to the X search API.

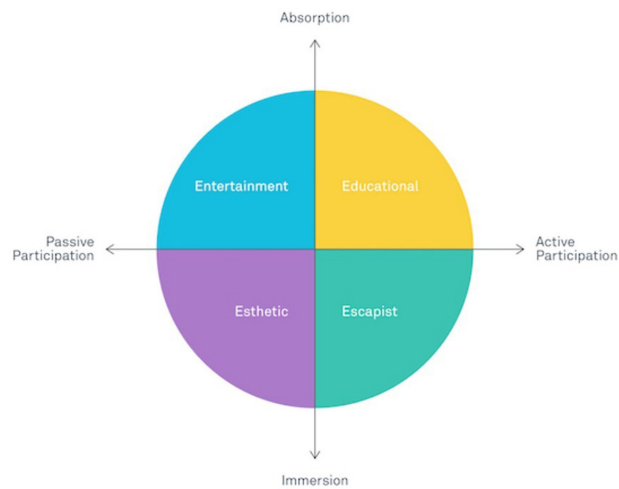


Fig. 2. Four realms of experience economy model

Use the Tweepy API's search method to conduct searches based on specific criteria. Utilize a sentiment analysis tool or library to retrieve tweets and analyze the text content. For example, as mentioned in a previous response, we utilized TextBlob. Data was collected from prominent travel forums, travel-specific X accounts, and travel-related blogs on social media platforms. The collection lasted for a year, from 2022 to 2023. A web scraping technique was developed to extract relevant textual data, such as posts, comments, and captions. The program collected both qualitative and quantitative data, along with user-generated content about travel experiences, recommendations, and emotions. For sentiment analysis, natural language processing (NLP) tools, including the NLTK Python package, were used. For data analysis, preprocessing was required. The raw data underwent a comprehensive pre-processing phase, which involved cleaning the text, removing unnecessary content, and standardizing text forms.

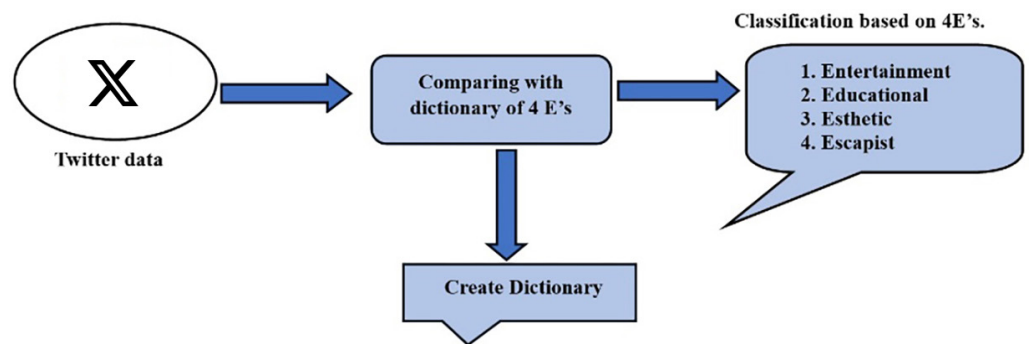


Fig. 3. Flow chart of tweet classification based on experience economy model

The emphasis was on preserving the authenticity of user-generated language. Out of a total of 5000 tweets, 1565 unique tweets were retrieved. The tweeted information consists of text, names, locations, and dates. These tweets were collected using various hashtags related to travel by solo female travelers. The tweets collected using various hashtags are displayed in Table 2. The system configuration includes 8GB of RAM, a 512GB SSD, an i5 processor, Windows OS, and Google Colab software.

Table 2. Data properties

Hashtags	Total Unique Tweets
#solotravelindia	210
#solowomentravel	300
#girlslovetravel	195
#travelgirlsgo	185
#Travelgramwomen	210
#travelwithgirls	178
#travelwithlove	196

2.2 Raw data classification based on experience economy model and nationality

Pine et al. [28] dubbed domains 4Es. Figure 2 depicts the 4Es: educational, aesthetic, escapist, and entertainment experiences for the travel business. The four experiences differ based on the customer's level of participation. Active and passive behaviors are one type, while absorption or immersion behaviors are another type of behavior in an event. The level of participation distinguishes between being active or passive. Consumers who actively participate in product trials or simply observe the presentation passively can clearly differentiate the experience attained by the customer. Active participation can also be described as having an educational and escapist dimension, while passive experience is typically characterized by entertainment and aesthetic dimensions. If the experience is captured in the mind, it is characterized as absorption. If physical presence is brought about by that experience, it is classified as immersion. Entertainment and educational experiences are absorbing and immersive, offering aesthetic and escapist dimensions for travelers. Tweets from X are analyzed and classified according to the four E's. The flowchart for tweet classification based on the 4E's is shown in Figure 3. Through this analysis, insights can be gained about a person's motivation for traveling and their interest in a certain topic. Each location has its own travel trend that can be detected.

Table 3. Output of tweet classification based on experience economy model

TEXT	NAME	LOCATION	CLASSIFICATION	COUNTRY
b'Gangsters and Ghosts Tour in Chicago 2022 #c...	b'BuzzKb'	b'Atlanta, GA'	esthetics	INTERNATIONAL
b'#DidYouKnow\nSolo travel trends show that th...	b'Letsgetlost_SA'	b'South Africa'	others	INTERNATIONAL
b'Last minute trip to Gran Can booked for next...	b'EIPablo_75'	b'Manchester, England'	others	INTERNATIONAL
b'Back to Interlaken, Switzerland \xf0\x9f\x87...	b'ilovepagadian'	b'Pagadian City'	others	INTERNATIONAL
b'Nestled in the middle of Fayette, Maine was ...	b'solowomentravel'	b'Los Angeles, CA'	others	INTERNATIONAL
...
b'Learn how #RosaParks was awarded the Martin ...	b'LowEntropyFoun1'	b'Coquitlam, BC'	education	INTERNATIONAL
b'Read about how these women changed the narra...	b'LowEntropyFoun1'	b'Coquitlam, BC'	education	INTERNATIONAL

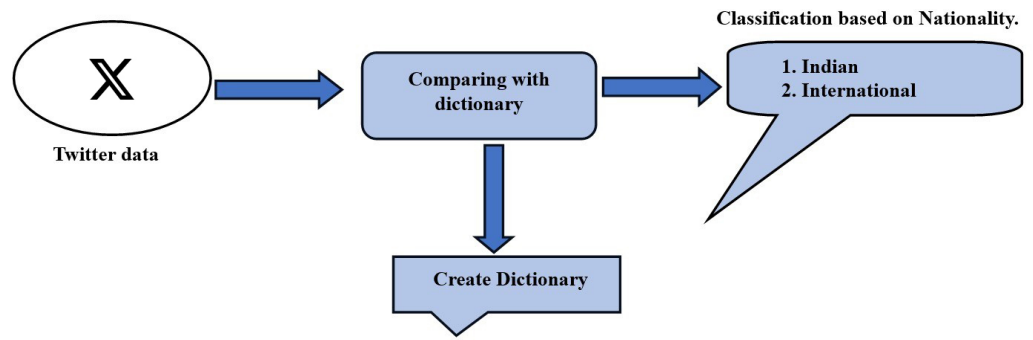


Fig. 4. Flow chart of tweet classification based on nationality

Table 4. Output of tweet classification based on Nationality

TEXT	NAME	LOCATION	CLASSIFICATION	COUNTRY
b'Gangsters and Ghosts Tour in Chicago 2022 #c...	b'BuzzKb'	b'Atlanta, GA'	esthetics	INTERNATIONAL
b'#DidYouKnow\nSolo travel trends show that th...	b'Letsgetlost_SA'	b'South Africa'	others	INTERNATIONAL
b'Last minute trip to Gran Can booked for next...	b'EIPablo_75'	b'Manchester, England'	others	INTERNATIONAL
b'Back to Interlaken, Switzerland \xf0\x9f\x87...	b'lovepagadian'	b'Pagadian City'	others	INTERNATIONAL
b'Nestled in the middle of Fayette, Maine was ...	b'solowomentravel'	b'Los Angeles, CA'	others	INTERNATIONAL
...
b'Learn how #RosaParks was awarded the Martin ...	b'LowEntropyFoun1'	b'Coquitlam, BC'	education	INTERNATIONAL
b'Read about how these women changed the narra...	b'LowEntropyFoun1'	b'Coquitlam, BC'	education	INTERNATIONAL

A text file containing a dictionary of terms, including synonyms for each of the four domains, is constructed. The raw data collected from X is compared to each of the four dictionary lists. If a certain tweet corresponds with any of the four dictionary text files, it is classified into that category. This method is repeated and categorized for each tweet. If a tweet does not fit into one of these four categories, it is classified as “others.” The classified sample tweets are shown in Table 3.

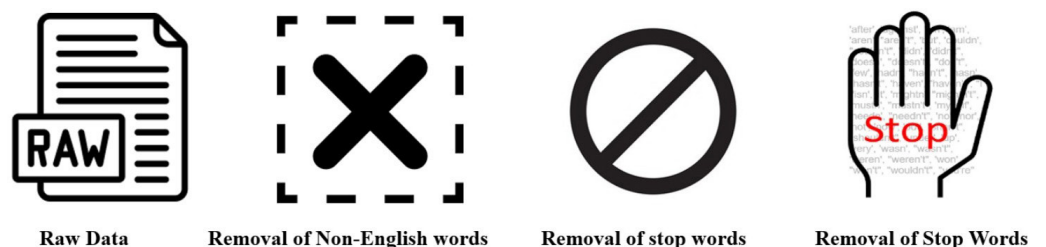


Fig. 5. Steps involved in tokenization

The tweets obtained from X need to be classified based on their original location, whether Indian or international. The methodology adopted is illustrated in Figure 4. For the classification based on nationality, a dictionary of terms containing the names of several cities in India is constructed. The raw data collected from X is compared to a

dictionary list. If a certain tweet matches any city names in the dictionary text file, it is classified as Indian; otherwise, it is classified as international. We can analyze the trends among domestic and international travelers. According to the categorization, the majority of the tweets obtained were from international locations. This method is repeated and categorized for each tweet. The classification method is illustrated in Table 4.

TEXT_CLEANING_RE

```
""@\S+|https?:\S+#girllovetravel\S+travelgram\S+#solotravelindia\S+travelgirlsgo\S+travelsolowomentravel\S+|https?:\S|[^A-Za-z0-9]+"""
```

Fig. 6. Screenshot of sample tweet before tokenization

Date	Travel Description
Dec 20,2022	I Love Ladakh.Hiking Solo in Sham Valley.Adventure girl with ten Kilo Backup
Jan 10,2023	Going to Meghalaya in September.Covering Beautiful places ,activites,safety,and hygiene.
Jan 30 ,2023	Travel never matters, only courage do.

Fig. 7. Screenshot of sample tweets after tokenization

2.3 Sentiment analysis on tokenized data

For sentiment analysis data classification, the raw data needs to be tokenized. Python is used to preprocess the extracted X data. Figure 5 depicts the tokenization process.

1. Tokenization

It divides the text or sentence into distinct components known as tokens, which often correspond to words, phrases, or symbols. Tokenization is a crucial stage in numerous NLP applications, such as text categorization, sentiment analysis, and language modeling. The tokens generated through tokenization are utilized as input by various NLP algorithms. Text cleaning, word segmentation, stop word removal, stemming, lemmatization, and eventually the production of individual tokens are all part of the tokenization process. When choosing a tokenization strategy, it is important to carefully consider the specific requirements of the task at hand. Figure 6 shows a screenshot of a sample tweet before tokenization.

2. Removal of non-English words

The removal of non-English terms is a vital phase of the pre-processing step in NLP. Non-English terms are words that do not belong to the target language, introducing interference in the data and reducing the accuracy of NLP models. Using language recognition technologies to identify the language of a text or document is one method for removing non-English words. These programs use statistical models and algorithms to detect the language and then remove any non-English words.

3. Removal stop words

To analyze sentiments, stop words such as “a,” “an,” “the,” etc. must be removed for in the context of sentiment analysis, this is insignificant.

4. Removal of symbols

The process aims to remove punctuation and symbols. In addition, we use regular expressions to eliminate HTTP links, URLs, and unnecessary symbols and numbers from the text. We will remove non-English words. When analyzing feelings, it is necessary to eliminate stop words that do not contribute to sentiment analysis. The Snowball stemmer converts the given text into the present tense. These are the steps involved in the tokenization process. Figure 7 displays the data obtained after tokenization, which includes the removal of stop words, hashtags, and uppercase terms.

The process of identifying and extracting the emotional tone or attitude expressed in a piece of text, such as a tweet, review, or news narrative, is known as sentiment analysis. The objective of sentiment analysis is to categorize the text as positive, negative, or neutral based on the emotional tone it conveys. Sentiment analysis has a wide range of applications, including market research, social media monitoring, customer feedback analysis, and political analysis. Industries can gain valuable insights into how their consumers or stakeholders perceive their products, services, or brand by analyzing the emotional content of text data.

A polarity classification challenge is synonymous with sentiment analysis. Sentiment polarity classification can be binary or multiclass, depending on the number of classes. Binary classification involves the specific evaluation of customers. In other words, binary classification assumes that the given text is predominantly positive or negative and then determines whether the review is “positive” or “negative.” The specific domain of application determines how the two ends of sentiment, positive and negative, are defined. The terms “positive” and “negative” correspond to “satisfied” and “unsatisfied” in the tourism context. The need to explore the connection between sentiment polarity and theoretical constructs of satisfaction should be investigated.

Sentiment analysis can be performed using a variety of procedures and approaches, including machine learning (ML), deep learning (DL), or rule-based methods. The current work utilizes the NLTK library [47]. All approaches have advantages as well as disadvantages, and the method chosen depends on the specific requirements and constraints of the application. Sentiment analysis has certain limitations and challenges, including emotional subjectivity, reliance on sentiment context, and linguistic ambiguity. Before incorporating sentiment analysis models into real-world applications, it is crucial to thoroughly verify their accuracy and reliability. The research on sentence-level analysis that extracts polarity from a small number of words rather than from paragraphs or text messages is challenging.

Polarity [48] expresses the sentiments in a piece of text. It is often measured on a scale that ranges from negative to positive, with a neutral point. Polarity identification is a crucial task in sentiment analysis, as it enables us to assess the overall sentiment of a text, such as customer feedback or a social media post. A positive polarity indicates a pleasant sentiment, while a negative polarity indicates an undesirable sentiment. Methodologies such as lexicon-based and deep learning are founded on textual elements. Other applications include political analysis, market research, and product development. Polarity values range from number, 1 implying greater positivity, whereas numbers closest to -1 indicate greater negative.

2.4 Travel assistance for women

The travel assistance for women is developed on Android using Java. The software promises to enhance users' travel experiences by incorporating features such as Google Maps integration, distance monitoring, a Wikipedia API system, and an

option for accessing a women's safety review system. Thus, it addresses the second research gap that was formulated. The app's goal is as follows:

1. By integrating various features into a single app, our aim is to offer users a seamless travel experience with a wide range of capabilities. The application aims to streamline various aspects of travel, including navigation, information retrieval, distance monitoring, and safety reviews. By integrating these features into one cohesive platform, users can access all the necessary tools and information required for a smooth and enjoyable travel experience.
2. Integrating Google Maps enables users to navigate to various destinations within the app. With the ability to view maps, obtain directions, and explore points of interest, users can easily plan their routes and navigate unfamiliar places. This feature expands the app's functionality by offering dependable and accurate navigation capabilities, eliminating the necessity to switch between multiple apps for mapping and travel planning.
3. The app's scope includes monitoring the distance traveled by users on their journeys. This feature enables users to track their progress, set distance-related goals, and monitor their overall travel activities. By offering distance monitoring capabilities, the app motivates users to be aware of their travel habits and possibly opt for more sustainable transportation options.
4. Enhance learning about cities with Wikipedia integration: The integration of Wikipedia makes it easier for users to learn more about the cities and destinations they are interested in. By tapping into the extensive knowledge available on Wikipedia, the app offers in-depth descriptions, historical information, and cultural insights about various locations. This expands the app's scope by providing users with a wealth of information that enriches their understanding and appreciation of the places they visit.
5. Review system for women: The addition of a safety review system tailored to women's needs expands the app's functionality by addressing a critical issue. This feature enables women to rate and review cities based on their safety experiences, offering valuable information for other female travelers. By integrating a platform for sharing safety reviews, the app aims to empower women and establish a safer travel environment for all users.

The app covers various aspects of travel, including navigation, distance monitoring, information retrieval, and safety reviews. By integrating these features, the app aims to offer users a comprehensive and seamless travel experience, improving their journey planning, navigation, and overall safety.

1. Google Maps integration:
 - a) Set up the required permissions and features in the AndroidManifest.xml file, such as location permissions and Google Maps API key.
 - b) Create a MapView or MapFragment in the app's layout XML file.
 - c) Initialize the Google Maps API in the app's activity or fragment by obtaining a GoogleMap instance and configuring it for desired functionalities.
 - d) Utilize the Google Maps API methods to display maps, add markers, draw routes, and perform location-related operations as per the app's requirements.
2. Wikipedia API system integration: The integration of the Wikipedia API system into an app involves the following steps:
 - a) Obtain API keys: Register the app with Wikipedia and obtain an API key to authenticate and authorize access to the Wikipedia API.

- b)** Add dependencies: Add the necessary dependencies in the app's build.gradle file to enable communication with the Wikipedia API.
 - c)** API request and response: Construct an API request to fetch specific information from Wikipedia, such as articles, descriptions, or multimedia content. Send the request to the Wikipedia API server.
 - d)** Parse and process the response: Receive the API response, which typically contains structured data in formats like JSON or XML. Parse the response to extract the desired information and process it accordingly.
 - e)** Display the information: Present the retrieved Wikipedia data within the app's user interface, such as displaying article content, images, or related information about specific locations or topics.
- 3.** Module description and its function: The work encompasses travel assistance for women. Different modules are discussed to provide a user-friendly mobile app for novice women users.
- a)** User authentication: This module handles user authentication and registration processes. Users can create an account, log in with their credentials, and securely access the app. It ensures data privacy and protects user information.
 - b)** Home page: The home page serves as the main interface for users after logging in. It provides quick access to essential features and functionalities. Users can navigate through different sections of the app and access relevant information.
 - c)** Country information: This module offers a comprehensive collection of pre-configured countries. Users can explore detailed information about each country, including currency, language, capital city, and important cities. It enables users to learn about various destinations and plan their trips accordingly.
 - d)** City information: The city information module provides users with a list of pre-configured cities. Users can access specific details about each city, including a brief description, location on Google Maps, and linked Wikipedia page. It helps users gain insights into cities they are interested in and facilitates better trip planning.
 - e)** Safety review system: This module allows users to write and submit safety reviews for countries or cities they have visited. Users can share their experiences and provide valuable feedback to other users. Currently, the app utilizes SQLite as an offline database to store these reviews securely.
 - f)** User favorites: The user favorites' module enables users to save their favorite countries or cities. Users can create a personalized list of places they wish to visit or have already visited. It helps users keep track of their travel preferences and create a personalized travel inventory.
 - g)** Split feature: This module provides a convenient way for users to split expenses among multiple participants. Users can input the number of participants and the total amount, and the app calculates the shared cost per person. It assists in managing shared expenses during group travel and promotes transparency among participants.
 - h)** Online database integration (future scope): As a future enhancement, the app can be upgraded to include an online database, such as PostgreSQL. This would enable real-time collaboration and sharing of safety reviews among app users. Users can access up-to-date information and contribute to a dynamic community of travelers.

3 RESULTS AND DISCUSSIONS

A total of 5,000 tweets were collected. We collected 1566 distinct tweets from these tweets. Based on the experience economy model, the linguistic data of the tweet was categorized into four groups: education, aesthetics, entertainment, and escapism. Figure 8 depicts the categorization of Indian and international travel destinations into four groups. The majority of unique tweets were by international travelers. 1379 tweets were sent from international locations, while 187 were sent from locations in India. This sheds light on the need for further investigation into the hesitance of Indian women travelers.

The subjectivity [49] and polarity of each tweet were determined. The tweets were categorized as positive, negative, or neutral based on this score. The results are shown in Figure 9. The term “positive” in this context refers to women sharing tweets about their enjoyable trips and their satisfaction with their destination. Women who traveled alone tweeted about their negative trip experiences, including not enjoying their destination, facing travel difficulties, or having poor lodging or meal arrangements. “Neutral” refers to solo women posting neutral comments about their experiences, which are neither positive nor negative. Figure 10 depicts the scatter plot of tweets and considers their corresponding sentiment scores. If the polarity value is greater than zero, the tweets are positive. If the value is less than zero, the tweets are classified as negative. Polarity values of 0 are categorized as neutral.

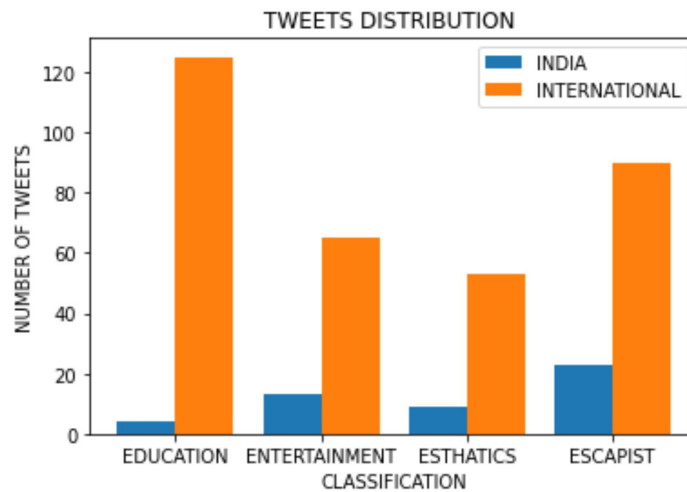


Fig. 8. Visualization of tweet classification based on nationality

TEXT	NAME	LOCATION	CLASSIFICATION	COUNTRY	SUBJECTIVITY	POLARITY
b gangsters ghosts tour chicago 2023 chicago ghosttourusa usa xe2 x81 xa6 viatortravel xe2 x81 xa9 voyagingenstyle xe2 x80 xa6	b'BuzzKb'	b'Atlanta, GA'	esthetics	INTERNATIONAL	0	0
b didyouknow nsolo travel trends show popular length solo trip 10 xe2 x80 x9312 days week xe2 x80 xa6	b'Letsgetlost_SA'	b'South Africa'	others	INTERNATIONAL	0.9	0.6
b last minute trip gran booked next week xf0 x9f x9b xab xf0 x9f x8f x96 dontstayathome travelsolo	b'EIPablo_75'	b'Manchester, England'	others	INTERNATIONAL	0.033333333	0
b back interlaken switzerland xf0 x9f x87 xa8 xf0 x9f x87 xad great experience grindelwald n n back inte xe2 x80 xa6	b'lovepagadian'	b'Pagadian City'	others	INTERNATIONAL	0.25	0.26666667
b nestled middle fayette maine quaint farm however xe2 x80 x99t farm home two n xe2 x80 xa6	b'solowomentravel'	b'Los Angeles, CA'	others	INTERNATIONAL	0	0
b famous travel groups women india n travel womentravel travelsolo thewomenachiever	b'womenachiever'	b'United States'	others	INTERNATIONAL	1	0.5
b gangsters ghosts tour chicago 2023 chicago ghosttourusa usa xe2 x81 xa6 viatortravel xe2 x81 xa9 voyagingenstyle xe2 x80 xa6	b'BuzzKb'	b'Atlanta, GA'	esthetics	INTERNATIONAL	0	0

Fig. 9. Screenshot of sample tweets after sentiment polarity classification

Figure 11 depicts that the majority of experiences were positive and neutral, with only a small number being negative. The graph below illustrates the distribution of positive, negative, and neutral tweets. Most of the experiences are either positive or neutral. We can examine the number of solo women who had a positive experience while traveling for education, entertainment, aesthetics, or escapism. Figure 12 depicts the distribution of polarity in the experience economy model.

According to the graph, the majority of women who visited for aesthetic reasons and to escape their routine had mostly favorable experiences. Women traveling for entertainment received the lowest unfavorable score. We may also observe that most women who have traveled to escape their difficult circumstances have had positive experiences. Most female travelers who have journeyed for educational purposes have had a neutral experience, as they have primarily visited historical sites and museums. By aligning sentiment scores with the classification of experiences and considering factors such as nationality, the study aimed to unravel trends in solo women traveling. This multifaceted analysis allowed us to draw connections between emotional responses and travel preferences. The work offers a comprehensive understanding of the emotions and patterns in the experiences of solo female travelers, connecting the areas of sentiment analysis and the experience economy model. The findings not only illuminate individual travel experiences but also provide useful insights for the tourism sector. This study emphasizes the importance of sentiment analysis in comprehending human emotions.

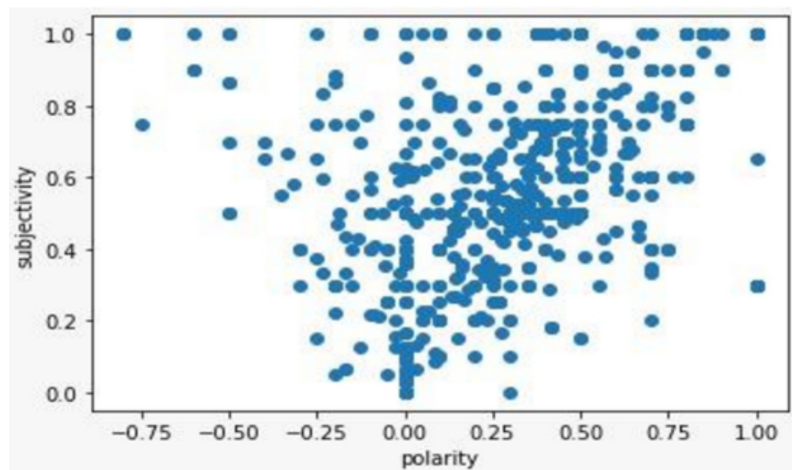


Fig. 10. Scatter plot of tweets with polarity

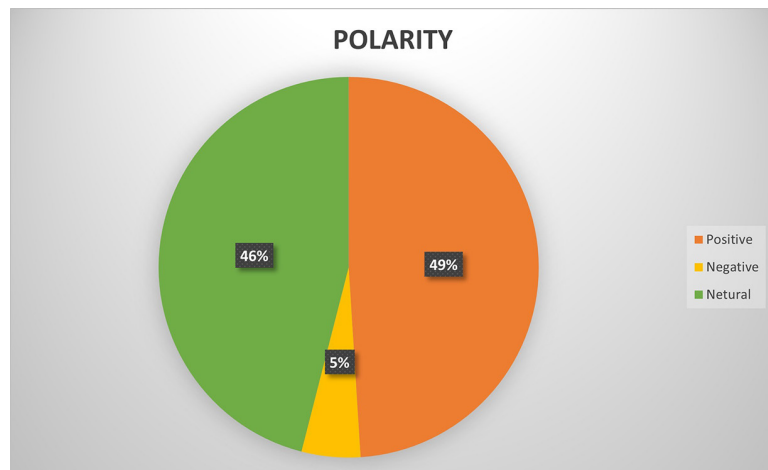


Fig. 11. Visualization of polarity distribution

The mobile travel assistance app, Tripwise, has been integrated with Google API and Wikipedia to ensure efficient and safe mobility for solo female travelers. The proposed app offers budget planning, travel tips, and safety reviews to alleviate the safety and stress concerns of women traveling alone. The screenshot in Figure 13 is attached for the proposed application. The app displays the login and home pages, as well as a list of countries. Figure 14 depicts the home page of the app. There is a floating button for the review feature and a button bar for countries, favorites, and cities. The countries are retrieved from a SQLite database. When clicking on a country, such as the US, a basic paragraph about the country and other important information will be displayed. Like currency, the spoken language, the capital city, and other important cities are shown. On the favorites' page, one can list the countries they wish to visit or have already been to. It depends on the user's preference for how they want to utilize this feature as an inventory of already-visited places. Figure 15 displays city details, categorized by nation, and provides the option to enter a review. This is the countries' page where all the pre-configured countries are displayed in the app. When clicking on one of the cities, such as Warri, a basic paragraph on the city and other important information will be displayed. When this button is clicked, Google Maps opens up because it is connected to the city map, which is a feature of the app. In addition, the Wikipedia page of the city opens up, allowing the user to read about it and be redirected to the same. Additionally, there is a feature showing the nearest airport. On the safety reviews page, users can write reviews for the countries or cities they have visited. Since we are using SQLite, an offline database, we are unable to share the review with other users of the app. However, implementing an online database such as PostgreSQL could be a future enhancement for the app.

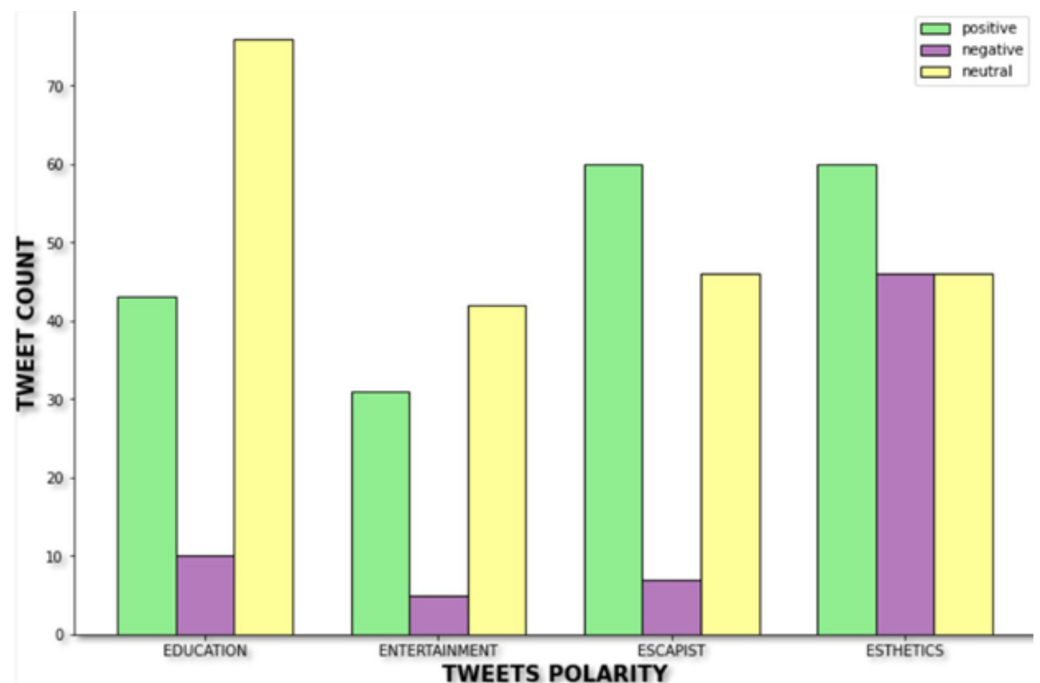


Fig. 12. Visualization of the distribution of polarity in the experience economy model

Thus, the sentiment analysis conducted on Twitter data yielded mostly positive results. Thus, it implies that women traveling alone can be considered safe based on e-WOM. The results indicate that there are fewer Indian women travelers, which

can be attributed to social ties and fear of safety. Therefore, this can be considered part of future work to analyze and obtain a conclusive explanation for the same. It can be considered that most travel intentions are for educational and aesthetic purposes. This implies that women experiencing digital transformations have recognized that travel exposure contributes to personal growth and an increase in inclusive behavior.

To address this, an application is proposed to help female travelers save countless bookmarks on restaurants, hotels, and places to visit at their intended destination. The application is a safe haven for spendthrifts, helping them budget their travel plans appropriately. The application includes safety review notes that can be made public on users' online profiles once they return to their own locations. Overall, the work proposes a comprehensive solution to the need for a female-friendly app.

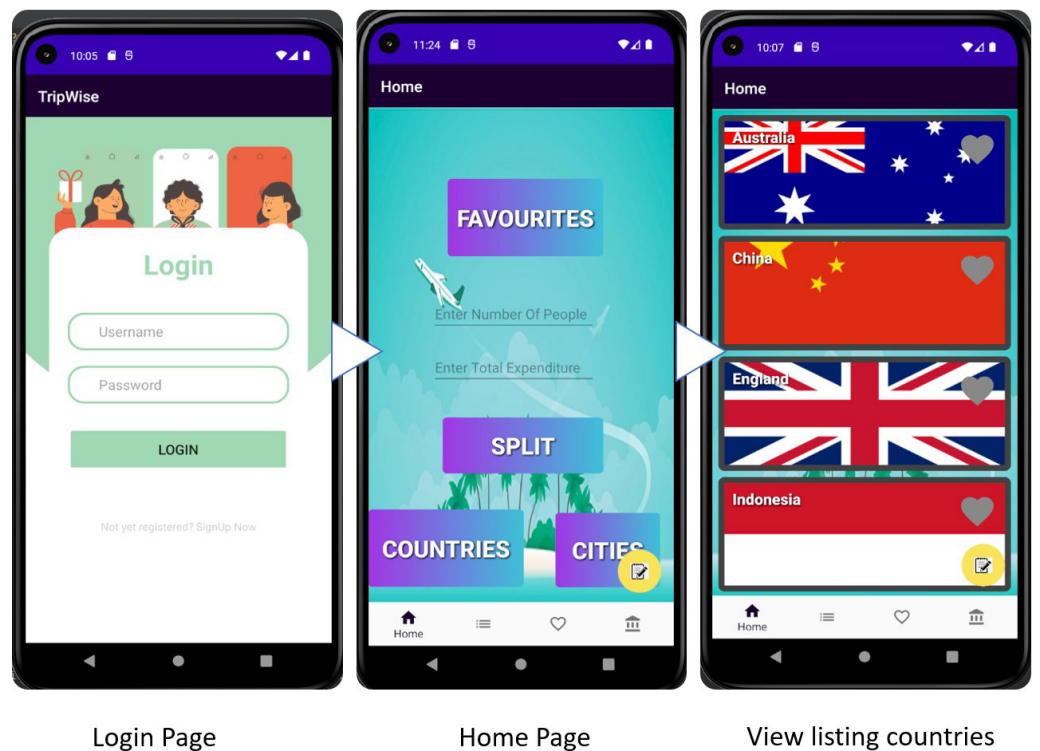


Fig. 13. Views of the proposed travel assistant

4 LIMITATIONS AND FUTURE WORK

The research study utilized only X data. Other social media platforms, such as Facebook and YouTube, can be considered as they may provide useful insights for the above observation. The research study could also be conducted to further analyze the safest travel destinations for women traveling solo and the reasons for their safety. Therefore, the tourism industry can proactively promote the safety of women solo travelers. The application itself can track the user's location and provide live updates to emergency contacts only. As future work, capture video of the visited places and automatically post it to their public platform to avoid dependence on multiple independent apps.

5 CONCLUSION

After COVID-19, Google Trends [30] show an increase in female travelers. According to Klook's report [20] for 2019, 48% of women are immobile due to safety concerns and travel constraints. In 2022, the report from She Pack's Lite [32] stated that only 86% of women are ready to travel solo post-pandemic. Hence, a study was necessary to analyze the aspects of e-WOW to understand the experiences of female netizen travelers. A study conducted sentiment analysis on tweets from female travelers and categorized them using the concept of the experience economy. Using the NLP approach, the classification of tweets resulted in the following distribution: nature of travel 34%, education 20%, entertainment 30%, and escapism 16%. The travel experiences of a solo woman in and around India and internationally have been documented. In the future, research could focus on developing real-time, multi-lingual systems with topics ranging from art and education to sports. The study aims to understand the current experiences of women who travel alone, with the goal of inspiring hesitant women travelers to embark on their own journeys of freedom and self-discovery.

The travel assistant for women, TripWise, is a comprehensive travel app designed to enhance the overall travel experience for users. With its user-friendly interface, integration of Google Maps, distance monitoring capabilities, Wikipedia integration, and a safety review system focused on women's safety, the app offers a wide array of features. The study justifies the need for analyzing Twitter data, which may inspire hesitant women solo travelers to take small steps toward personal growth in a new arena. The Android application aims to alleviate the stress of women solo travelers by helping them manage their budget and share their safety experiences, which may inspire others to embark on solo travel.

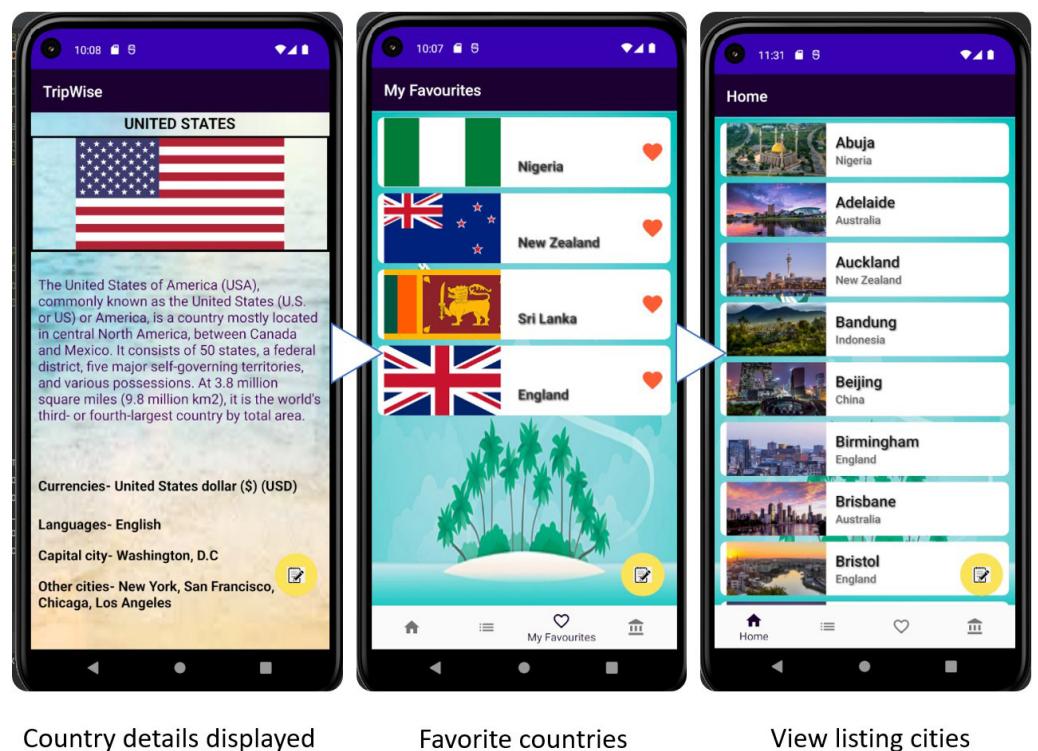


Fig. 14. View listing favorite countries listed in Tripwise app

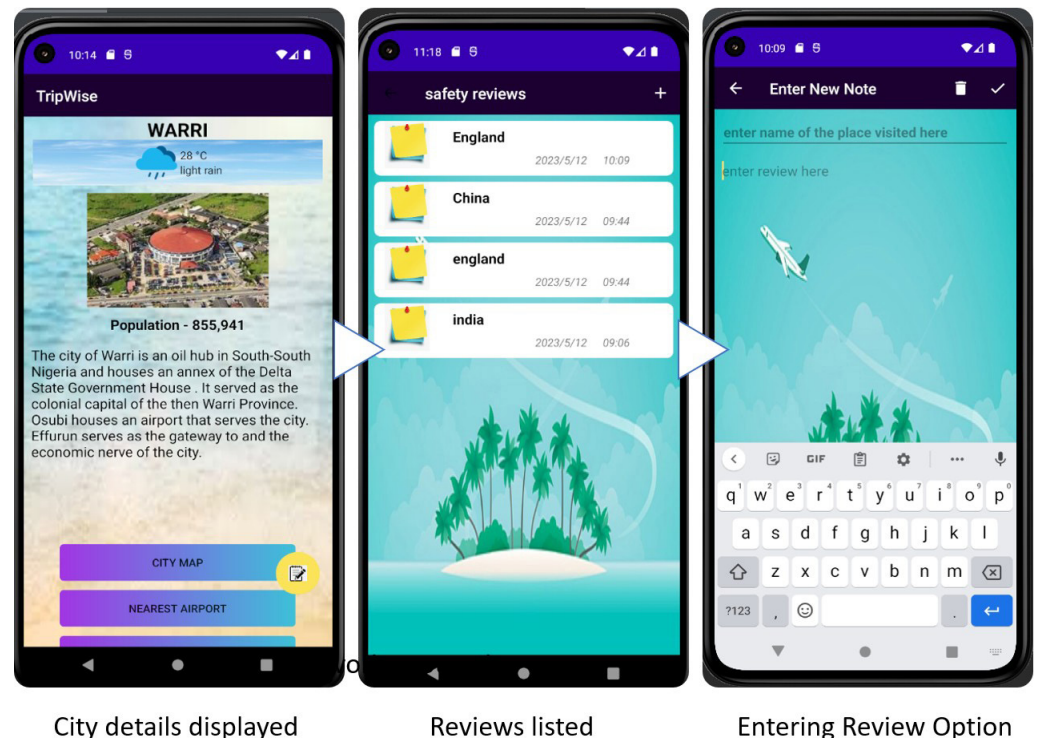


Fig. 15. View listing city details listed in Tripwise app

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