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TripMate: Smart Travel Assistance Mobile Application

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Abstract: TripMate is a smart travel assistance mobile application developed to streamline the travel planning process. The application enables travellers to book and compare group tour packages from various travel agencies within a single platform, eliminating the need to switch between multiple applications. It also integrates car rental and local buddy services, enhancing flexibility and cultural engagement during trips. The local buddy feature connects travellers with residents who act as local guides, while also allowing travellers to register as buddies to promote their own country's culture. Using the Waterfall Model as the development methodology, TripMate was systematically designed, implemented, and tested. Functional testing, including unit and integration testing, along with non-functional performance testing on real mobile devices, confirmed the system's stability, usability, and responsiveness. The results indicate that TripMate provides an intuitive user interface and effectively enhances the efficiency and convenience of travel booking and planning.

Keywords: Car rental, Group tour, Local buddy, Travel, Mobile application

1 Introduction

Over the past twenty years, individuals have booked travel more frequently through online travel agencies (OTAs). These online travel agencies provide the convenience of booking from home and frequently attract customers with appealing discounts and package offers was explained in [9]. Hence, a lot of travellers are now booking the trips online rather than go to the travel companies. According to the research from [9], two-thirds of the worldwide travel and tourism market's income in 2023 came from online sales channels. In figure 1, the result showed that the growth of the online revenue is continuous until 2027 and the offline revenues will only contain for one fourth of all revenues in the global Travel & Tourism market was discussed in [7]. Therefore, travel apps are very common and high demand in current market trend.

The existing apps such as Google Travel, Hopper, Roadtrippers focus on planning and organizing by helping users compare flight tickets or explore the country map. However, this type of app is only helping travellers to research but booking flight tickets is not allowed. Besides, Airbnb and booking.com focus on booking, which help users to book flights, accommodations, and car rental but this kind of app only has limited customer service or host, and cause user required a longer waiting time in enquiry stage. Next, travel app for recommendations such as happy cow and lonely planet which act as a travel guidebook for travellers to explore traveller place and local food, but traveller can only use

this app to search for the recommendation was discussed in [6]. Based on the research by Jill Duffy [6], there is not an application that provide price comparison service for travel package such as 8 days 7 nights trip in Shanghai from various travel agency and allowed user to make reservation for the travel package, and there is not an application for traveller to find for a buddy or local guide. Hence, TripMate will be included and enhanced the features from existing app and such as provide a car rental service and implement a buddy feature to guide traveller in exploring local culture. The existing travel app required users to compare the travel package by switching to different websites from various travel agency companies or go to the travel exhibition for inquiry purpose. Hence, this makes the travel planning process become inefficient was discussed in [6]. Therefore, a smart travel assistance app that helps traveller compare the price automatically across various travel agencies is needed. In TripMate, travellers can choose the interesting travel itinerary with lowest price and make reservation after enquiry with travel agent through the app. As a result, users do not need to compare the price by switching to various websites as this app will list down the travel package of user's desired destination directly.

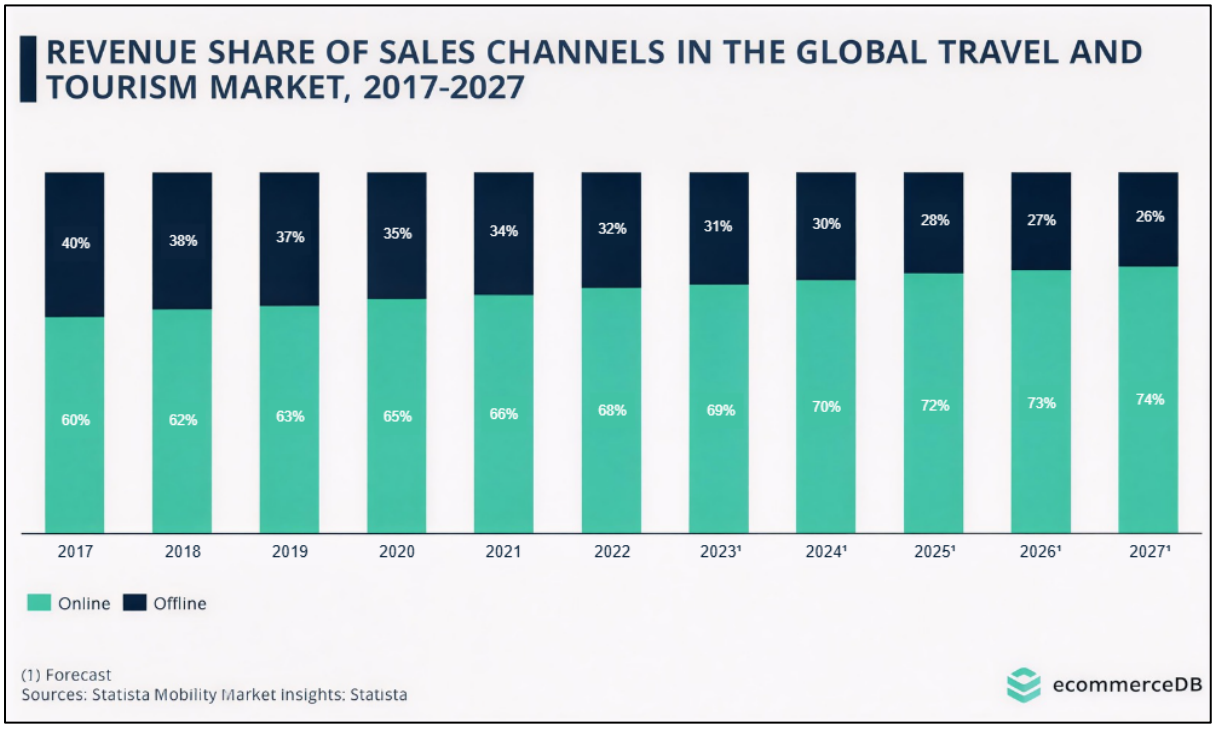

Figure 1: Forecasting result for the revenue share of sales channels in the global travel and tourism market from 2017 to 2027.

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Despite the increasing demand for flexible travel options, travellers often face limitations in mobility during the journeys due to the lack of easily accessible car rental services. Renting a car can offer a lot of advantages and flexibility during the trip such as convenience, cost-effectiveness, and better access to remote destinations was discussed in [5]. In the TripMate, there is a car rental service for travellers to rent a car while travelling which is to make the trip become time saving and efficient. By having this service, travellers can create own schedule, go to the destination without spending time waiting for public transportation, and explore the hidden destinations. Moreover, travellers often rely on recommendations from various platforms such as Facebook, google, and Instagram to generate the travel plan. Hence, the recommendation in these platforms mostly is about the café or tourism place so the traveller might not be able to explore the real local culture. Discovering local culture will help travellers to gain a deeper understanding of the visited country rather than simply observing the destination. For example, trying local cuisine can gain insight into a destination's history and learn the knowledge about the local environment was discussed in [8]. In TripMate, travellers can use the buddy features to explore the local food, and culture through the guide from local resident.

In conclusion, TripMate is designed to solve the issues that stated at above such as allowed traveller to compare and make reservation for the travel package from trusted and desired travel agency, traveller can rent a car during the trip, and traveller can utilize the buddy feature in exploring the local culture such as sampling traditional cuisine and engaging in cultural activities unique to each destination. The features designed for the TripMate are aimed at making the travel planning process become more easily and efficient.

2 Hypothesis

There are three hypotheses for this study which are:

1. The convenience of comparing travel packages from various agencies on a single mobile platform will be responsible for more in term of travellers' booking decisions than the availability of multiple websites for comparison.

2. The presence of an in-built car rental feature in a travel app will be more related to traveller's satisfaction and flexibility during travel than the option to rent a car through a third-party service.

3. The integration of buddy feature in a travel app that connects travellers with local buddy in the visited country will provide better insight into traveller's belonging and social interaction compared to relying on traditional travel guides or forums.

3 Literature Review

A Tripadvisor

According to the research of Tripadvisor, the platform's available services and user interface have been examined to derive functionality and design ideas that can be implemented in TripMate. Tripadvisor, founded in 2000, is an online travel portal that provides both web and mobile applications offering travel planning, researching, and booking services as described in [10]. From this study, two major features—car rental services and an AI-powered trip planner—were identified as key components enhancing user experience. The car rental feature allows users to search, compare, and book vehicles alongside other travel arrangements, creating a seamless all-in-one travel planning experience. This

concept was adopted in TripMate to give users a unified platform for transport and trip bookings. Furthermore, Tripadvisor's AI-powered trip planner, which provides personalized travel itineraries based on user interests and previous activity, inspired TripMate's AI feature. As emphasized by [16], AI-driven personalization in travel applications can substantially improve user experience by reducing decision overload and streamlining the planning process. Similarly, [17] demonstrated how large language model (LLM)–based systems such as GPT-4o can dynamically generate customized travel routes using user preferences and real-time contextual data, enabling adaptive and intelligent trip planning. In alignment with recent studies emphasizing the effectiveness of AI in delivering personalized travel assistance, TripMate integrates the Gemini API, as discussed in [4], to implement a basic AI-driven trip planning feature that provides users with intelligent and context-aware travel itinerary suggestions. This allows the application to generate suggested itineraries and destinations based on user preferences, providing an intelligent and user-friendly experience. As supported by [18], personalization and usability are critical factors influencing travellers continued use of tourism applications, thus validating TripMate's approach in adopting AI to enhance decision-making and overall satisfaction. By integrating these practical and research-driven insights, TripMate aims to deliver a more intuitive, efficient, and adaptive travel planning experience inspired by Tripadvisor's successful model.

B Withlocals

Withlocals is a platform that offering both web and mobile application for tour guiding. Tour guiding plays a crucial role in enhancing the travel experience by providing deeper understanding into a destination's culture. Besides, Withlocals allows travellers to find and book for the private local guides which has ensure a personalized and enriched travel experiences was discussed in [11]. The functionality of local buddy in TripMate was implemented with reference to the local guide feature offered by Withlocals. The local buddy feature aims to provide travellers with the same opportunity to connect with local buddy who can offer personalized travel plan and local culture, knowledge during the trips. Withlocals allows travellers to reserve tours with local guides who are experts in specific interests, making the travel experience more significant and unique. This is consistent with the goal of the local buddy feature, which is to match visitors with local "buddies" who can give personalized tips, assist in navigating the place, and aid in learning about the local culture in a more personal and authentic way. With the use of the principle of local guides, the local buddy feature aims at bridging the gap between the traveller and the local culture, enhancing the traveller's experience through a deeper understanding of visited places. By incorporating personalization and cultural knowledge, TripMate aims to bridge the gap between visitors and destinations, fostering more authentic and meaningful travel experiences—consistent with the personalization principles highlighted in recent tourism technology studies such as [16].

C Airbnb

Finally, the design of TripMate's group tour package and travel agent management system draws on the booking mechanisms and workflow management of Airbnb, a leading travel and accommodation platform. Airbnb is a platform that offers a web-based and mobile application in travel booking. Travellers can search and make booking for accommodation, activities, and online experience directly through the app. Besides, Airbnb also provides an opportunity for travellers to become a host to create listing for the property. Therefore, travellers can either be users or hosts in this application was explained in [1]. The transparent booking mechanism of the platform, price transparency, easy navigation, and easy-to-understand descriptions were the ideal model to be taken reference from while designing the group tour package booking feature in TripMate. In user role, Airbnb's platform gives users filtering features based on their requirements, seeing clear prices, and having the option to book accommodation in clicks. The same applies to the group tour package feature for users, where travellers can search freely among listed group tours, see detailed itineraries, and make a direct booking of a tour on the mobile application. By offering similar transparency with prices and tour details, users can compare different tour packages with ease and make an informed decision, eventually saving time and making planning simpler are discussed in [14]. Besides the user role, Airbnb's site also shed some light

on how bookings are managed by travel agents, especially in dealing with multiple users. Airbnb offers hosts the ability to manage listings, bookings, and communication with guests via a dedicated host interface. The process was applied to the available feature of a travel agent in TripMate, whereby agents are given the ability to manage group tour bookings. Travel agents can manage the availability of tours, establish prices, manage tour enquiry, and ensure the group tour data is correct and up to date. By analysing the reservation process and management workflow of Airbnb, the group tour package feature and travel agent management system in TripMate were carefully designed to simplify the booking process and provide an efficient, user-friendly experience for both travellers and travel agencies. This design approach ensures that all stakeholders in the tourism ecosystem can easily identify their roles and that the planning and coordination of group travel are more convenient, organized, and seamless.

4 Methodology

A Design

This study used a waterfall methodology in the development to achieve the project objective. The design beginning with requirement analysis to determine user needs. UI/UX design, system architecture, and component integration are developed step by step for seamless development. Prototypes are updated through feedback, and end design are subjected to testing in order to ensure all functionality work as expected.

B Data Collection

The requirement analysis for this study focuses on collecting primary data through a survey conducted with 15 participants from different age groups. The participants were selected using a convenience sampling method, mainly consisting of students and frequent travellers who have experience using travel-related mobile applications. This approach was chosen due to its practicality for early-stage requirement gathering. The purpose of this survey is to collect the requirements for the features implementation for TripMate. Conducting survey can identify the needs and expectations of the travellers who used the travel-related application frequently more easily. The survey contains 2 parts which are basic demographic and travel behaviours and potential features that can be developed.

The questionnaire survey used within this study was designed to capture respondents' travel behaviour, preferences, and travel mobile application usage. It was designed with consideration of previous research on travel preferences, user behaviour, and mobile application usability to ensure validity and reliability. The demographic items like age and gender were designed based on common survey methods in travel research. Travel frequency and mode of travel questions were presented with pre-coded travel frequency (once a year to frequently) and preferred travel companion option to identify the travel preferences (alone to group).

To evaluate the usage of travel-related applications, the survey has measured how frequently respondents used travel applications such as Google Maps, Airbnb, and Booking.com. This question has identified which type of travel applications are popular well-received such as accommodation, transportation, navigation and mapping service. Additionally, the questionnaire also measured user preferences regarding features in travel apps using multiple-choice question where the respondents were able to select features that they were useful with. The selection of such features was informed by existing research in usability and common features of travel applications.

Moreover, there are some questions related to innovative features such as "Local Buddy" system, car rentals, and group tour package booking which used to explore the potential feature development. These questions had been constructed around user experience research in mobile travel applications to ensure that the features introduced in TripMate align with traveller needs. The survey used multiple-choice and yes, no, and maybe responses option to gather clear and structed feedback from respondents. Last, the survey has provided a mandatory question for respondents to mention that features expected in a smart travel assistance application. The questionnaire was validated for accuracy and suitability before it was

distributed, thereby acting as a valid instrument to capture data on mobile travel application usage and expectations of users.

5 Study Findings

A Response Rate

The questionnaires were distributed to the individuals from different age group so that different travel behaviours can be collected. The population of this study were 15 individuals, and the sample size were also 15 respondents. A total of 15 questionnaires were distributed to the individuals, and all has been answered and submitted online.

The primary characteristics of the questionnaire were described using frequency statistics. The reason of using frequency statistics is because it can record how frequently an occurrence happens for better analysis. The questionnaire included some basic demographic question to identify user travel behaviour. This section included seven variables such as age, gender, travel frequency, travel mode, travel mobile application usage, currently used travel applications, and preferred features in travel assistance app.

A total of 15 questionnaires has been collected from the respondents which consisted of 8 (53.3 %) females and 7 (46.7%) males involved in the study. 8 (53.3%) respondents were mostly 18 to 25 years old while the category of 26 to 35 years old, 36 to 45 years old, 46 to 55 years old are 2 (13.3%) respondents. Only one respondent is 56 to 65 years old. In term of travel frequency, majority of the respondents travel once a year with 8 (53.3%), twice a year with 4 (26.7%) and travel frequently with 3 (20%). As for the travel mode, there were alone 1 (6.7%), family 6 (40%), friends 1 (6.7%), and group 7 (46.7%). For travel mobile application usage, most of the respondents have used travel application with 11 (73.3%), and 4 (26.7%) with does not use travel application. Next, booking.com is the most popular application that used by respondents which consist of 5 (33.3%) respondent, 4 (26.7%) uses Google maps, both respondents using Airbnb app and does not used any related travel app are same which is 3 (20%). Last, preferred features in travel assistance app is a multiple-choice question so the total number of responses will be more than 15. The option included group tour booking 12 (80%), local buddy feature 10 (66.7%), car rental 8 (53.3%), travel itinerary planning 7 (46.7%), language translation 5 (33.3%), currency converter 3 (20%), real-time weather updates 2 (13.3%), and local event notifications 1 (6.7%).

B Hypothesis Testing

The questionnaire also included some questions about potential features that can be developed in the proposed project. This section covered eight variables including usage of the local buddy facility, expected assistance by a local buddy, most significant determinants of selecting a local buddy, experience with car rental, most significant determinants for car rental, experience with booking a group tour package, attractions of group tour booking, and desired features in a smart travel assistance app.

As the H1 is about convenience of group tour booking so 12 (80%) respondents have answered detailed tour information and images will be more appealing, ease of booking with 10 (66.7%), review and ratings with 8 (53.3%), and variety of tours with 7 (46.7%). The majority mostly booked a group tour package through Mata fair with 10 (66.7%), 3 (20%) respondents through travel agent, and 2 (13.3%) respondents through online. Based on the result, respondents more focused on detailed tour information and ease of booking for group tour booking features.

Besides, H2 is focused on car rental feature in travel app. Based on this hypothesis, the question of experience with car rental and most significant determinants have been survey. 8 (53.3%) out of 15 respondents do not used car rental features during travel while 7 (46.7%) respondents have used before. In term of important factor for car rental feature, the major consideration factor is price which is 13 (86.7%), pick up and drop off location is 7 (46.7%), and vehicle type is 6 (40%).

Last, H3 is discussed about local buddy feature integration. 11 (73.3%) respondents choose to use local buddy feature while 4 (26.7%) respondents are choosing might use local buddy feature. As the

assistance being expect provided by a local buddy, city tour contains 10 (66.7%), culture insights, restaurant or local food recommendations have same percentage which is 9 (60%). For the consideration factor, majority respondents might consider safety and trustworthiness which is 9 (60%), feedback and reviews is 8 (53.3%) and language proficiency is 6 (40%).

6 Discussion

The result of the survey confirms H1, as users prefer detailed tour information (80%) and convenient booking (66.7%) when selecting group tour packages. TripMate subsequently added a group tour booking function that simplifies the booking process by including a price comparison feature among multiple travel agencies. The user can select a country and city, which triggers a navigation event that displays all tour packages based on their selection. Each package has detailed itineraries, images, prices, and provider information, responding to the need for openness. For extra convenience, TripMate aggregates tour packages from different travel agencies so that users can view packages on a single page. The best price available is indicated (e.g., "Price from RM5888/pax") to help users make better decisions. In addition to price comparison, other value-added features such as brochure downloads, wish list saving, sharing facilities, and live chat with tour agents improve convenience. Considering 66.7% of the respondents purchase tours at MATTA Fair, implementing the same would probably encourage more users to make the shift to online platforms by providing comprehensive descriptions and direct booking facilities. By responding to significant user preferences, this feature enhances usability and aligns with the project goal of making tour package comparisons easier without requiring users to visit multiple websites. This structured process lays a good foundation for group tour booking experiences to be further improved in the future.

The implemented car rental feature conforms to the H2 result since it addresses the most desirable user requirements uncovered by the survey. Since price was the most significant factor (86.7%) in car renting, transparency is ensured through the provision of rental prices per day along with the provision of comprehensive cost-related information. Also, the importance of pickup and drop-off locations (46.7%) is reflected in the aspect of displaying the location of the car on a map, selecting options to drive via Google Maps, and having precise pickup and drop-off details are discussed in [15]. Further, the ability to filter and look at required car information, such as model, transmission, fuel type, and seating capacity, caters to the 40% of users whose choice of vehicle is a key factor. Support for wish list, social media sharing options, and individual chat with travel agents also provides convenience and decision support to users and has the potential for increased adoption for non-users of car rental services. This rollout of the feature thus directly caters to the user preferences expressed, increasing ease of use, transparency, and accessibility in the travel app.

The hypothesis testing results support the addition of the local buddy feature, as 73.3% of the users are interested in using it and 26.7% would consider using it. In order to meet user expectations, TripMate has incorporated a local buddy system that enhances travel experiences by providing city tours (66.7%), cultural experiences (60%), and suggestions for local food (60%). Addressing key concerns such as reliability and safety (60%), ratings and reviews (53.3%), and language (40%), the feature displays important details, including the photo, name, location, languages, and reviews of the local buddy, for credibility and transparency. All registered local buddy will interview by admin for additional security level. Users can search for local buddies around them by entering a location, and the search results include buddies within a 50km radius, providing ease in finding assistance in their locality. Additionally, the detailed local buddy profile page provides information such as verification badges, introduction, rate per day, and reviews that allow users to determine credibility. The inclusion of a chat feature allows direct communication, establishing trust before booking. Further, users can save local buddy details to their wish list, share profiles, and proceed to booking with ease. With these functionalities, TripMate is aligned with the demands of users, increasing the safety, accessibility, and ease of connecting travellers with veteran locals.

7 Limitations and Recommendations

After gather and analyse the requirement through the questionnaire, the mobile application is being designed and developed. There are some limitations after development process is completed. One of the limitations in TripMate is only single language supported in the application which is English. This might cause TripMate loss the customer who does not familiar with English and this will decrease the number of users in using TripMate. Next, language translator feature is designed in TripMate, but the voice input only supported English language. Other language with voice input will not be detected correctly in the system. Last, TripMate only accessible in Android devices for all user roles. Since TripMate is developed by Flutter, accessible by iOS devices should be work, because Flutter supports Android and iOS platforms. For the configuration and testing for iOS devices, MacOS is needed to debug iOS application devices. Therefore, the current version of Trip mate only caters for Android users.

In future, TripMate aims to make enhancements in support for other platforms aside from Android devices which is to ensure more user can access to the application. Besides, Google Calendar is a service offered by Google to perform task such as time management and event scheduling are discussed in [12]. In TripMate, local buddy can view the appointment in the calendar and receive the notification when there is an appointment. However, local buddy might miss out the notification. Therefore, TripMate can integrate Google Calendar service at local buddy side to allow the received appointment schedule at the Google Calendar and Google Calendar also offer the service in sending reminder before the scheduled event. Hence, local buddy will receive reminder to avoid overlook user's appointment. Moreover, TripMate can leverage and extend the language translator facility through the addition of an image translation feature according to the research in [13]. In this manner, a user can instantly translate text that may appear in photos from signs, menus, and other printed materials one sees when traveling. In line with its vision as a smart travel assistant, TripMate could also adopt Artificial Intelligence (AI) to provide intelligent trip planning and personalization. For instance, users could paste the URL of a travel post, and the AI system would automatically extract destinations, attractions, and activities to generate a customized travel itinerary. Additionally, AI could analyse user preferences and contextual factors such as nearby attractions, travel routes, and seasonal events to offer personalized recommendations and optimized travel plans, thereby enhancing convenience and user experience in future versions of TripMate.

8 Conclusion

Overall, this study has provided an overview of TripMate, detailing how the functionalities being implemented and designed, along with the result of the questionnaire conducted for its development. TripMate is a project developed to serve as a travel assistance system. TripMate consist of 3 user roles such as user(traveller), travel agent and admin. Flutter is the platform that used to develop TripMate mobile application which is user-friendly and efficient for mobile application development is discussed in [3]. TripMate offers service for user to schedule booking for group tour package and car rental package from multiple travel agent, local buddy package for local buddy from different country, language translator. Travel agent can use TripMate to manage package, track booking status, and view analytics report for packages. Admin has the priority in managing all user accounts, registration request, withdrawal request, and view all packages and bookings. All proposed requirements and objectives are implemented and achieved in the project. Waterfall model was the research methodology used throughout the project. The requirements were gathered through a survey before project development, and most response show interested in using TripMate. The flowchart was split into module for each user role and explained clearly. All data in TripMate was stored in Firebase Firestore (store data) and Firebase Storage (store image and pdf file) are discussed in [2]. After the development, TripMate has conducted functional such as unit testing and integration testing to ensure that bugs were fixed before release to the end users. Non-functional testing that conducted was performance testing which used to evaluate the performance of TripMate in mobile devices. The result indicates a good overall

performance. In conclusion, TripMate was successful in terms of achieving the project objectives and the project also open to future enhancements in order to improve overall user experience.

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