E-RESERVATION RESTAURANT

BY

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ABSTRACT

This project develops an innovative e-Reservation Restaurant web application aimed at revolutionizing online restaurant booking systems. The existing similar platforms have various limitations, such as limited search filters that make it difficult to find the perfect restaurant, and a lack of reminders for customers' restaurant bookings can lead to high no-show rates due to customers forgetting about their bookings. Moreover, contacting customer support for reservation or website inquiries can be frustrating, as it lacks the efficiency of a live representative. Hence, this project seeks to overcome these issues by creating a revolutionary e-Reservation Restaurant website using the Agile methodology. The core motivation of this project is to address the problems faced by existing online restaurant booking systems to create an enhanced user-centric experience. This system empowers users with a personalized recommendation engine that enables users to select their preferences, such as cuisine type and desired location. The website then automatically recommends restaurants that align with the customer's individual needs. This not only saves users time searching but also introduces them to new dining options they might not have otherwise known about. Additionally, the system incorporates an "Add to Google Calendar" event function in the restaurant booking confirmation e-mail, providing a friendly reminder in case customers forget about their booking. This benefits diners and optimizes restaurant revenue and table management by reducing no-show rates. To further enhance the user experience, the system incorporates cutting-edge AI-powered features such as an AI chatbot to assist users with reservations and website inquiries, providing immediate and convenient support, unlike the current limitations of many platforms. By combining these functionalities, the system aims to significantly improve the customer experience and satisfaction. Diners can anticipate a more streamlined and enjoyable reservation process, while restaurants can expect a reduction in no-show rates and an overall improvement in table management.

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LIST OF ABBREVIATIONS

AI	Artificial Intelligence
API	Application Programming Interface
CSS	Cascading Style Sheets
HTML	Hypertext Markup Language
NLP	Natural Language Processing
SQL	Structured Query Language

Chapter 1

Introduction

This chapter introduces the e-Reservation Restaurant web application that is proposed to be developed. Prior to embarking on the system development, a comprehensive review of the preliminary study of the current existing systems was reviewed. Then, the motivation and contribution of the development of the e-Reservation Restaurant web application are studied to ensure that the proposed web application is innovative and competitive. The project scope and objectives are also identified to provide a sense of direction when prototyping and developing the project.

1.1 Introduction

A rapidly changing digital landscape has led to an increase in demand for convenient and efficient online services in the hospitality sector [1]. Hence, this research paper responds to this demand by developing a cutting-edge web application known as the e-Reservation Restaurant website. The primary objective of this project is to enhance user experience by providing a user-friendly, time-saving, and reliable platform for online restaurant bookings.

The e-Reservation Restaurant website mainly serves three user groups, which are the customers, restaurant owners, and website administrators. Customers can conveniently book tables in advance, specifying the number of guests, and streamlining the reservation process. Restaurant owners benefit from features such as a comprehensive reservation list for efficient booking management and an analytics tool to gain insights into reservation trends, aiding strategic decision-making [1]. Conversely, website administrators are essential in controlling and managing permission levels and ensuring that the website is operating smoothly.

A key aspect of this project involves conducting thorough research to identify and address limitations and challenges faced by existing reservation systems. By incorporating innovative solutions and user-centric features, the e-Reservation Restaurant website aims to revolutionize the online reservation experience for both customers and restaurant owners alike.

The e-Reservation Restaurant website's intricate details, such as its functionalities, system design, implementation process, evaluation metrics, and concluding remarks, will be covered in detail in this paper. The ultimate goal is to contribute to the advancement of restaurant booking systems in the hospitality industry and provide a benchmark for future developments in this field.

1.2 Problem Statement

1.2.1 Lack of Personalized Recommendation Feature

Online restaurant booking platforms have grown in popularity in the modern digital age, making it easier for customers to make reservations at restaurants of their choice. However, a significant gap exists in the functionality of these platforms, as many fail to offer a personalized recommendation feature that caters to the unique tastes and preferences of each user. Instead, customers are often required to manually search and input the names of restaurants they wish to book.

The lack of a recommendation feature significantly diminishes the user experience, as it hinders users from discovering a wide variety of food options that suit their preferences. This limitation not only reduces user interaction with the web application but also misses the opportunity to improve customer satisfaction by offering customized restaurant and cuisine recommendations.

Research suggests that personalized recommendations can significantly impact user engagement and satisfaction. For instance, a study by Lindecrantz, Gi, and Zerbi found that personalized product recommendations can increase customer engagement and sales by up to 20% [2]. Similarly, a survey by Epsilon revealed that 80% of customers are more likely to make a purchase when presented with personalized recommendations [3].

Hence, the lack of a personalized recommendation feature on many online restaurant booking platforms represents a significant gap in the user experience. By incorporating such a feature, these platforms can enhance engagement, increase customer satisfaction, and provide a more comprehensive and personalized service to their users [4, p. 60].

1.2.2 No Booking Reminders

The lack of booking reminders in online restaurant booking systems poses a significant challenge for both customers and restaurant owners. Without this feature, customers might forget about their made reservations [5], which would result in no-shows and lost revenues for restaurants. Additionally, restaurant owners will miss out on the opportunity to efficiently plan staffing and optimize seating capacity.

According to a scheduling survey conducted by Tebra, it is found that 54% of providers reported having procedures in place to reduce the number of no-shows, and 79% reported using digital appointment reminders. [6]. Hence, this concept can be directly applied to online restaurant booking systems as it can significantly reduce the number of no-shows in the restaurant industry [7].

Without a booking reminder, customer satisfaction and revenue are both impacted. If customers forget their reservations, they might get upset with the restaurant and decide to go somewhere else to eat in the future. This can lead to a loss of repeat business and negative reviews, damaging the restaurant's reputation.

Thus, it is evident that both customers and restaurant owners face a significant challenge as a result of the lack of booking reminders in reservation systems. By addressing this gap and incorporating booking reminders into the restaurant booking system, restaurants can improve customer satisfaction, reduce no-show rates, and maximize revenue potential [8]. This enhancement not only benefits the customer experience but also contributes to the overall success and efficiency of restaurant operations.

1.2.3 Lack of AI Chatbot with Help Center Search Engine and Live Chat Support Features

Restaurant booking websites face a significant challenge in providing immediate and effective customer support, often lacking an AI chatbot feature that can solve inquiries in real-time. In some cases, users may find themselves without access to a help center or live agent support when they require prompt assistance.

Existing similar systems use chatbots that operate within specific hours, limiting their ability to address customer inquiries immediately. Moreover, certain chatbots are deprived of artificial intelligence features, resulting in delayed responses and inefficient resolution of problems. In some instances, the chatbot does not redirect the customer to live agent chat, which further delays the resolution of customer concerns.

The lack of a comprehensive AI chatbot that encompasses a help center search engine and live agent support feature can lead to customer frustration and dissatisfaction [9, p. 1], potentially causing them to abandon the booking process or choose another platform instead. This gap in the existing systems can result in lost opportunities for restaurants to attract and retain customers.

Research from Franz and Górska states that 64% of customers expect to receive real-time assistance regardless of the time of day [10], while 42% of customers favor live chat as their preferred communication mode [11]. Without an AI chatbot with a help center search engine and live agent support functionality, restaurant booking websites cannot provide users with the necessary assistance to resolve their inquiries and concerns, leading to decreased user satisfaction and loyalty.

Hence, the lack of an AI chatbot feature that encompasses a help center search engine and live agent support functionality in restaurant booking websites represents a significant gap in the customer support and service offerings. Restaurant booking websites can reduce wait times, provide customers immediate support, and enhance the overall user experience by implementing these features [9, p. 3]. This can lead to increased customer satisfaction and loyalty, which will eventually drive the expansion and success of the restaurant booking website.

1.3 Motivation

The motivation for this project stems from the identified gaps in existing online restaurant booking websites, which include the lack of personalized recommendation features, booking reminder, and a feature-rich AI chatbot with a help center search engine and live agent support

functionalities. These gaps hinder user engagement, customer satisfaction, and the overall effectiveness of customer support systems. Addressing these limitations is essential to improving user experiences and enhancing the competitiveness of online restaurant booking systems. The project aims to fill these gaps by developing an innovative e-Reservation Restaurant web application with cutting-edge features that satisfy the needs of customers, restaurant owners, and website administrators. The purpose of this project is to offer an innovative solution that transforms online reservation booking processes and establishes a standard for upcoming advancements in the hospitality sector.

1.4 Project Scope and Direction

This project aims to deliver an e-Reservation Restaurant web application that incorporates the innovative and enhanced features that similar existing systems lack to facilitate and further enhance the online booking process for restaurants. This project is set to be completed within a year and the key stakeholders include the customers, restaurant owners, and website administrators.

There are several areas of work to be implemented and improved in this project. This includes the basic restaurant booking feature, table management and analysis feature, personalized recommendation and restaurant sorting feature, "Add to Google Calendar" event feature, and AI chatbot with a help center search engine and live chat support functionality. There will be three types of accounts with different functionalities for each different user identity, that is the customers, restaurant owners, and website administrators.

1.5 Project Objectives

This project aims to develop a user-centric e-Reservation Restaurant web application that prioritizes seamless and efficient restaurant bookings for customers while enhancing management capabilities for restaurant owners. It focuses on designing a comprehensive reservation process with features for analysis and table management. With the help of these features, restaurant owners will be able to manage reservations more efficiently, analyze reservation trends, and make data-driven decisions.

From the customers' point of view, the project seeks to implement a personalized recommendation and restaurant sorting feature. This feature will help customers discover restaurants that match their preferences that are based on several factors, such as the location and cuisine type. By personalizing the restaurant recommendations, the web application aims to enhance user engagement and satisfaction.

Another key objective of this project is to develop an "Add to Google Calendar" event feature in customer's booking confirmation e-mails. Enabling this feature will serve as a gentle reminder to customers by recording the booking schedule into the customer's own Google account. This way, it will reduce customers' forgetfulness about made reservations and help restaurants optimize their revenue generation and seating management through the reduction of no-show rates.

Lastly, this project aims to incorporate an AI chatbot with a help center search engine and live chat support functionalities to ensure 24/7 availability of customer assistance that addresses users' inquiries and concerns in real-time. The AI chatbot will provide immediate and effective support to users, thereby reducing wait times, and improving the overall user experience and satisfaction.

1.5 Contributions

Through the introduction of cutting-edge features like personalized restaurant recommendations, an "Add to Google Calendar" event feature, and an AI chatbot with help center search engine and live chat support functionalities, the project advances online restaurant booking systems. This project hopes to improve customer satisfaction, user engagement, and restaurant owners' operational efficiency by incorporating the above features to address the limitations of current similar existing systems.

Building upon the foundation outlined in the problem statement, the solution is designed to bridge the existing functionality gaps observed in current restaurant booking systems. The project serves to address these issues by integrating user-centric features such as streamlined reservation processes, personalized recommendations, effective booking reminders, and a responsive AI chatbot with a help center search engine and live customer

support. This proposed solution significantly improves the overall user experience for both customers and restaurant owners.

The development of the e-Reservation Restaurant web application provides a competitive edge in the online restaurant booking market by offering a comprehensive and user-friendly platform that adapts to the evolving demands of customers and restaurant owners. This contributes to the growth and success of online restaurant booking systems.

1.7 Outline of the Report

The report follows a structured format across seven chapters to present the research project comprehensively. The first chapter outlines the preliminaries of the proposed project. With all these preliminaries stated, it is expected that the idea of the proposed project will be highlighted. The specifics of this project will be shown in the following chapters. Chapter 2 conducts a literature review, analyzing three related existing systems to identify differences and highlight the unique features of the proposed system. Then, Chapter 3 will discuss the system analysis and design, outlining the methodology and approach. Chapter 4, on the other hand, focuses on illustrating system design aspects using wireframes to visually represent the user interface. In Chapter 5, the report details the system implementation process and setup, providing insights into the practical execution of the project. Following this, Chapter 6 evaluates the system's performance through system testing and discusses the findings in detail. Finally, Chapter 7 concludes the report by summarizing key insights, presenting final remarks, and offering recommendations for future research directions.

Chapter 2
Literature Review

2.1 Introduction

In this chapter, three online restaurant booking systems are reviewed, namely TableAgent, TABLEAPP, and Eatigo. A literature review is conducted to identify the advantages, disadvantages, and limitations of each similar existing system. Then, a comparison table is developed to display the main differences between each system reviewed. Lastly, proposed solutions are included at the end of this chapter to identify possible solutions that can address the disadvantages and limitations as reviewed in the systems.

2.2 Similar Existing System 1: TableAgent

TableAgent is a free cloud-based restaurant reservation web application that allows customers to make, manage, and access their bookings from any device, including smartphones and tablets, at any time. There are no monthly payments, and no need to install any software on the desktop or phone [12].

TableAgent's selection for review in this research is well-justified due to several factors. This cloud-based restaurant reservation system offers a range of attributes that closely align with the project's goals and objectives. TableAgent is a relevant option for analysis due to its cost-effective nature, ease of use, accessibility across devices, absence of monthly fees, online booking and payment capabilities, and use of cutting-edge technologies [13]. By studying TableAgent, the research can gain insights into how these attributes contribute to the success of a restaurant reservation system and how similar features can be implemented in the development of the e-Reservation Restaurant web application. These insights are crucial in shaping the project and ensuring it meets the expectations of users and industry standards.

Furthermore, the advantages and disadvantages identified in TableAgent provide a valuable baseline for comparing and contrasting existing systems, thereby enabling the project to offer an enhanced user experience by addressing shortcomings present in similar systems.

The home page of this online restaurant booking website is shown in Figure 2.1. Key advantages of this system include the ability to leave special occasion requests and providing a dashboard to display table booking status and analysis. The disadvantages identified upon reviewing the system consist of the lack of menu display, no discounts and yield management feature, no booking reminders, and the lack of personalized recommendations. The limitations of this system comprise the inability to provide an immediate response to customer inquiries, a lengthy and unorganized FAQ page, an unsorted bookings list, and the inability to check table availability in real-time.

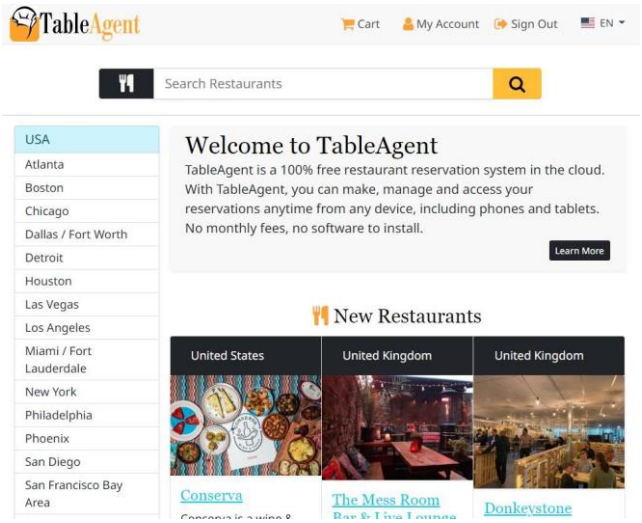

Figure 2.1 TableAgent home page [12]

Weblink [12]: https://tableagent.com/

2.2.1 Advantages of The System

2.2.1.1 Special Occasion Request

As shown in Figure 2.2, TableAgent enables customers to place a remark for special occasions in case they require additional setup or decorations for an event. They provide a platform for many pop-up restaurants, event spaces, and private groups to use the system

exclusively for special occasions [12]. This special occasion request is a crucial component in online restaurant booking platforms as a study by Chang et al. found that inattention to customer preferences or special requests by restaurants may cause service failures and customer dissatisfaction [14], as it does not take into account customers' dining preferences.

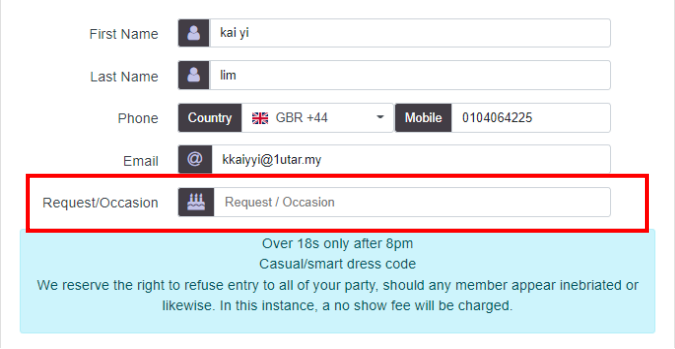

Figure 2.2 Special occasion request [12]

2.2.1.2 Table Booking Status and Analysis

TableAgent provides a dashboard and several analytics tools for the restaurant owner to keep track of their table booking status. As shown in Figure 2.3, restaurant owners can have their dashboard to view their restaurant table booking status, e.g., booked, waitlisted, seated, or finished. Moreover, restaurant owners can also generate reports to show the statistics of the customer booking data (Figure 2.4) and the most loyal customer reports (Figure 2.5).

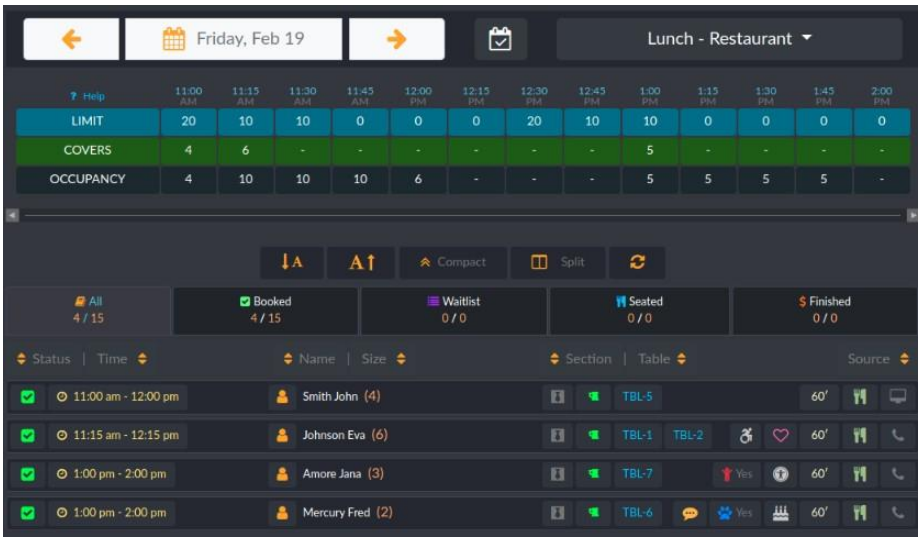

Figure 2.3 Table booking status dashboard [12]

Figure 2.4 Customer booking statistics report [12]

Figure 2.5 Most loyal customer report [12]

The restaurant booking dashboard is a key component for restaurateurs to conduct analysis of their booking data to aid data-driven decision-making and identify consumer booking patterns. Moreover, research by Roy et al. further states that restaurateurs can use customer data and data analytics tools to estimate booking demand, simulate demand substitution when competitors are present, and utilize the demand projections to make informed business decisions [15], all in which will enhance the restaurants' operational efficiency and help boost sales revenue.

2.2.2 Disadvantages of The System

2.2.2.1 Lack of Menu Display

TableAgent does not have a feature to allow customers to preview the menus of restaurants. An article by McCall and Lynn states that the menu is among the various factors that can attract customers to dine at a restaurant. This is because the menu serves as an outline that describes the restaurant's marketing plan and can make a critical first impression on customers. For example, hotels often provide a collection of local menus so guests can easily identify appropriate dining venues. Restaurants, on the other hand, will display their menus outside to attract and persuade passersby to dine in [16, p. 440].

This concept can be directly applied to online restaurant booking systems, as customers would require a complete understanding of what a restaurant is offering to be able to be persuaded to book for that restaurant. Thus, TableAgent lacks this important feature, which poses a great disadvantage to the system that can potentially reduce restaurant booking rates as customers do not know what is offered at different restaurants.

2.2.2.2 No Discounts and Yield Management Feature

TableAgent does not provide any sort of promo codes or discounts for customers when using the application. Without discount management, restaurant owners will have a hard time using the appropriate pricing strategies for their food items as they are unable to fully track the customers' consumer behaviours. In addition, customers will feel less appealed to use the web application as there are no pricing benefits offered.

This disadvantage is evidenced by a study from Kimes and Dholakia, where it is found that 44% of customers who use coupons claimed to be frequent customers. However, the use of coupons was also able to attract a significant number of new customers as well as to bring back infrequent customers. Most importantly, a large number of the new and infrequent customers expressed that they would both suggest the restaurant to friends and return to dine even at regular prices. Without the daily discount offer, the restaurant would not have drawn in any new customers [17, p. 4].

Hence, it is crucial to note that discounts play an imperative role in attracting new customers to place a booking when using an online restaurant booking system. TableAgent lacks this feature, which can be seen as a notable disadvantage of the system as it is unable to attract customers to use the system.

2.2.2.3 No Booking Reminders

After a customer places a booking on TableAgent, they will receive a confirmation e-mail as shown in Figure 2.6. While the confirmation e-mail provides a copy of the reservation details to customers, some customers might still forget about their booking [5]. Moreover, TableAgent does not provide any sort of booking reminders or notifications that will remind customers about their reservations, which will lead to a high no-show rate and lost revenues for restaurants.

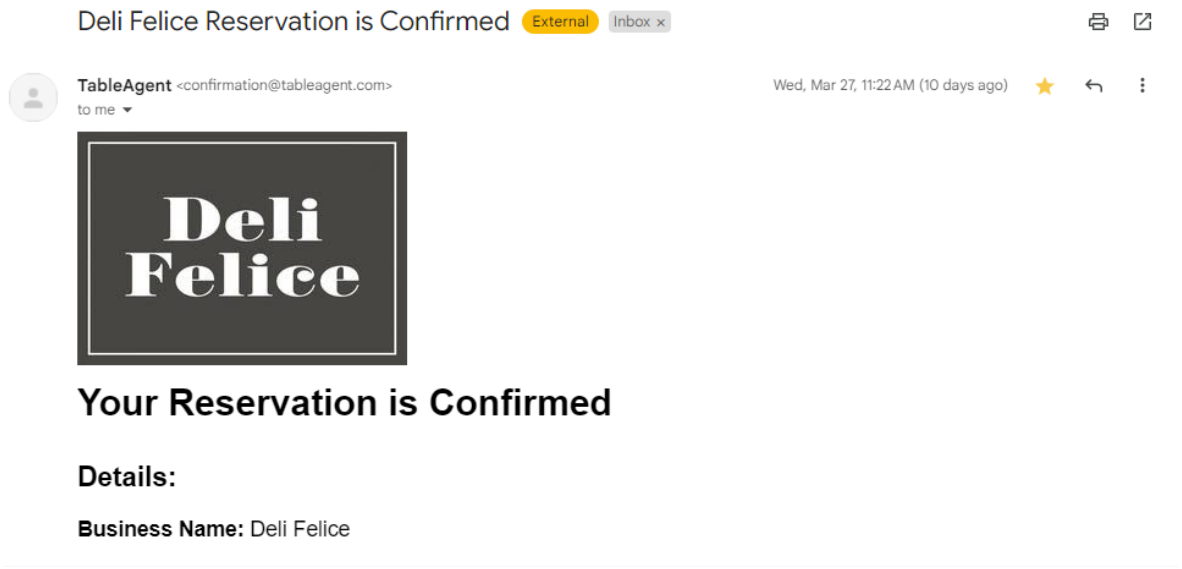

Figure 2.6 TableAgent booking confirmation e-mail

According to Tebra's scheduling survey, it is known that 79% of online providers utilize digital appointment reminders to remind customers about their appointments [6]. Thus, it is evident that TableAgent is currently lacking this feature, which poses a great drawback to the system.

2.2.2.4 Lack of Personalized Restaurant Recommendations

As shown in Figure 2.7, customers are only able to search for the restaurant by name upon successfully signing up for an account. TableAgent does not have a feature to recommend customers restaurants based on several factors, such as what is trending, cuisine types, new restaurants, etc.

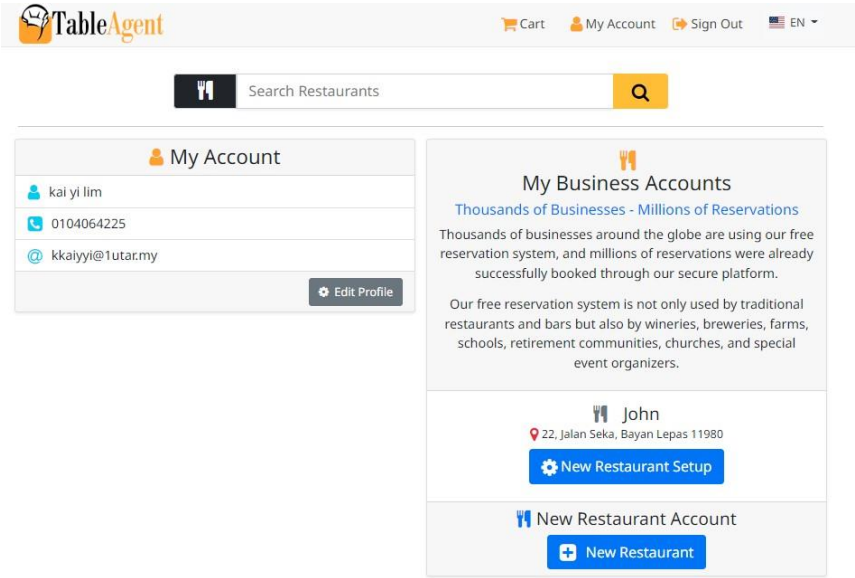

Figure 2.7 No restaurant recommendations (TableAgent) [12]

Without a personalized restaurant recommendation feature, customers are less likely to explore new food options that match their preferences. This will lead to lower customer bookings and user engagement rates, which will eventually impact the restaurants' booking rates and sales revenue.

According to a study by Lindecrantz, Gi, and Zerbi, personalized restaurant recommendations can boost sales and customer engagement by up to 20% [2]. In a similar vein, an Epsilon survey found that 80% of consumers are more likely to place a booking when given personalized recommendations [3].

Therefore, it can be said that the lack of personalized restaurant recommendations poses a crucial downside to TableAgent's booking system.

2.2.3 Limitations of The System

2.2.3.1 Unable to Provide Immediate Response to Customer Inquiries

Upon review, it is found that TableAgent does not provide a live chat function that allows users to communicate with customer service in real-time. Currently, TableAgent only allows customer inquiries through e-mail and phone calls (Figure 2.8), which can lead to a delay in response time as customers can only receive responses to their inquiries once the customer service representative is online and replies to their inquiries.

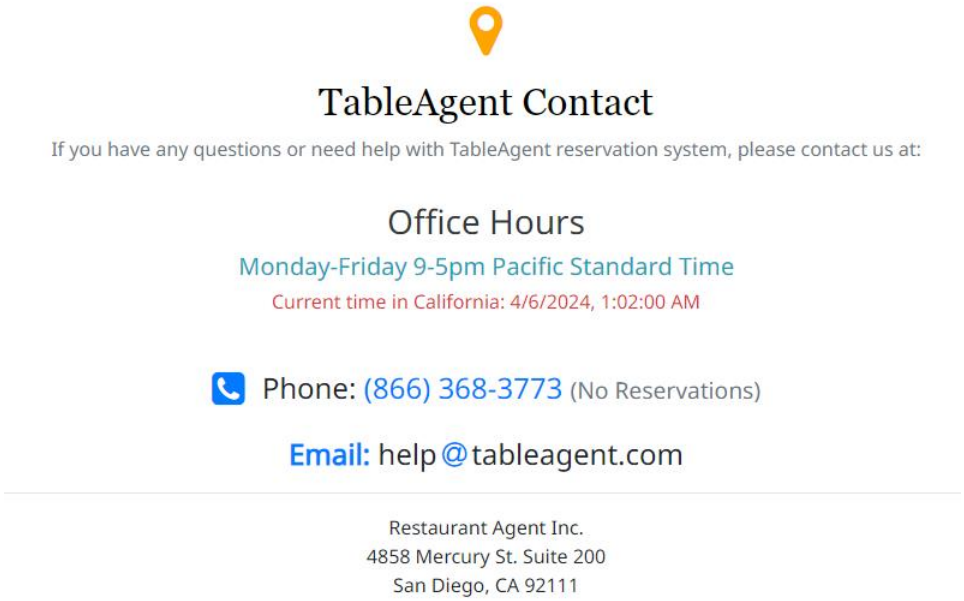

Figure 2.8 TableAgent contact information [12]

According to a study by Ahmad, a pre-composed e-mail is a general response sent to users to acknowledge their enquiries, while customer representatives will attend to the inquiries within 2448 hours [18]. This is a considerably long response time, which will cause customers to feel impatient and possibly abandon the inquiry process or seek alternative booking platforms.

Phone calls, on the other hand, may apply charges and might take a long time to connect to customer service agents especially when the line is busy. A survey by Call Center Helper found that 60% of customers gave up trying to contact customer service if their call was not answered within a minute [19]. In addition, it is proven by R. Coppell that wait times that are

longer than 90 seconds will decrease customer satisfaction [19]. Hence, these inefficient customer service channels will diminish the user experience, further aggravating customer frustration and dissatisfaction [9, p. 1].

While studies from A. Franz and Górska stress that customers prefer real-time assistance regardless of the time of the day [10], [11], TableAgent fails to meet the needs of users, which poses a great limitation when users are interacting with this system.

2.2.3.2 Lengthy and Unorganized FAQ Page

Though TableAgent provides a FAQ (Frequently Asked Questions) page (Figure 2.9) that addresses users' inquiries and concerns, customers are still required to skim through a long page of unorganized information to find answers to their inquiries, which will diminish the user experience as customers will easily feel overwhelmed by the overload of information. All information is congested on one FAQ page, and it is not categorized according to different topics of information.

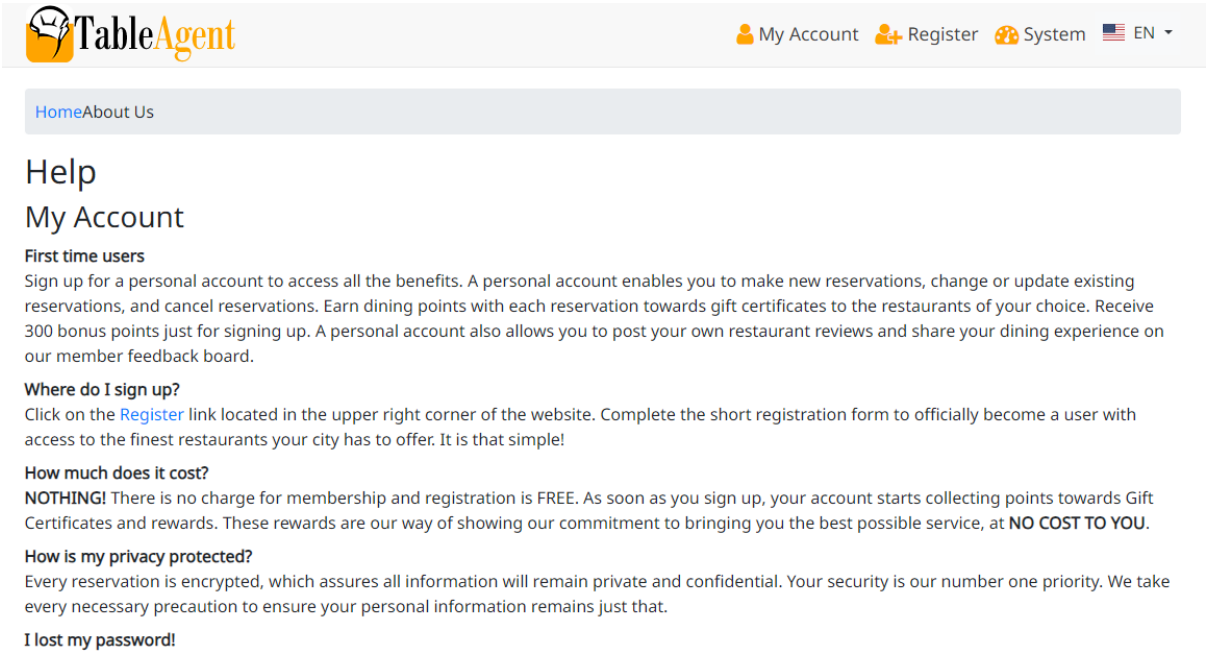

Figure 2.9 TableAgent FAQ page [12]

A study by G. L. Lohse and P. Spiller further proves this point by conducting research that proves only 10% of users navigate past the initial information screen on a webpage. This

is because long pages take more time to load and are more difficult to scroll through [20, p. 84].

Thus, these flaws in TableAgent present a serious gap that needs to be addressed to satisfy customer's needs for quick response to inquiries and easy access to information. It lacks a responsive help center search engine that can retrieve relevant information that the user is searching for.

2.2.3.3 Bookings List Not Sorted

TableAgent does not provide a feature to display the customer's bookings in a summarized sorted list. Instead, the customer bookings are displayed as separate listings and are also not sorted by the dine-in date (Figure 2.10). This will be challenging for customers to keep track of the booking dates, thus, causing more confusion to the customers and might lead to high no-show rates due to forgetting about their bookings.

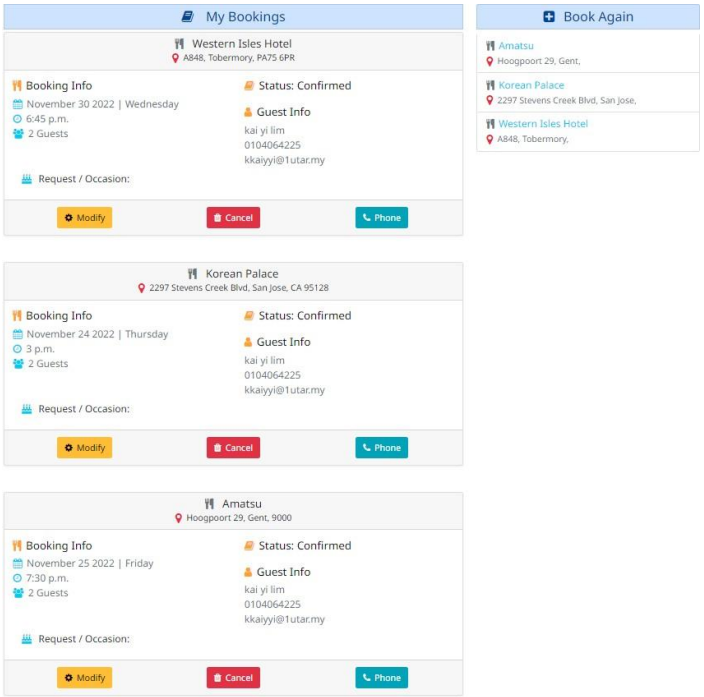

Figure 2.10 Separate booking listings [12]

Based on research by Warner, software applications can assist businesses in establishing extensive, well-structured, and easily accessible information for use in day-to-day

operations [21, p. 40]. Restaurants are required to maintain lists of bookings on a daily basis, and it is important to be able to view the bookings sorted in ascending order. This speeds up the information retrieval process and makes it easier for customers to refer to their bookings, as it is simpler to understand booking events that are arranged according to the timeline [22].

However, TableAgent's bookings list is limited to only displaying each booking separately, which is ordered by the date the booking is placed instead of the day to dine in at the restaurant. This poses a significant constraint towards the usability of the system to customers.

2.2.3.4 Unable to View Real-time Table Availability

Another limitation of TableAgent is that it is unable to provide real-time table availability information to customers. It only allows customers to select the booking date, time, and party size (Figure 2.11) without checking the restaurant's table availability in real-time. This will be a great challenge for both customers and the restaurant staff as hosts and servers may struggle to manage seating arrangements effectively without accurate information on table availability.

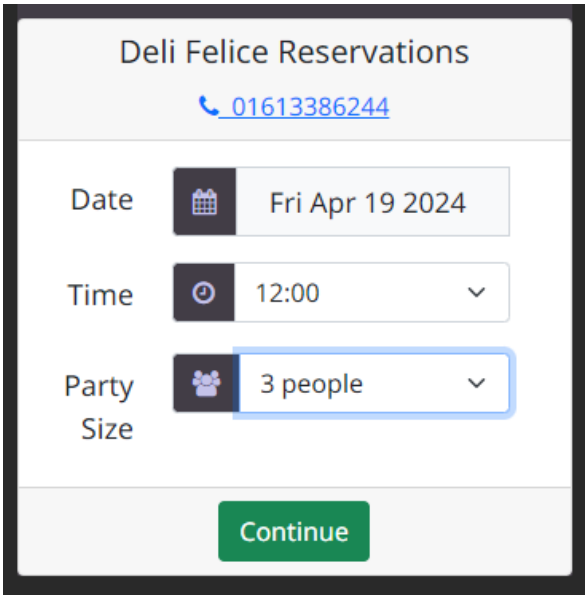

Figure 2.11 Unable to check real-time table availability (TableAgent) [12]

As mentioned by Ardiansyah et al., real-time data information is required to determine the data's current status. If the order does not contain real-time information, the customer will

not be aware of the most recent information if there is a change. Hence, a real-time table availability function is necessary for any online restaurant booking system so that customers may check in advance which tables are available before placing a booking for a restaurant. This is crucial to avoid lines that form at the restaurant from the large number of customers waiting for food [23, p. 134].

As TableAgent's seating arrangements are limited to only selecting the number of people and unable to view real-time table availability, this will lead to longer wait times for customers, which will decrease table turnover, and overall inefficiency in restaurant operations.

2.3 Similar Existing System 2: TABLEAPP

TABLEAPP, founded in 2013, is an online restaurant booking website based in Malaysia and Thailand that aims to connect diners and restaurants seamlessly while enhancing and simplifying the restaurant booking process [24]. It is a prime candidate for review due to its broad experience and industry influence, having served over 6.3 million diners since its founding in 2013 [25]. Its ability to offer real-time, cost-free, and user-friendly restaurant reservations aligns perfectly with the project's goal of creating an efficient and user-friendly e-Reservation Restaurant web application.

Furthermore, TABLEAPP provides a comprehensive solution for diners through its innovative approach, which includes the TABLEAPP ELITE membership program. Members of this special membership program can redeem complimentary premium signature dishes at top restaurants [24] in addition to having access to basic restaurant reservations, which enhances the overall dining experience.

By examining TABLEAPP, the research can gain insights into developing a successful and user-friendly e-Reservation restaurant system, offering a seamless and enhanced dining experience for users.

The home page of TABLEAPP is shown in Figure 2.12. Advantages such as menu options, consideration of allergies and religious restrictions, sorting features, discounts and yield management highlight TABLEAPP's user-centric approach and make it a valuable reference point for the project's development. However, there are some disadvantages to this online restaurant booking website, which include the lack of booking reminders, no special occasion requests, lack of an FAQ page, and the lack of restaurant recommendations. In addition, there are some limitations identified, such as the limited operating hours of the live chat function.

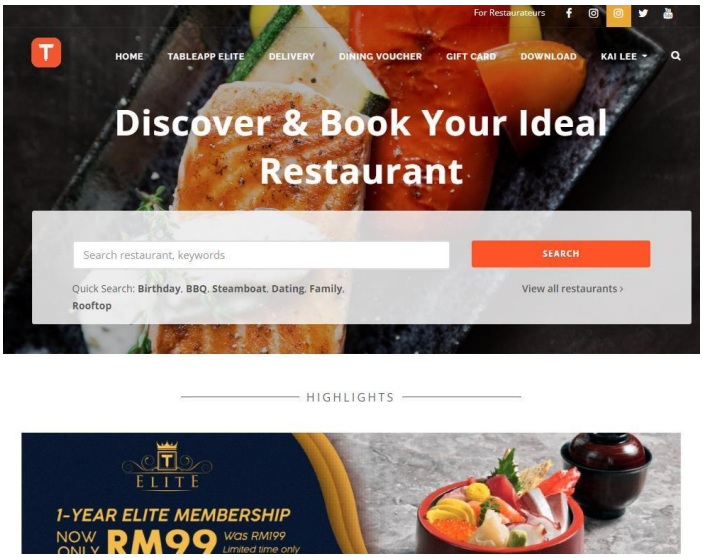

Figure 2.12 TABLEAPP home page [24]

Weblink [24]: https://www.tableapp.com/

2.3.1 Advantages of The System

2.3.1.1 Inclusion of Menu

TABLEAPP enables restaurant owners to post, categorize, and update their menus on the website (Figure 2.13) so customers can know what type of food is offered by each restaurant before making a reservation. This helps clear up customer confusion and speeds up the customers' decision-making process whether or not to place a booking for the restaurant [26].

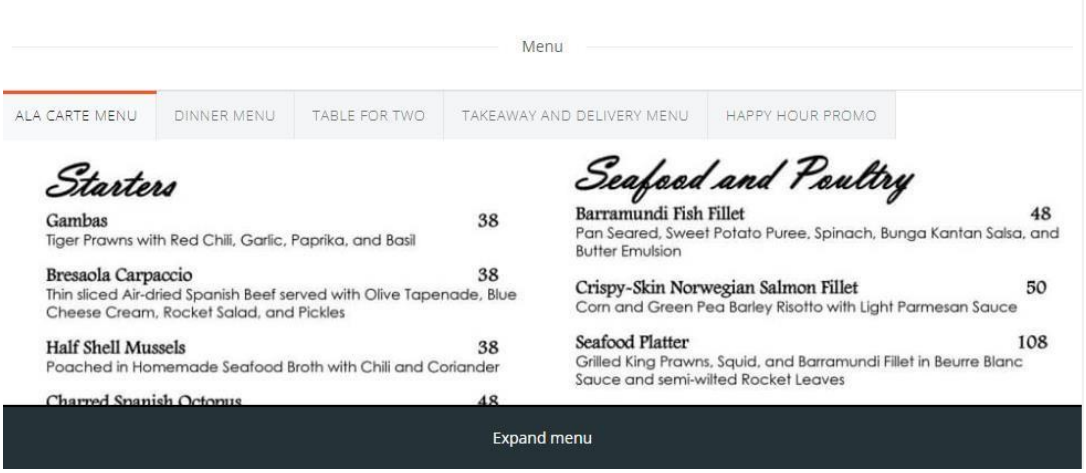

Figure 2.13 Restaurant menus [24]

The menu fulfils a number of purposes for both the restaurant owner and the customer. Well-designed menus make it easier for customers to choose what they want to eat by directing their attention to specific items. Menus are comparable to delivering a formal speech in the sense that they both symbolize a particular type of selling situation. Most importantly, menus aim to encourage customers' perceptions of value towards the restaurants' item selection [16, p. 440].

This feature is a crucial component in online restaurant booking platforms that must not be missed out on.

2.3.1.2 Allergies and Religious Restrictions

When customers are about to make a reservation, TABLEAPP provides a feature to allow customers to leave a remark if they are allergic to certain ingredients or constricted by certain religious restrictions (Figure 2.14). This feature can help restaurant chefs prepare the food without certain ingredients beforehand to prevent any accidents or disgruntlement from happening.

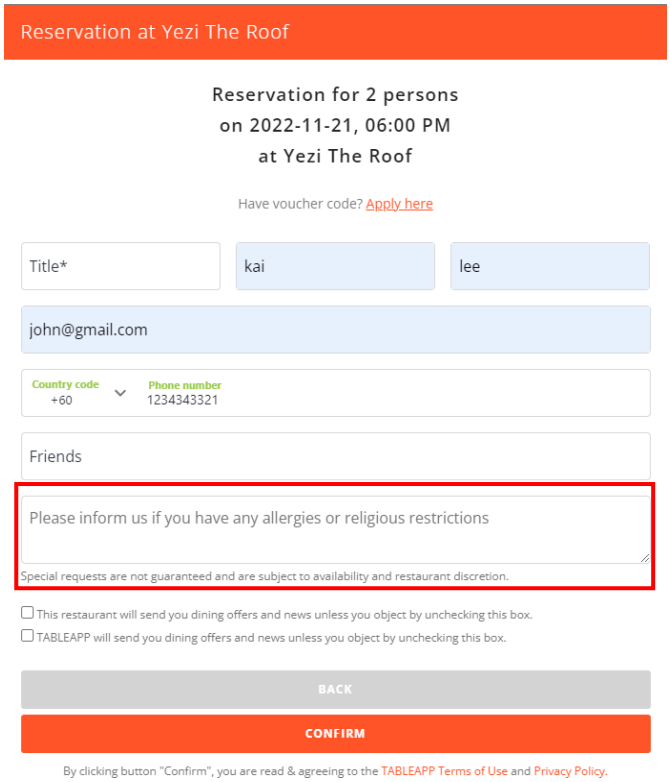

Figure 2.14 Allergy or religious restrictions remark [24]

According to an article by Peniamina et al., food allergies are becoming more common, yet society still does not fully understand how they impact people's lives. The lack of knowledge had a negative effect on the general public, food service providers, and medical experts, indicating that it would be beneficial to raise awareness through an intervention. [27, p. 933]. Therefore, it is recommended that restaurants adapt to customer's dietary restrictions so that customers with food allergies will be provided with special assistance and care to help cope with their restricted food options.

To support this stance, Wettstein et al. conducted one-on-one interviews with participants to discuss the topic of food shortages, the motivations behind them, and the expression of any accompanying coercion. Regarding diet, 56% of patients reported having some sort of limitation on any food type, and 6.3% of the patients had dietary restrictions related to religion, particularly with regard to the meat category. The remaining patients reported limitations because they didn't enjoy the meal (34%) or because they had related health issues (16%) [28, p. 1].

Thus, it can be said that the allergies and religious restrictions remark feature provides a great advantage to customers with dietary restrictions, as they can leave a remark to the restaurant in advance and the restaurant can prepare the meals according to the customer's preference. This can help to enhance user satisfaction and retain customers for returned bookings.

2.3.1.3 Sorting Feature

On the restaurant display page, TABLEAPP provides a sorting feature where users can search for restaurants, and sort the results by price, editor choice, alphabetical order, location, and cuisine (Figure 2.15). This feature is highly convenient to customers as it can help speed up the restaurant selection process by filtering out the most ideal restaurant based on the customer's preferences [26].

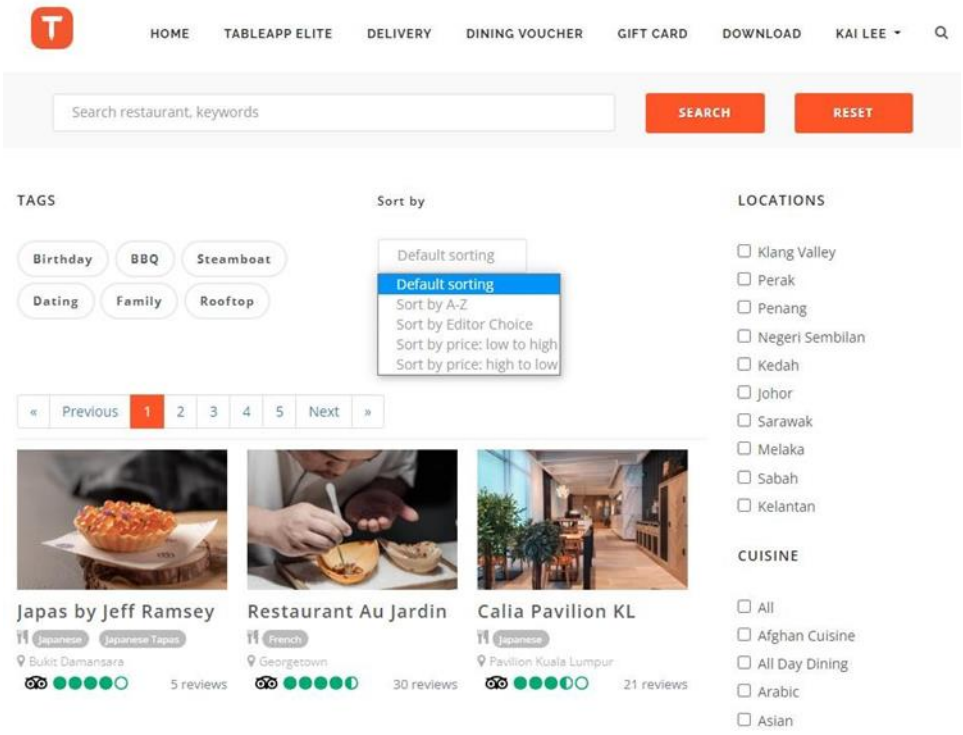

Figure 2.15 Filter restaurants feature (TABLEAPP) [24]

The benefits of a sorting feature are highly notable to customers. By developing a sorting sytem, it can help customers decide which restaurant to book for. It is known that there are various elements that influence a customer's decision to visit a restaurant, such as the restaurant's cuisine type, location, estimated cost, reputation, ratings, and so on [29, p. 1165]. Hence, with a sorting feature, customers can easily filter out restaurants based on their desired factors. This aids in customer's decision-making for restaurant selection and highly enhances their user experience and satisfaction [26].

2.3.1.4 Discounts and Yield Management

TABLEAPP provides customers with multiple pricing benefits, such as dining vouchers and gift cards (Figure 2.16). Other than that, customers can also apply voucher codes during checkout to enjoy a discount on their booking fee or order total (Figure 2.17). This feature can help track consumer behaviour and provide better sales insight to restaurant owners [30].

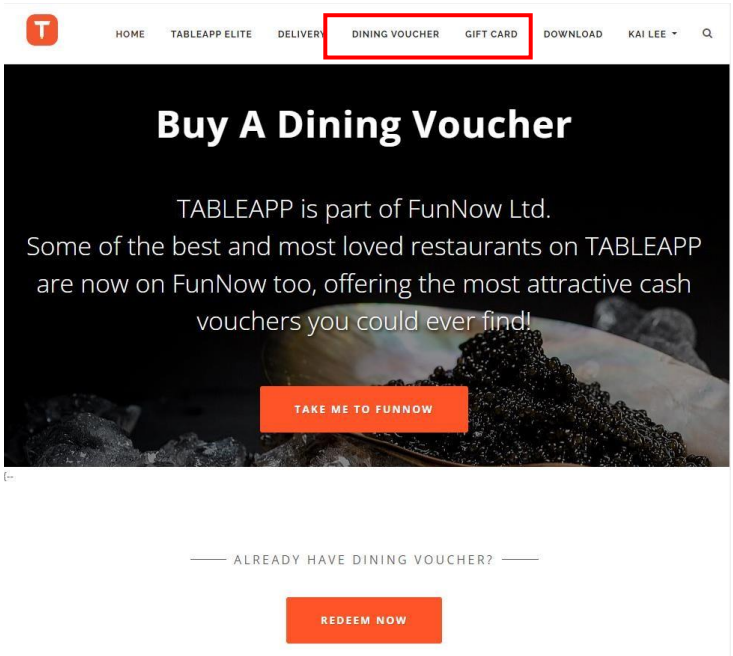

Figure 2.16 Dining voucher and gift card feature

Figure 2.17 Promo code feature [24]

As mentioned by Oh and Su, restaurants can provide discounts to encourage customers who make reservations to show up for their booking. One great example to depict the effectiveness of providing discounts is from Savored.com, a website where people book meal reservations. The website accepts reservations from over 850 restaurants in 10 different U.S. cities. One winning strategy of Savored.com is that customers who make reservations through the website can receive a discount for the meal, which ranges from 10% to 40%. This strategy sets Savored.com apart from other reservation platforms like OpenTable, which provides a great competitive advantage over its competitors [31, p. 2].

Furthermore, an increasing number of restaurants are offering discounted gift cards via LivingSocial or Groupon. When customers make reservations at the corresponding restaurants, they can redeem the discounts [31, p. 2], which leads to significant savings and increases customer satisfaction.

Hence, the discounts and yield management feature play an important role in online restaurant booking websites as it provides a competitive advantage over its competitors through promotions and discounts.

2.3.2 Disadvantages of The System

2.3.2.1 No Booking Reminders

The customer will receive a confirmation email as shown in Figure 2.18 following their booking on TABLEAPP. However, even if customers receive a copy of their reservation details via e-mail upon confirmation, some may still overlook their reservation [5]. Furthermore, similar to TableAgent, TABLEAPP does not offer any kind of booking reminders or notifications to customers, which would result in a significant no-show percentage and lost revenues for restaurateurs.

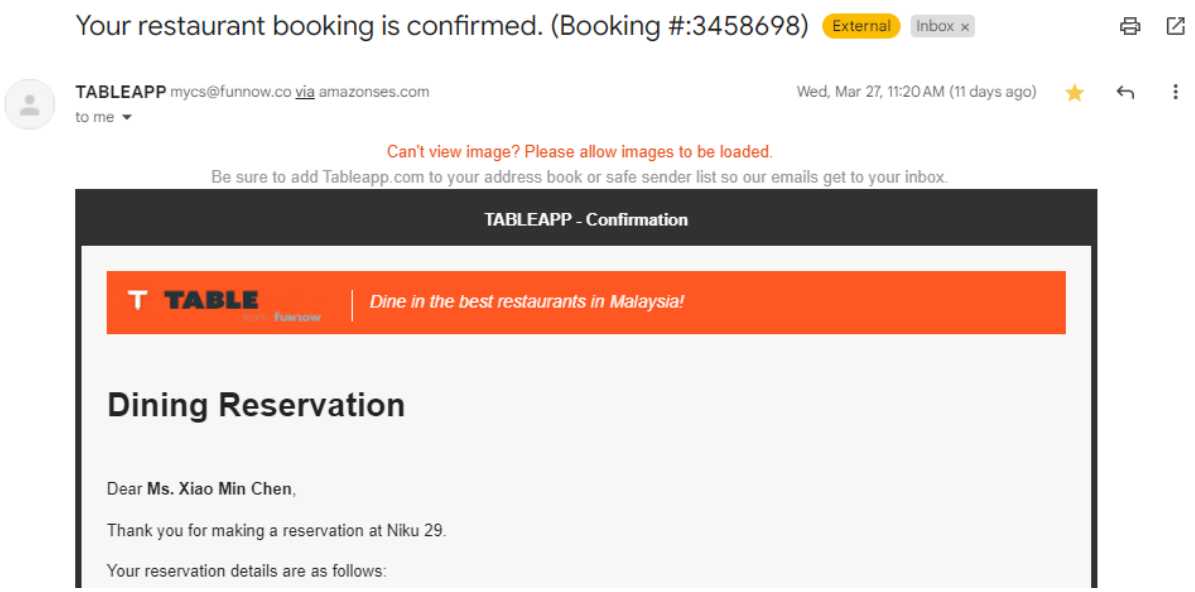

Figure 2.18 TABLEAPP booking confirmation e-mail [24]

As mentioned by Tebra's scheduling survey, 79% of online providers use digital appointment reminders to notify clients about their appointments [6]. Hence, it is clear from this review that TABLEAPP does not currently offer this feature, which is a major flaw in the system.

2.3.2.2 No Special Occasion Request

Unlike TableAgent, TABLEAPP does not provide any feature for customers to leave a special occasion request or remark to celebrate certain events. This might cause customers to call in for a booking to ask for certain services, which is inconvenient for the customers.

A survey conducted by Kimes and Dholakia found that respondents' expectations of and motivations for placing restaurant bookings are for three distinct dining situations, which are for a business dinner, a special occasion, and an everyday social meal [17, p. 7].

Regarding the three distinct dining occasions, the majority of respondents (70.0%) stated they always made reservations for dinners that are for special occasions, while 46.9% stated they always made reservations for dinners for business purposes. Merely 12.8% of participants indicated that they consistently made bookings for social dinners (Figure 2.19). According to the respondents (Figure 2.20), reservations were deemed of middling importance (4.3) for social dinners, but very important (5.6) for business dinners and extremely important (6.4 on a scale of 1 through 7) for special occasion dinners [17, p. 8].

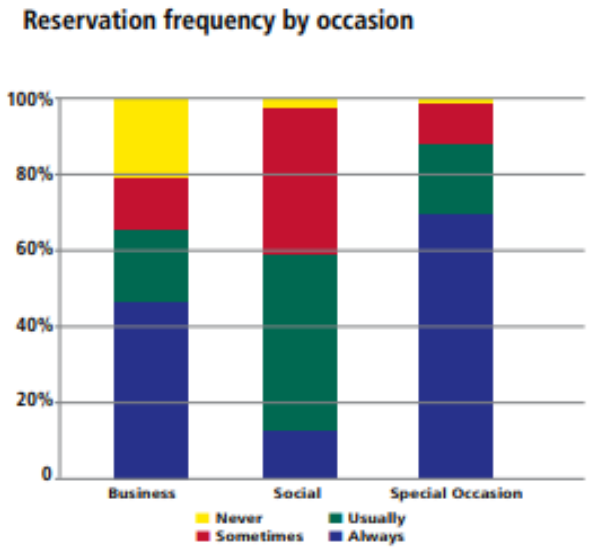

Figure 2.19 Reservation frequency by occasion [17, p. 8]

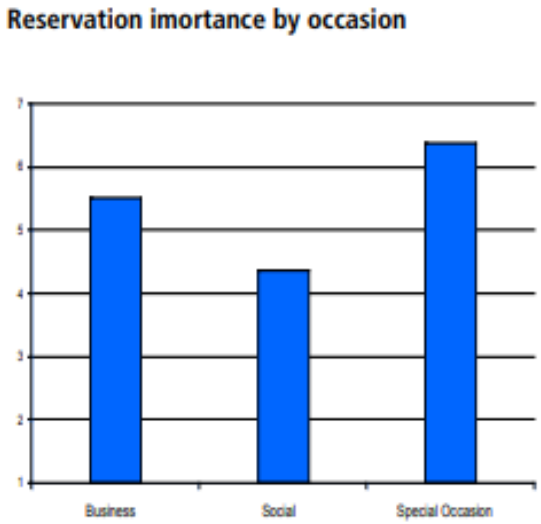

Figure 2.20 Reservation importance by occasion [17, p. 8]

Thus, special occasions are considered one of the main motives that encourage customers to make reservations at restaurants. Currently, TABLEAPP lacks a feature to allow customers to place a remark for special occasions, which presents a significant gap as a disadvantage to the system.

2.3.2.3 No FAQ Page

A major disadvantage of TABLEAPP is that it does not have a FAQ page that addresses customers' inquiries. Without the FAQ page, users are unable to search for information or answers to their questions without relying on contacting customer service. This is a troublesome process as it requires the user to take extra steps to receive answers to their concerns, which diminishes the user experience.

According to an article by Kim and Eom, one way to enhance customer relationship management (CRM) is by making appropriate use of the FAQ sections. In the context of e-commerce, managers should prioritize what their consumers want to know in a FAQ section rather than what they want to tell them [32, p. 248]. Thus, FAQ pages are an essential element in designing effective web pages as it provides all relevant information that can resolve user's concerns or questions immediately.

This concept is also directly applicable to online restaurant booking systems, as customers might be faced with various types of problems pertaining to the use of online systems to make restaurant reservations. A clear and helpful FAQ is a prerequisite to establishing a trusting relationship with platform users [32, p. 248]. Upon review, it is found that TABLEAPP lacks this feature, which is deemed a significant drawback of the system that needs to be addressed.

2.3.2.4 No Restaurant Recommendations Feature

On TABLEAPP, customers can only search for restaurant names or be prompted to a plethora of restaurant options when they click on the "View all restaurants" button from the home page (Figure 2.21). The home page does not have a feature to recommend customer restaurants based on several factors, such as what is trending, cuisine types, new restaurants, etc.

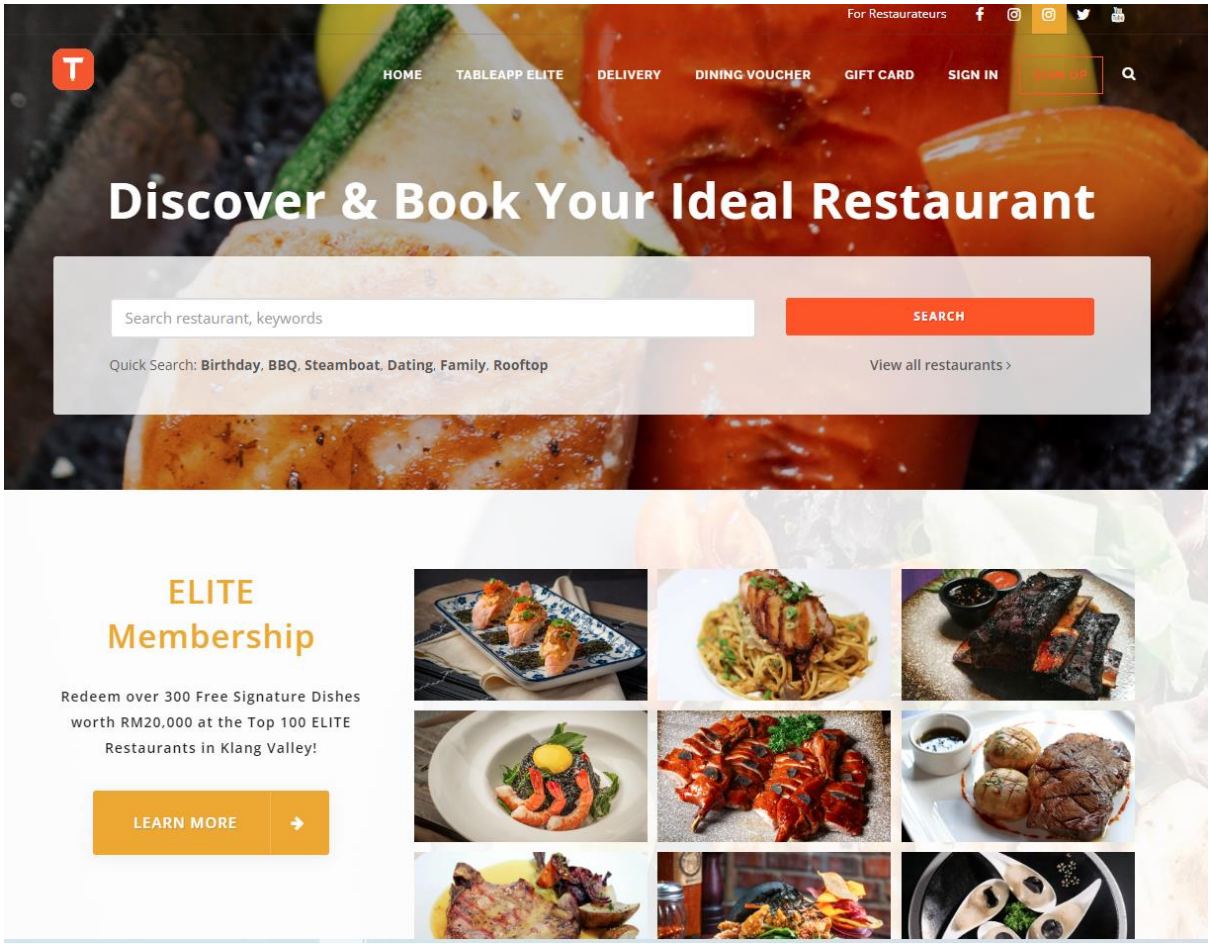

Figure 2.21 No restaurant recommendations (TABLEAPP) [24]

Without a restaurant recommendation feature, customers are less inclined to try new food options that suit their tastes. Lower user engagement and customer booking rates will result from this, which will ultimately affect the restaurants' sales revenue and booking rates.

A study by Lindecrantz, Gi, and Zerbi found that up to 20% more sales and customer engagement could result from personalized restaurant recommendations [2]. Parallel to this, a survey conducted by Epsilon revealed that 80% of customers are more inclined to make a reservation after receiving restaurant recommendations [3].

Thus, it can be concluded that one major drawback of TABLEAPP's reservation system is the absence of a restaurant recommendations feature.

2.3.3 Limitations of The System

2.3.3.1 Limited Live Chat Operating Hours

One limitation identified within the TABLEAPP website is that its live chat function is constrained to operate only within working hours. As displayed in Figure 2.22, it can be seen that when contacting the live chat outside of operating hours, customers are only able to leave a message and the customer service representative will reply on the next working day. This limitation may cause inconvenience to users who require immediate assistance or support during non-working hours, potentially leading to delays in addressing customer inquiries or issues.

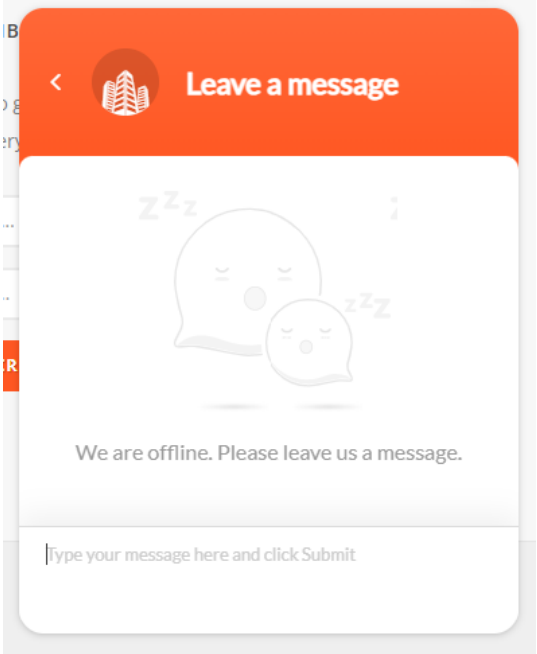

Figure 2.22 Offline live chat [24]

As stated by Carter, businesses can significantly increase revenue and improve customer service if they utilise live chat effectively. One crucial component that contributes to the success of a live chat channel is to make it accessible even outside working hours [33].

However, according to a survey by Carter, the majority of customers will not contact customer service during working hours. This is because most of them do not have the time to do so. The results from the survey suggested that most customers will use live chat services before work, which is around 8:00 am, and occasionally around 6;00 - 9:00 pm after work.

Sometimes, even later. Therefore, it is pivotal for businesses to have their chat team available during these hours as live chat is the most cost-effective and efficient method of contacting customer service [33].

If customers can only reach customer service representatives via live chat during business hours, they will be forced to contact customer service through alternative channels, such as e-mail and phone calls [33]. Hence, this limitation presents a noteworthy inconvenience to users, as it limits them to be able to contact live chat within its operating hours. This causes a delay in response, potentially resulting in increased customer dissatisfaction and diminishing the user experience.

2.4 Similar Existing System 3: Eatigo

Eatigo [34] is a web application that provides an online platform for customers to make a reservation for restaurants in Southeast Asia [35]. Users can use this application to search for restaurants, perform reservations, and enjoy numerous discounts and promo codes to use during certain times.

Eatigo was chosen for review due to its novel approach to revolutionizing restaurant reservations and its widespread impact on the dining industry. Other than that, another factor for selecting Eatigo to be reviewed is due to its unique model of offering time-based discounts, which ensures users can enjoy significant savings, with discounts of up to 50%, simply by booking at off-peak times [36]. This approach aligns with the project's objective of creating an e-Reservation Restaurant web application that enhances the dining experience while maximizing restaurant capacity utilization.

Eatigo's unique selling point as an "anti-Groupon" platform—which emphasizes effectiveness, user-friendliness, and removing obstacles to exploring new restaurants [36] — makes it an attractive choice for selection. By studying Eatigo, the research can gain insights into how it successfully influences user behavior and restaurant operations. It addresses the inefficiency of capacity utilization in the restaurant industry during off-peak hours by utilizing a demand-based pricing system, which is popular in the airline and hotel industries [37].

Furthermore, the platform's expansion into multiple Southeast Asian markets, backed by major investors like TripAdvisor [37], highlights its potential for global relevance. By reviewing Eatigo, the research aims to understand how it has maintained its growth trajectory and gained users' trust in diverse markets.

Eatigo caters to the unique requirements and tastes of its Southeast Asian user base by emphasizing the enhancement of the dining reservation experience through time-based bookings and discounts [37]. Through an analysis of Eatigo, the research can determine the driving forces and strategies behind its success, providing valuable insights for the creation of an e-reservation Restaurant web application that meets the needs and desires of customers.

The home page of this online restaurant booking website is shown in Figure 2.23. Some advantages of this system include an add-to-favourites feature, a recommendation and sorting feature, discounts and yield management, and a well-organized FAQ page. However, upon reviewing the system, several disadvantages have been identified, such as no special occasion requests, no allergies, religious restrictions remarks, and the lack of booking reminders. The limitation of this system includes incomplete restaurant menus, the inability of the chatbot to address personalized customer issues, and the inability to view real-time table availability.

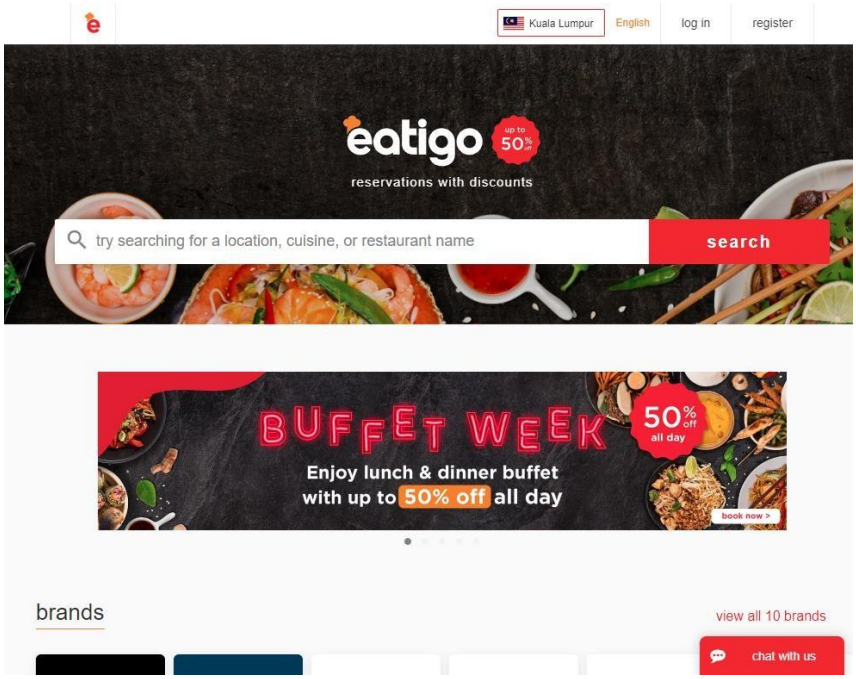

Figure 2.23 Eatigo home page [34]

Weblink [34]: https://eatigo.com/my/kuala-lumpur/en

2.4.1 Advantages of The System

2.4.1.1 Add-to-favourites Feature

Eatigo has a feature that lets users add a restaurant to their favourites folder so they can keep track of the restaurants they are interested in and make a booking for it in the future. As shown in Figure 2.24, users can view their favourite restaurants in the favourites folder for easy access

and reference. This feature is a favourable aspect of the web application as many online restaurant booking websites do not provide this kind of feature.

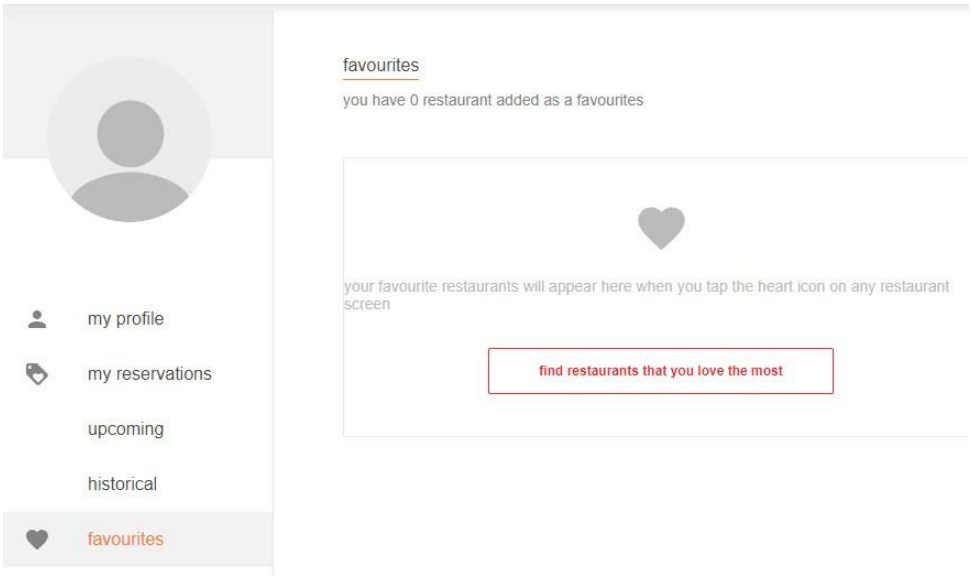

Figure 2.24 Add-to-favourites feature [34]

A survey by Liu et al. has found that in e-commerce applications, users performed an add-to-favourites action type for 3,005,723 (5.47%) in a span of six months prior to the "Double 11" promotion [38]. This user activity log data statistics evidenced the frequent use of the add-to-favourites function in e-commerce applications.

According to Collis, the add-to-favourites feature in the context of e-commerce is a useful strategy for closing deals with customers who expressed interest in your products but weren't quite ready to buy yet. The add-to-favourites feature is advantageous to both sellers and buyers since it allows users to quickly recall items they have saved and helps sellers measure consumer interest in a product [39].

This concept is directly applicable to online restaurant booking websites, as customers frequently research restaurants before making a reservation. However, browsing through countless restaurants on the online restaurant booking website in search of the ideal restaurant can be a time-consuming and difficult task. This time-consuming process is shortened when

users can mark their favourite products, allowing them to make an instant booking the next time they visit the website instead of having to browse the restaurants again [39].

Hence, based on studies from Liu et al. and Collis, it is evidenced that the add-to-favourites feature can provide a significant advantage to online restaurant booking websites.

2.4.1.2 Recommendations and Sorting Feature

On the home page, Eatigo provides a recommendation feature where users will be recommended types of restaurants based on brands, location, themes, cuisines, what is trending, what is new, and recently viewed (Figure 2.25). In addition, when customers search for restaurants, they can sort the results by most reserved, price, recommended, distance, and star rating (Figure 2.26). This feature is highly convenient to customers as it can help speed up the restaurant selection process by filtering out the most ideal restaurant based on the customer's preferences [26].

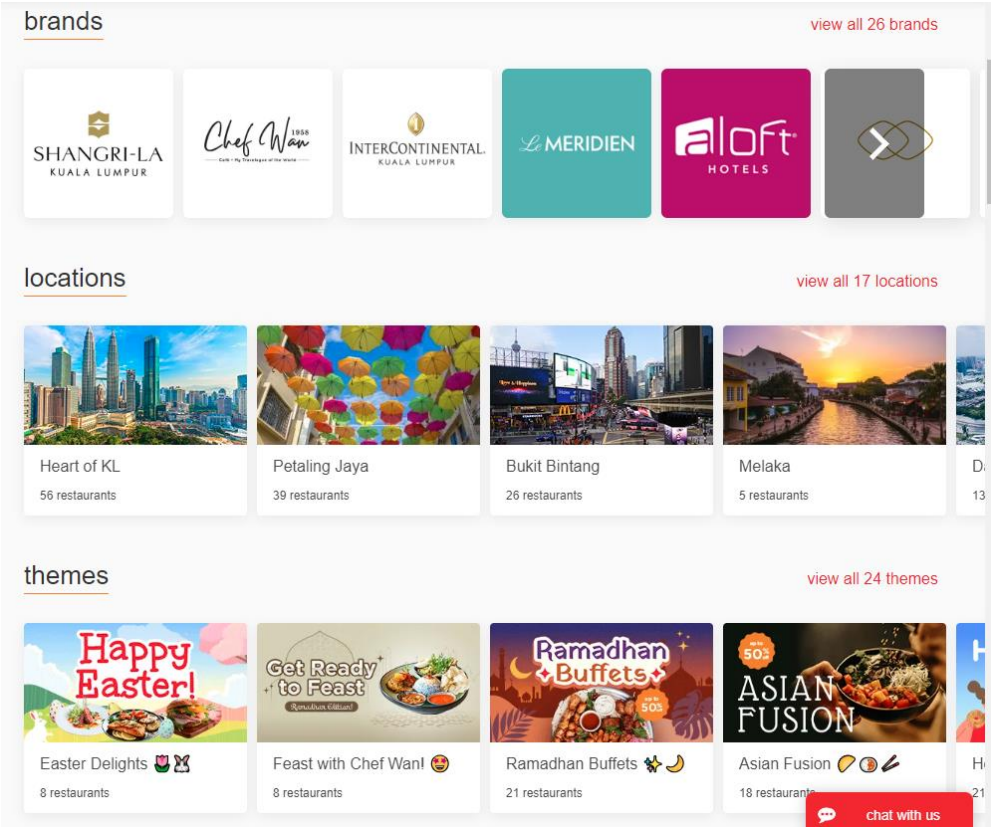

Figure 2.25 Restaurant recommendations on several factors [34]

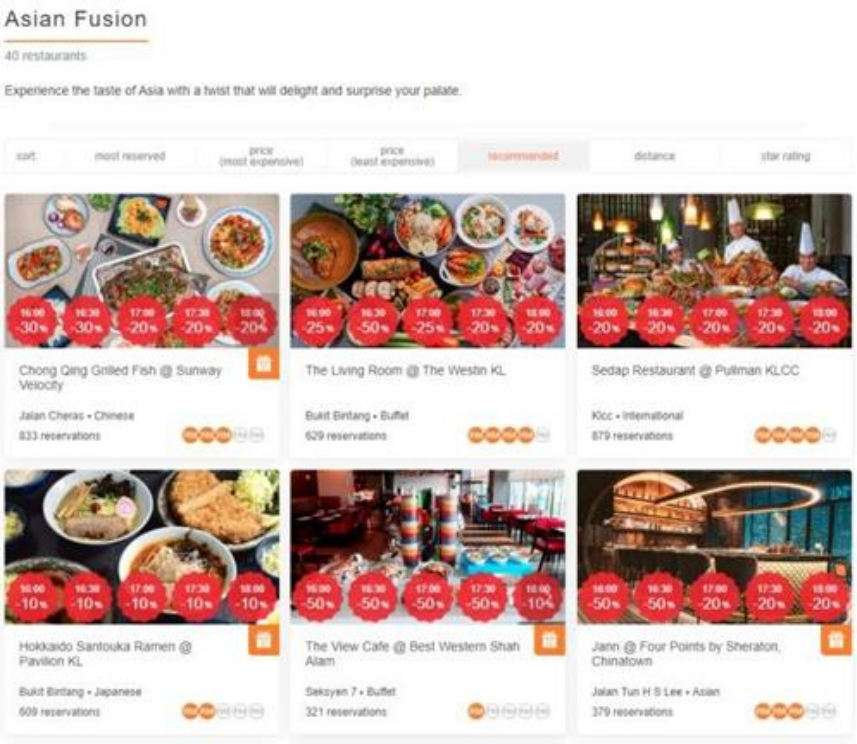

Figure 2.26 Filter restaurants feature (Eatigo) [34]

It is well known that several factors, including the restaurant's reputation, estimated cost, location, cuisine type, ratings, and so forth, affect a customer's decision to visit [29, p. 1165]. Customers can therefore quickly filter out restaurants based on their desired criteria when a sorting feature is available.

Personalized restaurant recommendations have been shown to increase sales and customer engagement by up to 20%, according to a study by Lindecrantz, Gi, and Zerbi [2]. Concurrently, an Epsilon survey found that 80% of customers are more likely to book a reservation following a restaurant recommendation [3].

Thus, it can be concluded that customers find a recommendation system and sorting feature very beneficial especially in an online restaurant booking system. By providing a recommendation and sorting system, it assists customers in selecting the restaurant for their reservation. This feature greatly improves the user experience and satisfaction of customers and helps them make decisions when choosing restaurants [26].

2.4.1.3 Discounts and Yield Management

Another advantage of Eatigo is that it provides customers with multiple pricing benefits, such as promo codes and hourly discounts (Figure 2.27). Other than that, customers can also apply voucher codes during checkout to enjoy a discount on their order total. This feature can help track consumer behaviour and provide better sales insight to restaurant owners [30].

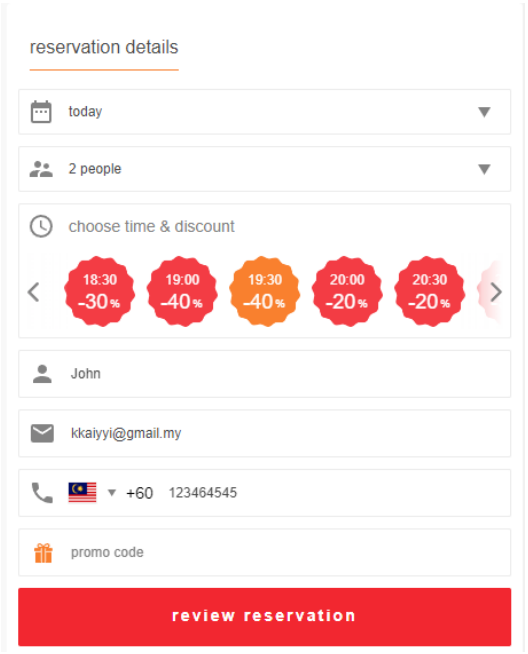

Figure 2.27 Hourly discount and promo code [34]

Based on research by Chung and Saini, time-based discounts such as the hourly discount offered by Eatigo can be used to draw in customers in the off-season. It can be offered at large percentage discounts and not induce strong inertia in action even when it is withdrawn [40, p. 117]. In Eatigo, larger discounts of up to 50% off are given during non-peak hours to encourage customers to place bookings, which evens out the average booking time and helps the restaurant to effectively optimize their seatings for increased revenue.

Another benefit of introducing discounts and promotions in online restaurant booking websites is that it can encourage customers to confirm their reservations and show up on time. Studies from Oh and Su have also shown that providing discounts on online restaurant booking websites can provide a competitive edge over its competitors, as it allows customers to have significant savings and increases customer satisfaction [31, p. 2].

Hence, the discounts and yield management feature, especially the time-based discount strategy, plays an advantageous role in Eatigo as it urges customers to place bookings on non-peak hours to even out the booking times, leading to more efficient seating management and increased revenue.

2.4.1.4 Well Structured and Organized FAQ Page

Another advantage of Eatigo is that it has a well-structured and organized FAQ page (Figure 2.28). Customers can use this page as a comprehensive resource to find answers to frequently asked questions without having to contact customer support, which lessens the workload for customer service agents.

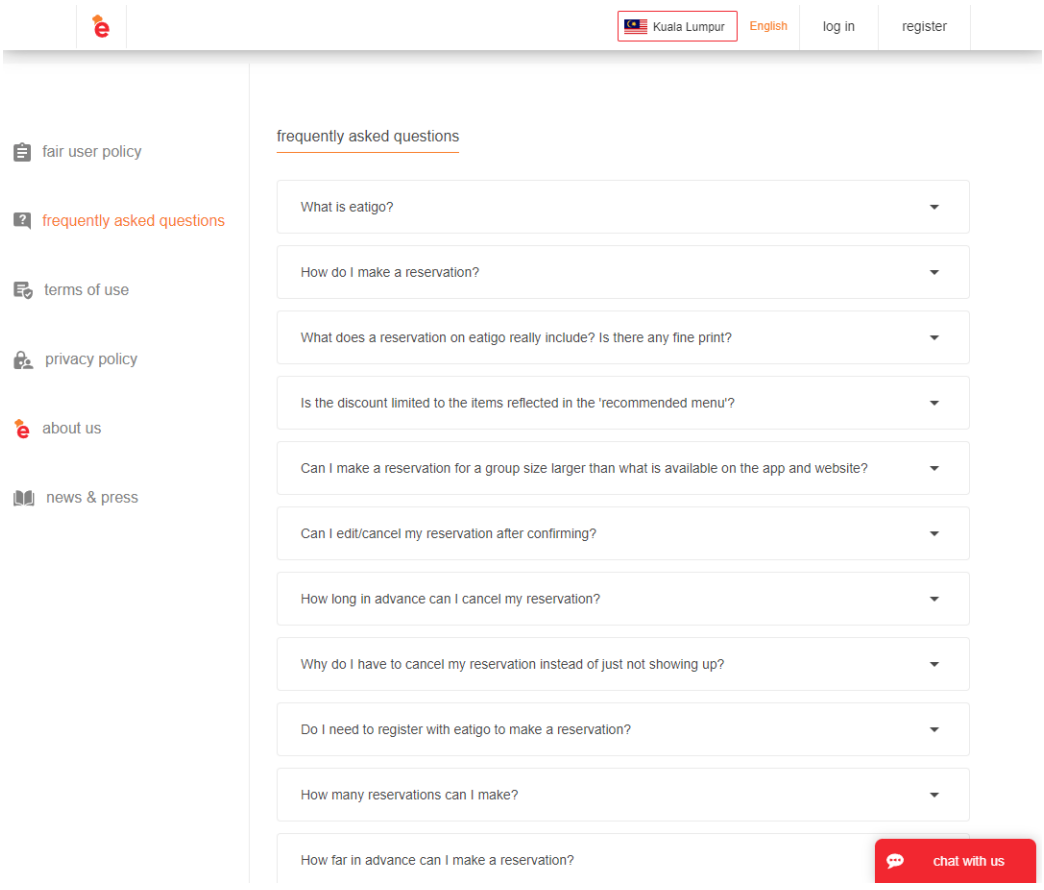

Figure 2.28 Well structured and organized FAQ page [34]

A well-categorized FAQ page improves user experience by offering clear and straightforward information, enhancing navigation, and making sure that users can quickly find pertinent answers to their questions. As users perceive the website as user-friendly and efficient, this increases user satisfaction and loyalty.

According to Hammond et al., a well-organized FAQ page should be developed by using knowledge sources that have already been created to address frequently asked questions in a domain and are therefore more highly organized than free text. This way, users can easily navigate the relevant information by looking at the headings of each category and performing a quick search in that specific question domain [41, p. 81].

Additionally, a well-structured FAQ page can lessen customer frustration and confusion, particularly when it comes to reservation processes, cancellation policies, payment options, and restaurant details. By addressing these typical worries upfront, users can feel more confident about using the booking platform and make informed decisions [32, p. 248].

Overall, a well-categorized and designed FAQ page on websites for online restaurant reservations improves user experience, lowers support costs, increases website usability, and helps Eatigo succeed as a whole, making it a valuable feature of the system.

2.4.2 Disadvantages of The System

2.4.2.1 No Special Occasion Request

Unlike TableAgent, Eatigo does not provide any feature for customers to leave a special occasion request or remark to celebrate certain events. This might cause customers to call in for a booking to ask for certain services, which is inconvenient for the customers.

As discussed in section 2.3.2.2 of this report, it is known that the majority of survey respondents (70.0%) stated they always made reservations for dinners that are for special occasions and rated special occasion dinners as extremely important (6.4 on a scale of 1 through 7) [17, p. 8].

Thus, special occasions are considered one of the main motives that encourage customers to make reservations at restaurants. Currently, Eatigo lacks a feature to allow customers to place a remark for special occasions, which presents a significant gap as a disadvantage to the system.

2.4.2.2 No Allergies and Religious Restrictions

When customers are about to make a reservation on Eatigo, they are unable to leave a remark if they are allergic to certain ingredients or constricted by certain religious restrictions. Without this feature, restaurant chefs will have to spend more time preparing the food without certain ingredients beforehand to prevent any accidents or disgruntlement from happening.

Food allergies are becoming more common, but society still does not fully understand how they affect people's lives, according to an article by Peniamina et al., indicating that increasing awareness through an intervention would be beneficial [27, p. 933]. Therefore, it is recommended that restaurants adapt to customer's dietary restrictions so that customers with food allergies and religious restrictions will be provided with special assistance and care to help cope with their restricted food options.

It can be said that the lack of allergies and religious restrictions remark feature provides a great disadvantage to customers with dietary restrictions, as they cannot leave a remark to the restaurant in advance for the restaurant to prepare meals according to the customer's preference. This can reduce user satisfaction and make it difficult to retain customers for returned bookings.

2.4.2.3 No Booking Reminders

After making a reservation on Eatigo, the customer will receive a confirmation e-mail, as indicated in Figure 2.29. Customers may still forget about their reservation, even if they receive a copy of the details via e-mail after confirmation [5]. Additionally, similar to the two other systems reviewed previously, Eatigo also does not provide any sort of booking reminders or notifications to customers, which would cause a high percentage of no-shows and lost revenues for restaurant owners.

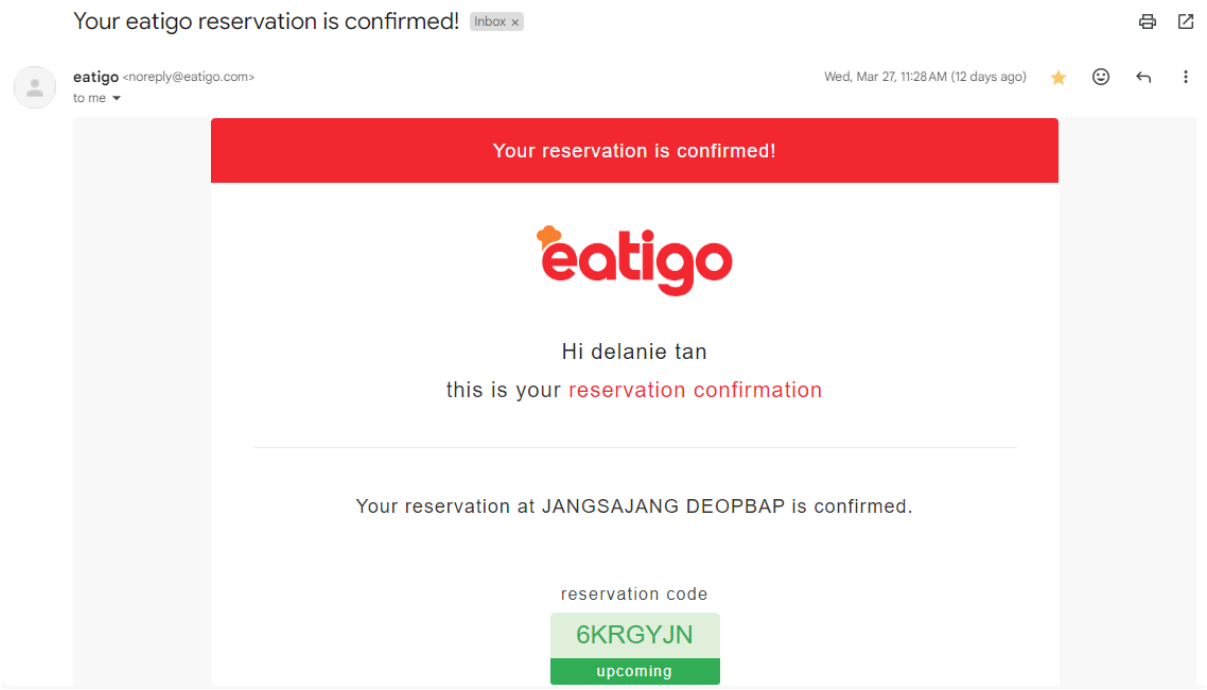

Figure 2.29 Eatigo booking confirmation e-mail

79% of online providers use digital appointment reminders to remind customers about their appointments, according to Tebra's scheduling survey [6]. This review makes it abundantly evident that Eatigo does not provide this feature, which is a serious shortcoming in the system that needs to be addressed.

2.4.3 Limitations of The System

2.4.3.1 Incomplete Restaurant Menus

As shown in Figure 2.30, the listing for one of the restaurants in Eatigo only included 4 items from the menu. This restricted menu information is inadequate for customers to fully understand the range of food and beverages offered at a restaurant. In addition, there are no images on the menu listings, which will confuse the customers especially when they have no idea what the food listed on the menu is. Thus, customers' curiosity and convenience are limited by the inadequate listing of menus and food images [26], which will cause dissatisfaction among customers when using the application.

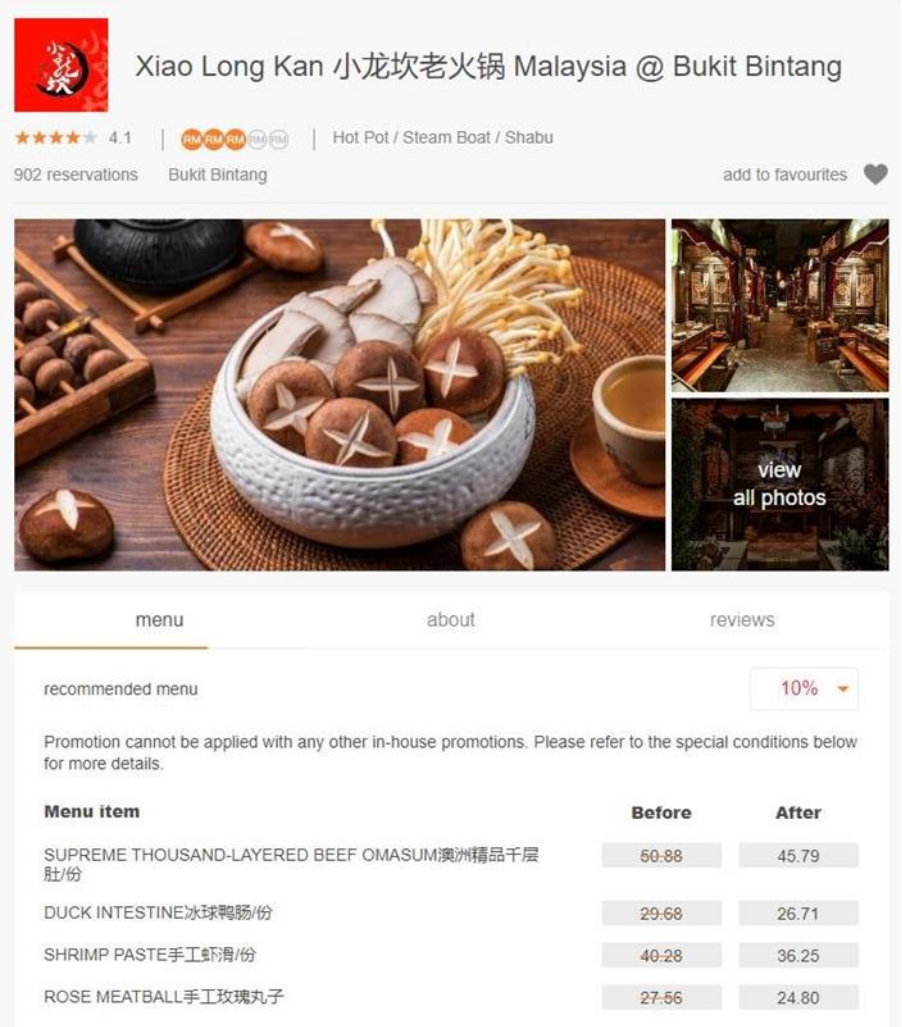

Figure 2.30 Inadequate restaurant menu [34]

The menu is one of the many things that can entice customers to dine in at a restaurant, according to an article by McCall and Lynn. This is because menus can create a lasting first impression on customers and act as an outline for the restaurant's marketing strategy [16, p. 440].

However, in Eatigo's case, the lack of a comprehensive menu listing and food images limits customers from making informed dining choices. Customers rely on detailed menu descriptions and visuals to get a clear idea of what a restaurant offers and decide if it suits their tastes. When this information is missing, it leaves customers unsure and less likely to enjoy using the system. Therefore, addressing the issue of incomplete menu information is key to improving user engagement and enhancing the usability of the platform.

2.4.3.2 Chatbot Unable to Address Personalized Customer Issues

Upon review, it is found that Eatigo's chatbot is designed to guide users through a set of predefined inquiry choices (Figure 2.31), which limits the scope of personalized interactions. While this approach offers efficient solutions for common queries, the chatbot may not provide satisfactory answers when users require specific or personalized assistance beyond these predefined choices. When users are met with such situations, they are instead directed to contact the customer service team via email for further assistance (Figure 2.32).

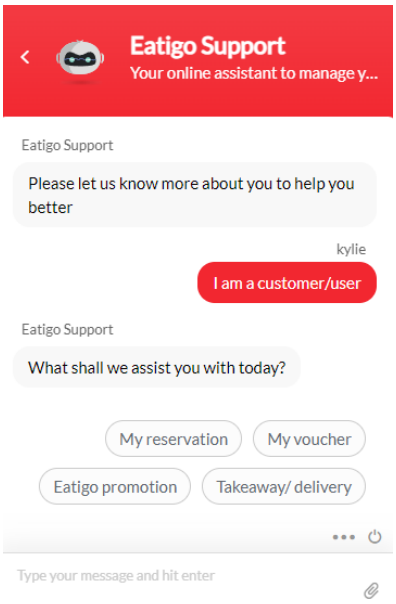

Figure 2.31 Limited Inquiry Choices [34]

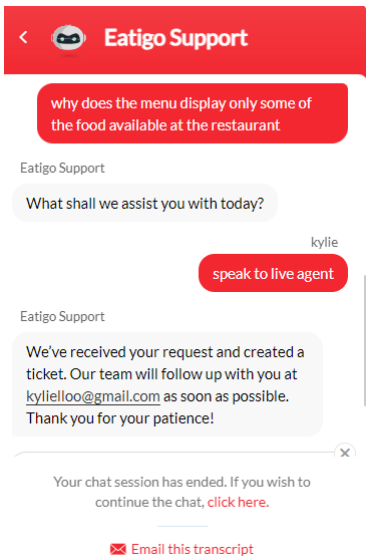

Figure 2.32 No live chat representatives [34]

Due to this limitation, customer inquiries may not receive prompt attention as e-mail responses frequently take longer to process than chat conversations. According to research by Franz and Górska, 42% of customers prefer live chat as their preferred communication mode [11], and 64% of customers expect to receive real-time assistance regardless of the time of day [10].

Customers may become frustrated with Eatigo if there is no prompt resolution, especially if they are expecting prompt and effective support from the platform [9, p. 1]. Furthermore, a less seamless user experience may result from the chatbot's inability to address personalized issues directly within the chat interface, which could lower overall satisfaction and engagement with the website.

Therefore, Eatigo's lack of a comprehensive AI chatbot that includes a help center search engine and live agent support feature may lead to customers abandoning the booking process or selecting a different platform. This functional gap in Eatigo may cost restaurants opportunities to attract and retain customers, making it a less attractive platform for users to make restaurant reservations.

2.4.3.3 Unable to View Real-time Table Availability

Similar to TableAgent, Eatigo is unable to provide real-time table availability information to customers. Customers can only choose the date, time, and size of the party when making a reservation (Figure 2.33), without knowing the real-time table availability information. Without precise information about table availability, hosts and servers may find it difficult to properly manage seating arrangements, which will present a significant challenge for both customers and restaurant employees.

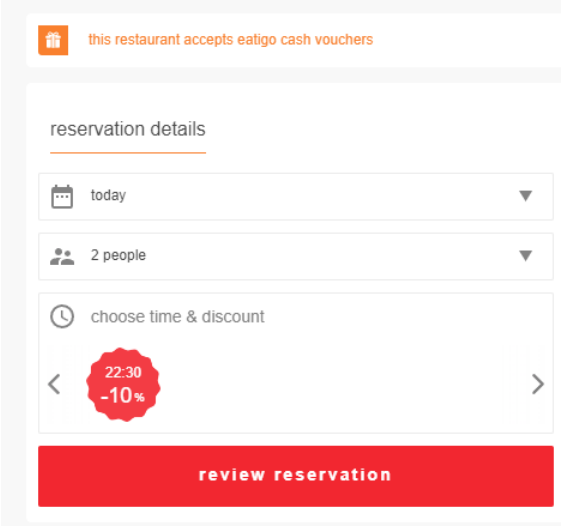

Figure 2.33 Unable to check real-time table availability (Eatigo) [34]

According to Ardiansyah et al., in order to ascertain the data's current status, real-time data information is necessary. If the order does not contain real-time information, the customer won't be informed of it if there is a change. Therefore, any online restaurant booking system must have a real-time table availability feature so that customers can confirm which tables are available before making a reservation. This is essential to prevent long waiting times for food at the restaurant caused by the high volume of customers [23, p. 134].

Eatigo's seating arrangements will result in longer wait times for customers, which will lower table turnover, and general inefficiency in restaurant operations because it can only select the number of people and cannot display real-time table availability.

2.5 Proposed Solutions

To develop a revolutionary and highly competitive online restaurant booking website, three solutions are proposed to equip the e-Reservation Restaurant web application with the required innovations and enhancements. The solutions include the implementation of a personalized recommendation and sorting feature, an "Add to Google Calendar" event function for notification reminders, and the integration of a comprehensive AI chatbot with a help center search engine and 24/7 availability of live chat support.

2.5.1 Implement A Personalized Recommendation Feature

The proposed web application prioritizes a user-centric approach by integrating a robust recommendation feature. Through conducting academic research and researching industry best practices [2], [3], [4], [26], [29], it is found that a personalized recommendation feature can help streamline customers' decision-making process. Other than facilitating decision-making, it also actively recommends the ideal restaurants or cuisines according to individual preferences, which eventually results in improved user experience [42, p. 105] and booking rates.

The recommendation system will incorporate elements such as "what's new," "trending now", and diverse "cuisines" types to accommodate a wide range of user preferences through using the B-tree algorithm to display the respective results in an efficient manner [43]. The web application will also use a user-friendly form to effectively personalize recommendations. Important details such as preferred cuisine styles and locations are recorded in this form.

The system will then employ the B-tree algorithm [43] to further analyze two types of factors, which include the cuisine types and locations, to tailor restaurant recommendations that closely suit the individual preferences and needs of every user. The system presents users with personalized recommendation results that closely align with their stated preferences by utilizing data points from the user-filled preference form.

In addition, a dynamic restaurant advertising system will be implemented in the web application to recognize and encourage restaurants that consistently generate reservations via

the platform. Restaurants that receive more than 50 reservations a month will automatically be featured on the e-Reservation Restaurant homepage through the use of B-tree algorithms [43], giving them more exposure to potential customers. Restaurants will be able to promote their products and services and reach a wider audience with this featured placement, which will eventually drive more bookings and revenue.

By implementing these innovative features, the web application aims to improve user experience by offering highly personalized recommendations and providing restaurants with powerful advertising tools to improve their online visibility and attract more customers. This integrated approach combines advanced technology such as the B-tree algorithm with strategic marketing initiatives to create a mutually beneficial ecosystem for both users and restaurants within the e-Reservation Restaurant platform.

2.5.2 Implement An “Add to Google Calendar” Event Function for Notification Reminders

The lack of booking reminders in online restaurant booking systems poses a significant challenge for both customers and restaurant owners, according to studies and research from [5], [6], [7], [8]. This problem frequently results in no-shows, leading to lost revenue for restaurants [7]. Furthermore, customers might overlook their reservations, which could lead to dissatisfaction [5] and impact the restaurant’s reputation negatively. To tackle this issue, it is proposed to implement an "Add to Google Calendar" event function that enables notification reminders.

The "Add to Google Calendar" event function is integrated within the booking confirmation e-mail to provide customers the option to choose whether they want to receive reminder notifications about their bookings from their Google accounts. This way, customers can easily add their reservations to their calendars with just one click through this seamless integration.

When customers receive their booking confirmation e-mail, they have the option to choose to receive reminders by clicking the "Add to Calendar" button. The booking information, which includes the reservation date, time, and restaurant name, is synchronized

with their Google Calendar as a result of this action. The customers can then receive the notification reminders on their web browser, desktop, or even mobile device [45]. By opting for this reminder, customers can ensure they stay informed about their upcoming reservations, which lowers the possibility of forgetting and subsequently lowers the number of no-shows [8].

The booking confirmation e-mail's seamless integration of the "Add to Google Calendar" feature improves the user experience in general. Customers value the proactive reminder system that uses their Google Calendar app, which encourages them to participate more actively in the booking process. This feature, which offers personalized and convenient solutions, not only enhances the booking experience but also demonstrates a customer-centric approach [8].

From the restaurant's point of view, incorporating this function enhances customer relationship management and operational effectiveness. Automated reminders can facilitate better planning and management of reservations, allowing restaurants to efficiently assign resources and arrange seating [7]. Restaurants that provide notification reminders to their customers can demonstrate their commitment to improving customer satisfaction and therefore, mitigate potential issues associated with no-shows.

Thus, embedding the "Add to Google Calendar" event function within the booking confirmation e-mail is a strategic solution that benefits both customers and restaurants. It makes adding reservations to calendars easier, lowers the chance of no-shows, and enhances the seamless and engaging booking experience for customers, all while enhancing restaurant operational efficiency and customer relationship management [7].

2.5.3 Implement An AI Chatbot with a Help Center Search Engine and 24/7 Availability of Live Chat Support Features

As reviewed in sections 2.2.3.1, 2.2.3.2, 2.3.3.1 and 2.4.3.2 of this report, restaurant booking websites face a major challenge for not having an AI chatbot with a comprehensive help center search engine and live chat support features. Customers frequently experience delays in

receiving immediate and effective customer service, particularly after hours when conventional support channels might not be available. Due to this gap in existing systems, customers become increasingly frustrated [9, p. 1] and are more prone to abandon the reservation process, which results in lost opportunities for restaurants to retain and attract customers.

The implementation of an AI chatbot with a help center search engine and 24/7 available live chat support feature through Tawk.to's REST API integration [46] is one proposed solution to solve this problem. Regardless of the time of day, this AI chatbot would be available to users all day around the clock, offering real-time assistance. The chatbot's help center, on the other hand, will provide self-service options so that users can solve problems on their own and find answers to frequently asked questions. This would lessen the workload for customer support agents and increase process efficiency.

Studies from [10] and [11] reveal that a significant portion of customers expect real-time assistance and favour live chat as their preferred means of interaction. Restaurant booking websites can thus meet these customer expectations and improve user satisfaction, loyalty, and overall experience [9, p. 3] by integrating an AI chatbot with these relevant features.

The Tawk.to AI chatbot would be able to handle a variety of queries, from simple ones regarding booking procedures to more complex ones requiring live agent assistance. The smooth transition from chatbot to live agent support ensures that users receive immediate and personalized assistance right away [46], thereby improving customer satisfaction and resolving concerns efficiently.

In order to solve the lack of immediate and effective customer support on restaurant booking websites, tawk.to AI chatbots [46] with help center search engines and 24/7 live chat support features is proposed to be implemented. This solution boosts customer satisfaction, loyalty, and the overall success of the restaurant booking website [9, p. 3] in addition to cutting wait times and enhancing user experience.

2.6 Summary

A table (Table 2.1) is charted to display the comparison of features between TableAgent, TABLEAPP, Eatigo, and our proposed system. The features that are compared include special occasion requests, allergies, and religious restrictions, table booking status and analysis, ability to view real-time table availability, the inclusion of menu, discounts and yield management, personalized restaurant recommendations feature, restaurant filters and sorting, my bookings list, 24/7 live chat support with AI and live agent service, help center search engine and an "Add to Google Calendar" event feature. This table shows how our proposed system will stand out from the reviewed similar existing systems.

Table 2.1 Comparison of features between similar existing systems and proposed system

Features/ Software Name	**TableAgent**	**TABLEAPP**	**Eatigo**	**Proposed System**
Special Occasion Request	Yes	No	No	Yes
Allergies and Religious Restrictions	No	Yes	No	Yes
Table Booking Status and Analysis	Yes	Yes	Yes	Yes
View Real-time Table Availability	No	Yes	No	Yes
Inclusion of Menu	No	Yes, but item images are not displayed	Selected menu items only, item images are not displayed	Yes, item images are displayed
Discounts and Yield Management	No	Yes	Yes	Yes

Personalized Restaurant Recommendations	No	No	Yes	Yes
Restaurant Filters and Sorting	No	Yes	Yes	Yes
My Bookings List	Not sorted, listed individually	Sorted, listed individually	Sorted, listed individually	Sorted, listed individually
24/7 Live Chat Support with AI and Live Agent Service	No	No	No	Yes
Help Center Search Engine	No	No	No	Yes
"Add to Google Calendar" Event Function	No	No	No	Yes

Chapter 3

System Methodology/Approach

3.1 Introduction

The project is categorized into several different phases in the development process, which include the planning, analysis, design, and implementation phases. Thus, it is essential to have a predetermined approach that illustrates the path to be followed by the software development process [47]. It is crucial for the deployment of the e-Reservation Restaurant web application and the successful completion of this project.

3.2 System Requirement

3.2.1 Hardware

The hardware involved in this project is a PC device. A PC is used for the process of visualizing and developing the e-Reservation Restaurant system. Thus, this project requires an i7 processor or top-tier graphics card for coding [48]. The memory space of the PC must also be sufficient to store the software required for this project. Then, the deployment and testing will also be carried out on the PC.

Table 3.1 Specifications of PC

Description	Specifications
Model	ASUS G11CD
Processor	Intel® Core™ i7-6700 CPU @ 3.40GHz
Operating System	Microsoft Windows 10 Home
Graphic	NVIDIA GeForce GTX 950
Memory	20GB DDR4 RAM
Storage	240GB SSD SATA and 1TB HDD SATA

3.2.2 Tools and Technologies Involved

As we are developing a full-stack web application, several tools and technologies are required to code the program and store data input from users. After a thorough review of its features, suitability for the given project requirements, as well as conformity with industry practices, the tools and technologies as discussed in the following section were selected to develop the e-Reservation Restaurant web application.

3.2.2.1 Visual Studio Code

Figure 3.1 Visual Studio Code logo

The first application used is Visual Studio Code. The reason it was chosen as the source-code editor for this project is that it is lightweight but incorporates powerful developer technologies, such as IntelliSense code completion, imported modules, parameter suggestions, and graphical debugging [49]. It has improved built-in support for Node.js development and is a superb tool for web technologies [50]. This can facilitate and speed up the project's development process.

3.2.2.2 PHP

Figure 3.2 PHP logo

PHP is used as the back-end scripting language for developing the web application in this project as it offers several advantages. Firstly, PHP's server-side scripting capability allows for dynamic content generation, which enhances user interactivity [51, p. 169]. It is also a good choice to use PHP as a server-side script language as it can easily integrate with MySQL [51,

p. 176] such that it can provide efficient database management and thus ensuring data consistency and security. Moreover, a robust, interactive, and user-centric platform for online restaurant reservations can be created through PHP's developer-friendly nature, broad range of frameworks, and cross-platform compatibility.

3.2.2.3 MySQL

Figure 3.3 MySQL logo

A database server is needed to store, retrieve, update, and delete restaurant and customer data obtained from the web application. The selected database management application for this project is MySQL. MySQL is suitable for this project as it is highly scalable and fits the website's requirements. It also controls how quickly items load on the website and how fast users can access stored data [52]. It is an essential element of web design because it has a direct impact on how well the site functions.

3.2.2.4 phpMyAdmin

Figure 3.4 PhpMyAdmin logo

The streamlined database management capability of phpMyAdmin in a MySQL environment makes it the ideal choice to use for user-friendly interface that simplifies tasks such as data insertion, deletion and modification. It supports a large number of operations on MySQL and MariaDB databases [53], hence improving web application performance. PhpMyAdmin's

versatility [54, p. 28], along with its ability to work with different hosting environments also makes it more attractive to developers because this provides them with consistent and reliable tools for managing their databases regardless of where they have been deployed. Thus, the easy-to-use nature of phpMyAdmin, its extensive features set as well as compatibility makes it an ideal tool for managing this project's MySQL database to enhance workflow efficiency and achieve optimal database performance.

3.2.2.5 XAMPP

Figure 3.5 XAMPP logo

Moreover, a web server is required to host the program in a web application. The suitable application selected for this is XAMPP. The reason for this selection is that XAMPP provides a local host or server that allows clients or websites to test before publishing them to a remote web server. In addition, MYSQL and PHP are used to develop this project. Hence, this project can be tested in a suitable environment using the XAMPP server software on a local PC as it creates an integrated testing framework that ensures seamless compatibility and functionality testing for PHP applications [55].

3.2.2.6 REST API

Using REST APIs (Representational State Transfer Application Programming Interfaces) in modern web development is very important as it allows for communication between different software systems and makes exchange of information possible [56, p. 5]. This project uses REST APIs to provide additional functionalities from external services and improve users' overall experience.

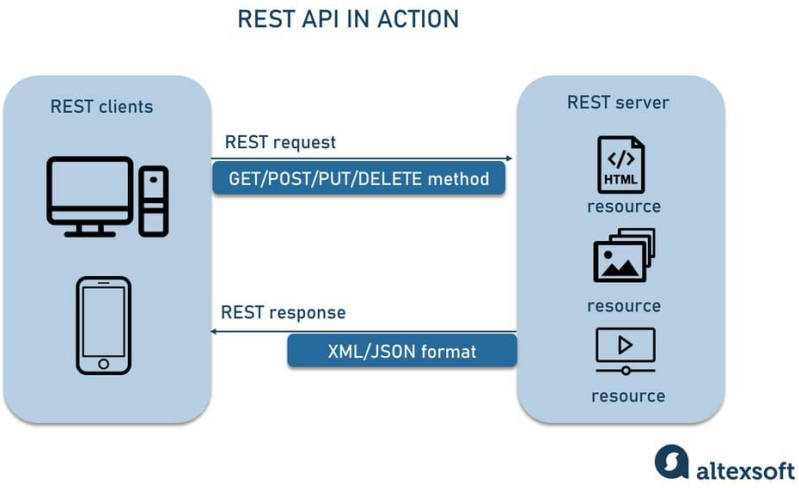

Figure3.6 REST API function method [57]

In the same vein, REST APIs are guided by principles such as client-server model, statelessness, cacheability, layered system architecture, uniform interface and data formats like JSON or XML [58, p. 39]. Clients make requests to servers using standard HTTP methods such as GET, POST, PUT/PATCH and DELETE while servers handle these requests and return responses [59, p. 6]. The reason why REST APIs are stateless is that each request has all the necessary details hence making them easy to scale up and manage [58, p. 22]. From clients' perspective, employing REST APIs means having consistent and efficient communication with servers, resulting in better interoperability of web applications as well as scalability.

One excellent example of a REST API that has been incorporated into this system is the Google API (Figure 3.7). To be more precise, the "Add to Google Calendar" feature has been implemented by the project using Google's API. With just one click, users can effortlessly add their restaurant reservations to their Google Calendar, making it easier to organize their schedule and minimize the chances of forgetting about their bookings by receiving notification reminders on their web browser, desktop, or even mobile device [45]. By using this method, it ensures compatibility and reliability because many users trust the widely used Google calendar.

Google APIs

Figure 3.7 Google API logo

Additionally, Tawk.to's REST API (Figure 3.8) has been integrated to enhance customer support and engagement. Tawk.to provides AI chatbot functionality along with a help center search engine and live chat support features. Through the REST API integration, this web application can communicate with Tawk.to's services, enabling real-time interactions between users and the AI chatbot. Live chat agent can also join in whenever user calls for a live representative [46]. This feature empowers users to receive immediate assistance, obtain answers to their queries, and resolve issues efficiently, all within the platform.

Figure 3.8 Tawk.to logo

3.2.2.7 Data Processing and Algorithms

The restaurant recommendation system in the e-Reservation Restaurant web application uses the B-tree algorithm, which is a data structure that organizes large datasets into manageable groups in an efficient way. It is especially useful for scenarios that need instantaneous sorted data retrieval like database systems. B-trees maintain data in a balanced tree structure, where each node can contain multiple keys and pointers to child nodes [43]. The way how B-tree algorithm operates search functions is shown in Figure 3.9.

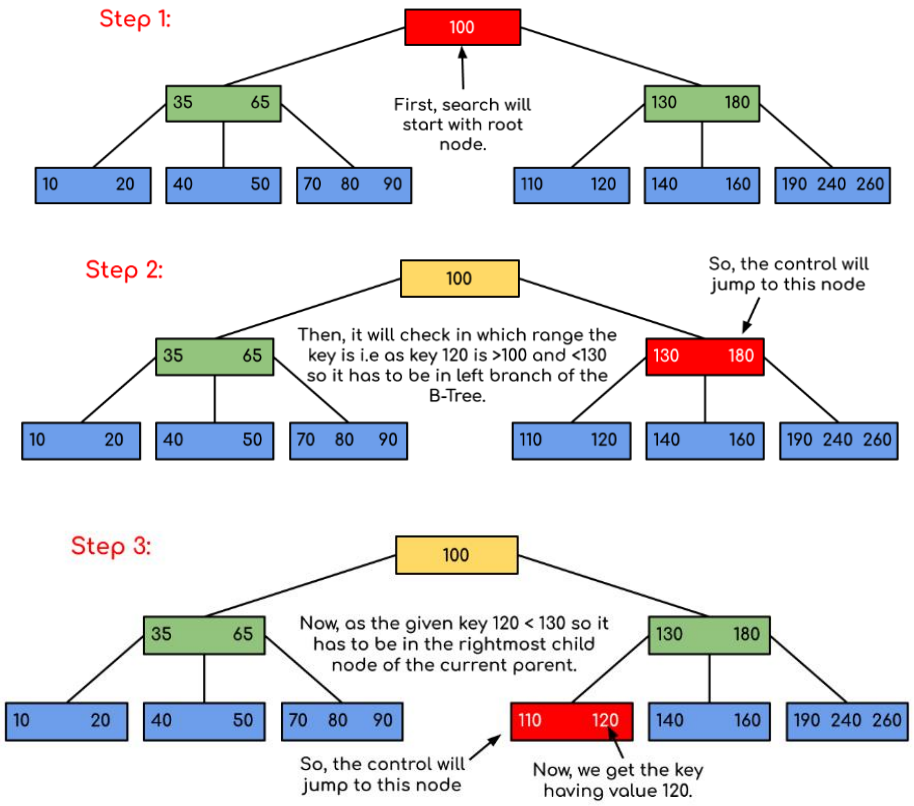

Figure 3.9 B-tree algorithm search operation [60]

This design allows for rapid search, insertion, and deletion operations [61, p. 278], making it suitable for applications such as the recommendation system in the e-Reservation Restaurant web application, which needs to handle huge amounts of restaurant and user data. One of the proposed solutions for this project is to provide restaurant recommendations by analyzing item attributes along with user preferences in order to make personalized recommendations. In this project's context, this algorithm evaluates two types of factors, which are the preferred cuisine types and restaurant locations of users. Understanding these aspects makes it possible for the B-tree algorithm to match user preferences with relevant restaurant options, thus increasing the chances of customers getting recommendations that they would find appealing [43]. This approach improves user satisfaction by giving suggestions based on customers' needs and interests, which results in higher user engagement since users would also perceive the recommendations as valuable.

Other than providing personalized recommendations, the B-tree algorithm is also used to recommend relevant restaurants according to currently trending restaurants, cuisine types

and newly registered restaurants on the web application's home page. To incentivise restaurants, the web application will display restaurants with more than 50 bookings in the "Trending Now" recommendation bar on the home page. Therefore, the B-tree algorithm helps process and retrieve relevant restaurant information quickly in the recommendation system [43], thus improving user experience and satisfaction for customers, while acts a great promotion strategy to help boost the restaurant's visibility and booking rates.

3.3 Development Methodology

Selecting an appropriate methodology is crucial since it is used to describe how the project's life cycle will be developed [62]. For this project, the most appropriate development methodology is the agile development methodology (Figure 3.10). This is because agile can quickly respond to customer and market demands and adjust project direction as needed [63, p. 10698]. Given the dynamic nature of the digital restaurant industry and the ever-evolving market, it is paramount to have a methodology that can swiftly respond to changes in project direction, consumer expectations, and market dynamics. Agile's ability to effectively adapt to these changes reduces the risk of delivering a product that is outdated or not in line with client and market needs. This adaptability serves as a strong barrier against potential project setbacks.

Figure 3.10 Agile methodology summary

Moreover, agile places a premium on frequent customer engagement and incremental value delivery, both of which are central to the success of the e-Reservation Restaurant web

application. As regular meetings are conducted with the project's supervisor, agile methodology's iterative approach guarantees constant integration of supervisor's feedback [64], enabling real-time fine-tuning of the product's features and functions. This maximizes the value provided to clients at each iteration and ensures that the project closely aligns with supervisor's expectations and market needs.

Agile's emphasis on the incremental and regular delivery of small functional components also resonates with the project's core objectives. By providing immediate value of the e-Reservation Restaurant web application to users and stakeholders through small feature releases, agile methodology ensures that the project is consistently meeting the evolving requirements of the online restaurant booking market and the clients [63, p. 10698].

Furthermore, the choice of agile is not just a matter of appropriateness but also one of expedience, given the project's ambitious one-year completion target. In this context, agile's well-known capacity to accelerate product development is extremely helpful. By segmenting the project into time-bound iterations and delivering smaller portions of the product more quickly, agile aligns perfectly with the objective of on-time completion. This approach also enables the project supervisor to provide feedback early [64], further ensuring that the final product not only meets but exceeds their expectations.

Hence, the selection of the agile development methodology is intrinsically linked to the e-Reservation Restaurant web application's unique criteria and imperatives. Agile's adaptability, customer-centricity, incremental value delivery, capacity to mitigate risks, ability to adhere to tight timelines, and support for collaboration align seamlessly with the project's objectives and challenges. This alignment sets agile apart from other available methodologies and solidifies it as the best option for the successful development of the e-Reservation Restaurant web application.

3.4 User Requirements

The functional and non-functional requirements for the e-Reservation Restaurant web application are described in the requirements specification section. In order to ensure the web

application satisfies user and stakeholder expectations, these requirements form the basis for the project's design, development, and testing phases.

3.4.1 Functional Requirements

Table 3.2 shows the functional requirements that are compulsory to develop the e-Reservation Restaurant web application. These functional requirements define the specific features and functionalities that the system must perform in order to meet and satisfy the needs of users [65, p. 10].

Table 3.2 Functional requirements

No.	Functional Requirement
1.	The system must allow new users to create accounts with unique e-mail and password and allow existing users to log in with their credentials.
2.	The system must allow customers to fill up the preference form and receive personalized bookings.
3.	The system must allow customers to search and filter restaurants according to location and restaurant name.
4.	The system must allow customers to book for restaurants by specifying the customer's name, phone number, e-mail, booking date, booking time, remarks, and table number.
5.	The system must allow customers to modify or delete their bookings.
6.	The system must send booking confirmation e-mail with "Add to Google Calendar" event function to customers if their booking is accepted.
7.	The system must send booking rejection e- to customers if their booking is rejected.
8.	The system must allow restaurateurs to access a dashboard to add, modify, or delete tables.
9.	The system must allow restaurateurs to access a dashboard to add, modify, or delete menu items.
10.	The system must allow restaurateurs to access a dashboard to accept or reject bookings.
11.	The system must allow restaurateurs to view monthly and yearly generated reports and analytics on booking trends.

12.	The system must allow the web administrator to accept or reject restaurant applications and send the respective acceptance or rejection e-mail to them.
13.	The system must allow users to search for frequently asked questions in the help center search engine.
14.	The system must have an AI-powered chatbot with 24/7 availability to assist users with inquiries and general assistance.
15.	The system must allow users to be transferred to live chat support agent when the user specifies so.

3.4.2 Non-Functional Requirements

Table 3.3 shows the non-functional requirements that describe the qualities or attributes that the system must possess, instead of what functions it should perform [65, p. 10].

Table 3.3 Non-functional requirements

No.	Non-Functional Requirement
1.	**Availability:** The system must be available whenever an Internet connection is established to ensure users can access the website and make bookings at any time.
2.	**Performance:** The system must be able to handle a large number of concurrent users without significant delays or lag. Each user interaction must have a response time of less than a few seconds, ensuring a smooth and responsive user experience even during peak hours.
3.	**Usability:** The system must have an intuitive and easy-to-navigate user interface that allows even new users to understand the website's functions and features and use the website with ease.
4.	**Security:** The system must prevent any unauthorized access and conduct regular backups of data to prevent data loss, ensuring that the service is continued even when unexpected failures or disruptions happen.

3.5 Use Case Diagram

Figure 3.11 shows the use case diagram for the proposed e-Reservation Restaurant web application. 3 actors interact with the system, which are the customer, the web administrator, and the restaurant owner.

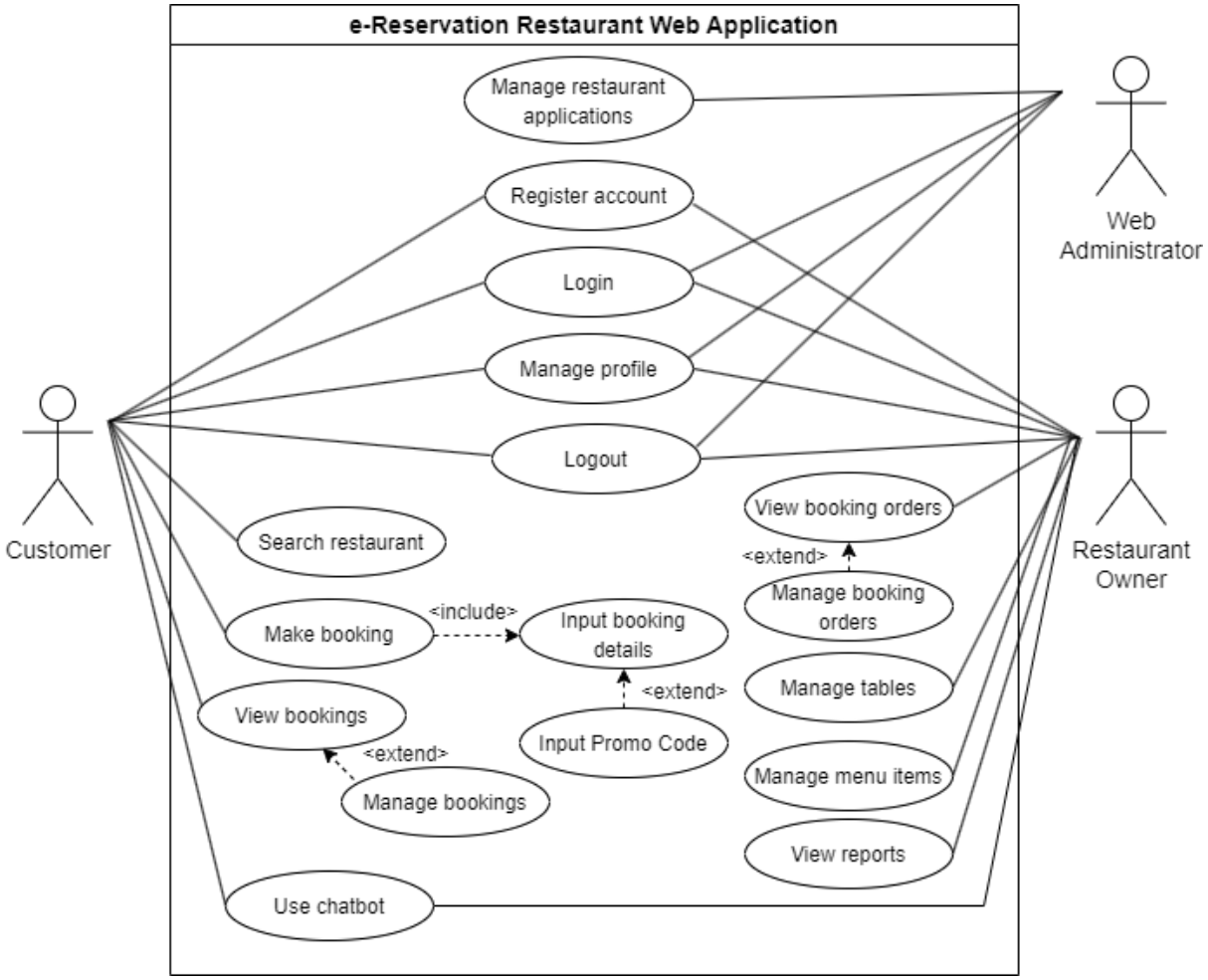

Figure 3.11 Use case diagram of proposed system

To help understand the use case diagram better, 13 use case descriptions (as depicted in section 3.4.1 to section 3.4.13) are created to help explain the operations and details of each use case.

3.5.1 Register Use Case Description

Table 3.4 Register Use Case Description

Use Case Name: Register	**ID:** 1	**Importance Level:** High
Primary Actor: User (Customer, Restaurant Owner)	**Use Case Type:** Detail, Essential	
Stakeholders and Interests: Customer: Register an account to use the restaurant booking system. Restaurant Owner: Register an account to use the booking management system.		
Brief Description: This use case describes how users register an account in the system.		
Trigger: Users want to create a new account in the system. **Type:** Internal		
Relationships: Association: User (Customer, Restaurant Owner) Extend: None Include: None Generalization: None		
Normal Flows of Events: 1. User selects the user type to register an account. 2. User fills in the required information. 3. The information is validated. 4. The information is saved into the system. 5. The user has successfully registered for an account.		
Sub Flows: Not applicable		
Alternate/ Exceptional Flows: 2a. The confirmation password is entered wrongly. 2b. User is prompted to enter a matching password.		

3.5.2 Login Use Case Description

Table 3.5 Login Use Case Description

Use Case Name: Login	**ID:** 2	**Importance Level:** High
Primary Actor: User (Customer, Restaurant Owner, Web Administrator)	**Use Case Type:** Detail, Essential	
Stakeholders and Interests: Customer: Login to restaurant booking system. Restaurant Owner: Login to booking management system. Web Administrator: Login to restaurant application management system.		
Brief Description: This use case describes how users login to their respective account in the system.		
Trigger: Users want to create an account. **Type:** Internal		
Relationships: Association: User (Customer, Restaurant Owner, Web Administrator) Extend: None Include: None Generalization: None		
Normal Flows of Events: 1. User enters their e-mail and password to log in. 2. The e-mail and password entered are validated. 3. The user enters the system successfully.		
Sub Flows: Not applicable		
Alternate/ Exceptional Flows: 2a. The e-mail or password entered is incorrect. 2b. The user is prompted to enter the correct e-mail and password.		

3.5.3 Manage Profile Use Case Description

Table 3.6 Manage Profile Use Case Description

Use Case Name: Manage Profile	**ID:** 3	**Importance Level:** Medium
Primary Actor: User (Customer, Restaurant Owner, Web Administrator)	**Use Case Type:** Detail, Essential	
Stakeholders and Interests: Customer: Update their personal information. Restaurant Owner: Update their restaurant information. Web Administrator: Update account information.		
Brief Description: This use case describes how users manage their profile details in the system.		
Trigger: Users want to update their account information in the system. **Type:** Internal		
Relationships: Association: User (Customer, Restaurant Owner, Web Administrator) Extend: None Include: None Generalization: None		
Normal Flows of Events: 1. User enters their new account information. 2. User click on the save button. 3. User's account information are saved into the system.		
Sub Flows: Not applicable		
Alternate/ Exceptional Flows: 2a. The save is unsuccessful. 2b. The user is prompted to re-enter the account details and save again.		

3.5.4 Logout Use Case Description

Table 3.7 Logout Use Case Description

Use Case Name: Logout	**ID:** 4	**Importance Level:** High
Primary Actor: User (Customer, Restaurant Owner, Web Administrator)	**Use Case Type:** Detail, Essential	
Stakeholders and Interests: Customer: Logout from their account in the restaurant booking system. Restaurant Owner: Logout from their account in the booking management system. Web Administrator: Logout from their account in the restaurant application management system.		
Brief Description: This use case describes how users logout from their account in the system.		
Trigger: Users want to logout from their account in the system. **Type:** Internal		
Relationships: Association: User (Customer, Restaurant Owner, Web Administrator) Extend: None Include: None Generalization: None		
Normal Flows of Events: 1. User clicks on the logout button. 2. User is successfully logged out from the system.		
Sub Flows: Not applicable		
Alternate/ Exceptional Flows: Not applicable		

3.5.5 Manage Restaurant Applications Use Case Description

Table 3.8 Manage Restaurant Applications Use Case Description

Use Case Name: Manage Restaurant Applications	**ID:** 5	**Importance Level:** High
Primary Actor: Web Administrator	**Use Case Type:** Detail, Essential	
Stakeholders and Interests: Web Administrator: Use the restaurant application management system to approve or reject restaurant applications.		
Brief Description: This use case describes how the web administrator approves or reject restaurant applications.		
Trigger: Web administrator wants to approve or reject a restaurant application. **Type:** Internal		
Relationships: Association: Web Administrator Extend: None Include: None Generalization: None		
Normal Flows of Events: 1. Web administrator selects the restaurant application. 2. Web administrator clicks on the approve button. 3. The system sends an approval e-mail to the approved restaurant. 4. The restaurant becomes a registered user of the system.		
Sub Flows: Not applicable		
Alternate/ Exceptional Flows: 2a. Web administrator clicks on the reject button. 2b. The system sends a rejection e-mail to the rejected restaurant.		

3.5.6 Search Restaurant Use Case Description

Table 3.9 Search Restaurant Use Case Description

Use Case Name: Search Restaurant	**ID:** 6	**Importance Level:** High
Primary Actor: Customer	**Use Case Type:** Detail, Essential	
Stakeholders and Interests: Customer: Use the restaurant booking system to search for available restaurants.		
Brief Description: This use case describes how the customer search for restaurants.		
Trigger: Customers wants to search for restaurants. **Type:** Internal		
Relationships: Association: Customer Extend: None Include: None Generalization: None		
Normal Flows of Events: 1. Customer enters the name and location of the restaurant. 2. Customer clicks on the search button. 3. The system displays the search results.		
Sub Flows: Not applicable		
Alternate/ Exceptional Flows: 3a. Empty search result page as no relevant restaurant is found.		

3.5.7 Make Booking Use Case Description

Table 3.10 Make Booking Use Case Description

Use Case Name: Make Booking	**ID:** 7	**Importance Level:** High
Primary Actor: Customer	**Use Case Type:** Detail, Essential	
Stakeholders and Interests: Customer: Use the restaurant booking system to place a booking for a restaurant.		
Brief Description: This use case describes how the customer places a booking at a restaurant.		
Trigger: Customers wants to book for a restaurant. **Type:** Internal		
Relationships: Association: Customer Extend: None Include: Input booking details Generalization: None		
Normal Flows of Events: 1. Customer clicks on the desired restaurant to place a booking for. 2. Customer input their personal details and booking information. 3. Customer selects a table according to party size. 4. Customer confirms the booking details. 5. The booking is recorded in the system.		
Sub Flows: Not applicable		
Alternate/ Exceptional Flows: 4.1.a. Customer inputs a promo code. 4.1.b. Promo code is validated. 4.1.c. Promo code is applied. 4.2.a. Customer inputs a promo code. 4.1.b. Promo code is not valid. 4.1.c. Customer is prompted to re-enter a valid promo code.		

3.5.8 View Bookings Use Case Description

Table 3.11 View Bookings Use Case Description

Use Case Name: View Bookings	**ID:** 8	**Importance Level:** High
Primary Actor: Customer	**Use Case Type:** Detail, Essential	
Stakeholders and Interests: Customer: Use the restaurant booking system to view their booking details.		
Brief Description: This use case describes how the customer views the booking details of the booked restaurants.		
Trigger: Customers wants to view booking details. **Type:** Internal		
Relationships: Association: Customer Extend: Manage bookings Include: None Generalization: None		
Normal Flows of Events: 1. Customer clicks on the "My Bookings" tab to be directed to the bookings list page. 2. Customer selects on a specific booking to view the full details of the booking.		
Sub Flows: 2.1: Customer selects modify booking: 1. Customer enters the new booking details. 2. Customer selects the new table number according to party size. 3. Customer clicks on the save button to save the booking modifications into the system. 4. The booking details is successfully modified. 2.2: Customer selects delete booking: 1. Customer clicks on the confirm delete button. 2. The booking is successfully cancelled.		
Alternate/ Exceptional Flows: 2.1.4.a. Error modifying the booking details. 2.1.4.b. Customer is prompted to enter the new booking details to try again.		

3.5.9 View Booking Orders Use Case Description

Table 3.12 View Booking Orders Use Case Description

Use Case Name: View Booking Orders	**ID:** 9	**Importance Level:** High
Primary Actor: Restaurant Owner	**Use Case Type:** Detail, Essential	
Stakeholders and Interests: Restaurant Owner: Use the booking management system to view booking orders.		
Brief Description: This use case describes how the restaurant owner views the booking details of customers' bookings.		
Trigger: Restaurant owner wants to view booking details. **Type:** Internal		
Relationships: Association: Restaurant Owner Extend: Manage booking orders Include: None Generalization: None		
Normal Flows of Events: 1. Restaurant owner clicks on the "Bookings List" tab to be directed to the bookings list page. 2. Restaurant owner selects a specific booking to view the full details of the booking. 3. Restaurant owner selects the action for the booking.		
Sub Flows: 2.1: Restaurant owner approves the booking: 1. A booking confirmation e-mail with booking details will be sent to the customer. 2. The system will update the status of the booking to "Approved". 2.2: Restaurant owner rejects the booking: 1. A booking rejection e-mail with booking details will be sent to the customer. 2. The system will update the status of the booking to "Rejected".		
Alternate/ Exceptional Flows: Not Applicable		

3.5.10 Manage Tables Use Case Description

Table 3.13 Manage Tables Use Case Description

Use Case Name: Manage Tables	**ID:** 10	**Importance Level:** High
Primary Actor: Restaurant Owner	**Use Case Type:** Detail, Essential	
Stakeholders and Interests: Restaurant Owner: Use the booking management system to manage table details.		
Brief Description: This use case describes how the restaurant owner manages the table information.		
Trigger: Restaurant owner wants to update table information. **Type:** Internal		
Relationships: Association: Restaurant Owner Extend: None Include: None Generalization: None		
Normal Flows of Events: 1. Restaurant owner clicks on the "Tables List" tab to be directed to the tables list page. 2. Restaurant owner selects the action for managing the tables.		
Sub Flows: 2.1: Restaurant owner adds a new table: 1. Restaurant owner selects the table's party size to be added. 2. Restaurant owner selects the number of tables with the specific party size to be added. 3. Restaurant owner clicks on the confirm button. 4. The new table information is added into the system. 2.2: Restaurant owner deletes a table: 1. Restaurant owner select the table they wish to delete. 2. Restaurant owner clicks on the delete button. 3. The table is deleted from the system. 2.3: Restaurant owner edits a table:		

1. Restaurant owner select the table they wish to edit. 2. Restaurant owner enters the new table information. 3. Restaurant owner clicks on the save button. 4. The table is updated with the latest information into the system.
Alternate/ Exceptional Flows: 2.3.4.a. Error modifying the table details. 2.3.4.b. Restaurant owner is prompted to enter the new table details to try again.

3.5.11 Manage Menu Items Use Case Description

Table 3.14 Manage Menu Items Use Case Description

Use Case Name: Manage Menu Items	**ID:** 11	**Importance Level:** High
Primary Actor: Restaurant Owner	**Use Case Type:** Detail, Essential	
Stakeholders and Interests: Restaurant Owner: Use the booking management system to manage menu item details.		
Brief Description: This use case describes how the restaurant owner manages the menu item information.		
Trigger: Restaurant owner wants to update menu item information. **Type:** Internal		
Relationships: Association: Restaurant Owner Extend: None Include: None Generalization: None		
Normal Flows of Events: 1. Restaurant owner clicks on the "Menu List" tab to be directed to the menu list page. 2. Restaurant owner selects the action for managing the menu items.		
Sub Flows: 2.1: Restaurant owner adds a new menu item: 1. Restaurant owner enters the details of the menu item to be added. 2. Restaurant owner clicks on the confirm button. 3. The new menu item is added into the system. 2.2: Restaurant owner deletes a menu item: 1. Restaurant owner select the menu item they wish to delete. 2. Restaurant owner clicks on the delete button. 3. The menu item is deleted from the system. 2.3: Restaurant owner edits a menu item: 1. Restaurant owner select the menu item they wish to edit. 2. Restaurant owner enters the new menu item information. 3. Restaurant owner clicks on the save button.		

4. The menu item is updated with the latest information into the system.
Alternate/ Exceptional Flows: 2.3.4.a. Error modifying the menu item details. 2.3.4.b. Restaurant owner is prompted to enter the new menu item details to try again.

3.5.12 View Reports Use Case Description

Table 3.15 View Reports Use Case Description

Use Case Name: View Reports	**ID:** 12	**Importance Level:** Medium
Primary Actor: Restaurant Owner	**Use Case Type:** Detail, Essential	
Stakeholders and Interests: Restaurant Owner: Use the booking management system to view booking reports.		
Brief Description: This use case describes how the restaurant owner views the booking reports.		
Trigger: Restaurant owner wants to view booking report. **Type:** Internal		
Relationships: Association: Restaurant Owner Extend: None Include: None Generalization: None		
Normal Flows of Events: 1. Restaurant owner clicks on the "View Reports" tab to be directed to the booking reports page. 2. Restaurant owner selects the type of report they want to view.		
Sub Flows: 2.1: Restaurant owner selects to view monthly report: 1. Restaurant owner inputs the month and year value of the report to be viewed. 2. The relevant booking report for the selected month and year is displayed. 2.1: Restaurant owner selects to view yearly report: 1. Restaurant owner inputs the year value of the report to be viewed. 2. The relevant booking report for the selected year is displayed.		
Alternate/ Exceptional Flows: Not applicable		

3.5.13 Use Chatbot Use Case Description

Table 3.16 Use Chatbot Use Case Description

Use Case Name: Use Chatbot	**ID:** 13	**Importance Level:** Medium
Primary Actor: Customer, Restaurant Owner	**Use Case Type:** Detail, Essential	
Stakeholders and Interests: Customer: Use the chatbot to inquire about booking processes. Restaurant Owner: Use the chatbot to inquire about booking management processes.		
Brief Description: This use case describes how the user uses the chatbot.		
Trigger: User wants to use the chatbot. **Type:** Internal		
Relationships: Association: Customer, Restaurant Owner Extend: None Include: None Generalization: None		
Normal Flows of Events: 1. User clicks on the chatbot icon. 2. User selects the action they want to perform on the chatbot.		
Sub Flows: 2.1: User searches the help center for frequently asked questions: 1. User clicks on the help center. 2. User selects the relevant article. 3. User views the frequently asked questions. 2.2: User inquire the AI chatbot for general inquiries: 1. User selects to start a new chat. 2. User writes the questions to the chatbot. 3. The AI chatbot responds to user's inquiries. 2.3: User gets transferred to live agent support: 1. User selects to start a new chat. 2. User prompts to contact live agent.		

3. Live agent is directed to the user. 4. User writes the questions to the live agent. 5. The live agent responds to user's inquiries.
Alternate/ Exceptional Flows: Not applicable

3.6 Activity Diagram

3.6.1 Register Account and Login

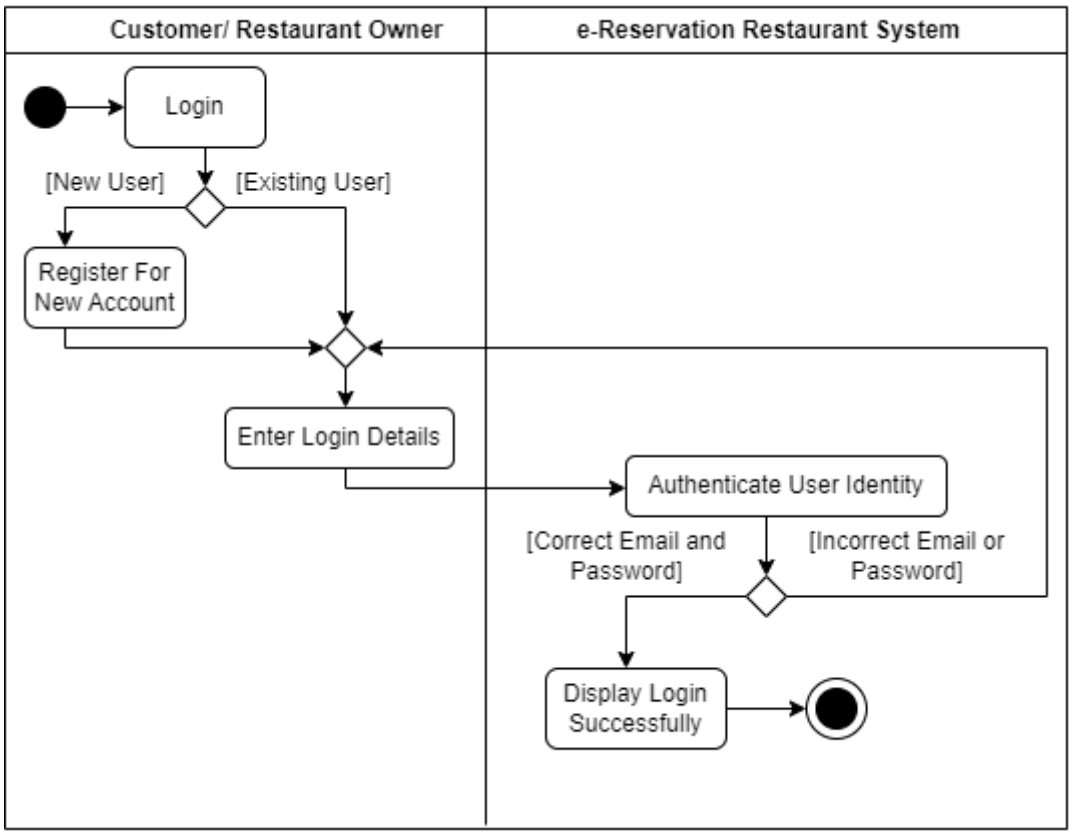

Figure 3.12 Activity diagram of register account and login use case

Figure 3.12 above shows the activity diagram of the register account and login use case. First, the customer or restaurant owner will log in to the web application. If they are a new user, they are required to register for a new account. After registering for an account, they will be prompted back to the login in page to enter their email and password. If they are an existing user, they will directly proceed to enter their email and password. After that, the application will authenticate the user's identity to check if the email and password are correct. If it is an incorrect email or password, the user will be redirected back to enter their email and password. If their email and password are correctly inserted, the application will display login successfully.

3.6.2 Manage Profile

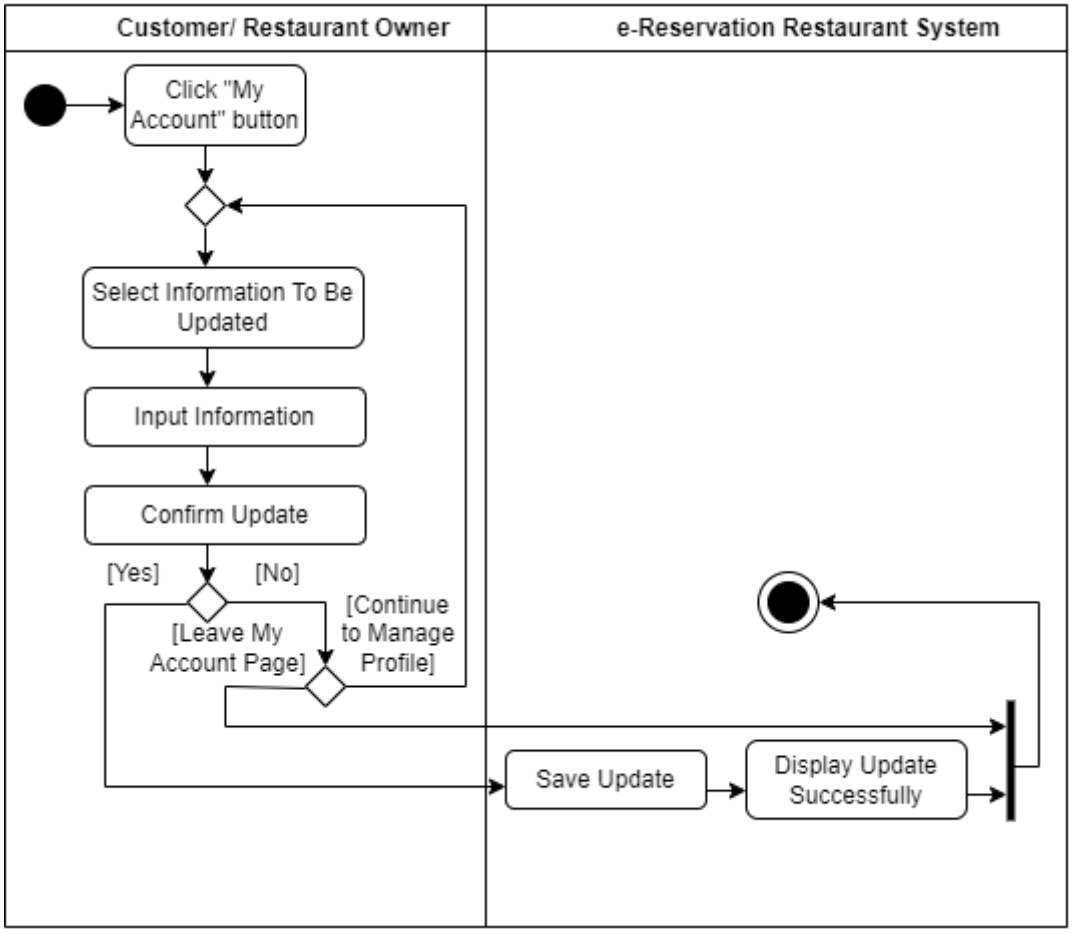

Figure 3.13 Activity diagram of manage profile use case

Figure 3.13 above shows the activity diagram of the manage profile use case. First, the customer or restaurant owner can click the "Manage Profile" button. Then, they will select the information to be updated and input the relevant information. Next, users will be asked if they would like to confirm the update. If the user chose no, they can either choose to continue to stay on the manage profile page to continue managing their profile or leave the manage profile page and just exit. If the user has confirmed their update, then the application will help save the update and display the update successfully message to the users.

3.6.3 Search Restaurant

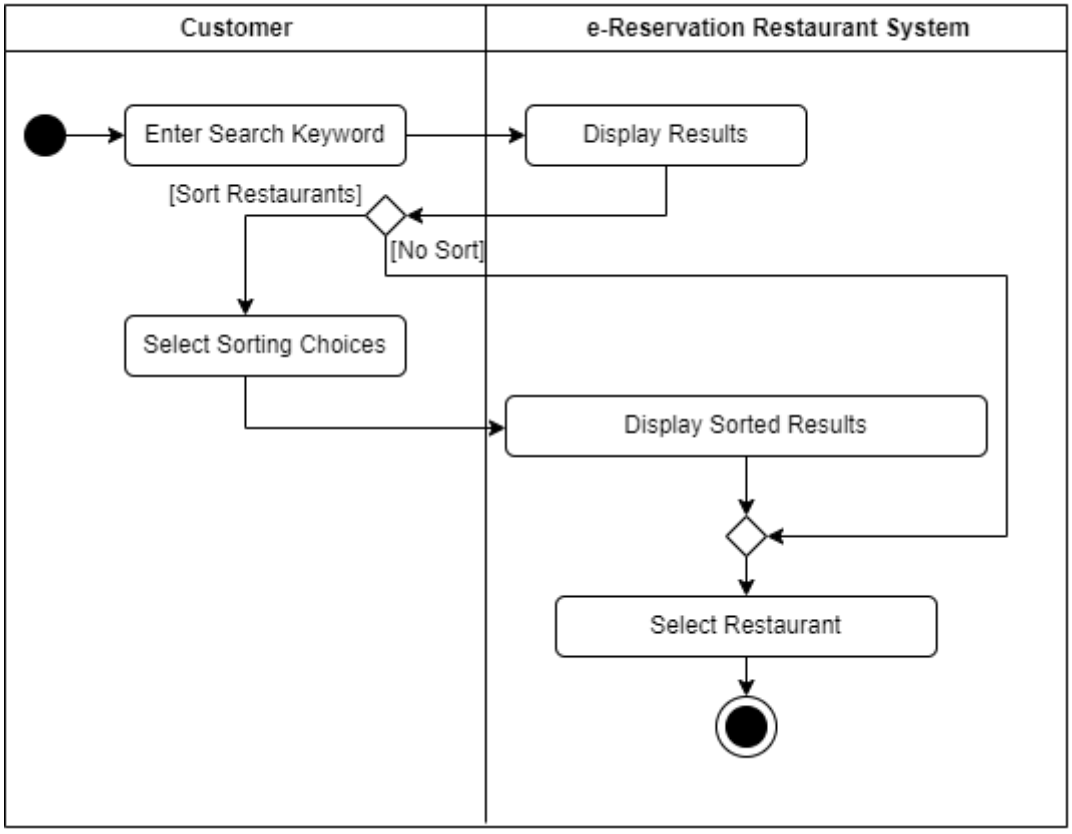

Figure 3.14 Activity diagram of search restaurant use case

Figure 3.14 above shows the activity diagram of the filter restaurant use case. First, the customer will enter the search keyword in the search bar. Then, the system will display the results based on the searched keyword. If customers want to sort restaurant, then they can select the sorting choices such as location and name sequence. Then, the system will display the sorted results for the customer to select a restaurant. If customers do not want to sort restaurants, then they can straight up select the restaurant and it will be the end of action.

3.6.4 Make Booking

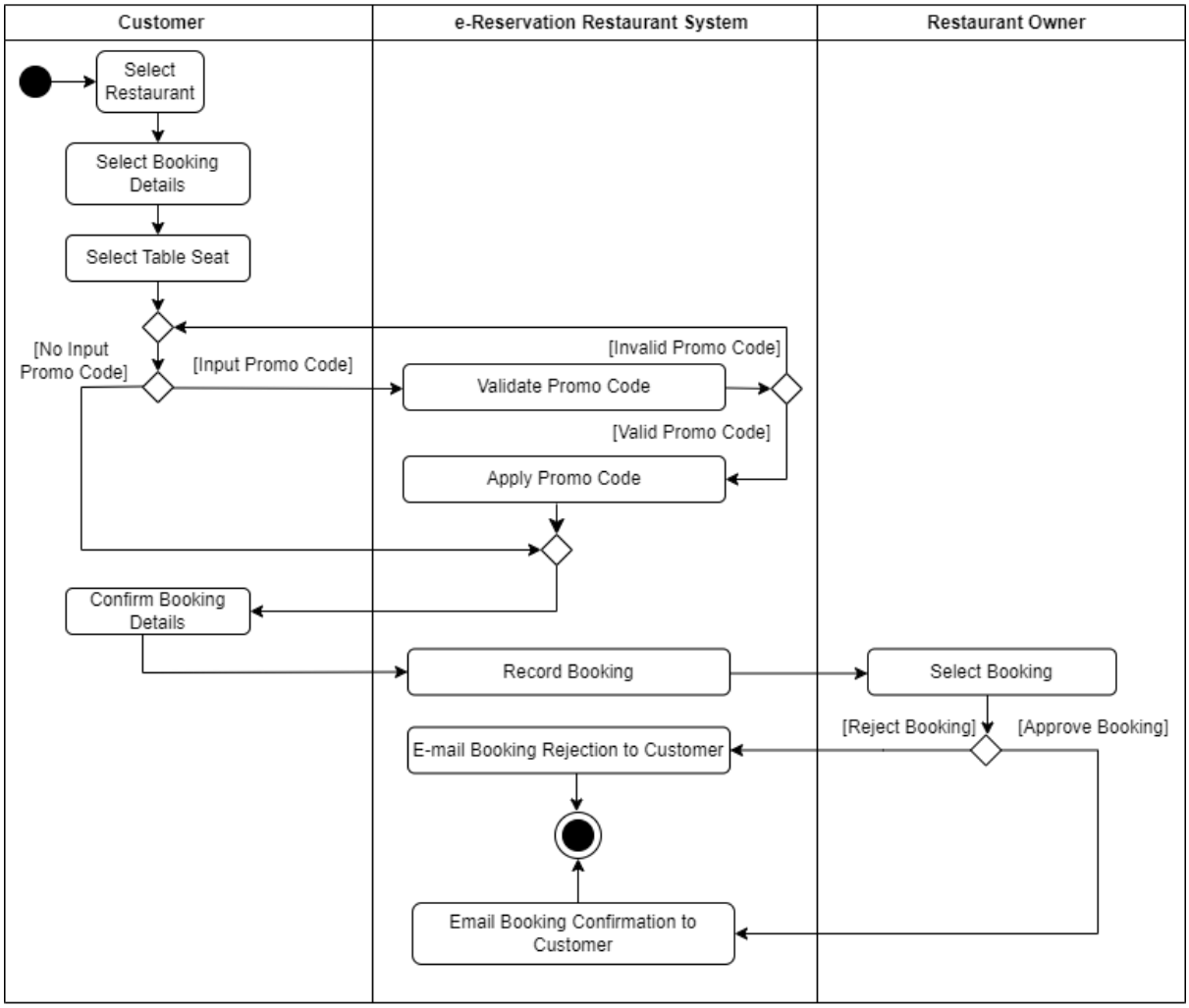

Figure 3.15 Activity diagram of make booking use case

Figure 3.15 shows the activity diagram of the make booking use case. The customer will first select the restaurant they are interested in booking at, then select the booking details like the dine-in date and time, as well as input their booking information like name, phone number, and e-mail. Then, they can select their table seat based on the party size. After that, the customers can choose to whether enter a promo code or not.

The e-Reservation restaurant system will validate the promo code. If the promo code is invalid, it will prompt the user to try again. If the promo code is valid, then it will be applied to the booking order. After that, the customer confirms the booking details, and the booking will be recorded in the system.

Moving on, the restaurant owner will need to select the booking and choose to whether approve or reject it. If the restaurant rejects it, the system will notify the customer with a rejection e-mail that their booking has failed to be placed. Otherwise, if the booking has been approved, the system will send a confirmation e-mail with the booking information to the customer.

3.6.5 View Bookings

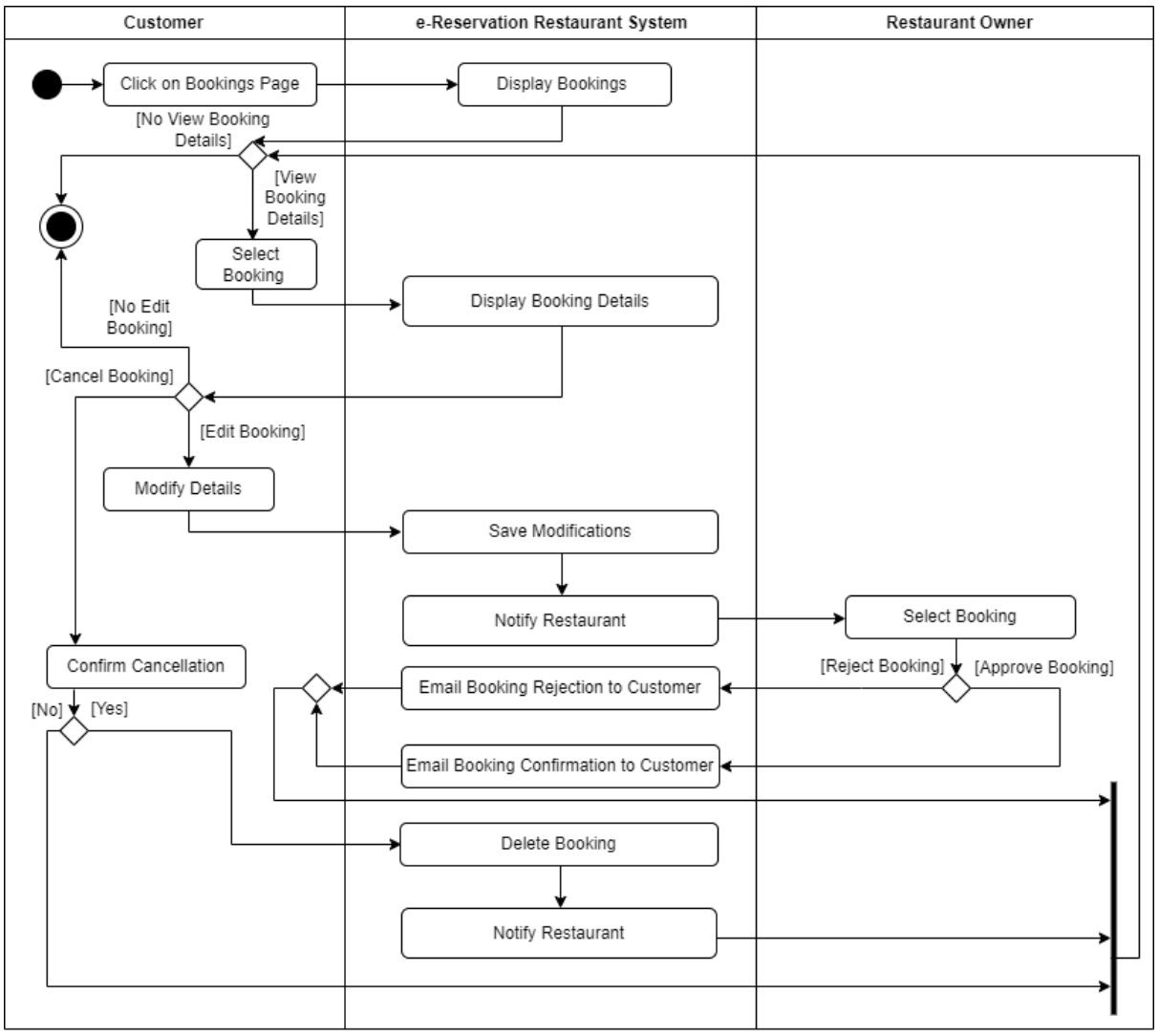

Figure 3.16 Activity diagram of view bookings use case

Figure 3.16 shows the activity diagram of the view bookings use case. The customer will first click on the bookings page to view their bookings. The system will display the customer's list of bookings and the customer can choose to view the booking details of each booking. If the customers do not want to view the booking details, then it will be the end of action.

If customers want to view booking details, they need to select the specific booking for the system to display the booking details. Then, they can choose to edit or cancel the booking. If they do not want to edit nor cancel the booking, then it will be the end of action.

If customers chose to edit booking, they will first edit the booking details. Then, the system will save the changes and notify the restaurant about the modification. The restaurant owner can then select the booking to review, and if they reject the modified booking, the system will notify the customer that their booking edit has failed. However, if the restaurant owner approves the edited booking, the system will send a confirmation e-mail to the customer. Then, it will loop back to where customers can choose to view booking details again.

If customers chose to cancel a booking, they will need to perform a confirmation first. If they have confirmed it, then the system will save the delete the booking and notify the restaurant. After that, it will loop back to where customers can choose to view booking details again.

3.6.6 Manage Tables

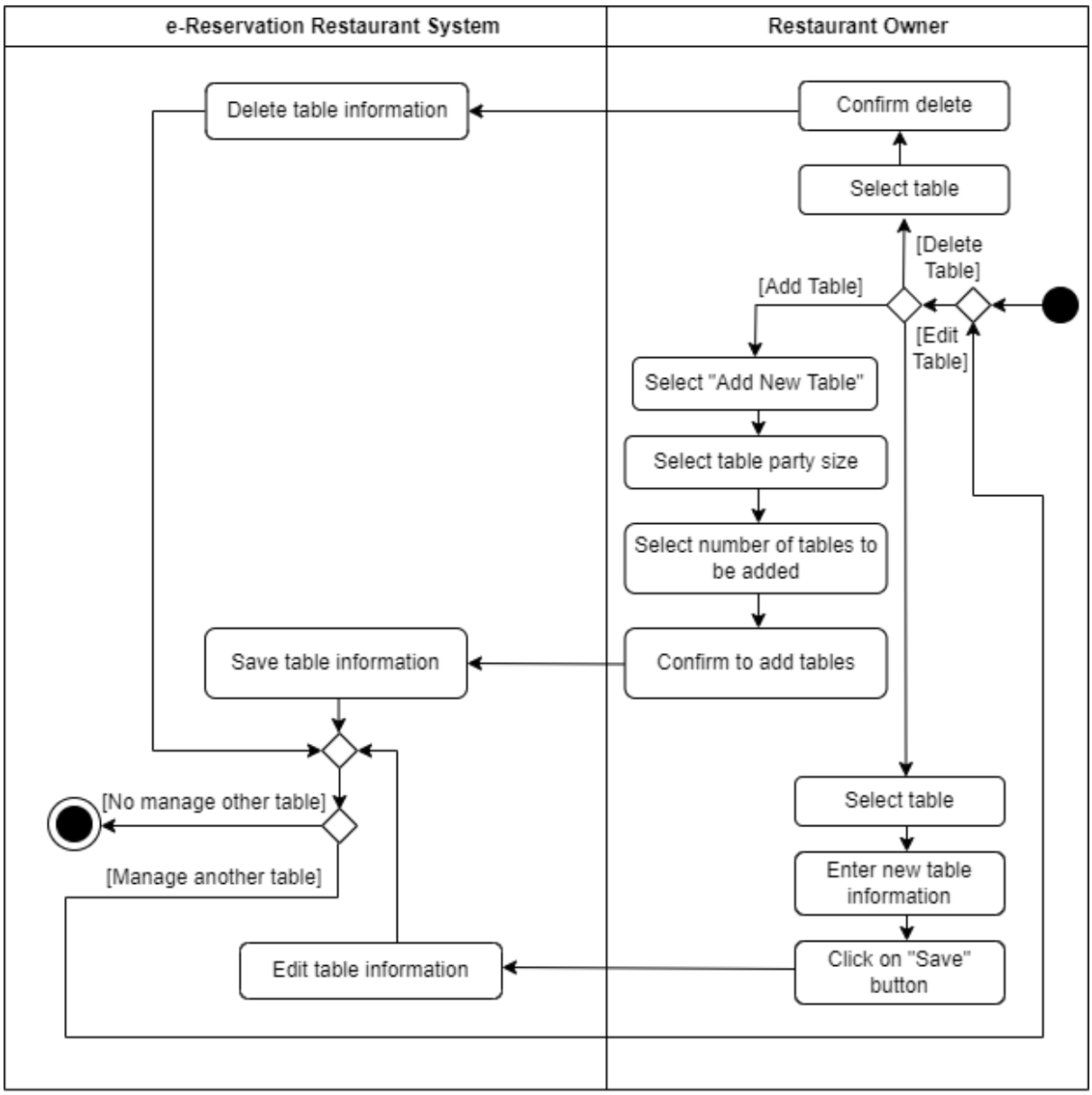

Figure 3.17 Activity diagram of manage tables use case

Figure 3.17 shows the activity diagram of the manage tables use case. The restaurant owner can select to add, delete, or edit tables. If the restaurant owner selects to delete tables, they are required to select the specific table they want to delete and click on the confirm button. The system will then delete the table information from the database.

If the restaurant owner wants to add a new table, they can click on the "Add New Table" button and proceed to select the table party size and number of tables to be added. Then, they will need to confirm to add the tables and the system will save the table information.

If the restaurant owner wants to edit table information, they can select the table they want to edit, and enter the new table information. After that, they will have to click on the "Save" button and the system will edit the table information in the database.

After these three actions, the restaurant owner can choose if they want to continue managing the tables. If yes, it will loop back to where the restaurant owner selects the table operations, such as delete, add, or edit. If not, then it will be the end of action.

3.6.7 Manage Menu Items

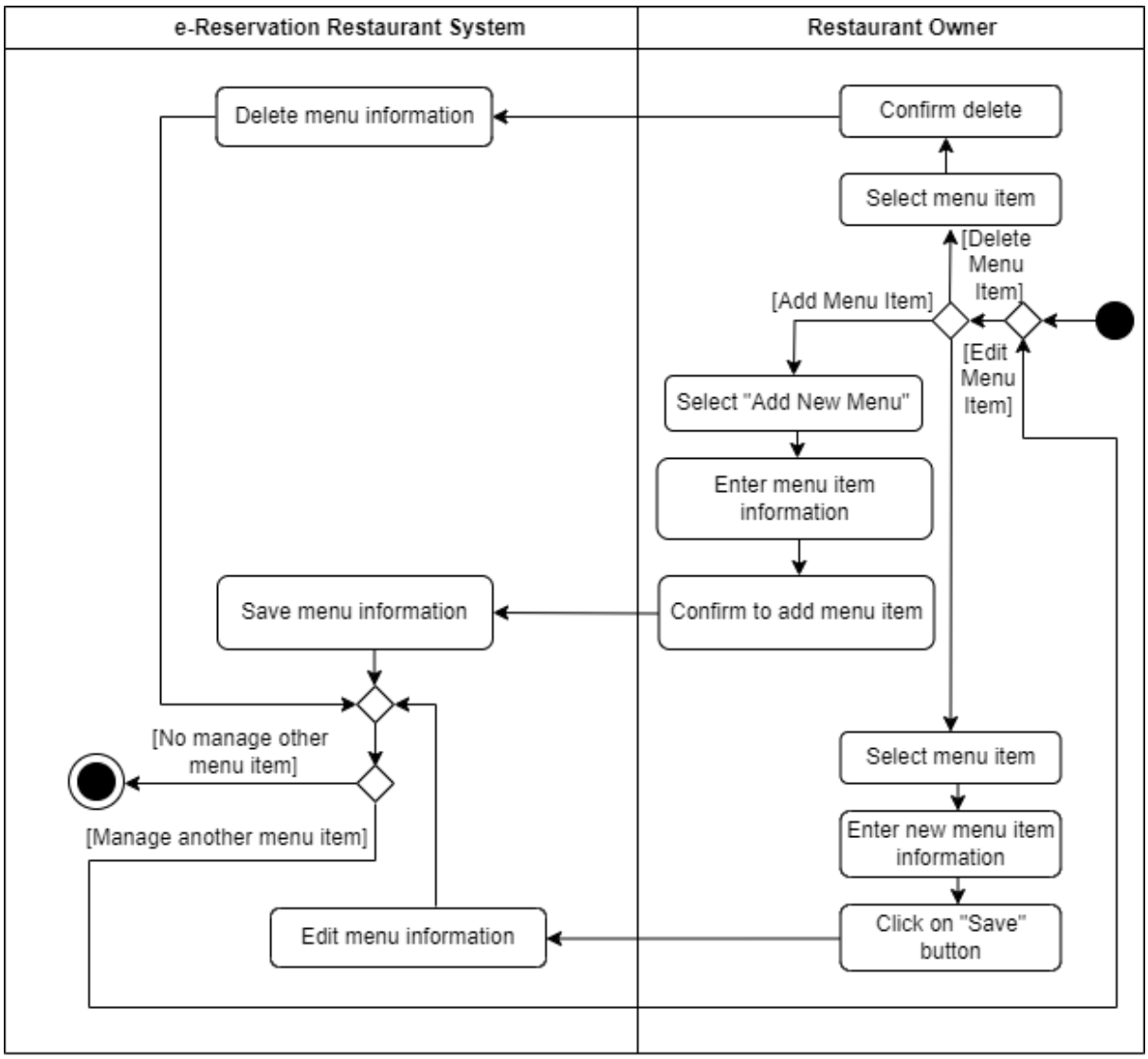

Figure 3.18 Activity diagram of manage menu items use case

Figure 3.18 shows the activity diagram of the manage menu items use case. The restaurant owner can select to add, delete, or edit menu items. If the restaurant owner selects to delete menu items, they are required to select the specific menu item they want to delete and click on the confirm button. The system will then delete the menu information from the database.

If the restaurant owner wants to add a new menu item, they can click on the "Add New Menu" button and proceed to enter the menu item information. Then, they will need to confirm to add the menu item and the system will save the menu information.

If the restaurant owner wants to edit a menu item, they can select the menu item they want to edit and enter the new menu item information. After that, they will have to click on the "Save" button and the system will edit the menu information in the database.

After these three actions, the restaurant owner can choose if they want to continue managing the menu items. If yes, it will loop back to where the restaurant owner selects the menu items operations, such as delete, add, or edit. If not, then it will be the end of action.

3.6.8 View Reports

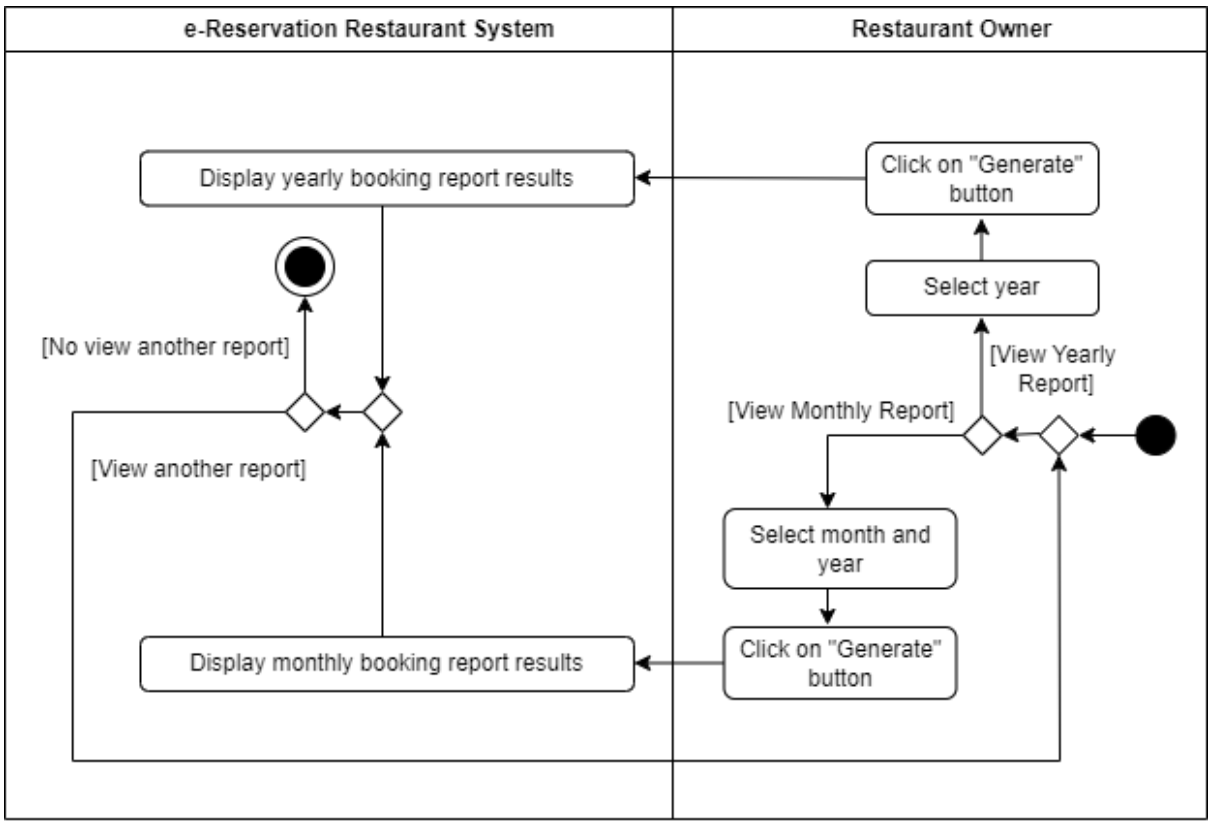

Figure 3.19 Activity diagram of view reports use case

Figure 3.19 shows the activity diagram of the view reports use case. The restaurant owner can select to view the monthly or yearly booking report. If they select to view the yearly report, they are required to input the year of the report they wish to view and click on the “Generate” button. The system then displays the respective yearly booking report results accordingly.

If the restaurant owner selects to view the monthly report, they are required to input the month and year of the report they wish to view and click on the “Generate” button. The system then displays the respective monthly booking report results accordingly.

After viewing the reports, the restaurant owner can choose if they want to continue viewing another report. If yes, it will loop back to where the restaurant owner selects a report type, such as a monthly or yearly report. If not, then it will be the end of action.

3.6.9 Use Chatbot

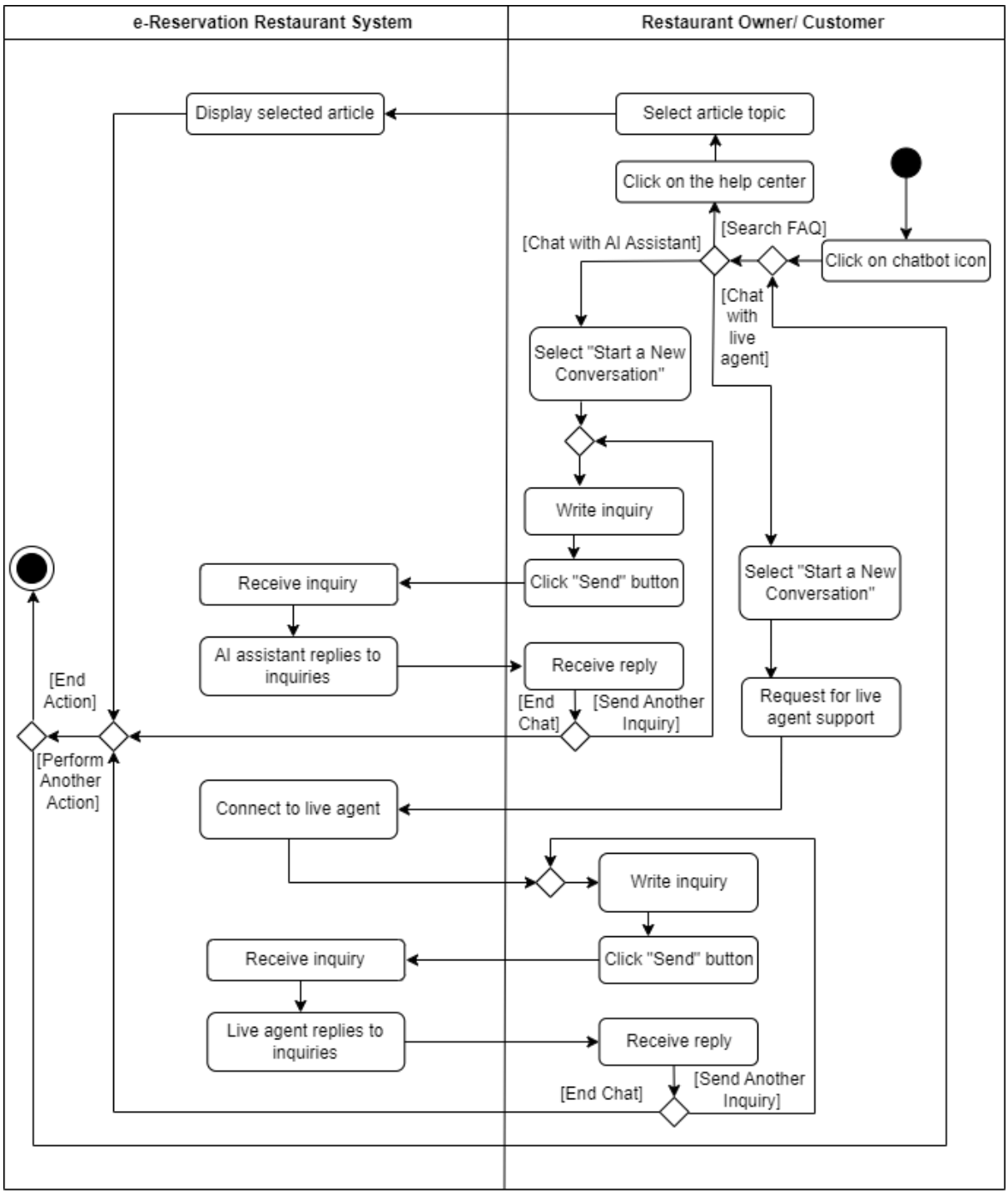

Figure 3.20 Activity diagram of use chatbot use case

Figure 3.20 shows the activity diagram of the use chatbot use case. The restaurant owner or customer first clicks on the chatbot icon. Then, they can choose what operations they want to perform.

If the restaurant owner or customer wants to search for a frequently asked question, they can click on the help center to select the article topic. The system then displays the relevant article for the user to read.

If the restaurant owner or customer wants to chat with an AI assistant, they can click on the “Start a New Conversation” button. After that, they can type in their inquiry and hit the “Send” button to send the message to the system. After the system receives the message, the trained AI assistant will write a reply to the inquiry and send it back to the user. After the user receives the reply, they can choose whether to continue sending messages to the AI assistant. If yes, the process will be looped and they can write messages and the AI assistant again.

If the restaurant owner or customer wants to chat with a live agent, they can click on the “Start a New Conversation” button. After that, they can request for a live agent in the chatbox and the system will connect a live agent with the user. After that, the user can write an inquiry and hit the “Send” button to send the message to the live agent. After the system receives the message, the live agent will write a reply to the inquiry and send it back to the user. After the user receives the reply, they can choose whether to continue sending messages to the live agent. If yes, the process will be looped and they can write messages and the AI assistant again.

After performing these actions, the restaurant owner or customer can choose if they want to continue with another operation. If yes, it will loop back to where they can select the chatbot operation. If not, then it will be the end of action.

3.6.10 Manage Restaurant Applications

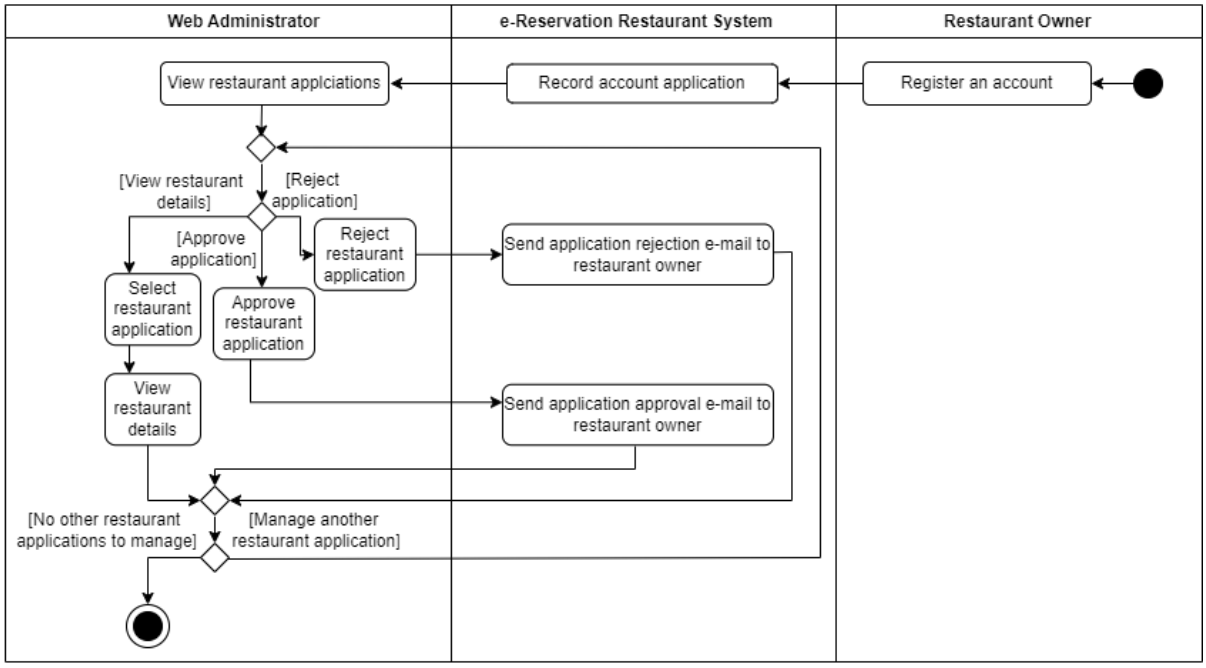

Figure 3.21 Activity diagram of manage restaurant applications use case

Figure 3.21 shows the activity diagram of the manage restaurant applications use case. The restaurant owner first registers for an account. After that, the system will receive and record the account application. The web administrator will be the one to view the restaurant applications and decide what operations to proceed with.

If the web administrator wants to view the restaurant details, they can select the specific restaurant application and view its details. If the web administrator wants to approve the restaurant application, they can click on the approve button and the system will send an application approval e-mail to the restaurant owner. If the web administrator wants to reject the restaurant application, they can click on the reject button and the system will send an application rejection e-mail to the restaurant owner.

After performing these actions, the restaurant owner can choose if they want to continue with another operation. If yes, it will loop back to where they can select to manage the restaurant applications. If not, then it will be the end of action.

3.7 Timeline

There are 14 weeks given to prepare the works for FYP2. The Gantt chart below (Figure 3.22) shows that there are six phases in the development of FYP2, which include planning, analysis, design, development, testing, and wrapping. Each process phase is planned appropriately such that the requirements and works of FYP2 can be completed on time.

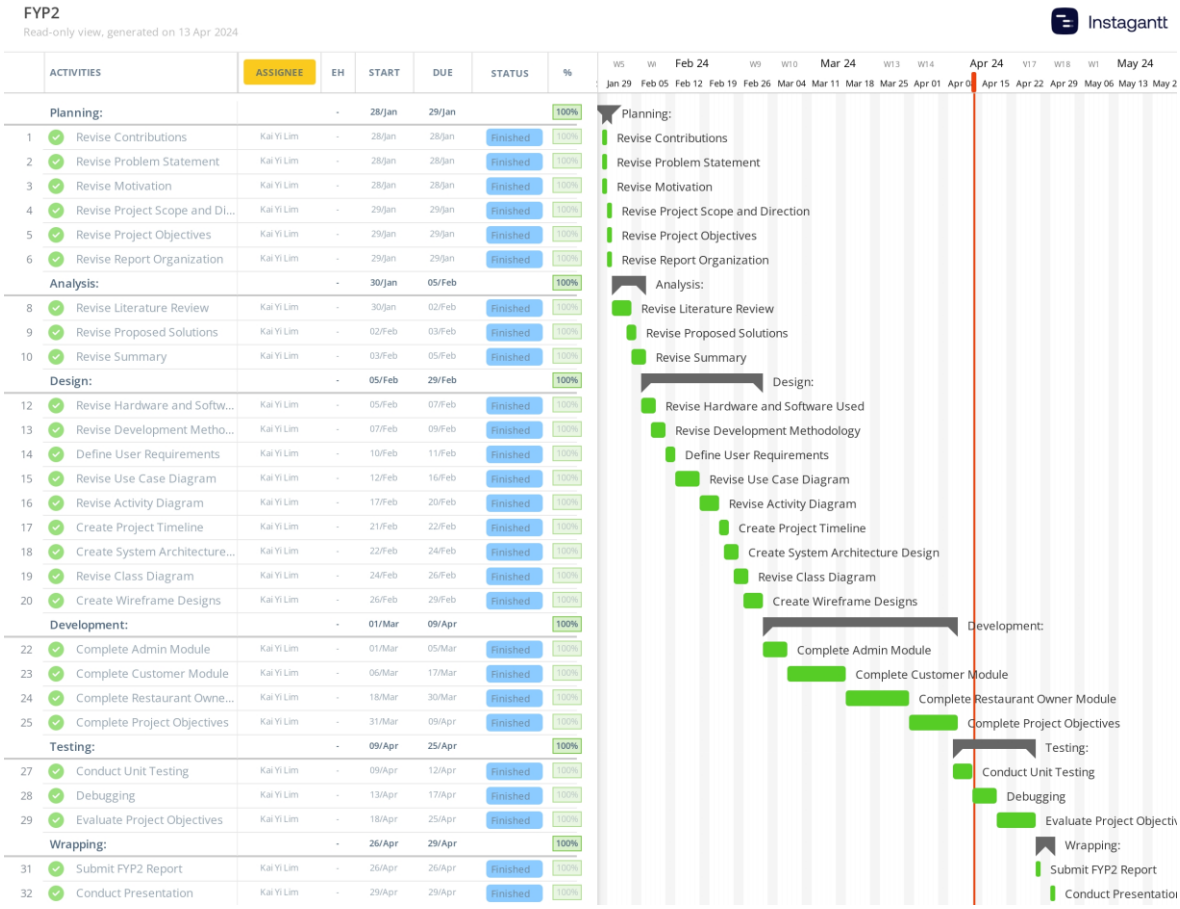

Figure 3.22 FYP2 Timeline

Chapter 4

System Design

4.1 Introduction

This section discusses the systematic approach taken to create a resilient system architecture that forms the backbone of the application's functionality. Through the detailed system designs, this chapter explains the thought process behind shaping the foundation of the e-Reservation Restaurant web application.

4.2 System Architecture Design

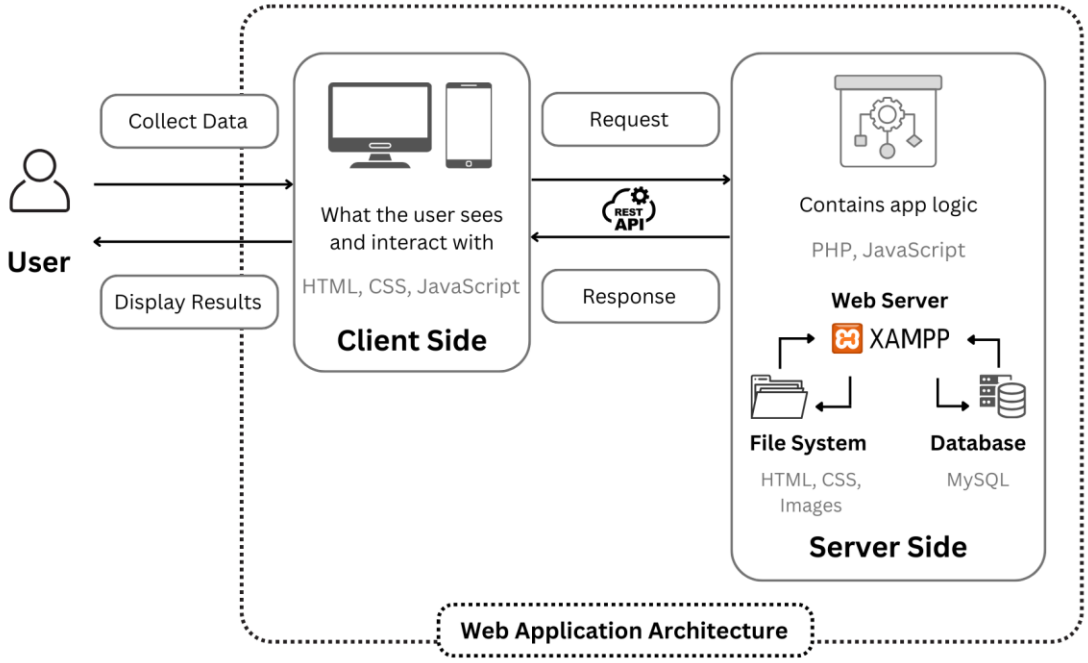

Figure 4.1 System architecture design of proposed system

The system architecture design of the e-Restaurant Reservation web application is as shown in Figure 4.1 above. It is divided into two main parts, which are the client side and server side.

The client side, which is also known as the front-end, is where the users interact with the web application using web browsers such as Google Chrome, Mozilla Firefox, Opera, and many more. HTML, CSS, and JavaScript are primarily used to build the content to be displayed

to the user. HTML is used to structure the content, whereas CSS is used to style the content, and JavaScript is used to make the content interactive. The client side also includes a REST API, which connects to the server side to communicate to retrieve or send data as needed.

The server side, on the other hand, is known as the back-end. This is where the web application's logic is executed. The server side is built using PHP and JavaScript, and it runs on a web server called XAMPP. The server side performs tasks such as processing requests from the client side, accessing the database, and generating responses to send back to the client side. The database employed in this project is MySQL and it is also included in the server side to store all the data needed for the web application to function.

4.3 Class Diagram

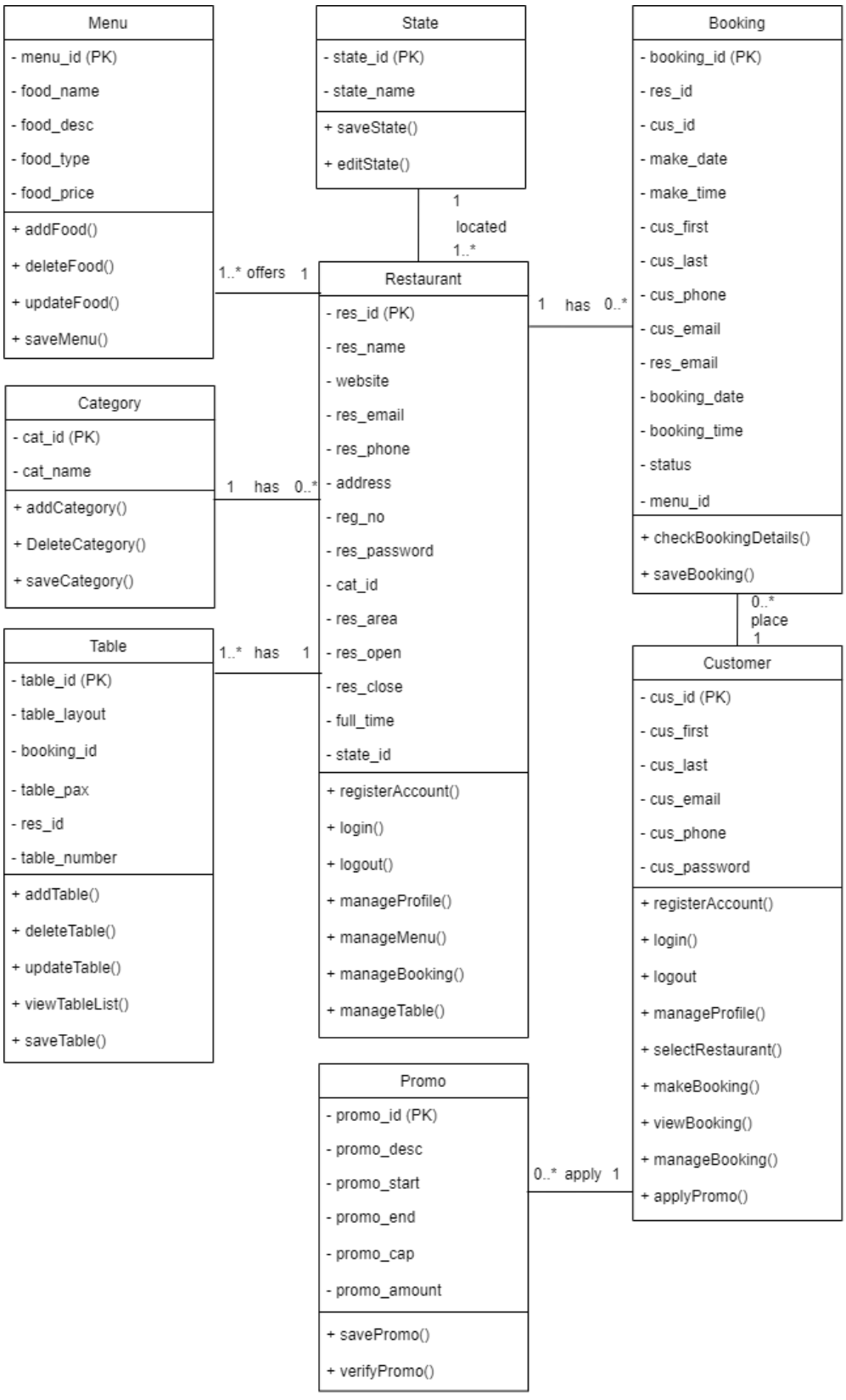

Figure 4.2 Class diagram of proposed system

Figure 4.2 shows the class diagram for the proposed system. In the customer class, the customer can perform the following actions, such as register for an account, login, logout, manage profile, select restaurant, make booking, view booking, manage booking, and apply promo.

A customer can place a booking, which its details will be recorded in the booking class, and the class can perform actions such as check booking details and save booking. Customers can also use promo codes provided by the platform before they confirm their bookings. The details of each promo will be stored in the promo class, and it can perform actions such as save promo and verify promo.

The restaurant, on the other hand, can register for an account, login, logout, manage profile, manage menu, manage booking, and manage table. The category class records the categories of restaurants and can perform the following actions, such as add category, delete category, and save category. Whereas the state class records the state of each restaurant is located at. It can perform actions such as save state and edit state.

Furthermore, the menu class records each menu item uploaded by the restaurant, which include actions such ass add food, delete food, update food, and save menu. In addition, the table class records the information of each table in the restaurant. It can perform actions such as add table, delete table, update table, view table list, and save table.

4.4 Wireframe Design

Wireframe sketches are black-and-white layouts created to visualize the screen layouts and functional elements. Serving as a blueprint for the website, it shows stakeholders where the page elements, site features, conversion areas, and navigation should be placed structurally [66] to better illustrate the user interface and user experience concept.

4.4.1 Customer Page Wireframe Design

This section displays all the wireframe sketches for the customer's page. This includes the home page, customer register page, login page, customer profile page, restaurant list page,

restaurant booking page, table selection page, booking confirmation page, promotions page, booking list page, booking details page, and modify booking page.

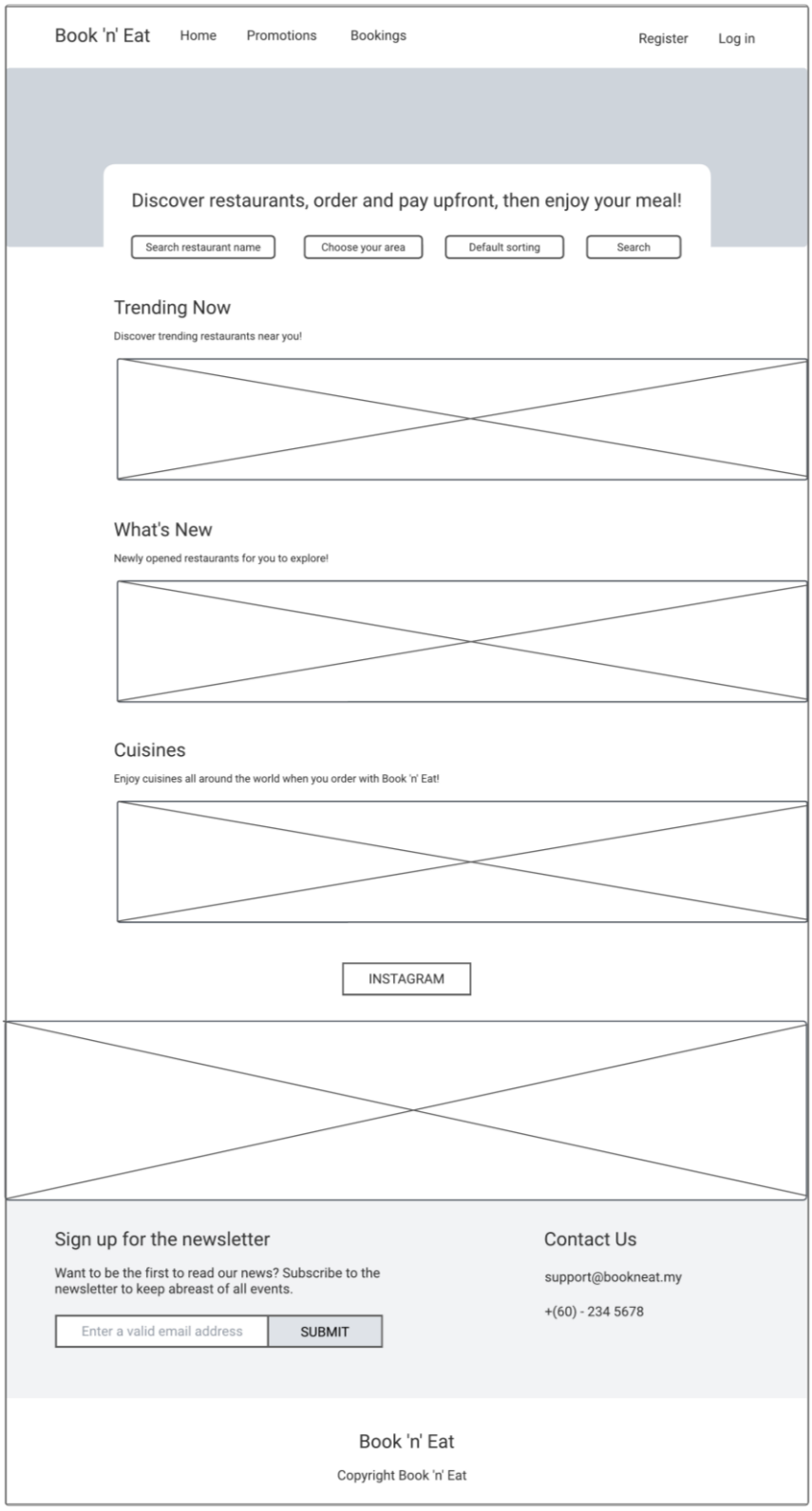

Figure 4.3 Wireframe sketch of home page

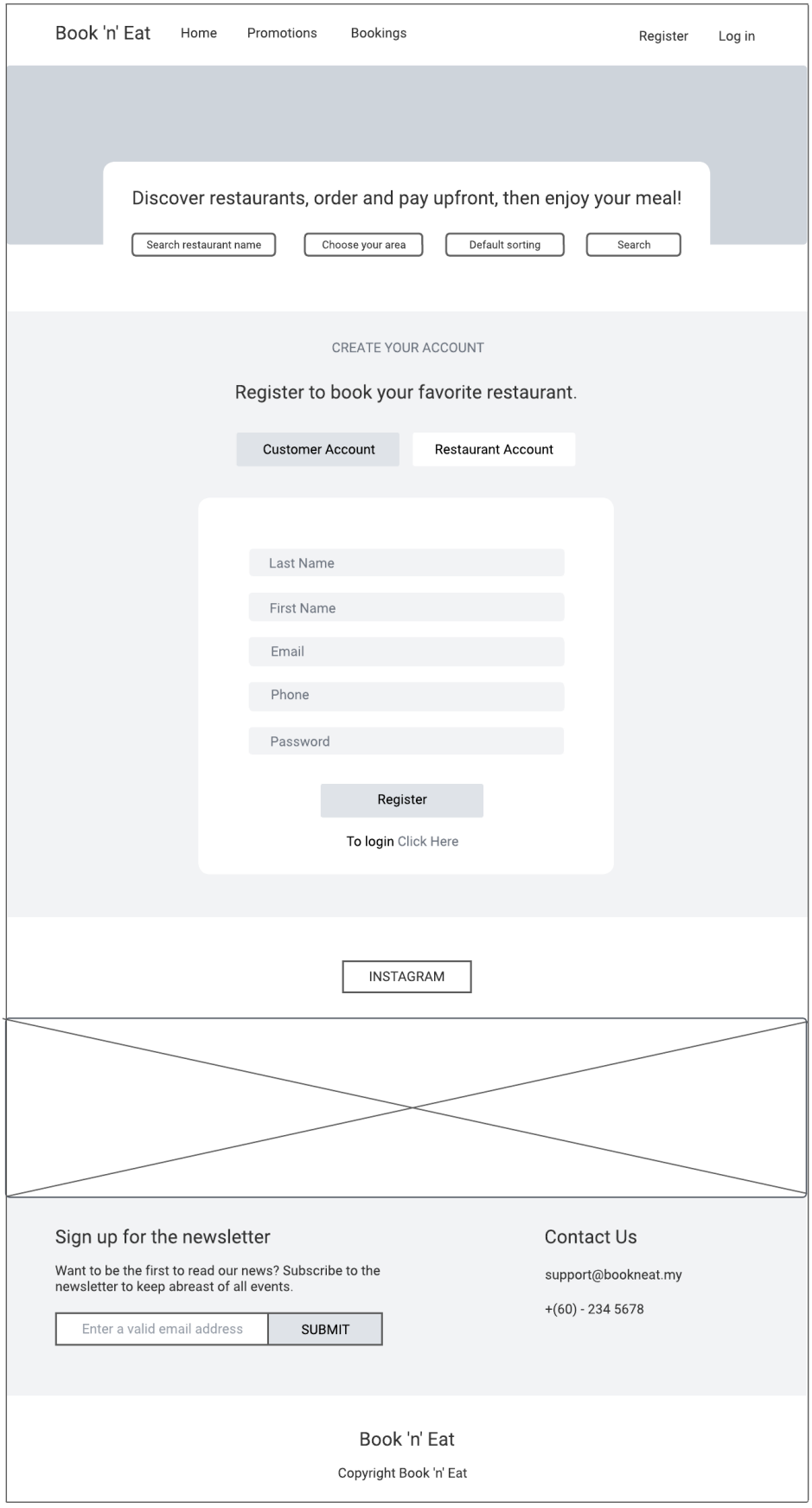

Figure 4.4 Wireframe sketch of customer register page

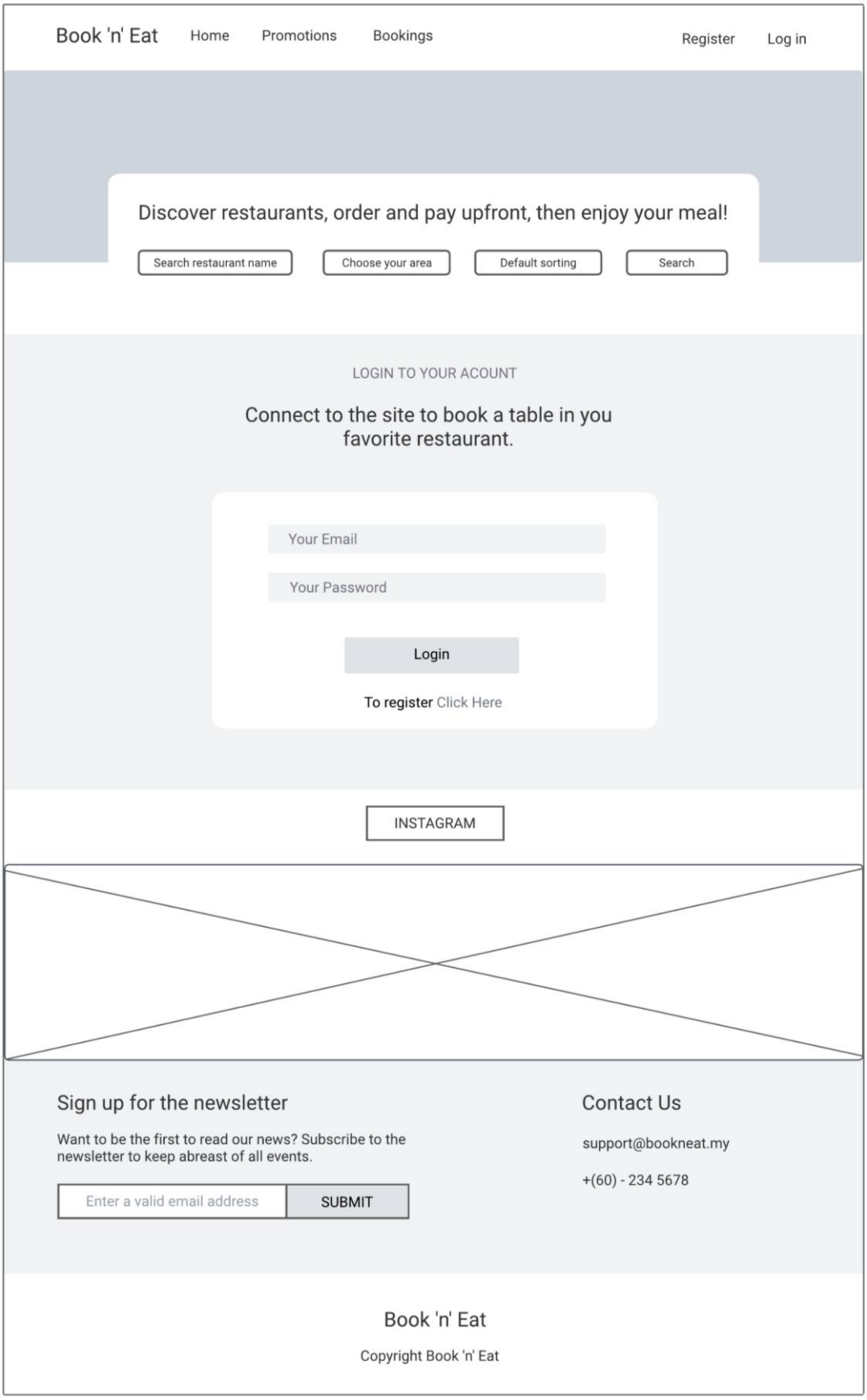

Figure 4.5 Wireframe sketch of login page

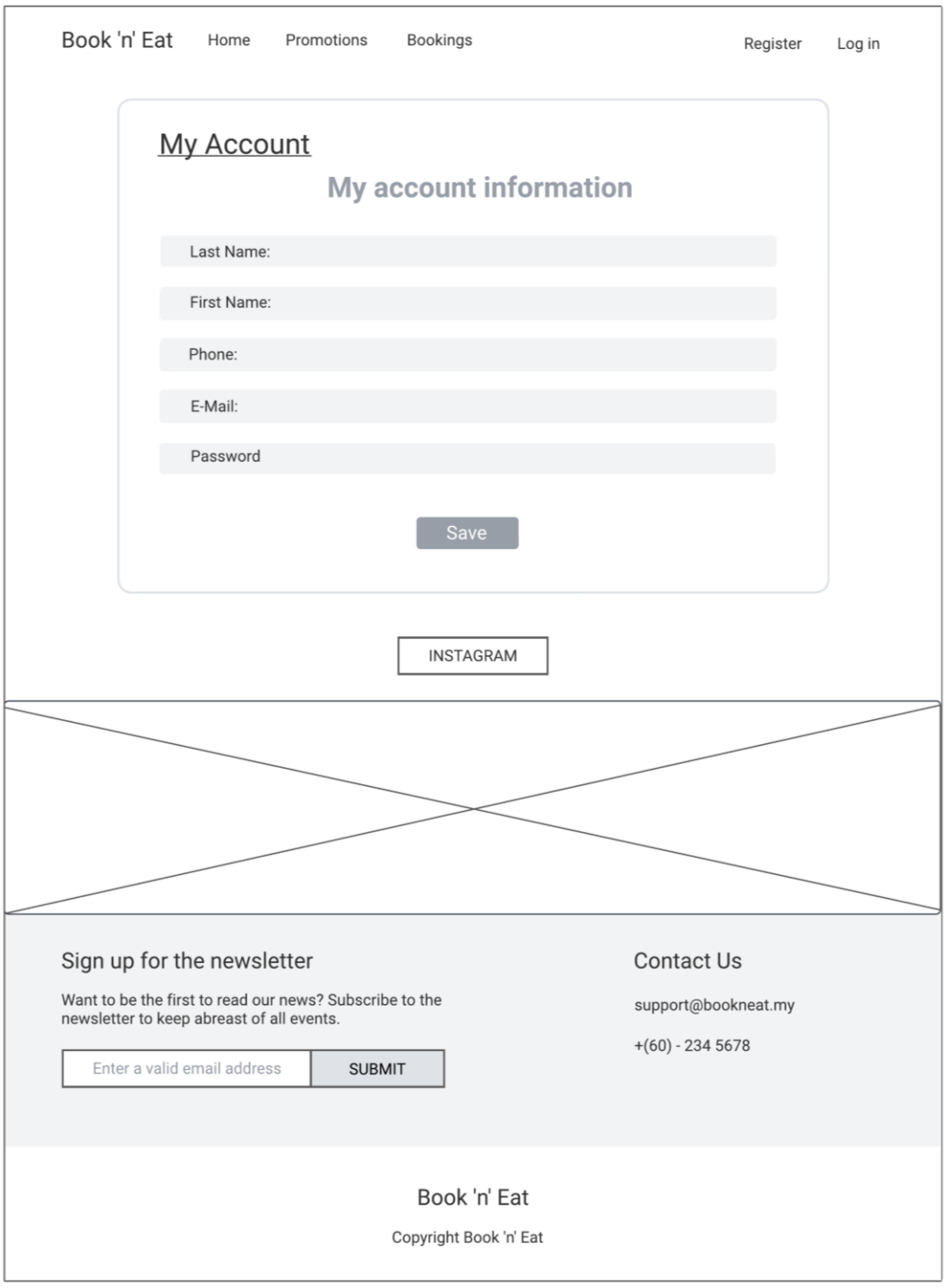

Figure 4.6 Wireframe sketch of customer profile page

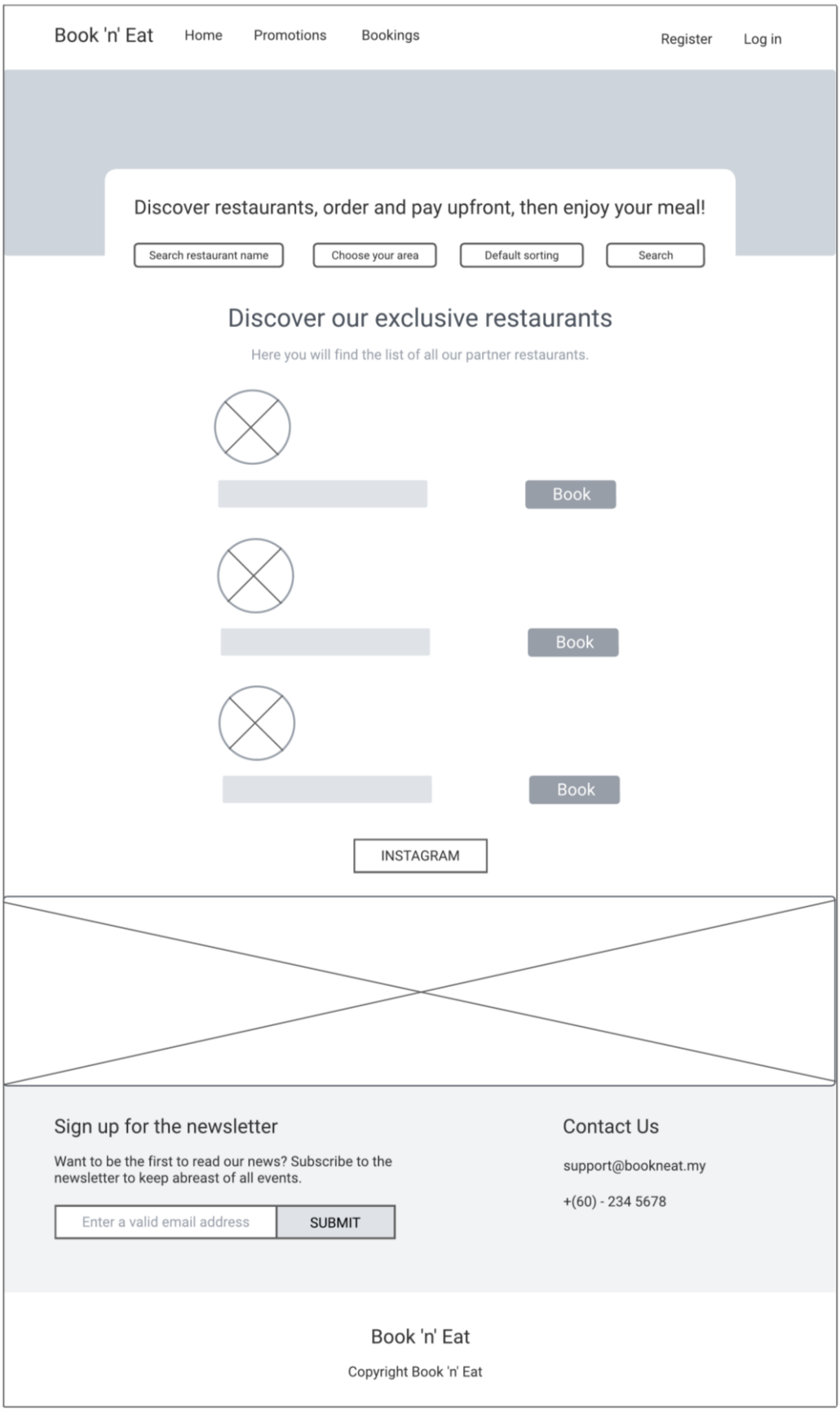

Figure 4.7 Wireframe sketch of restaurant list page

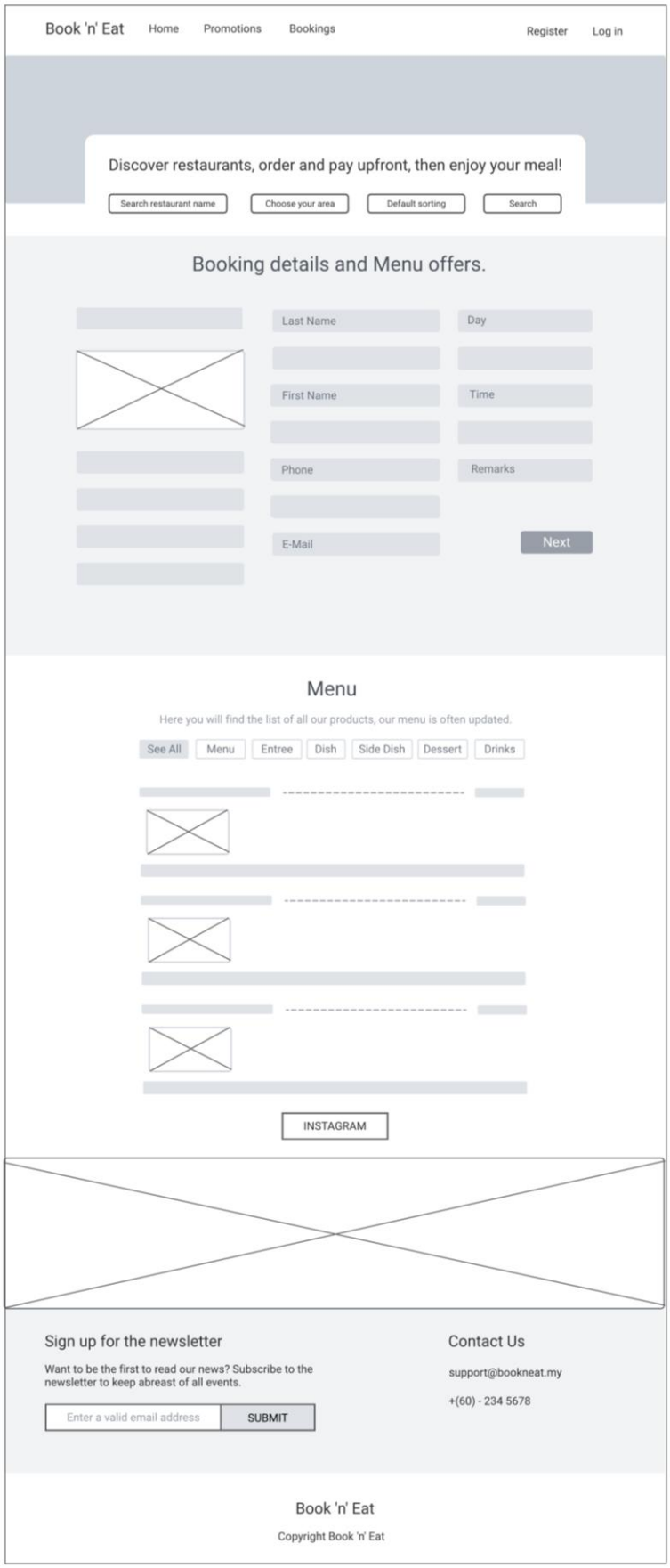

Figure 4.8 Wireframe sketch of restaurant booking page

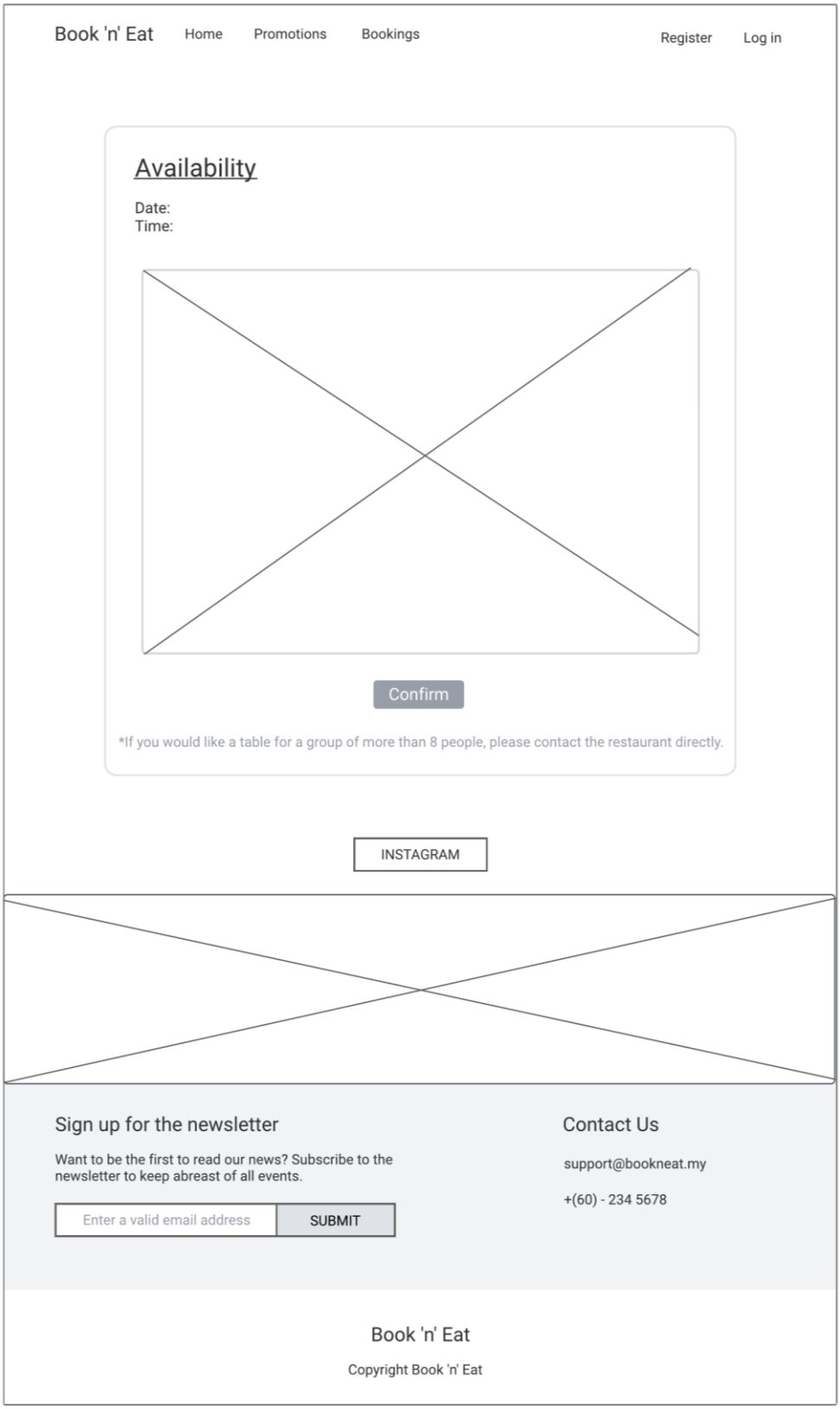

Figure 4.9 Wireframe sketch of table selection page

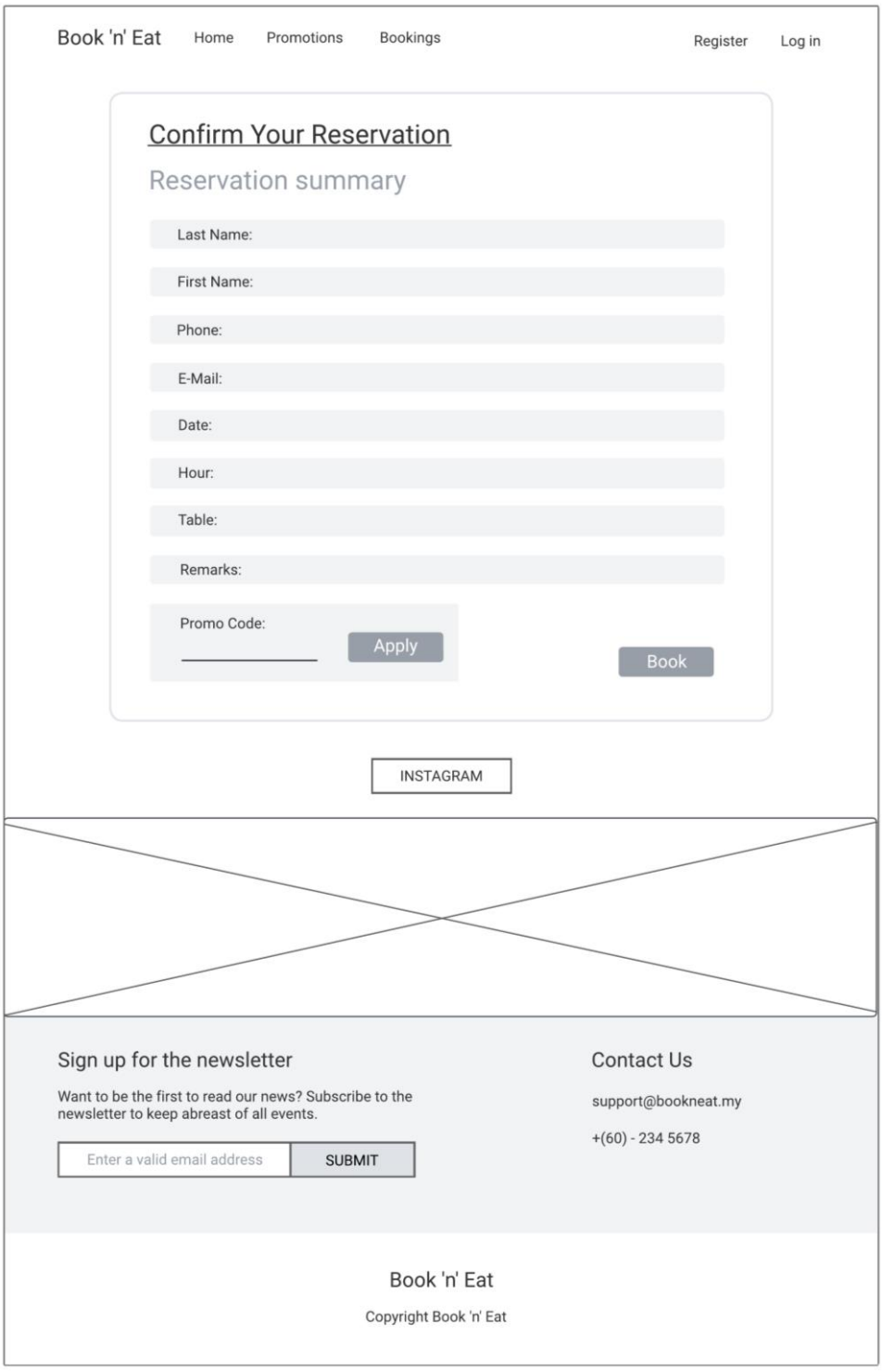

Figure 4.10 Wireframe sketch of booking confirmation page

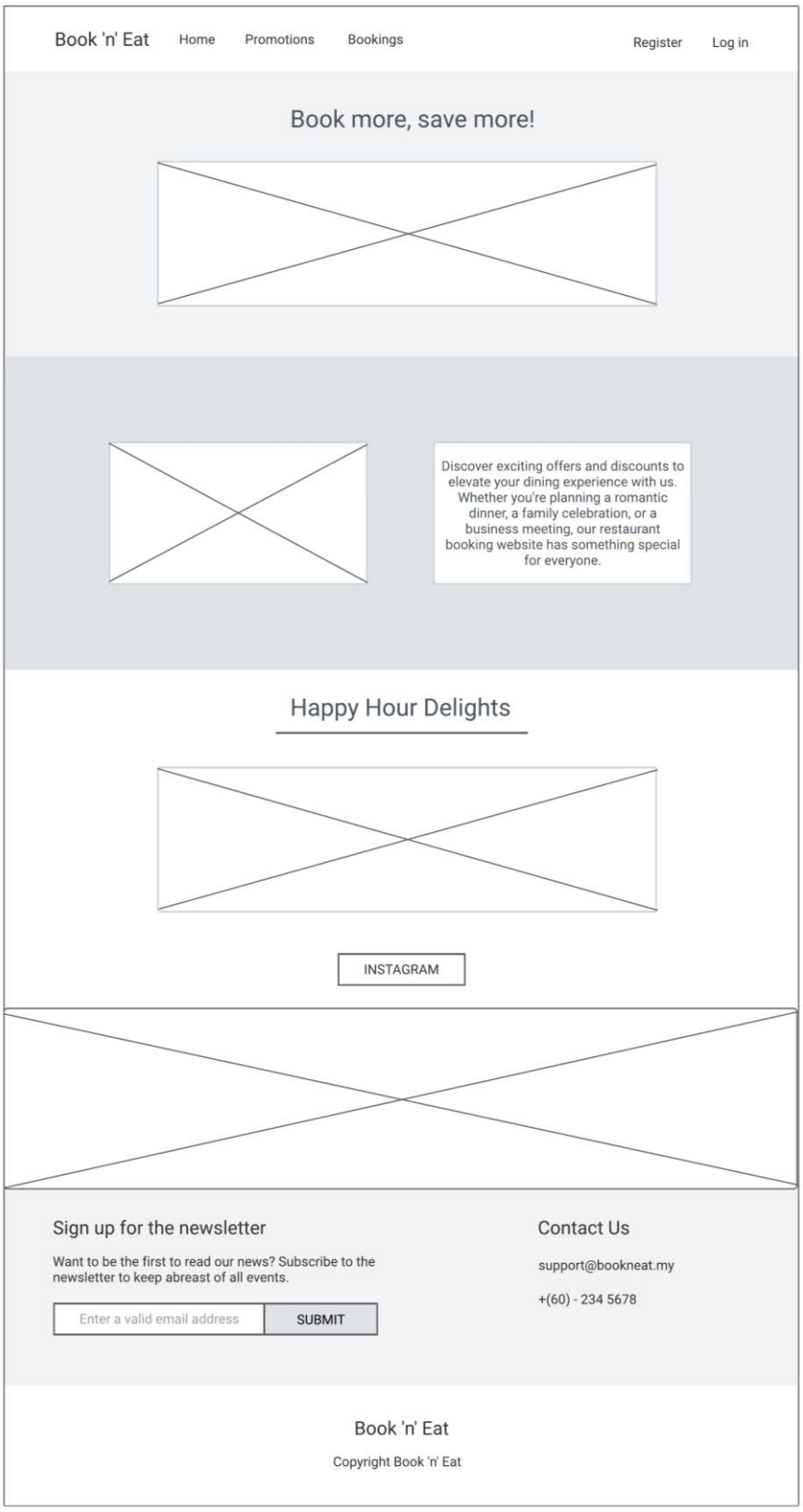

Figure 4.11 Wireframe sketch of promotions page

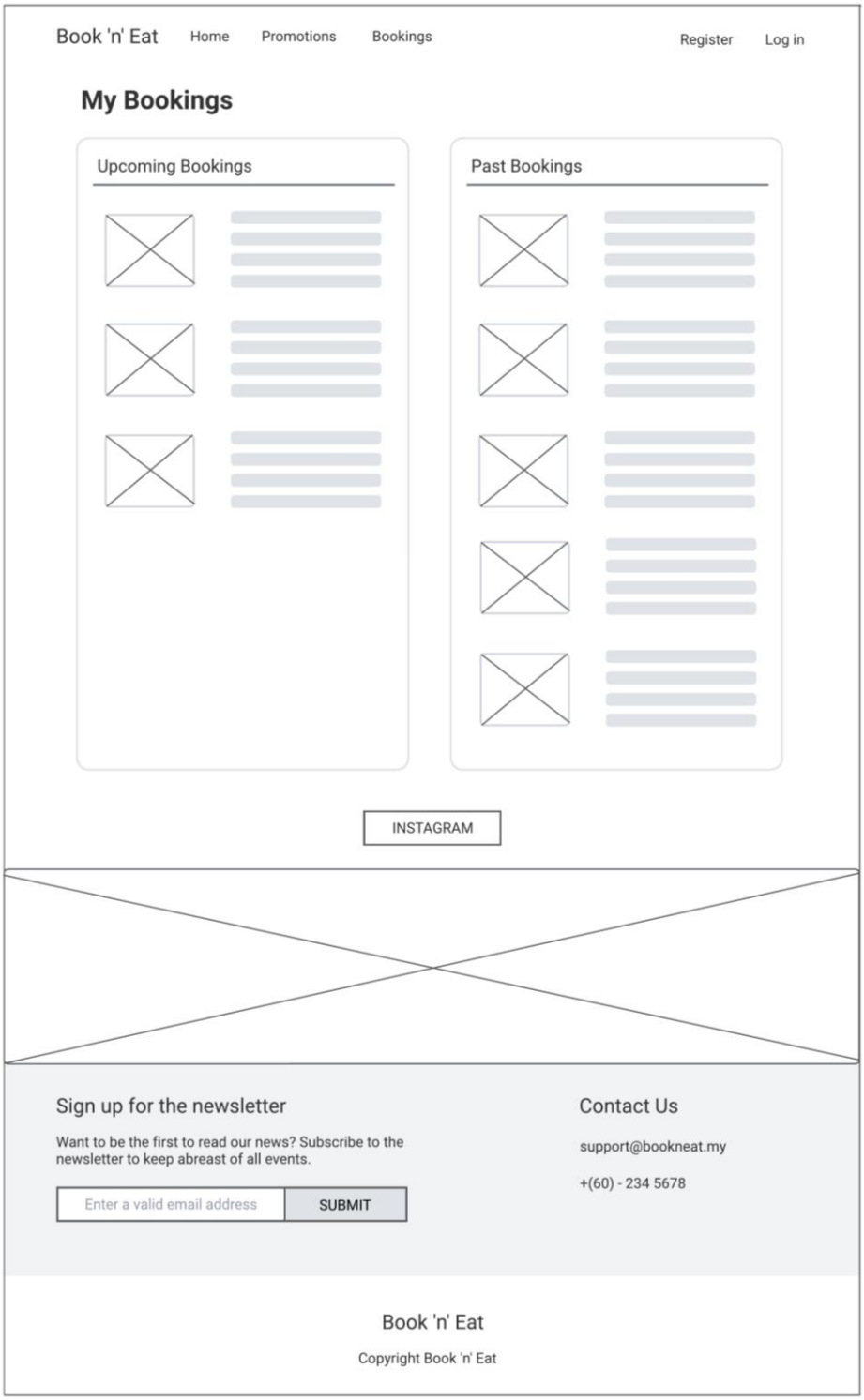

Figure 4.12 Wireframe sketch of bookings list page

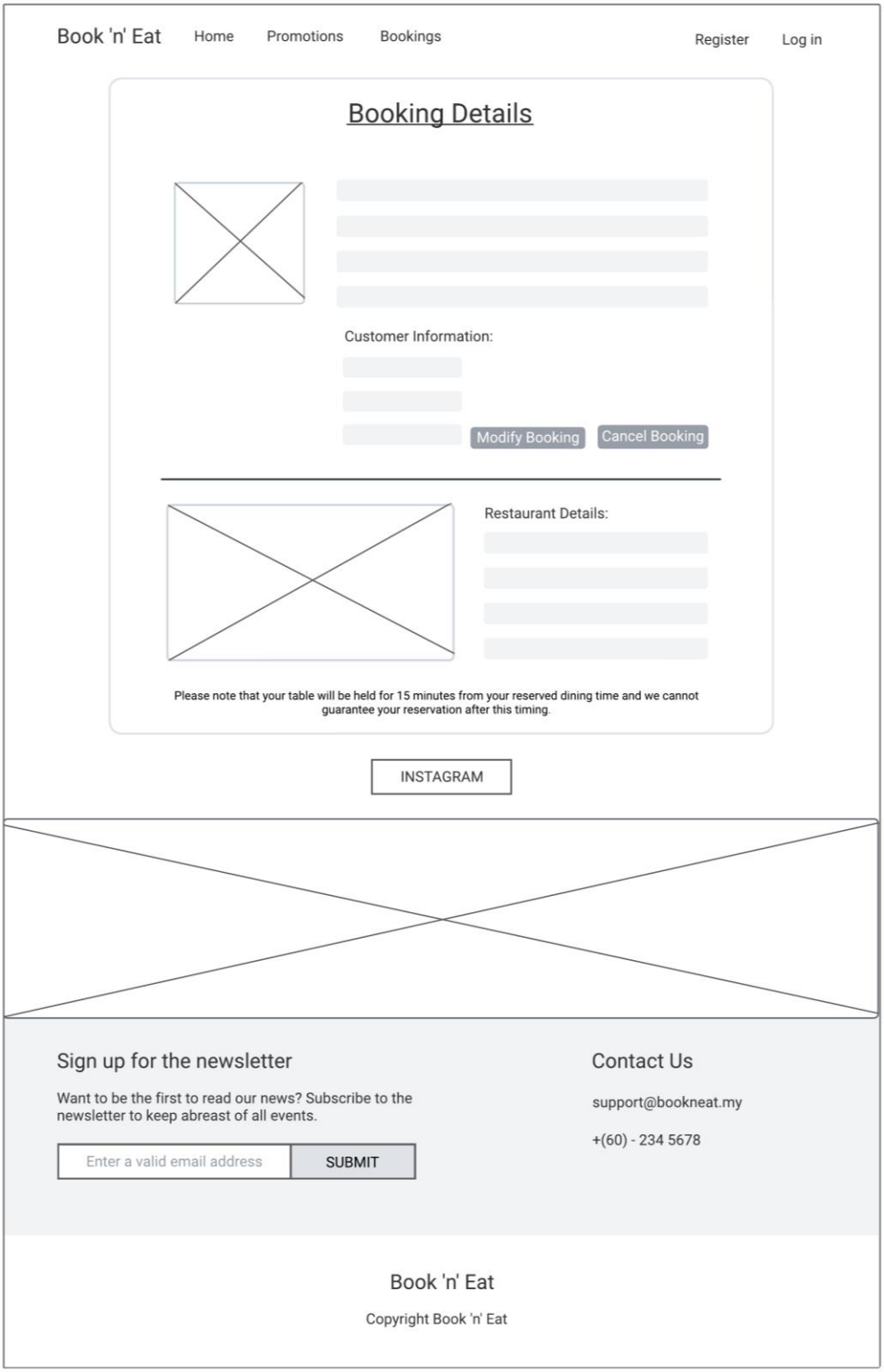

Figure 4.13 Wireframe sketch of booking details page

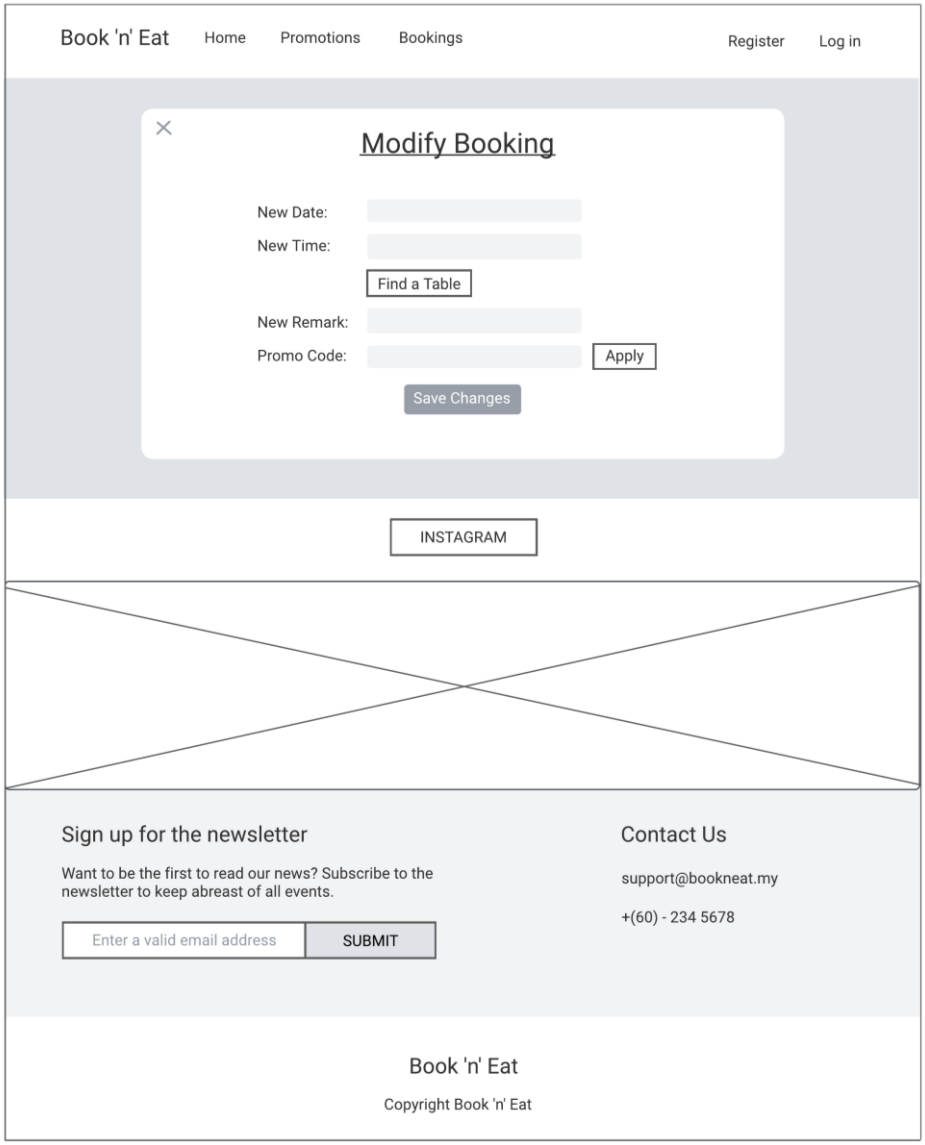

Figure 4.14 Wireframe sketch of modify booking page

4.4.2 Restaurant Owner Dashboard Wireframe Design

This section displays all the wireframe sketches for the restaurant owner's dashboard page. This includes the restaurant register page, restaurant profile page, dashboard home page, customer booking details page, add new table page, tables list page, add new menu item page, menu list page, monthly analytics page, and yearly analytics page.

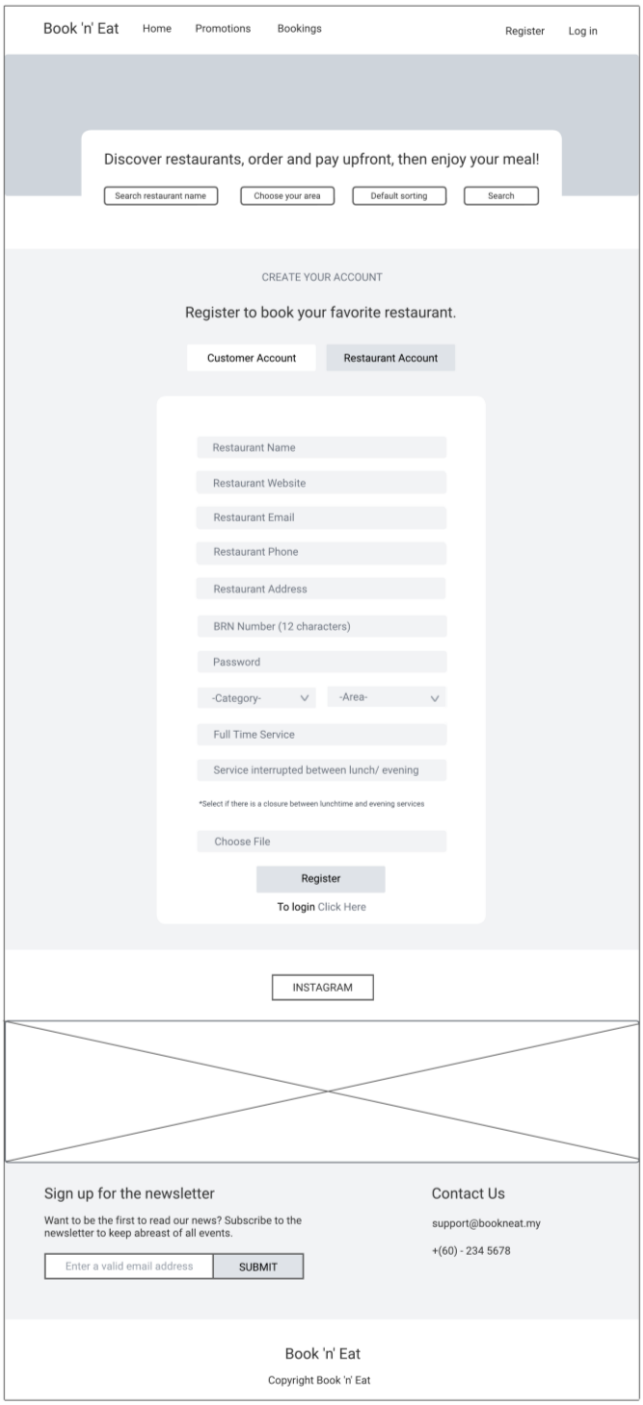

Figure 4.15 Wireframe sketch of restaurant register page

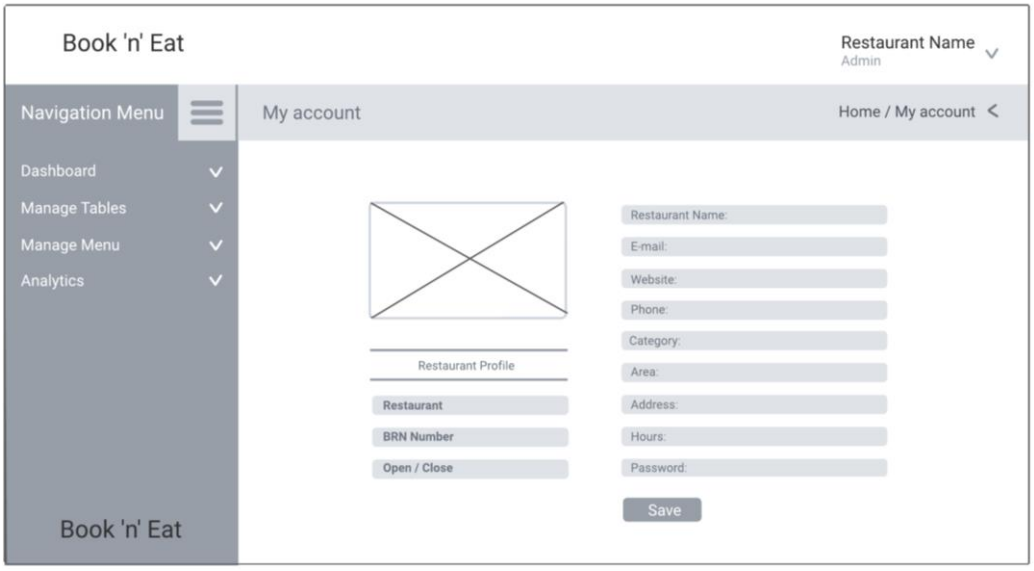

Figure 4.16 Wireframe sketch of restaurant profile page

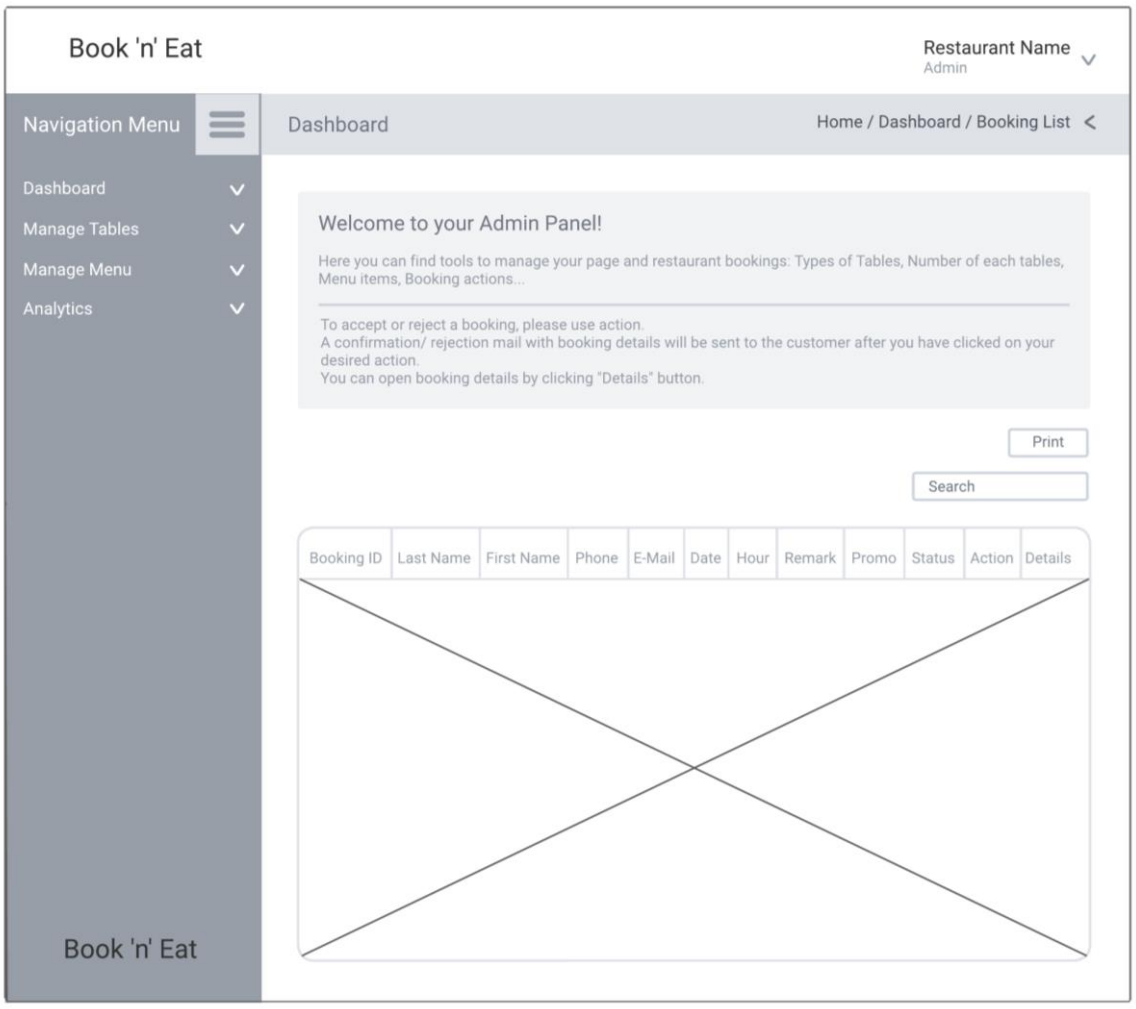

Figure 4.17 Wireframe sketch of restaurant owner dashboard home page

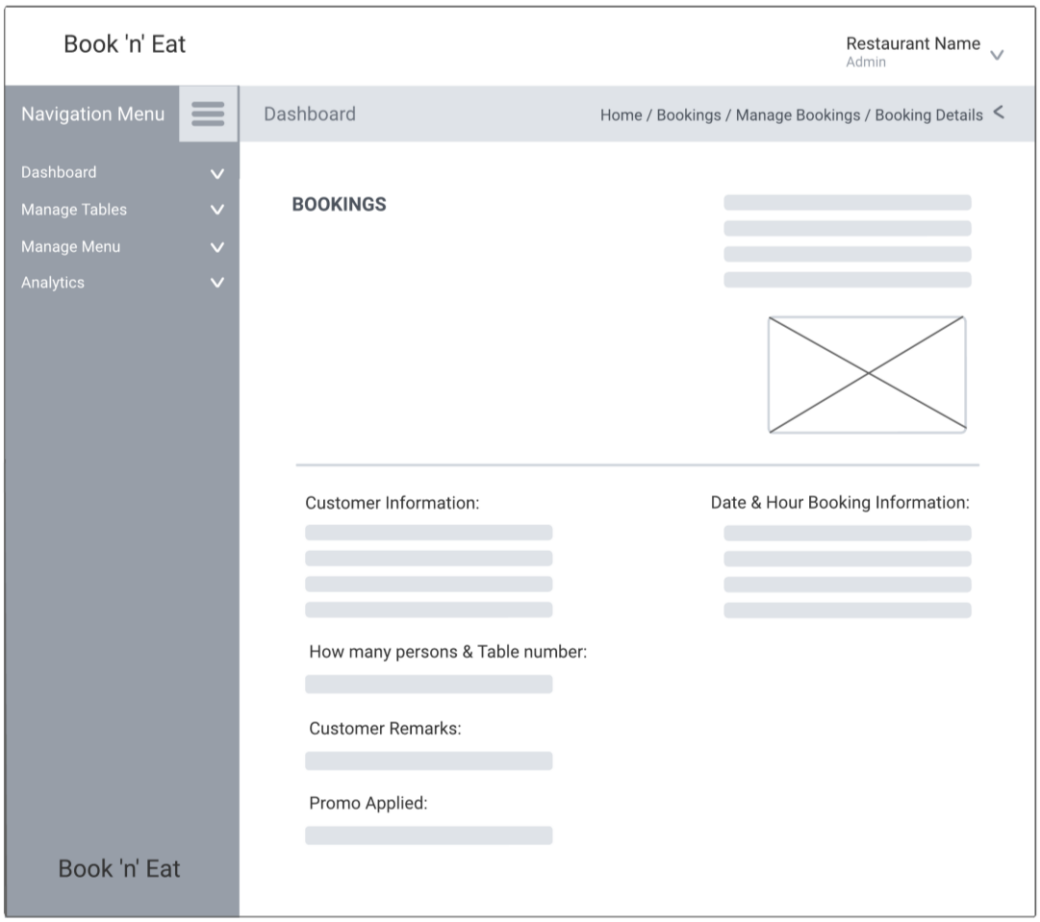

Figure 4.18 Wireframe sketch of customer booking details page

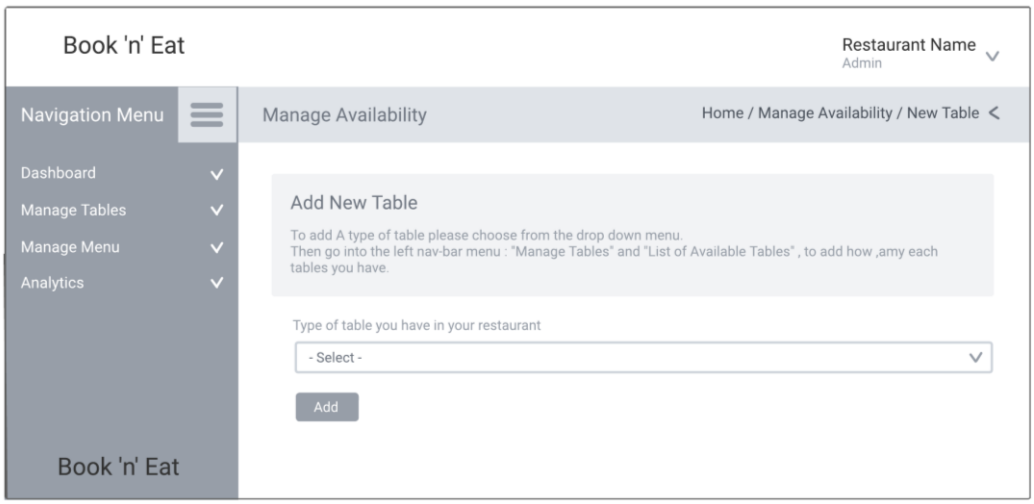

Figure 4.19 Wireframe sketch of add new table page

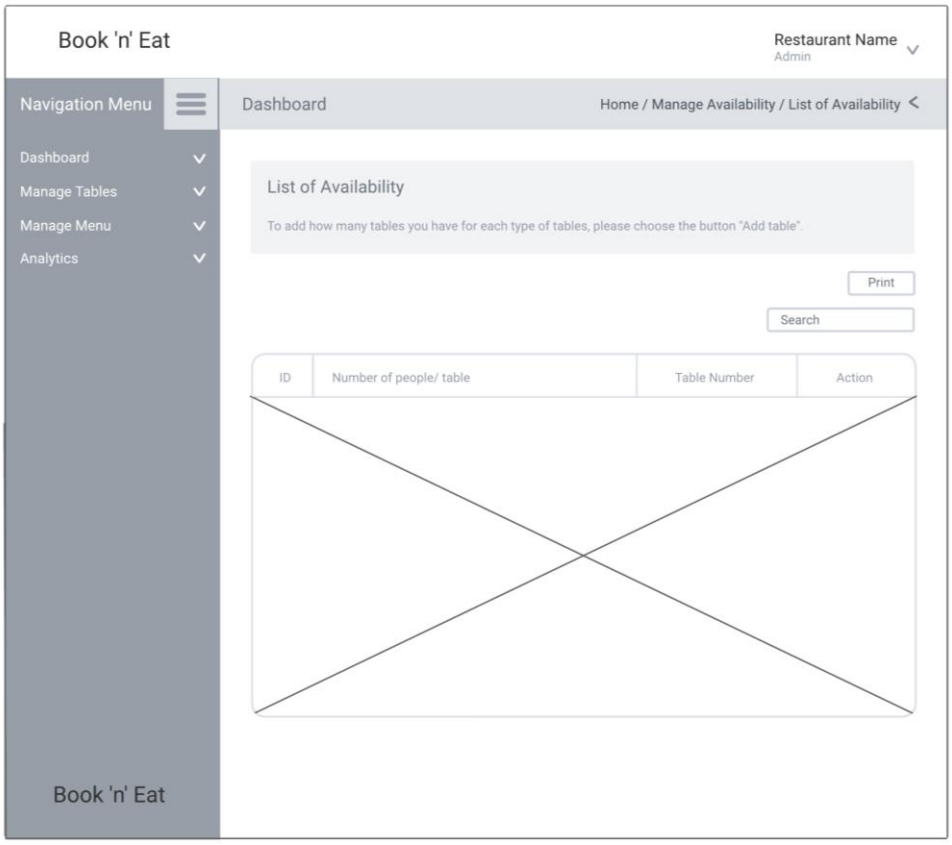

Figure 4.20 Wireframe sketch of tables list page

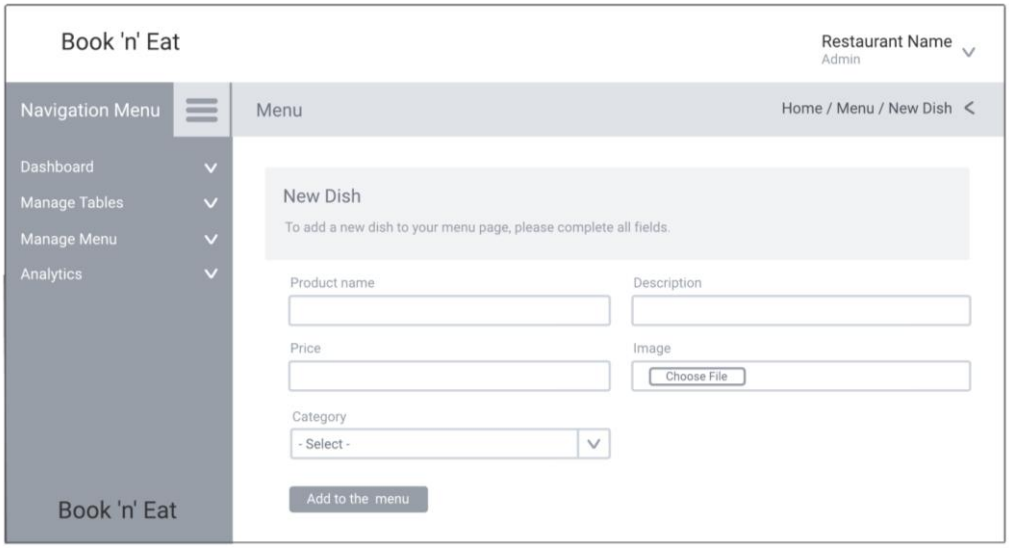

Figure 4.21 Wireframe sketch of add new menu item page

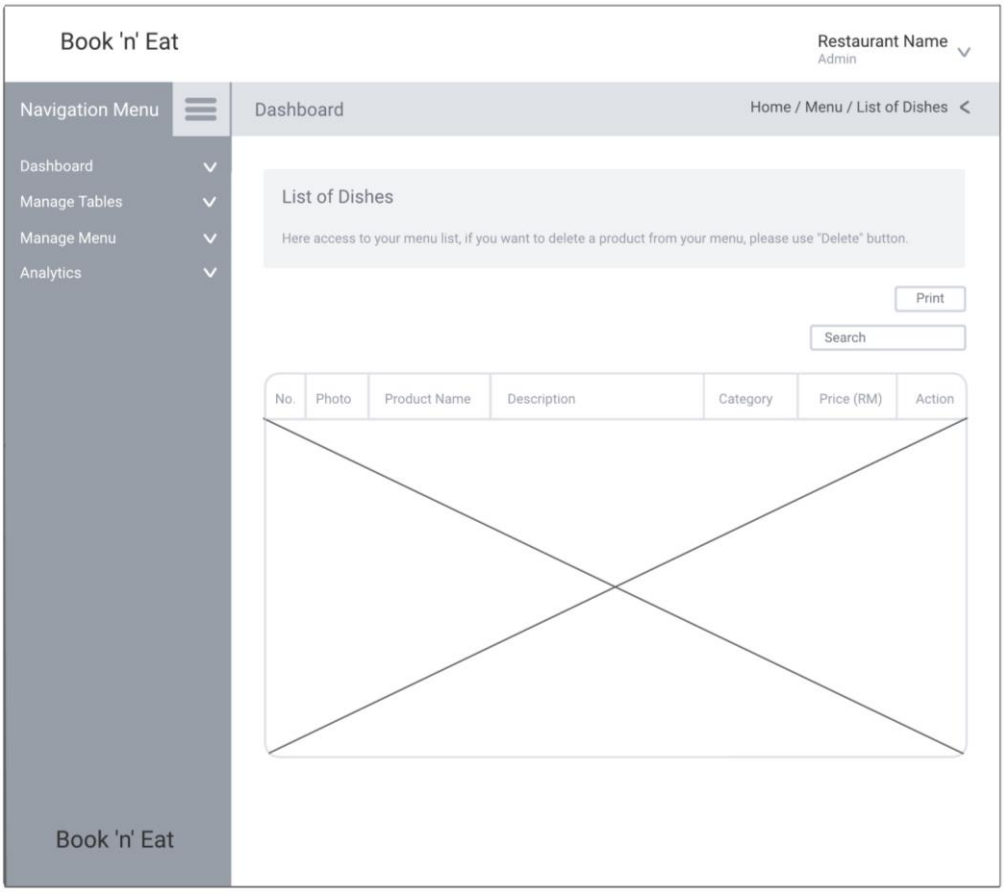

Figure 4.22 Wireframe sketch of menu list page

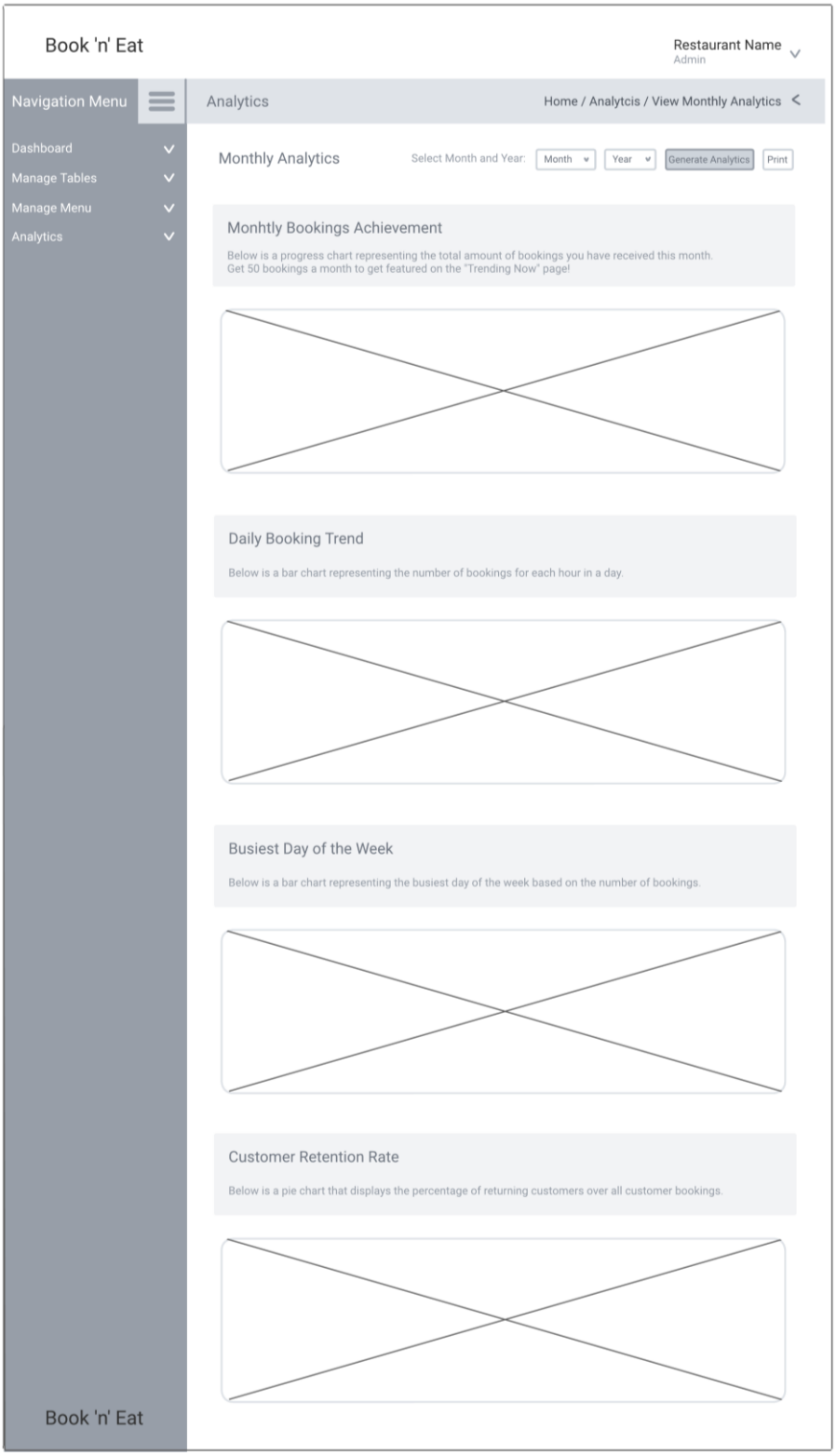

Figure 4.23 Wireframe sketch of monthly analytics page

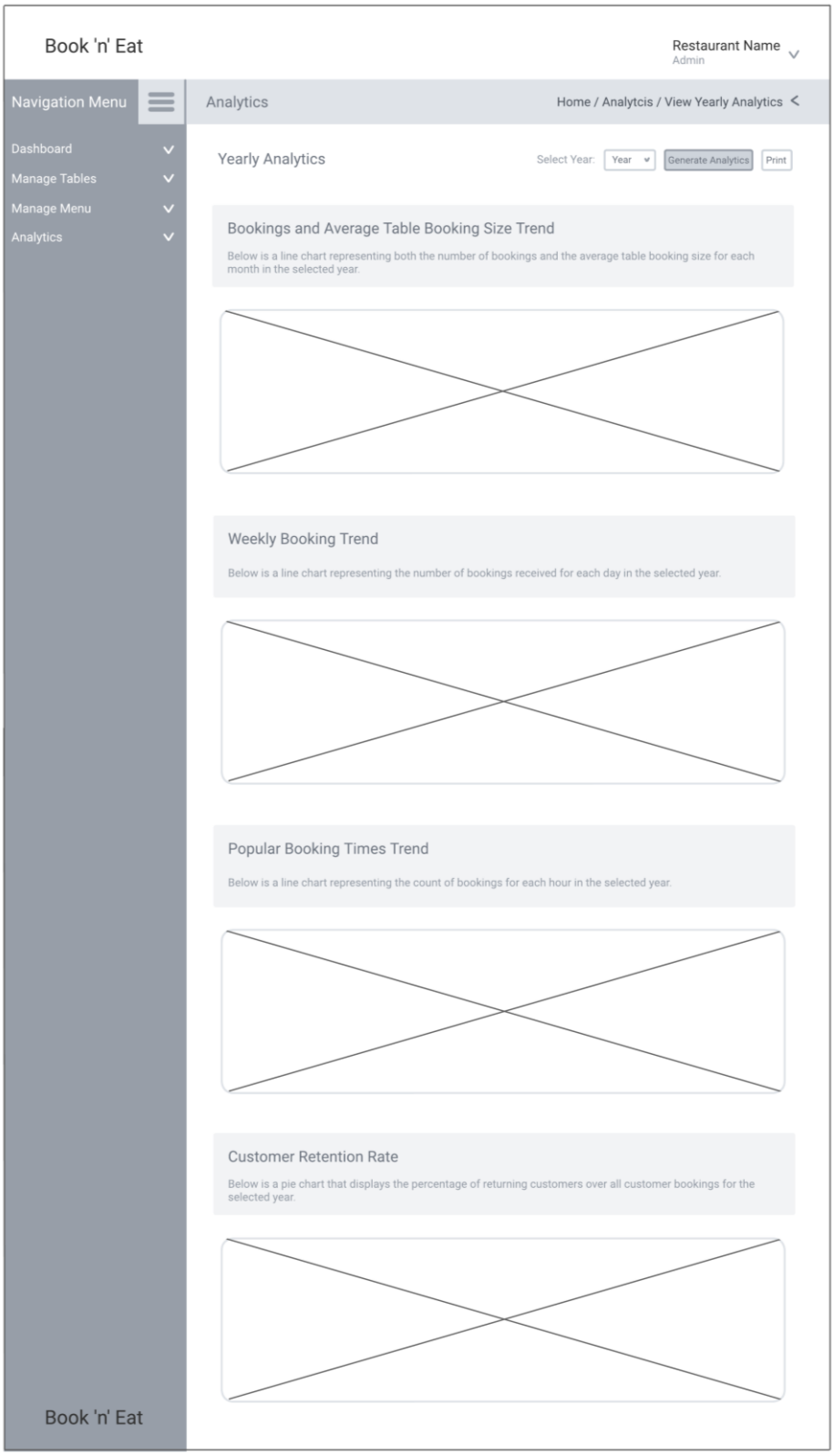

Figure 4.24 Wireframe sketch of yearly analytics page

4.4.3 Web Administrator Dashboard Wireframe Design

This section displays all the wireframe sketches for the web administrator's dashboard page. This includes the restaurant application management page and the restaurant application details page.

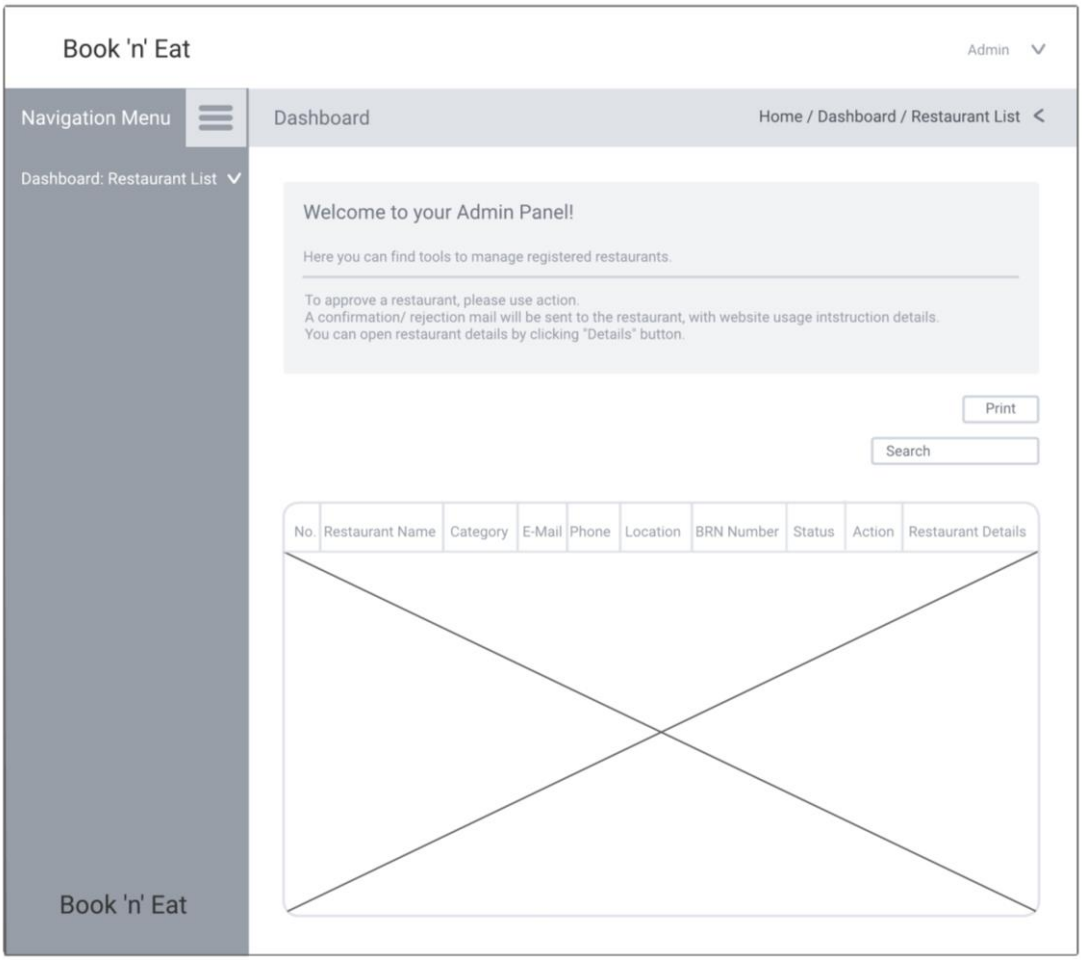

Figure 4.25 Wireframe sketch of restaurant application management page

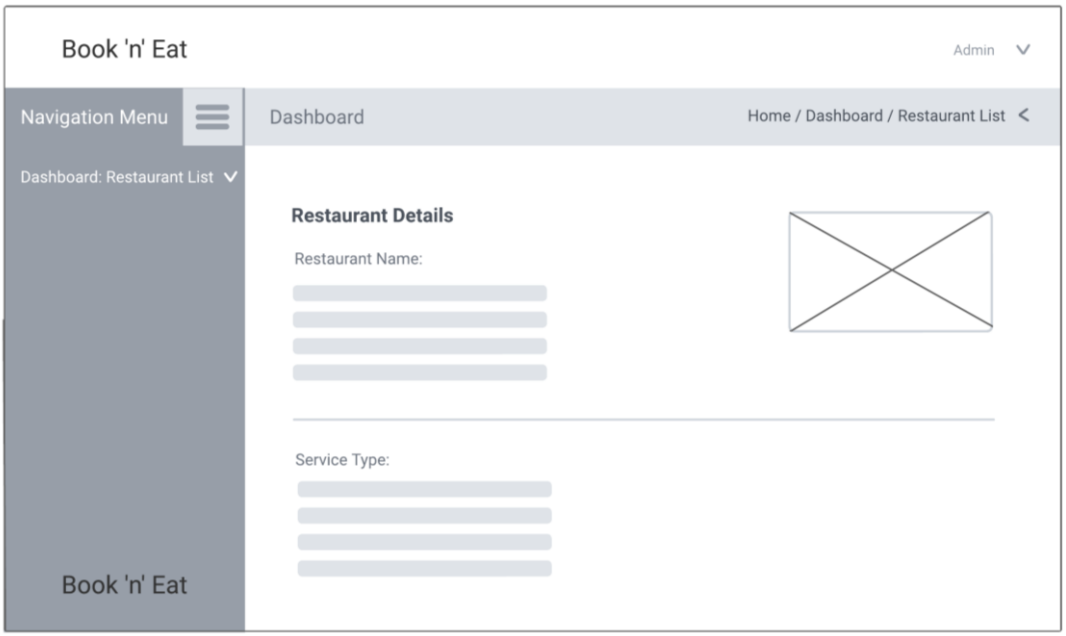

Figure 4.26 Wireframe sketch of restaurant application details page

Chapter 5

System Implementation

5.1 Hardware Setup

To use the e-Reservation Restaurant web application efficiently, users are required to have a laptop or computer with moderate specifications. This includes an Intel Core i5 processor or equivalent with at least 8GB of RAM and 1GB of hard-disk space. Moreover, they must have a steady internet connection with a decent speed to enjoy smooth navigation and real-time updates. For optimal viewing experience, it is advised to have a screen resolution of 1280 x 800 or above. These hardware requirements are necessary so that users can users can access all the features and functionalities of the system without having any performance problems.

5.2 Software Setup

Users need to have specific software components and configurations in order to ensure seamless access and interaction with the e-Reservation Restaurant web application. Thus, the following software setup components are a prerequisite to enable to website to function as expected:

1. **Web Browser:** A modern web browser should be installed by all users. Google Chrome, Mozilla Firefox, or Microsoft Edge are good options to install as the browser's latest version. It is important to keep your browser up-to-date in order for it to be well-compatible and perform optimally when using the website.

2. **Local Web Server:** In order to develop and test locally, one has to set up a local web server. XAMPP is recommended as it consists of Apache as its web server software, utilizes MySQL for its database management system and PHP for server-side scripting. XAMPP can be downloaded from https://apachefriends.org/ [67] by following the instructions in section 5.3 of the report.

3. **Source Code:** It is required to download the source code zip file for the e-Reservation Restaurant from the authorized source. This file has all the important files and scripts needed to make sure that the website works well.

4. **Database Management Tool:** It is essential to have a database management tool that will manage the website's database. PHPMyAdmin, a web-based administration tool for MySQL databases, is recommended. PHPMyAdmin usually comes with XAMPP and can be accessed via the PHPMyAdmin local host once the user starts the local web server [53].

5. **Text Editor or Integrated Development Environment (IDE):** A text editor or IDE is not a must but advantageous to developers who want to edit or customize the site's source code. Visual Studio Code is the most popular choice that can be downloaded as it allows better integration with a wide array of extensions [50].

With these software components correctly set up and configured, users can access the e-Reservation Restaurant web application using their browser. The XAMPP web server serves this website locally while tasks like database management and code changes can be accomplished using PHPMyAdmin along with a text editor or IDE. Thus, by enabling this setup, a stable and efficient environment is created for both users and developers to ensure a seamless user experience and further facilitate future customization possibilities when required.

5.3 Setting and Configuration

Users and developers must correctly configure the software components in order to access and use the e-Reservation Restaurant web application. Hence, this section gives a thorough explanation of how to set up and configure the required components for a seamless experience.

5.3.1 Downloading XAMPP and Configuring the Server

Firstly, navigate to the official website, Apache Friends (https://apachefriends.org/ [67]) to download XAMPP. Select the suitable download version according to the device's operating system to start the download.

Figure 5.1 XAMPP download source [67]

After the file is downloaded, double-click it to start the installation process.

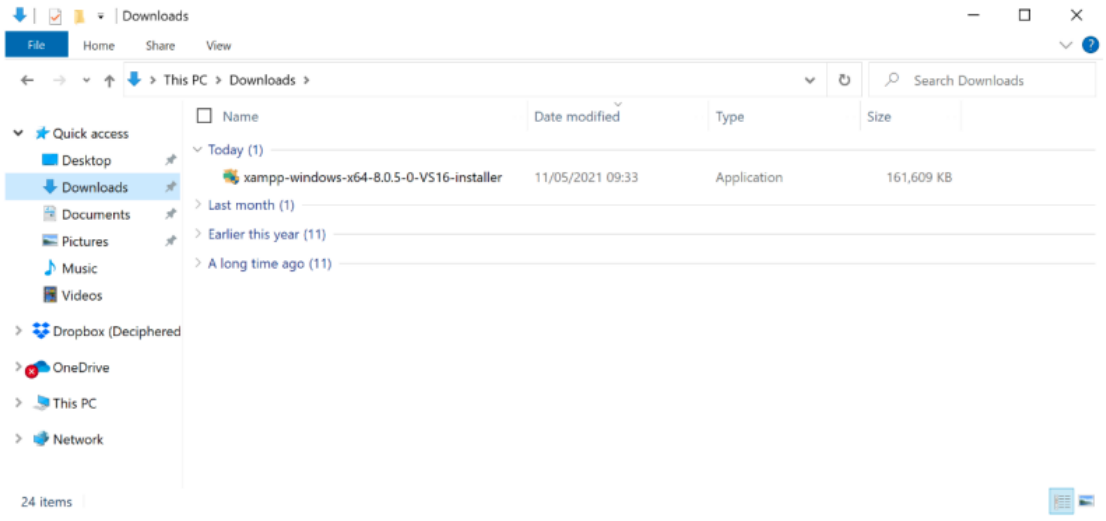

Figure 5.2 Initiate the XAMPP file installation process

Next, it is required to select the destination folder to install XAMPP. This step is crucial as it is needed to copy all the project files into this location later. After selecting the destination folder, click on the "Next" button to proceed with the next step.

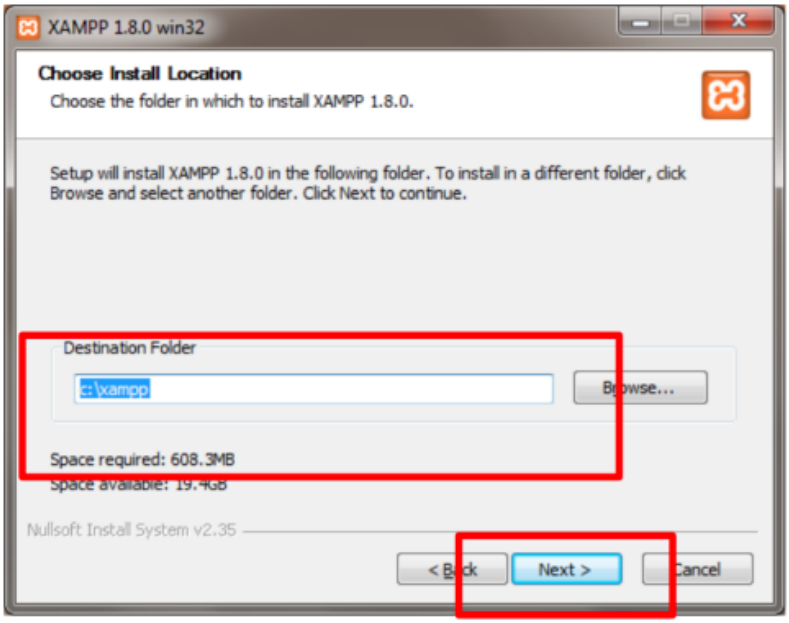

Figure 5.3 Selecting destination folder

After that, check all of the XAMPP options to enable its full functionalities. Then, click on "Install" to start the installation.

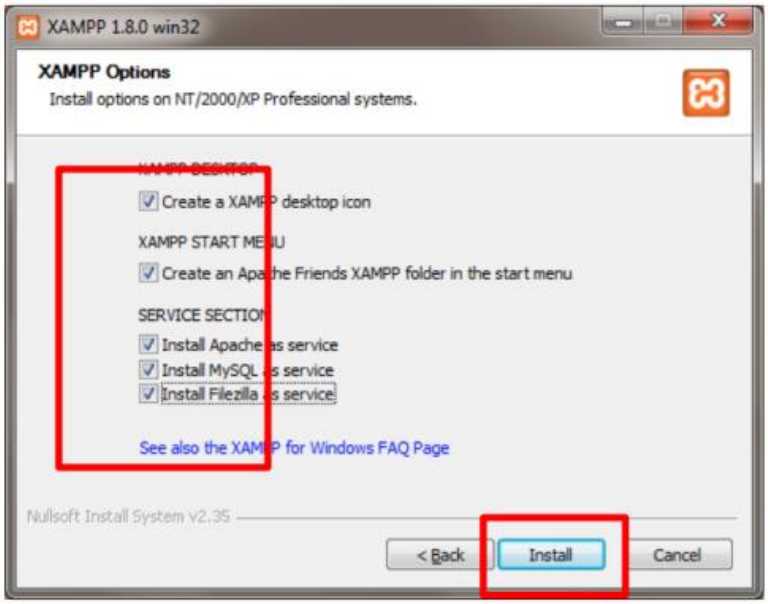

Figure 5.4 Checking XAMPP options

Once it is successfully installed, type “XAMPP” on the device search bar and click on “XAMPP Control Panel” to open the application.

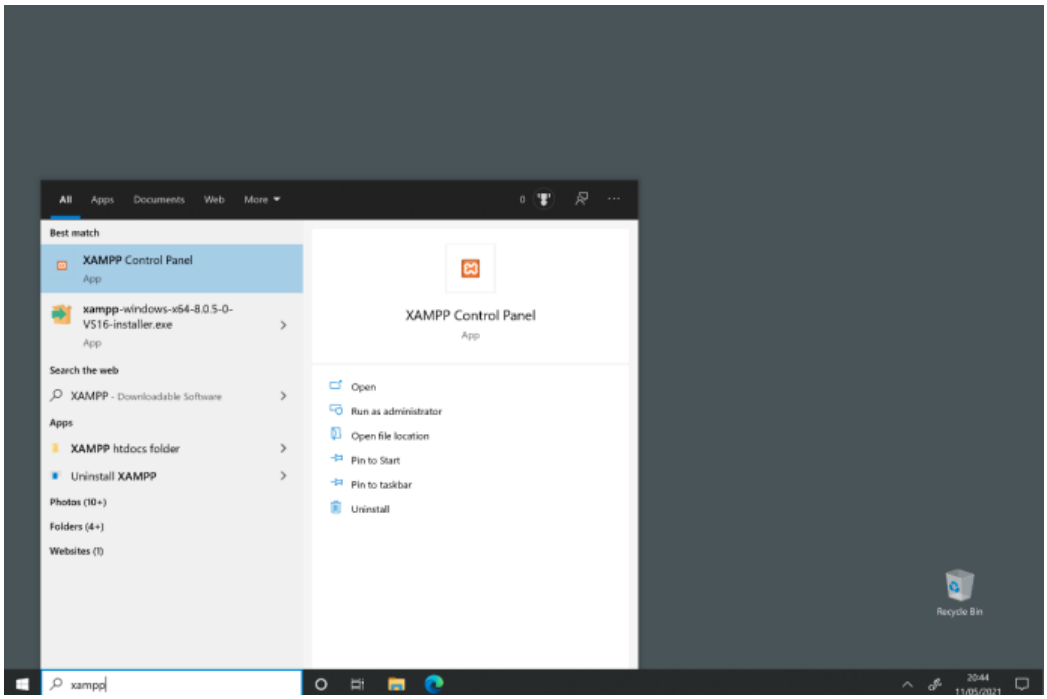

Figure 5.5 Opening XAMPP application

The control panel of XAMPP is as shown in Figure 5.6. Click on the “Start” action for Apache and MySQL to enable MySQL connection.

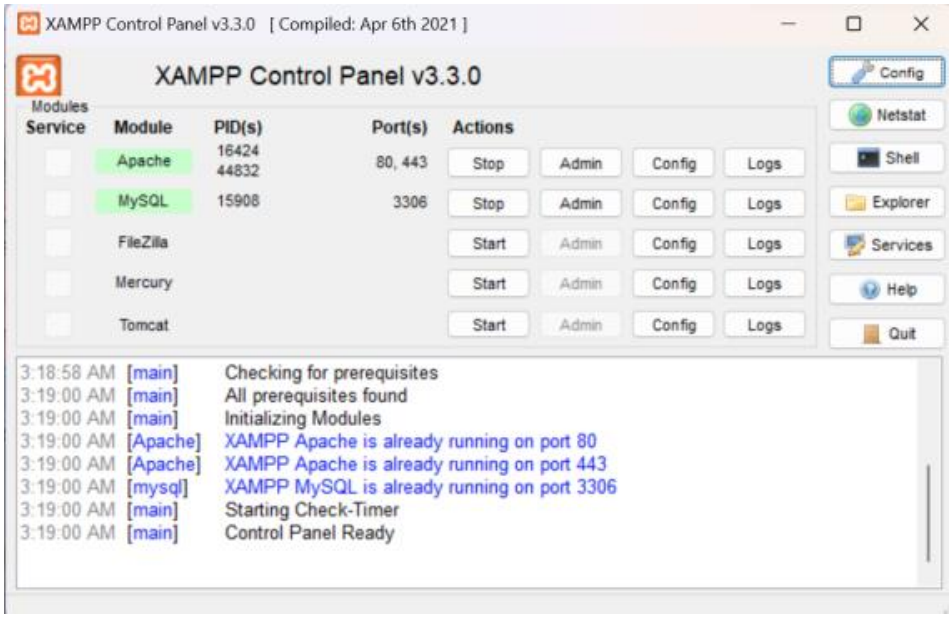

Figure 5.6 XAMPP control panel

5.3.2 e-Reservation Restaurant Source Code Setup

Firstly, download the e-Reservation Restaurant source code zip file into the device. Make sure to extract the zip file to recover the original files.

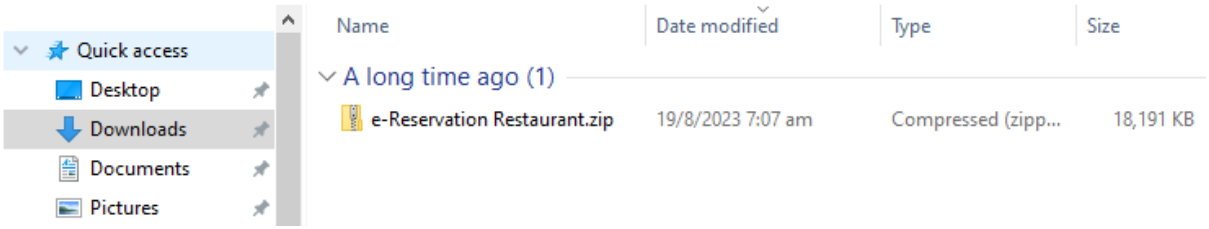

Figure 5.7 Source code download

Next, navigate to the location where XAMPP is installed. For example, Figure 5.8 shows XAMPP is downloaded in local disk C of the device. Paste the extracted contents into the "htdocs" folder. This folder is responsible for storing all the programs for the web pages.

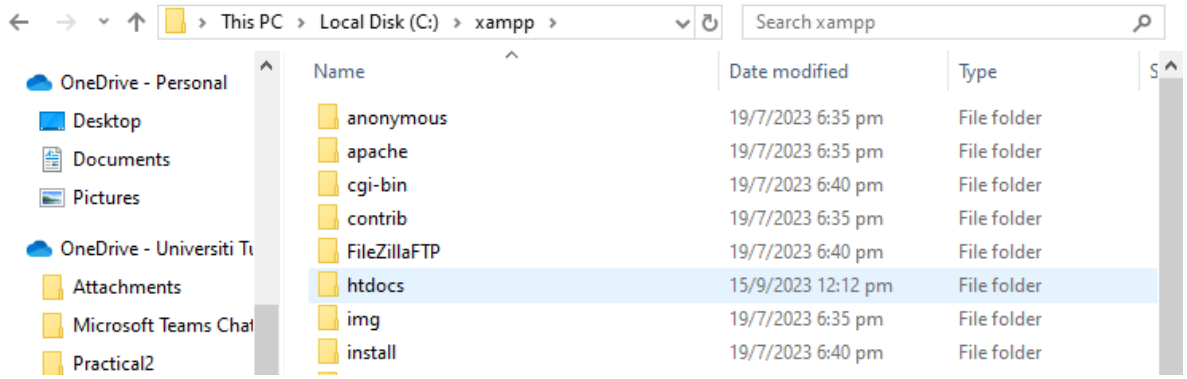

Figure 5.8 Paste contents to XAMPP root folder

5.3.3 Database Configuration

After downloading XAMPP and the source code zip file, it is also required to have a database management system to store and manage all of the web application's data. To do this, open any web browser on the device and insert http://localhost/phpmyadmin [53] into the search bar and click enter. This action will redirect users to the phpMyAdmin site (Figure 5.9).

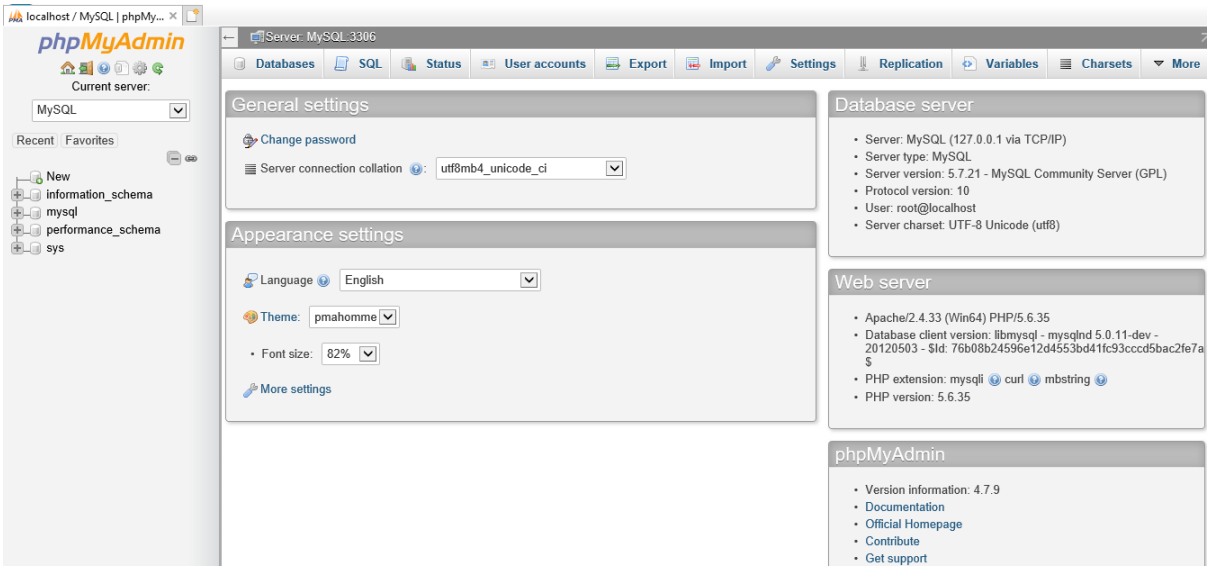

Figure 5.9 phpMyAdmin site

To create a database, click on the “Databases” tab and enter the database name “restaurant_db” into the “Create database” field (Figure 5.10). Then, click on the “Create” button and a new database named restaurant_db will be created.

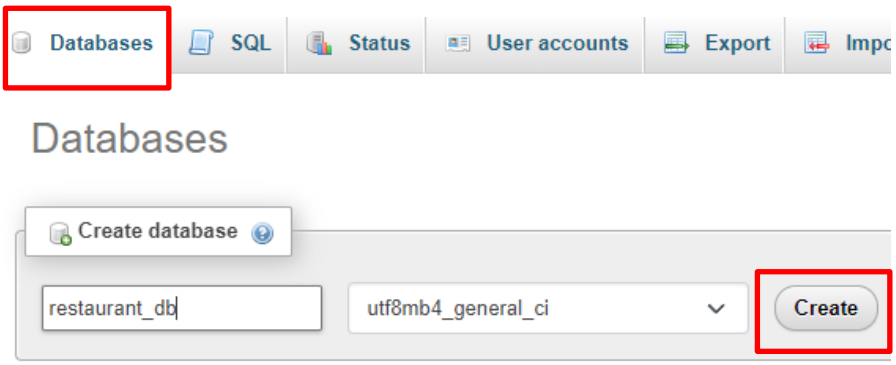

Figure 5.10 Create new database

The next step is to import the SQL data into phpMyAdmin. Click on the “Import” tab (Figure 5.11) and choose the file “restaurant_db.sql” that is provided in the e-Reservation Restaurant source code zip file. Once the file is selected, click on the “Import” button to load the SQL data into the phpMyAdmin site.

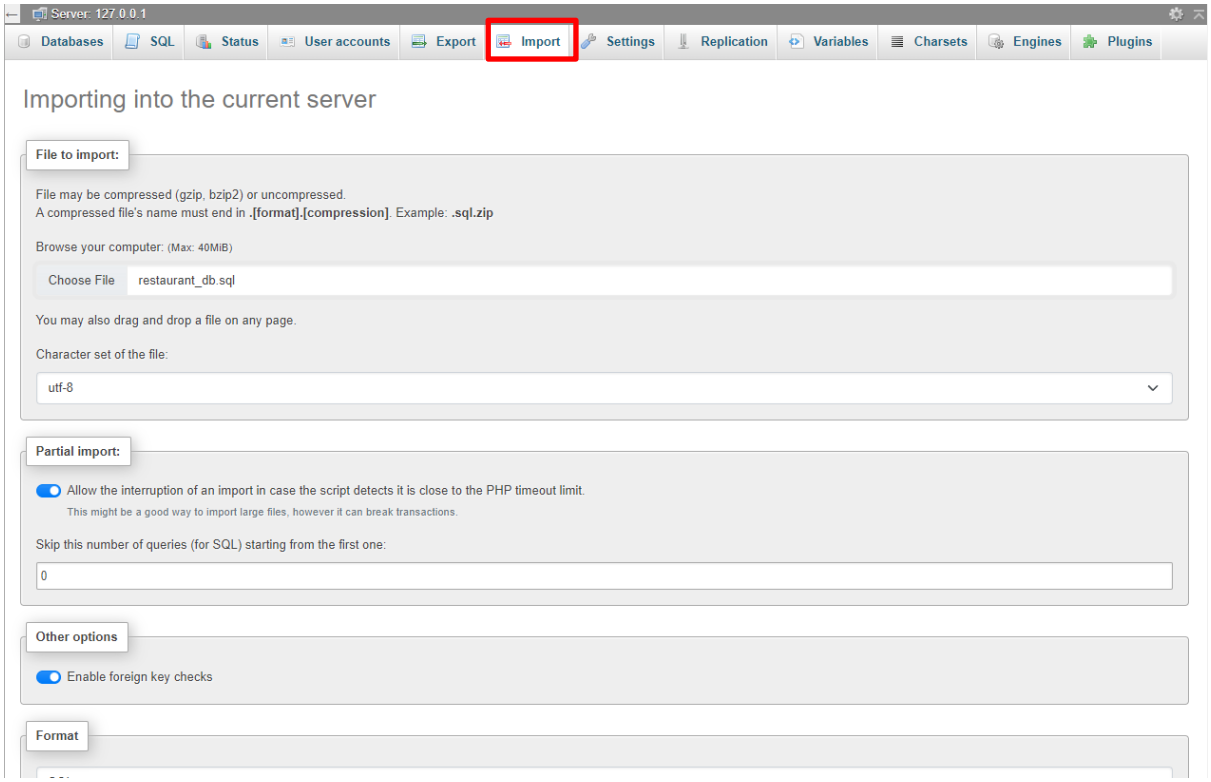

Figure 5.11 Import SQL data

5.3.4 Accessing the e-Reservation Restaurant Web Application

After performing the steps above, open a web browser and navigate to http://localhost:3000/home.php to be redirected to the home page of the e-Reservation Restaurant web application, which is known as Book 'n' Eat, as shown in Figure 5.12.

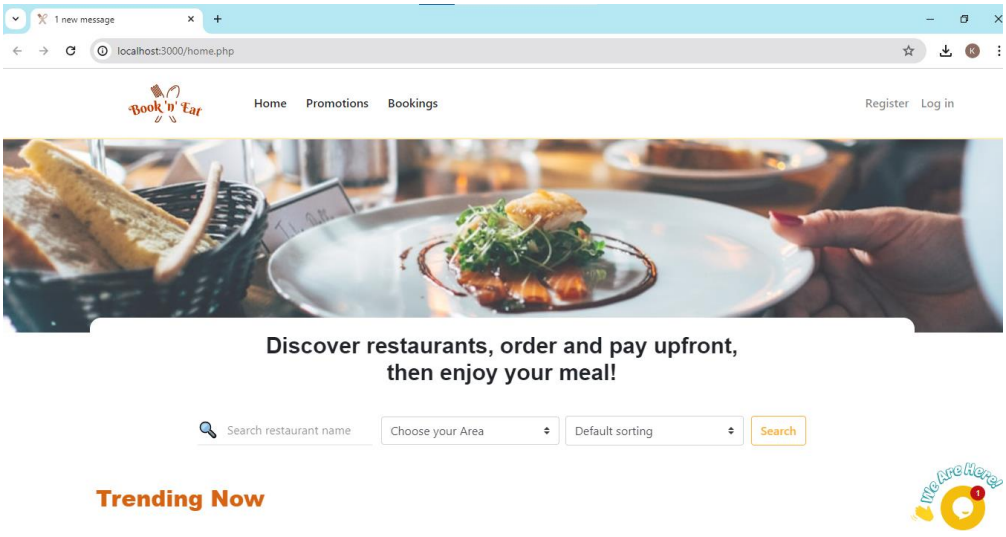

Figure 5.12 Accessing Book 'n Eat home page

5.4 System Operation

This section describes the detailed operations of the e-Reservation Restaurants. It documents the website's usage steps as a tutorial or reference to help users better understand the features and functionalities of the website.

5.4.1 Home Page

Figure 5.13 shows the home page of the e-Restaurant Reservation Booking website, which is called Book 'n' Eat. There are three main pages on this website as shown on the left side of the navigation bar, which are Home, Promotions, and Bookings respectively. Whereas the right side of the navigation bar provides the link to the register and login page.

At the center of the home page, users can select their city and enter the restaurant name in the search bar to search for specific restaurants. Once clicked on the "search" button, users will be prompted to the restaurant list page, where the system will display restaurant search results according to the user's selections.

Under the restaurant search bar, several recommendations have been provided to users to help them aid their restaurant selection process. For example, there is a Trending Now recommendation, What's New recommendation, and Cuisines recommendation. If users click on the restaurant images, they will be redirected to the booking page of that restaurant.

Then, the e-Restaurant Reservation website's Instagram images are also displayed near the footer, followed by the newsletter sign-up and contact us section.

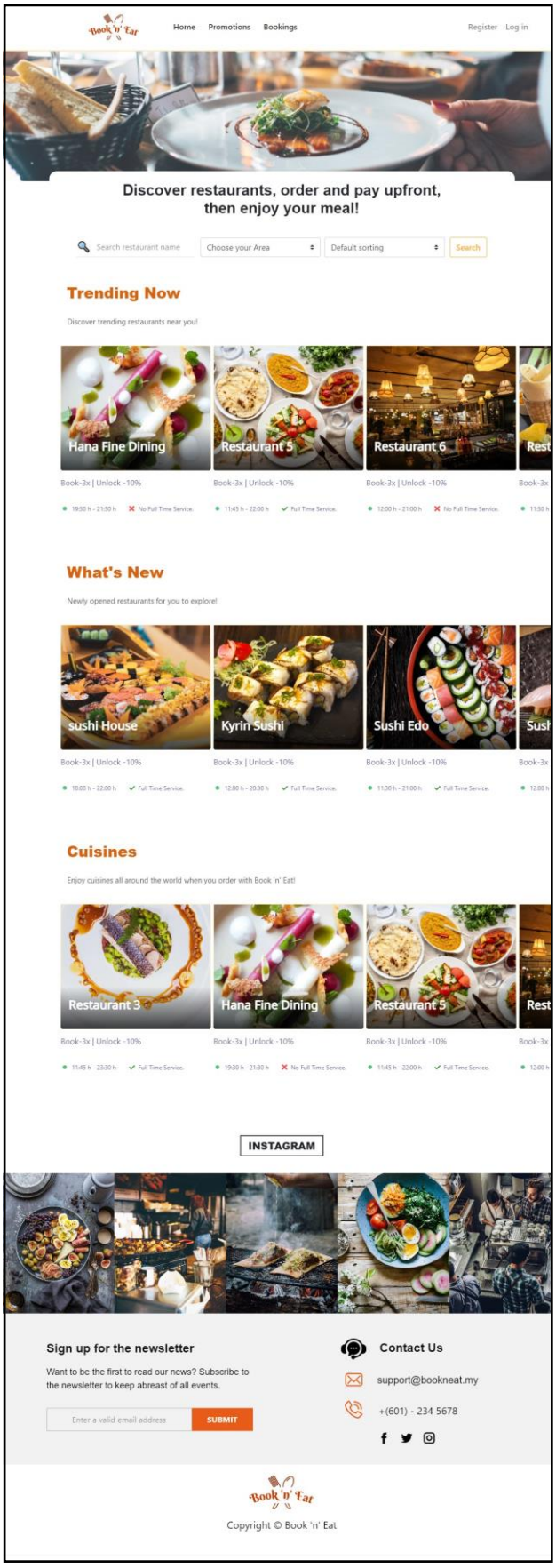

Figure 5.13 Home page of Book ‘n’ Eat

5.4.2 Register Page

Figure 5.14 shows the register page, where users can sign up for an account on Book 'n' Eat. There are two types of accounts where users can sign up as, for example, a customer or restaurant account. As a customer, it is required to enter personal details such as last name, first name, e-mail, phone number, and password.

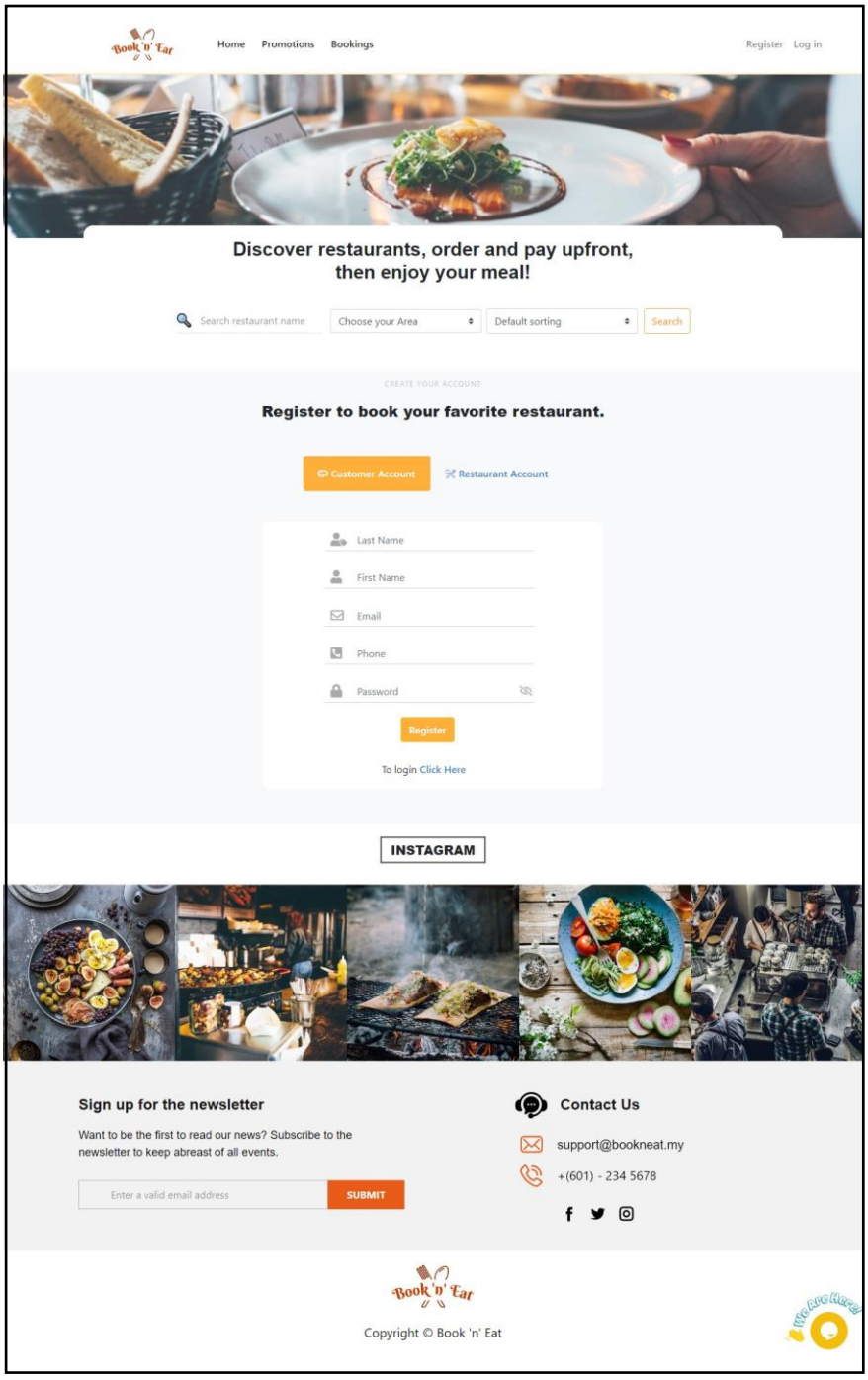

Figure 5.14 Register page of Book ‘n’ Eat for customers

However, if users were to sign up as a restaurant account, they need to enter their business name, restaurant website, e-mail, phone, address, business registration number, password, cuisine category, city area, service time, and upload store image as shown in Figure 5.15. Then, users can click on the "Register" button at the bottom of the form to complete their registration.

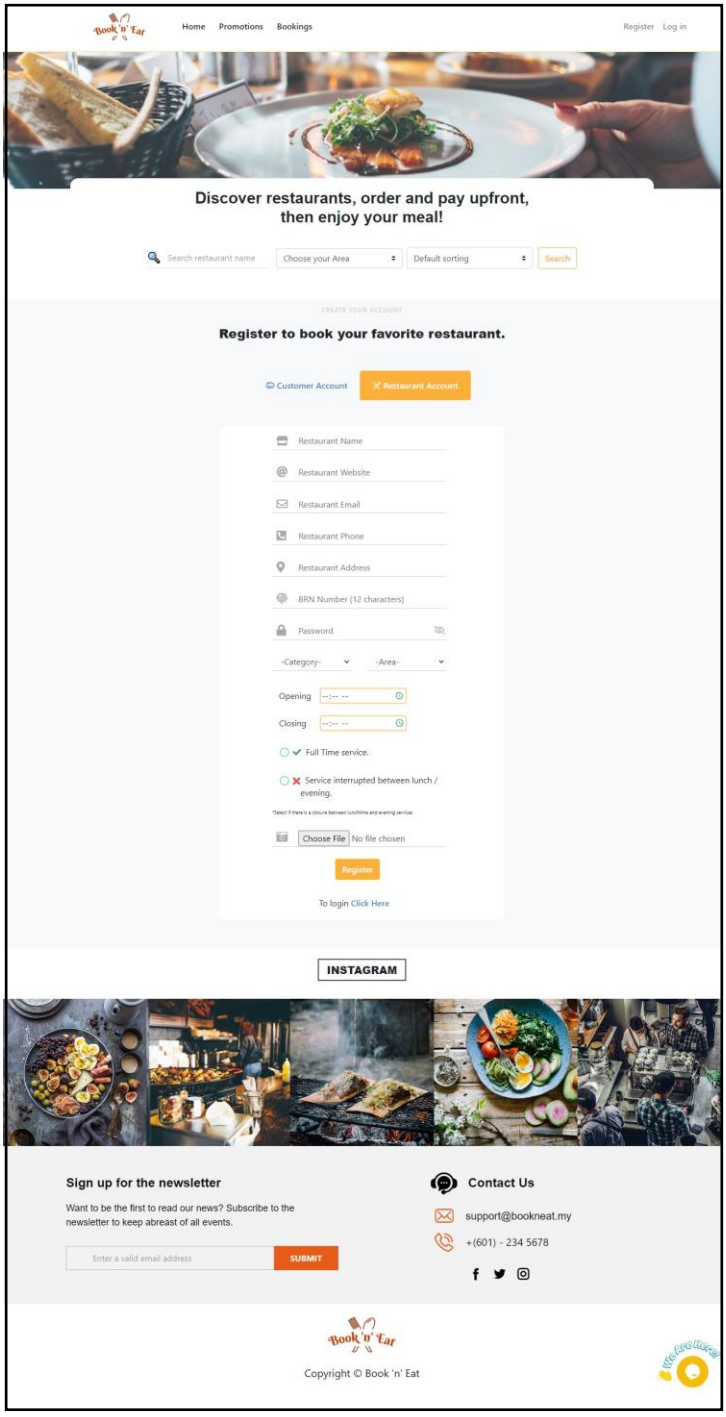

Figure 5.15 Register page of Book ‘n’ Dine for restaurants

If the registration is successful, users will receive an alert notification as shown in Figure 5.16, saying their newly registered account has been added to the system database, and once users click on the "OK" button, they will be redirected to the login page to log in.

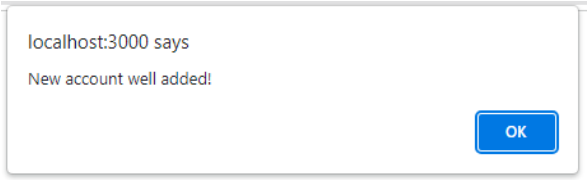

Figure 5.16 Account added alert notification

5.4.3 Login Page

Figure 5.17 shows the login page of Book 'n' Eat. On this page, both customers and restaurant users can use the same page to enter their e-mail and password to log in. After customers enter their login details and click on the "Login" button, they will be redirected to the home page as shown in Figure 5.13.

Whereas restaurant accounts will be redirected to the restaurant admin panel as shown in Figure 5.22 in Chapter 5.4.4 after entering their login details and clicking on the "Login" button.

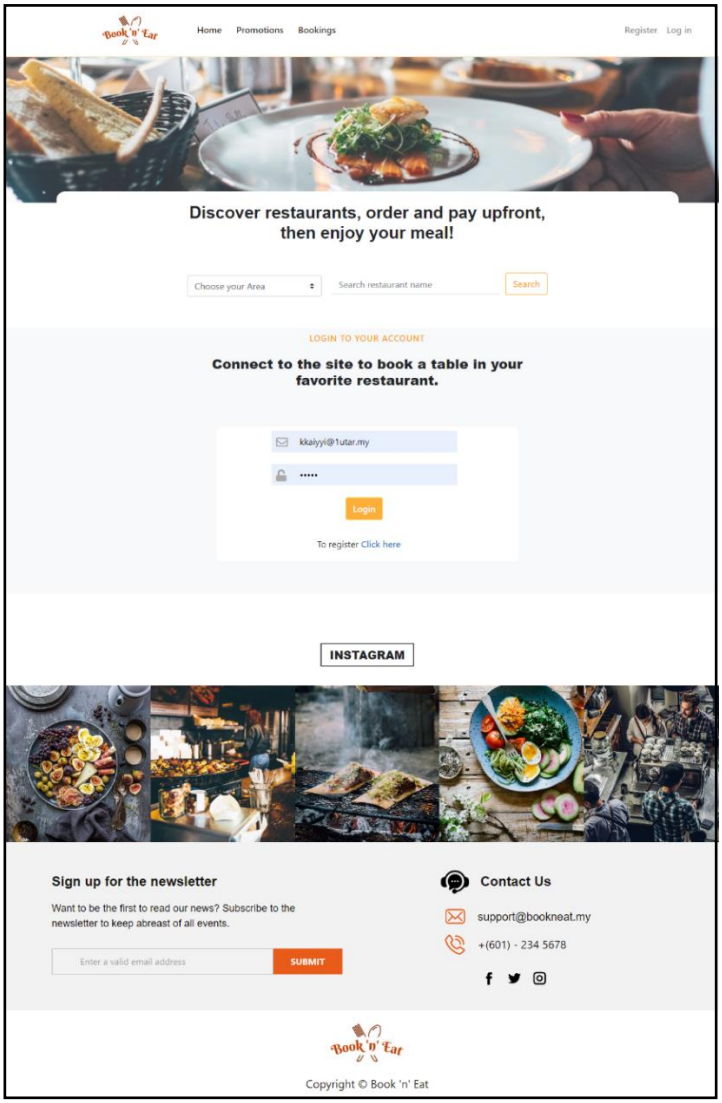

Figure 5.17 Login page of Book ‘n’ Eat

5.4.4 My Profile Page

Figure 5.18 shows the home page for a successfully logged-in customer account. On the top right of the navigation bar, users should be able to see the wording "Hello," followed by their registered name. Upon clicking on this button, users can access their profile page or log out.

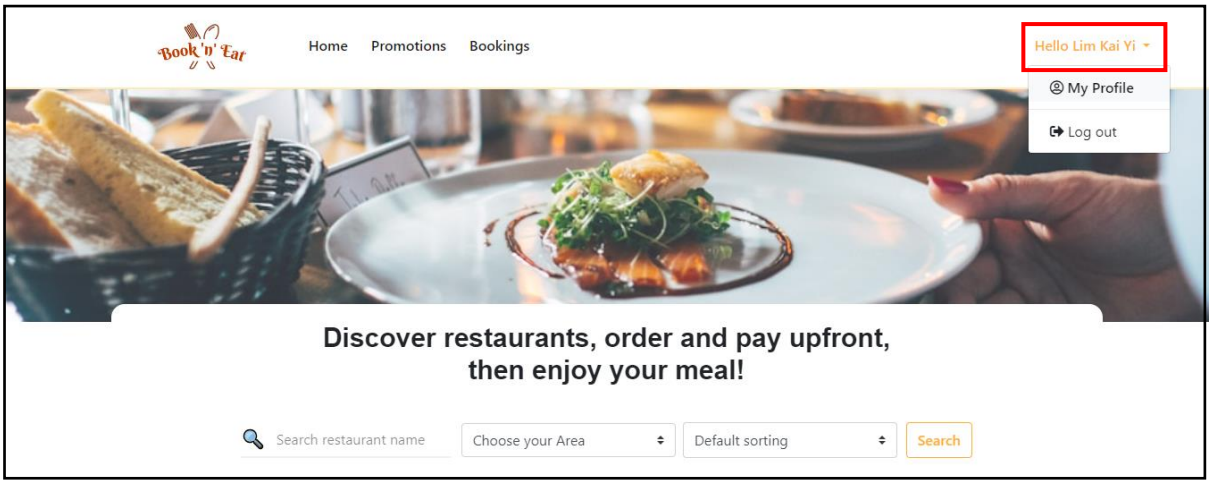

Figure 5.18 Home page of Book 'n' Eat for customers

If users click on the "My Profile" button, they will be redirected to their account details page as shown in Figure 5.19. On this page, users can view their registered last name, first name, phone number, e-mail, and password. If users wish to change their phone number or password, they can select the column and edit it directly. After that, they will need to click on the "Save" button to save the modifications.

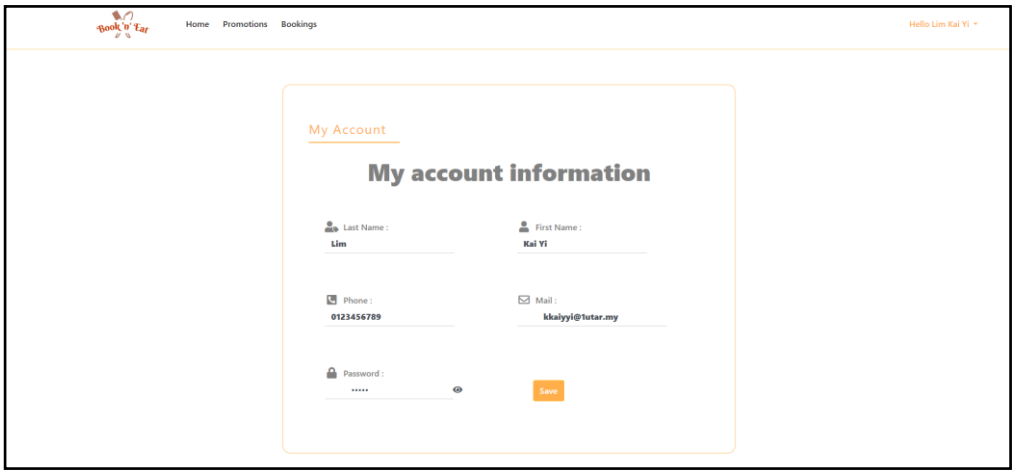

Figure 5.19 My profile page of Book 'n' Eat

If the modification is successful, the system will alert users with a "Save success!" notification pop-up as shown in Figure 5.20. Then, the saved changes will be updated in the database as well.

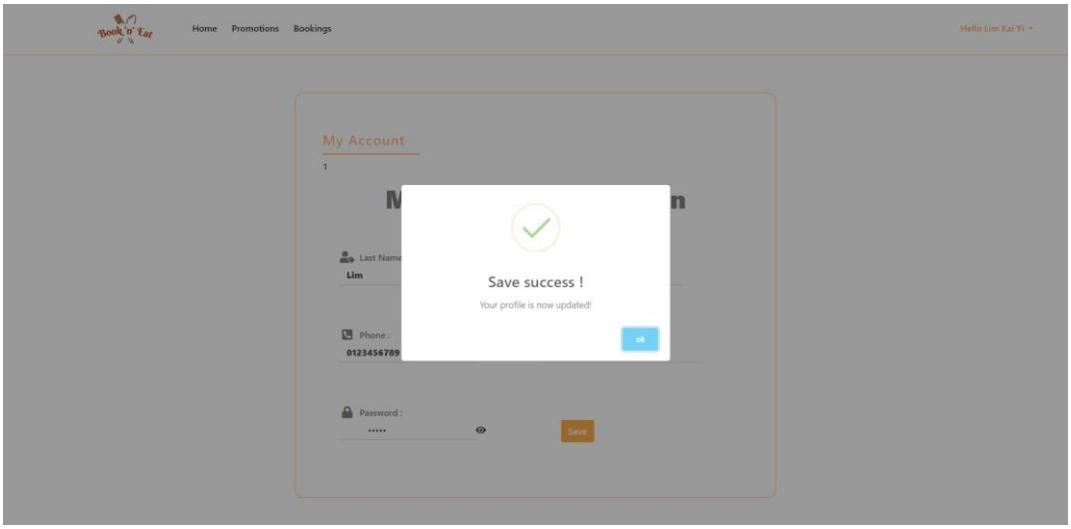

Figure 5.20 Save success notification pop-up

However, if users did not make any changes and click on the “Save” button, an error message will pop-up as shown in Figure 5.21, notifying users that a problem has occurred.

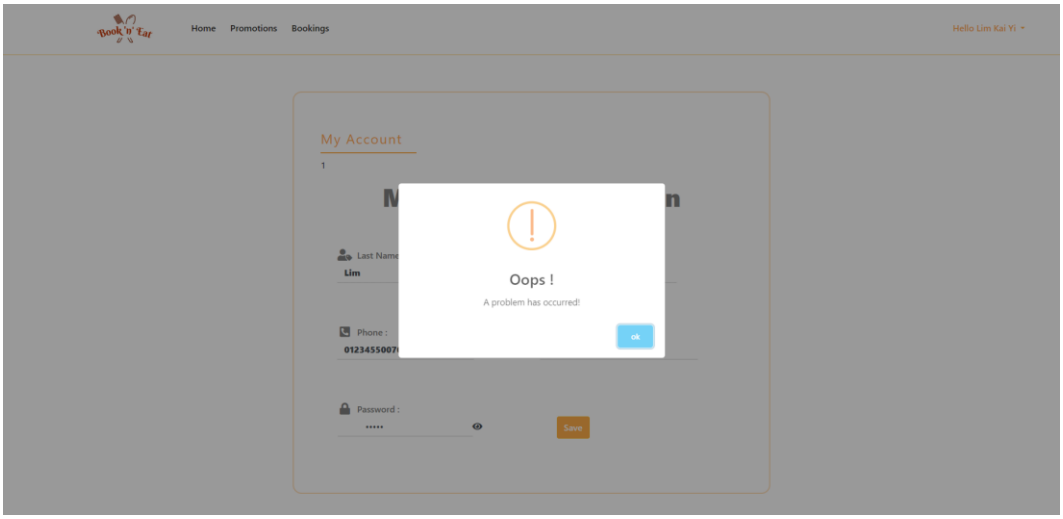

Figure 5.21 Save error notification pop-up

Figure 5.22 shows the profile page for restaurant admins, which can be accessed by clicking on the “My Profile” button below their restaurant name icon in the right side of the navigation bar. On their profile page, they can also edit their business details such as phone, area, address, business hours, and password.

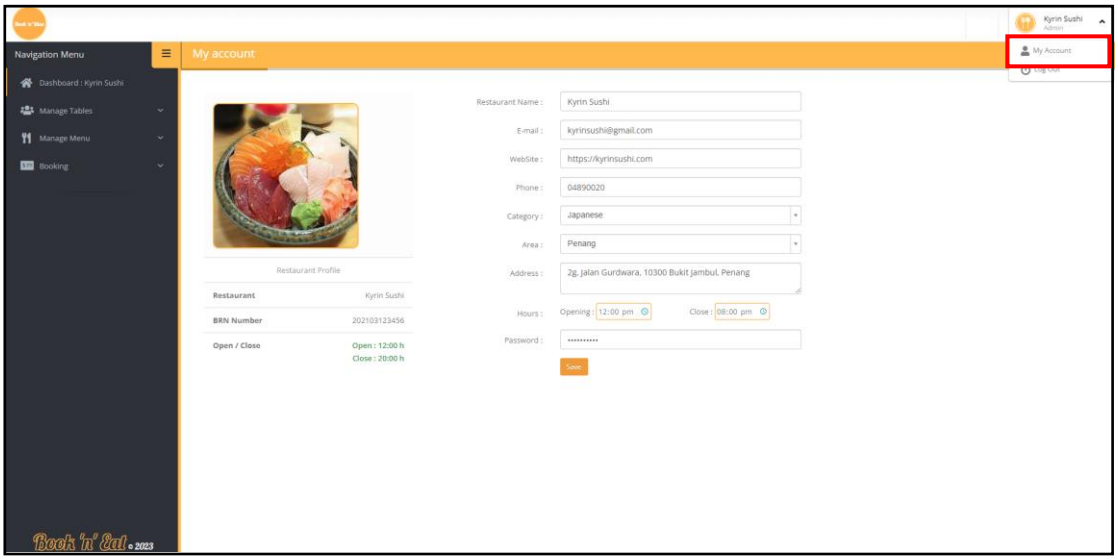

Figure 5.22 My profile page for restaurant admin

5.4.5 Logout Page

If users want to log out, they may navigate to the “Log out” button under the “Hello,” tab of the navigation bar as shown in Figure 5.23. After clicking on it, users will be logged out of their account and will be redirected back to the login page as shown in Figure 5.17.

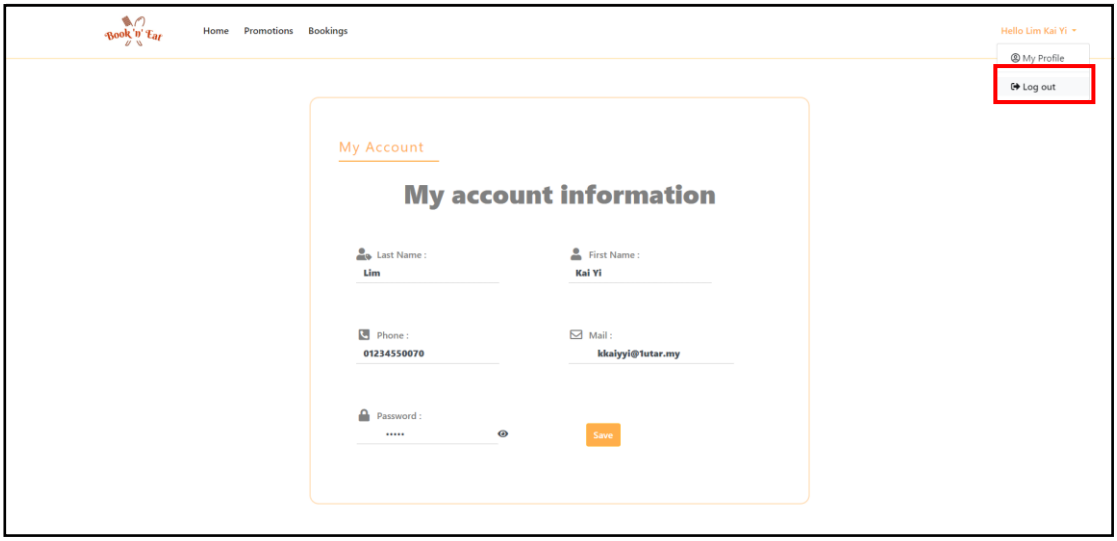

Figure 5.23 Logout function of Book ‘n’ Eat

5.4.6 Personalized Restaurant Recommendation Feature

Figure 5.24 shows the personalized recommendation feature that allow users to select their cuisine category and restaurant location preferences to be recommended with a list of personalized restaurant recommendations. After users select the checkboxes, they can click on the "Get Results" button and the website will employ B-tree algorithm to retrieve and recommend users restaurant recommendations based on their selected preference.

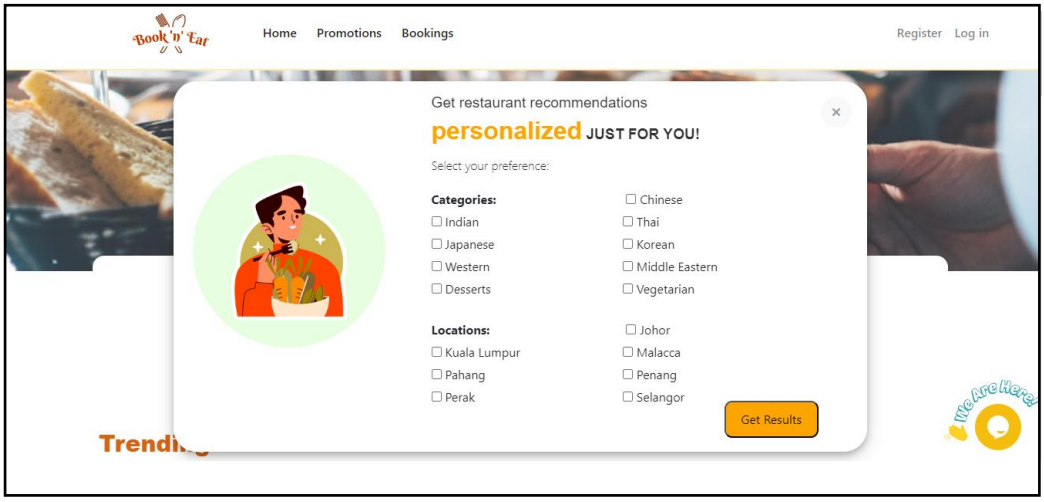

Figure 5.24 Personalized restaurant recommendations feature

For example, the "Japanese" and "Western" categories along with "Kuala Lumpur" and "Penang" location preferences were selected. Thus, the B-tree algorithm will proceed to retrieve and recommended the respective list of restaurants based on those selected criteria (Figure 5.25).

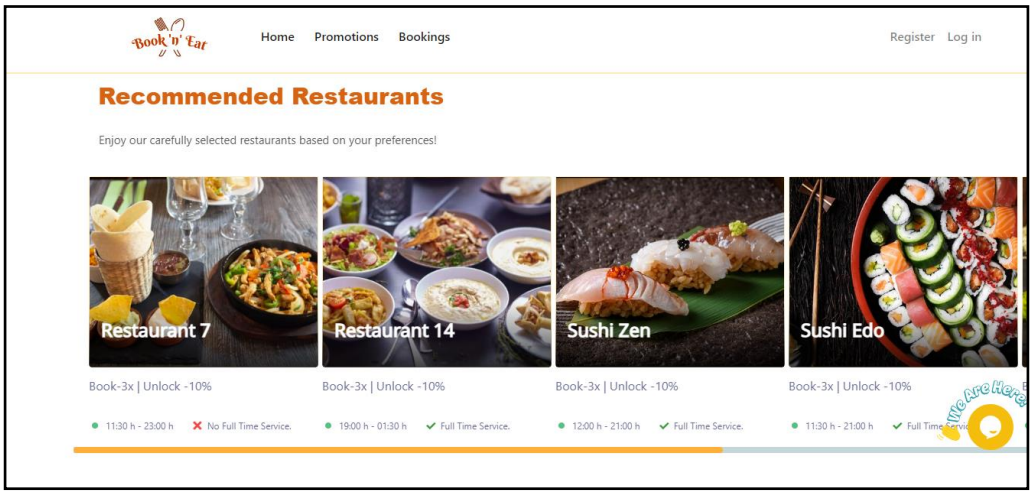

Figure 5.25 Personalized restaurant recommendations list

5.4.7 Booking Page

Figure 5.26 shows how customers can select the area from the drop-down box and enter the restaurant name in the search bar. For example, as shown in Figure 5.26, we searched for restaurants with "sushi" in their name that are in Penang. The restaurants can also be sorted based on their alphabetic order. In the example below, default sorting is selected, which will sort the restaurant names from A-Z.

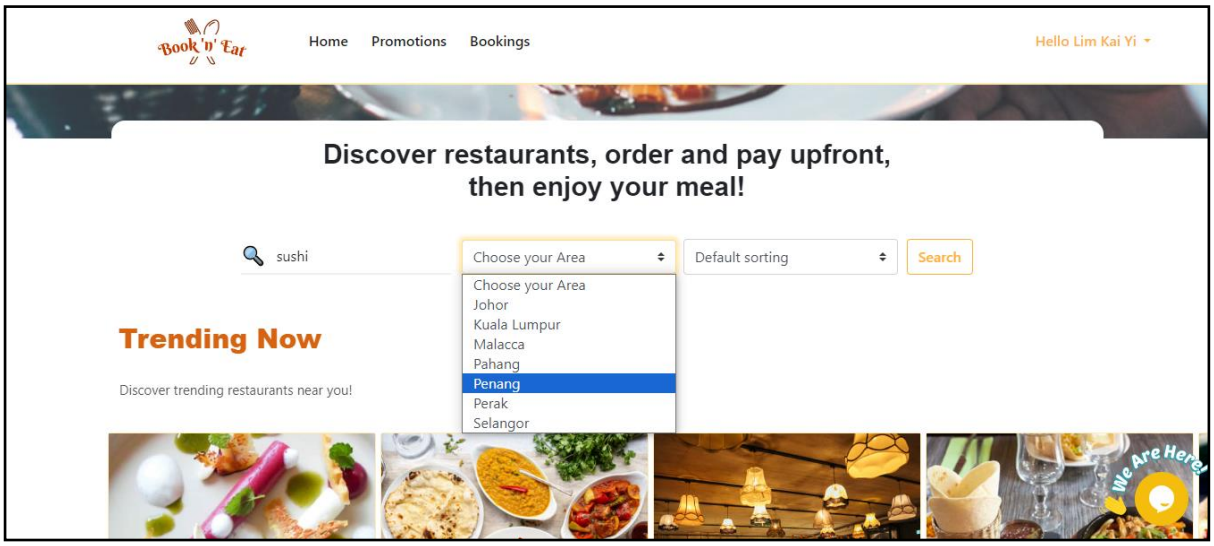

Figure 5.26 Search function for restaurants

After clicking on the “Search” button, customers will be redirected to the restaurant list page as shown in Figure 5.27, where the search results will be displayed according to the area, search keyword, and sorting criteria. If customers are logged in, they can then proceed to the booking page by clicking on the “Book” button for a specific restaurant.

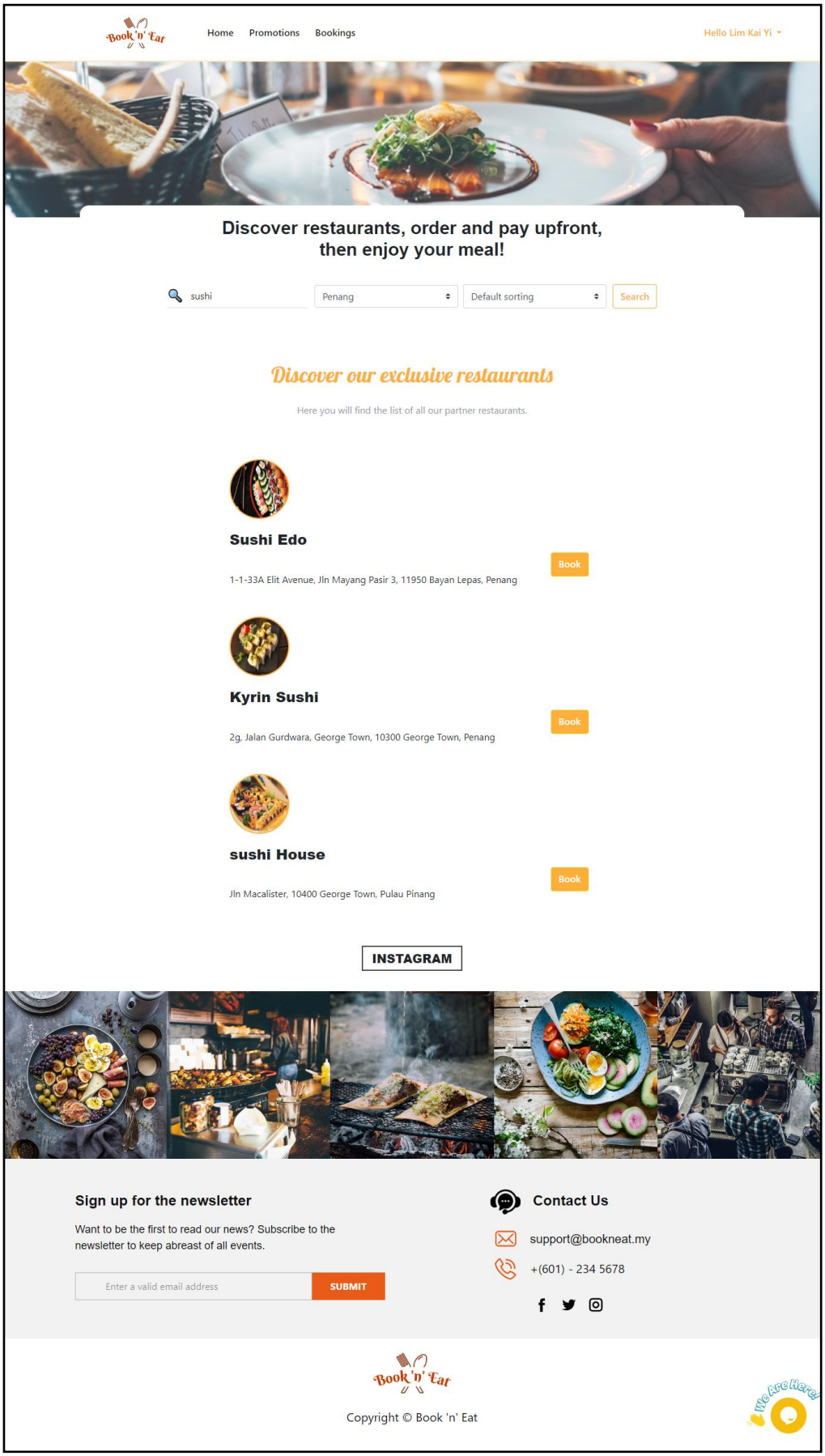

Figure 5.27 Restaurant result display page

Figure 5.28 shows the booking page for Sushi Edo restaurant. In the booking details section, the restaurant's name, image, website, and phone number are displayed. On the right side of the section, customers can fill in their booking details, such as last name, first name, phone, e-mail, booking day, time, and remarks for any special occasions or allergic and religious restrictions.

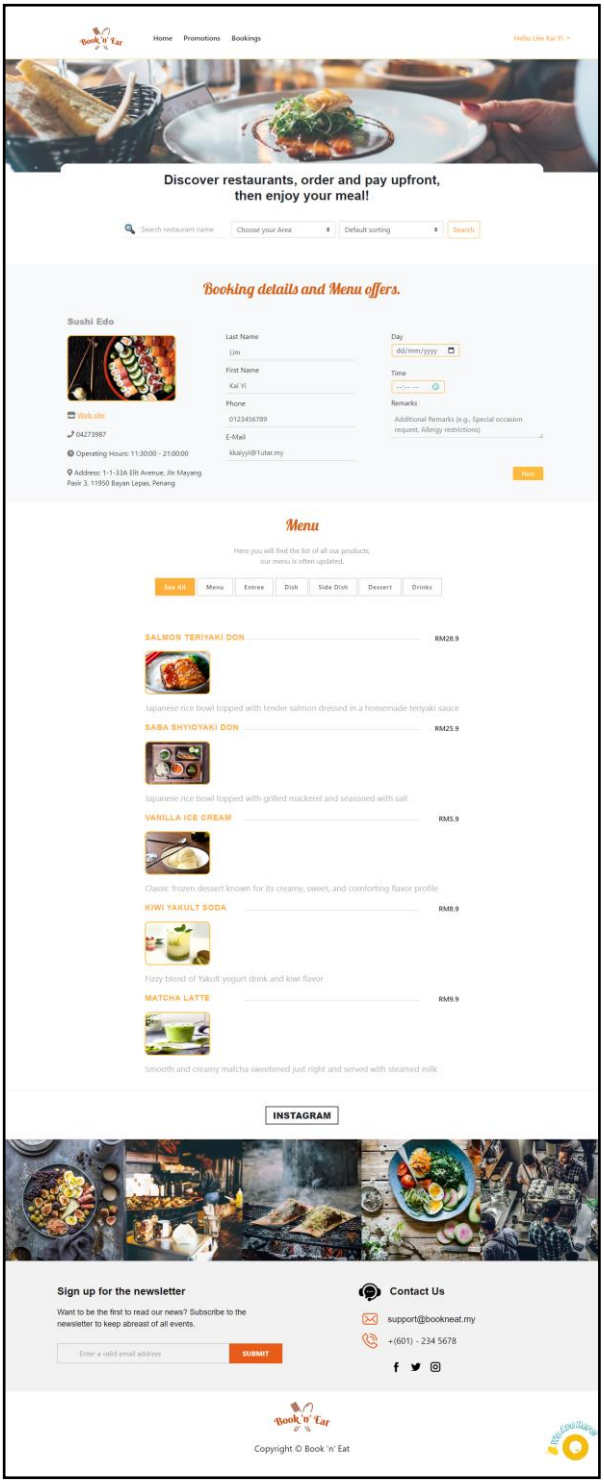

Figure 5.28 Booking page of Book ‘n’ Eat

Below the booking section is the menu, where customers can view all uploaded menu items followed by their price and description. The menu item can be categorized, such as "See All", "Menu", "Entree", "Dish", "Side Dish", "Dessert" and "Drinks". The system will display the menu results according to the category the customer selected, for example, in Figure 5.29, if customers select the "Desserts" tab, then the menu results will only display the available dessert menu.

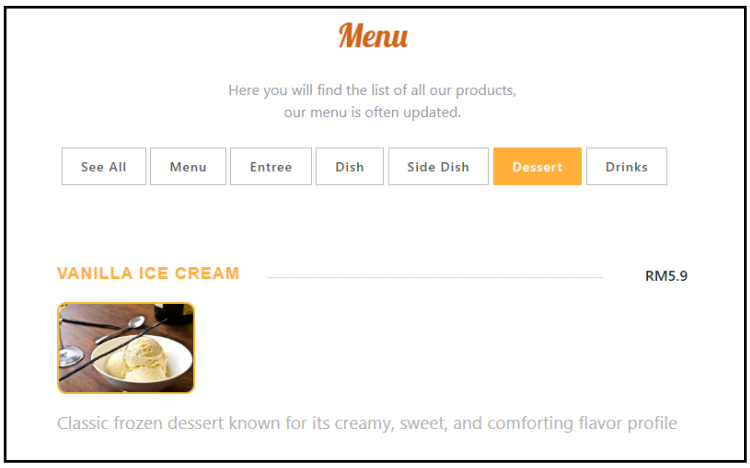

Figure 5.29 Menu category function

Figure 5.30 shows how customers can enter their booking details. Once entered all the booking details, they can click on the “Next” button and will be prompted to the table availability page in Figure 5.31, where they can see how many tables are available for the number of pax they are booking for. The table availability is updated in real-time, thus ensuring that customers will not double book for a specific table in the restaurant.

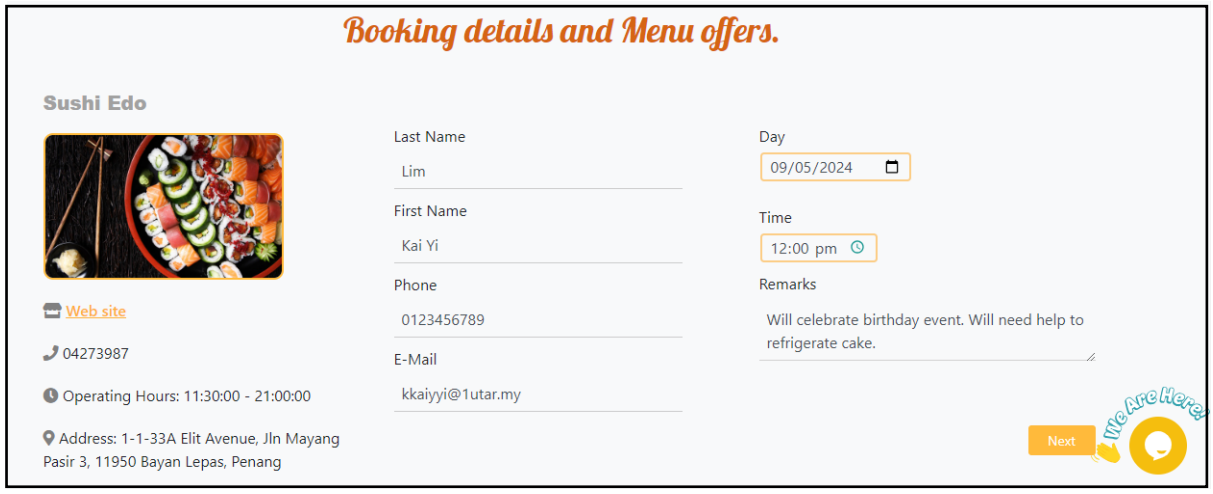

Figure 5.30 Enter customer booking details

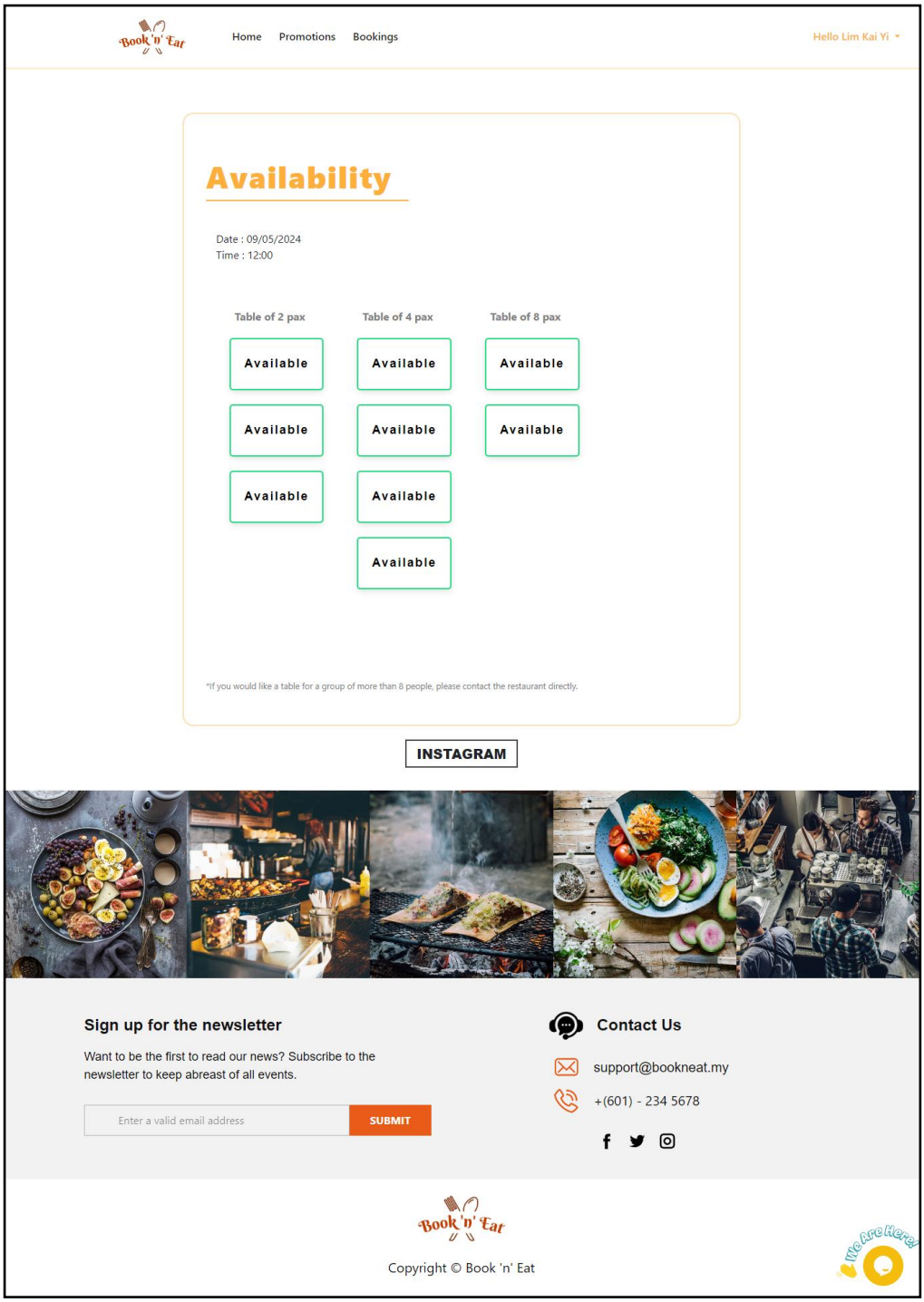

Figure 5.31 Table availability page of Book ‘n’ Eat

Then, customers can select the table of pax they are interested in booking and click on the “Confirm” button as shown in Figure 5.32 to proceed to the booking summary page.

Figure 5.32 Table selection function

Figure 5.33 shows the booking summary page where customers can check their booking details such as name, phone number, e-mail, booking date, time, and table number. They can also apply for a promo code if they have one.

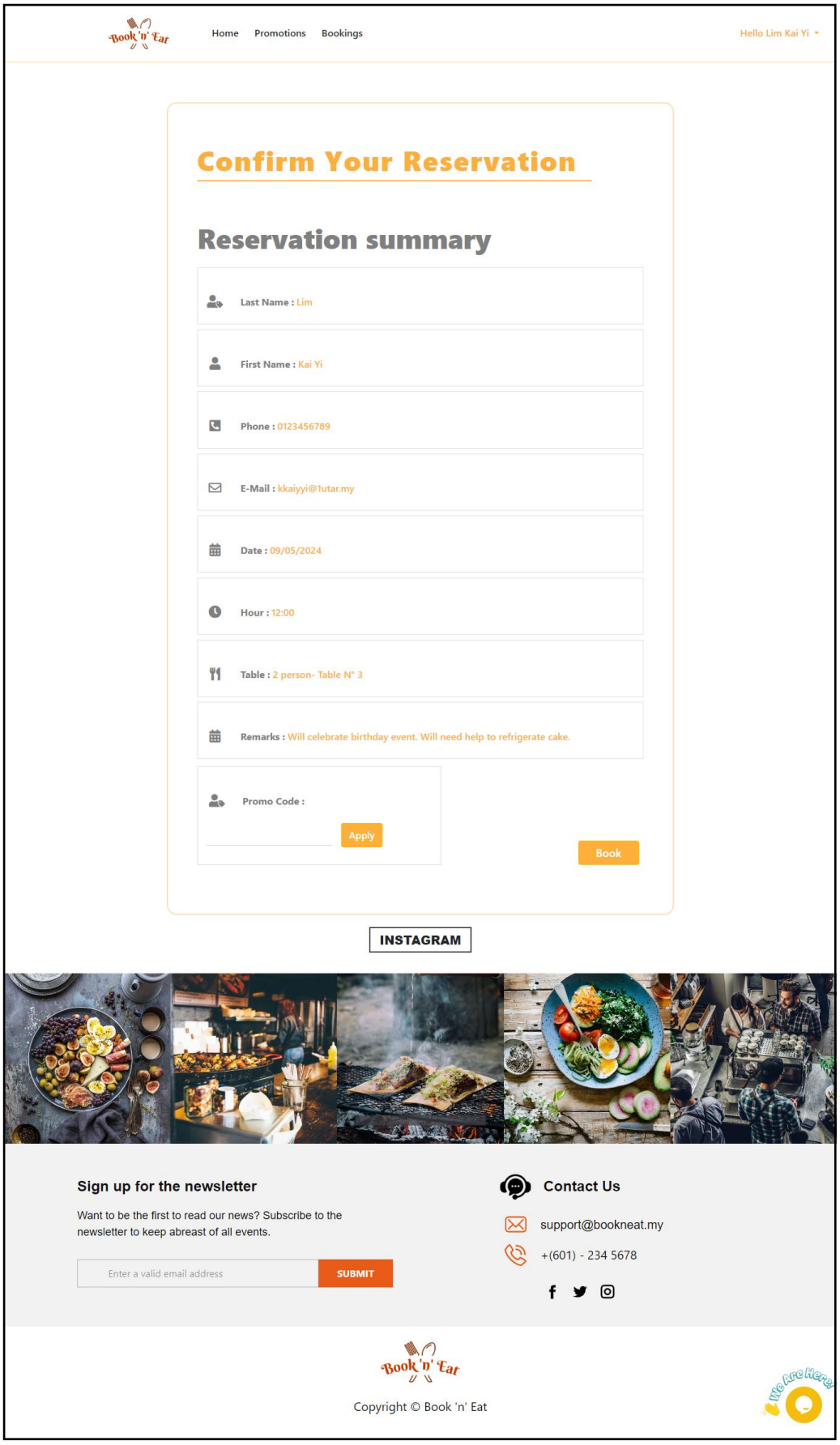

Figure 5.33 Booking summary page of Book 'n' Eat

If users were to apply a promo code, they can input a valid promo code and click on the "Apply" button to validate it. If the promo code is valid, it will be successfully applied to the booking as shown in Figure 5.34.

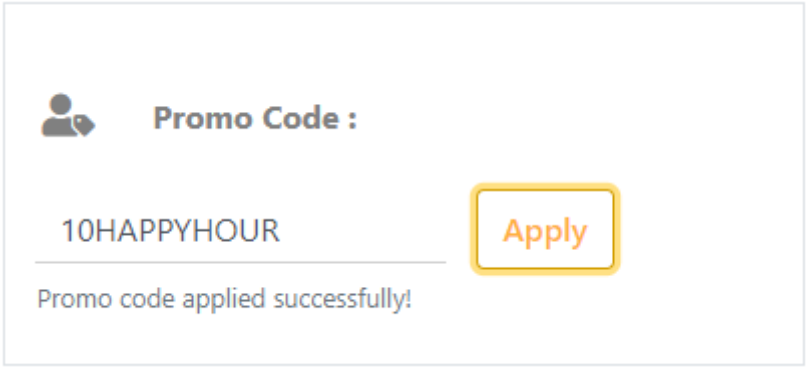

Figure 5.34 Valid promo code

However, if the promo code is invalid, users will be prompted to try again as shown in Figure 5.35.

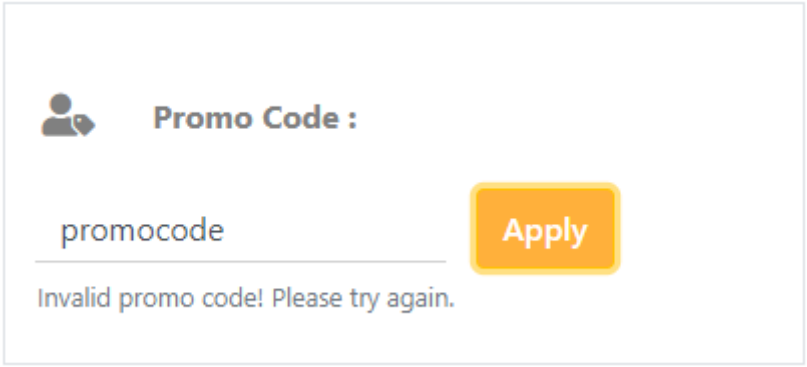

Figure 5.35 Invalid promo code

Upon clicking on the "Book" button, a notification message will pop up, alerting customers that a confirmation e-mail will be sent to them after the restaurant confirms their booking (Figure 5.36).

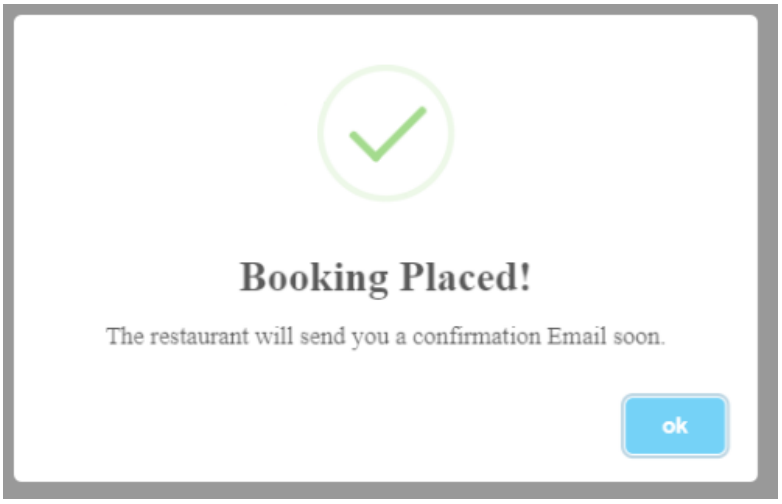

Figure 5.36 Booking placed notification pop-up

However, if users are not logged in when they try to book for restaurants, the system will display an error message as shown in Figure 5.37 that says they must be logged in to book and redirect users to the log-in page.

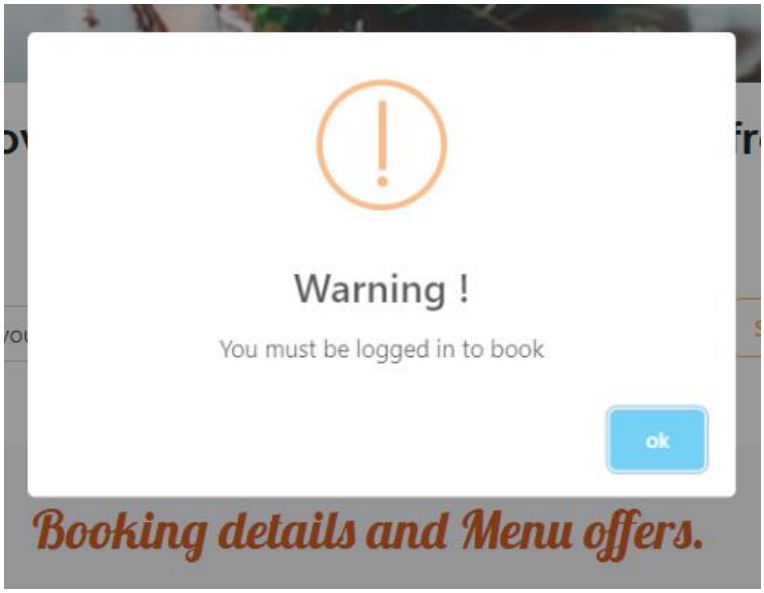

Figure 5.37 Not logged in error notification pop-up

5.4.8 Promotions Page

Figure 5.38 shows the promotions page of the website. This page displays all information about existing promotions to attract users to place bookings using the Book 'n' Eat website. In the first block of the promotions page, promo codes such as "10OFFTOTAL", "20OFFTOTAL",

and “30OFFTOTAL” provide users with a 10% - 30% discount off their order total by booking for a same restaurant for three, six, and nine times respectively. In the third block of the page, customers can view information about the happy hour promotion, which are essentially time-based discounts that are implemented to attract users to place booking at non-peak hours to optimize the restaurant’s seating arrangements for both peak and off-peak hours. The promo code “10HAPPYHOUR” allows a 10% off on the total order if the customer places a booking for 2pm or 8pm. The promo code “20HAPPYHOUR” allows a 20% off on the total order if the customer places a booking for 3pm or 5pm. Whereas the promo code “30HAPPYHOUR” allows a 30% off on the total order if the customer places a booking for 4pm.

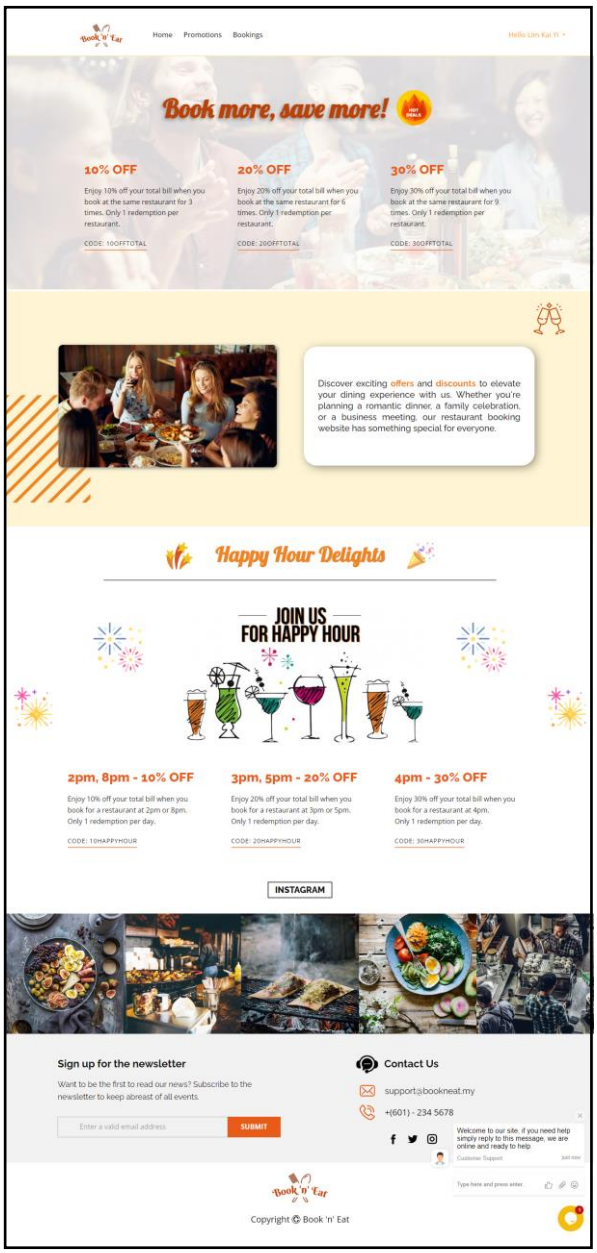

Figure 5.38 Promotions page of Book ‘n’ Eat

When users click on the promo code, a notification will display on the top center of the page (Figure 5.39), indicating that the code will be automatically copied to the users' clipboard, where they can directly paste the code to the promo code application field. This eases the process of remembering and typing the promo code as some users may be frustrated when they forget the promo code and need to re-check it to input the code into the promo code application field.

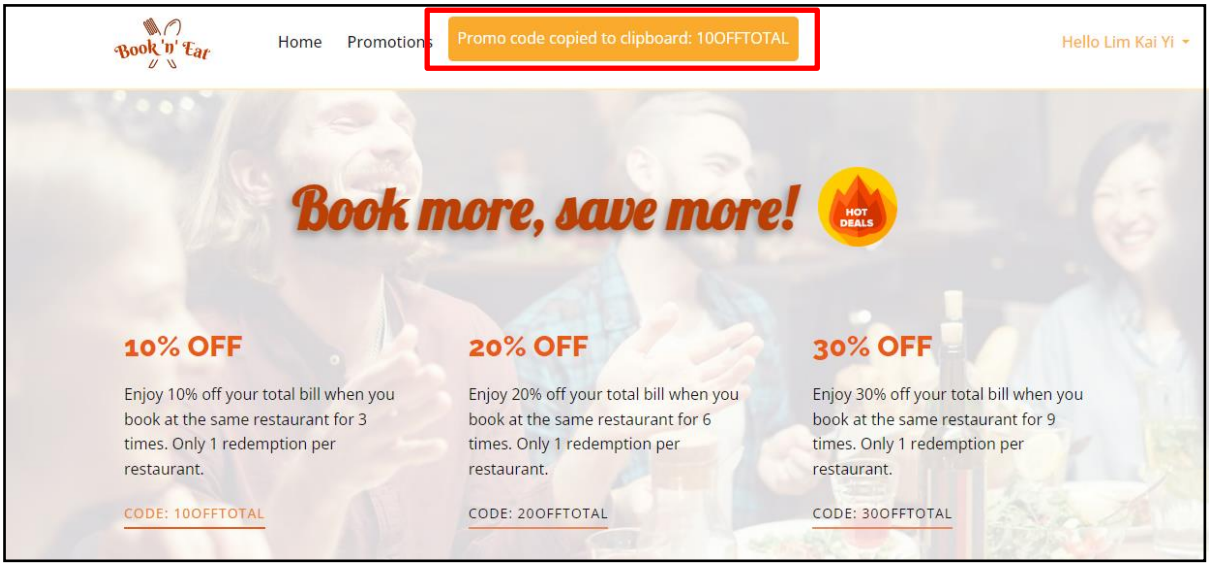

Figure 5.39 Copy promo code function

5.4.9 My Bookings List Page

Figure 5.40 shows the customer's bookings list page. This page displays all the customer's placed bookings and the status of each booking is updated whenever the customer cancels an order, or when the restaurateur accepts or rejects the booking. The bookings are separated into two sections, which are upcoming bookings and past bookings.

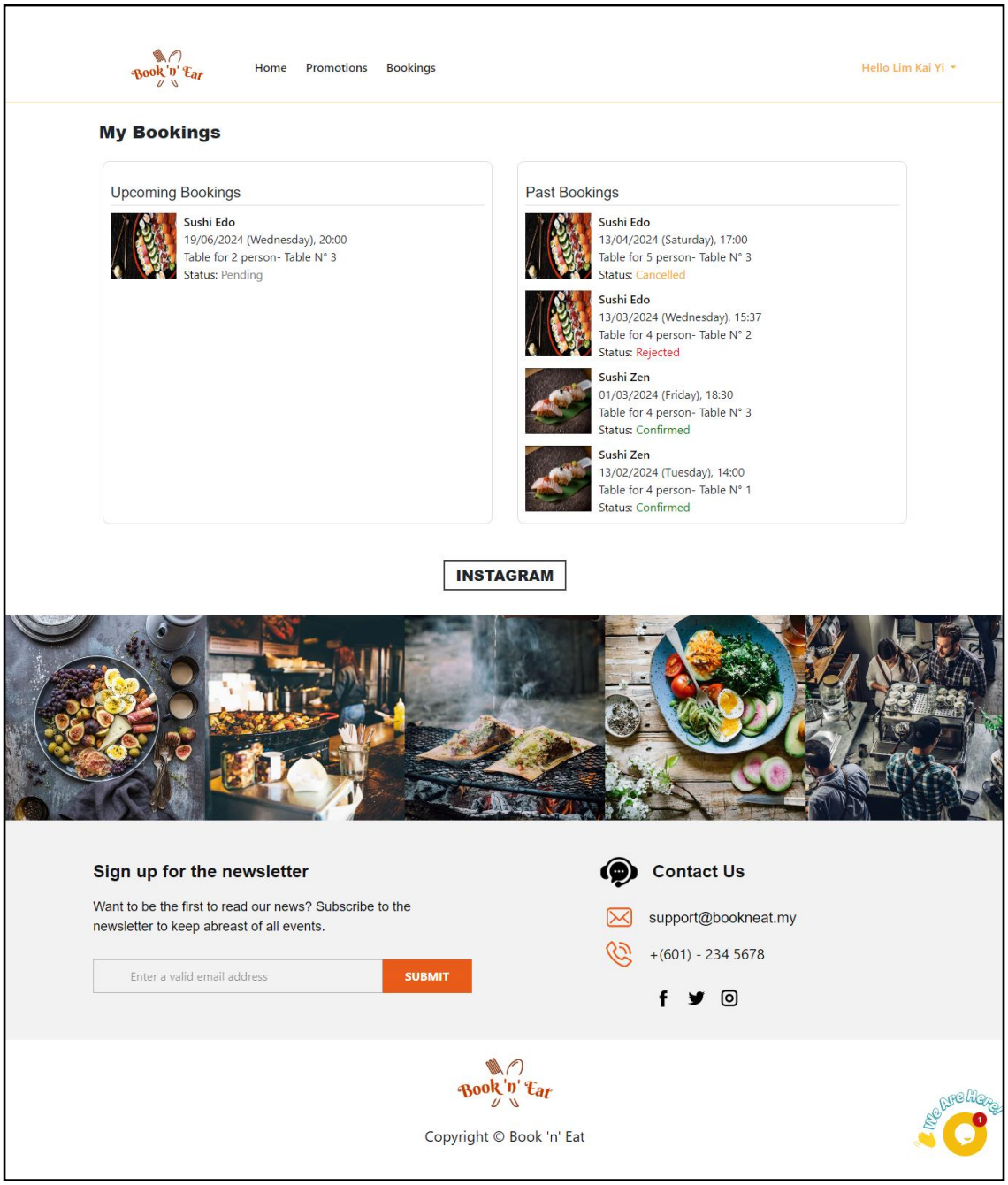

Figure 5.40 My bookings list page

To view the details of an upcoming booking, users can click on the restaurant's name and they will be redirected to the booking details page as shown in Figure 5.41. In this page, users can view the booking details such as the restaurant they booked for, the booking number, status, date, time, table, remark, promo applied, and restaurant address. The customer's personal information such as name, phone, and e-mail are also displayed in the following section. To allow users to easily search for the restaurant, a google map location of the

restaurant is provided, followed by the restaurant's operating hours, phone number, e-mail, and website details.

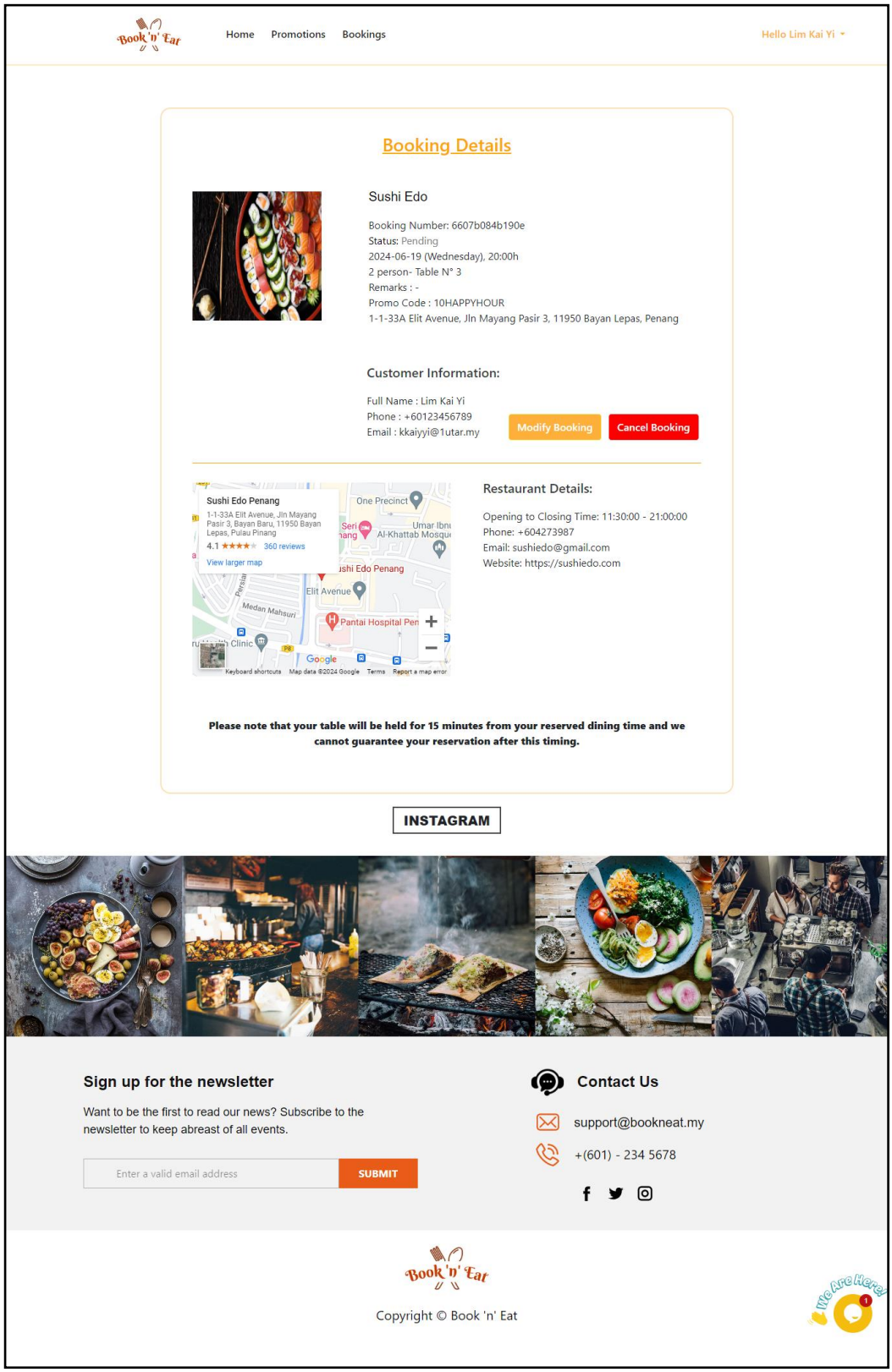

Figure 5.41 Booking details page

If users click on the “Modify Booking” button, they will be redirected to a pop-up modal, where they can fill in the new booking details (Figure 5.42).

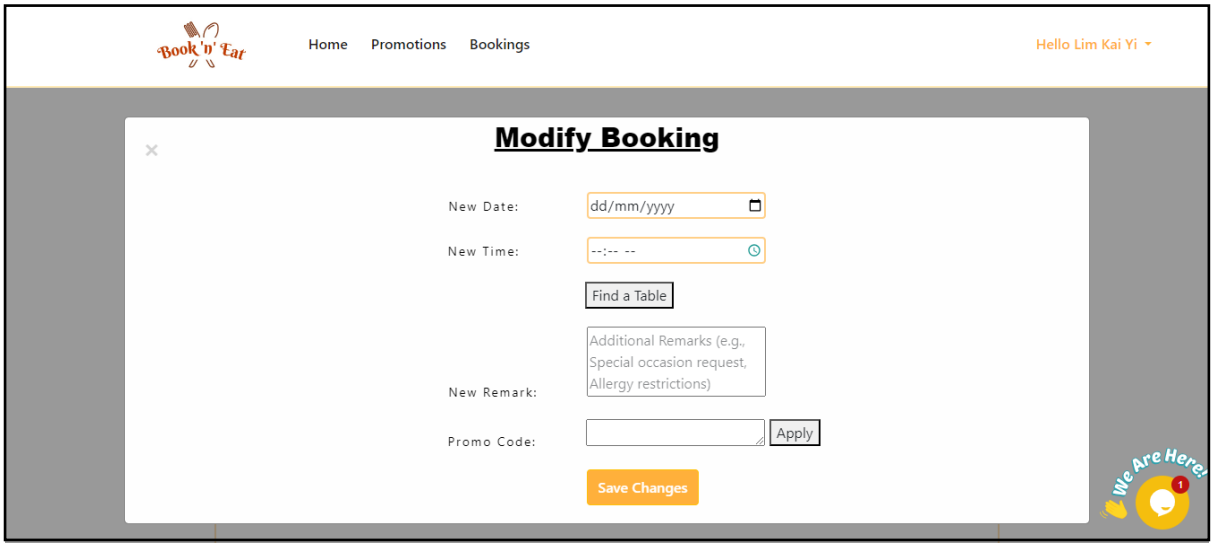

Figure 5.42 Modify booking page

Users can then proceed to fill up their new booking details in the modify booking form. The table selection feature will appear after users entered the new date and time and clicked on the “Find a Table” button (Figure 5.43). This process helps to retrieve table availability information in real-time and display it in the table selection section for users to select.

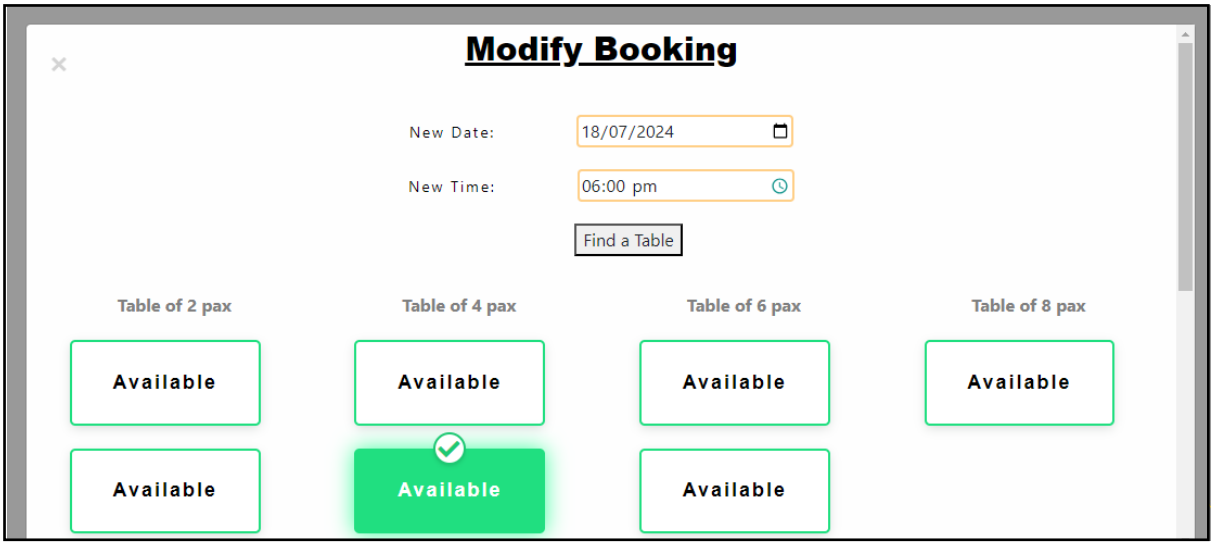

Figure 5.43 Insert new booking details

After selecting the tables, users can fill in the new remark or promo code (if available) and click on the “Save Changes” button to update their booking details.

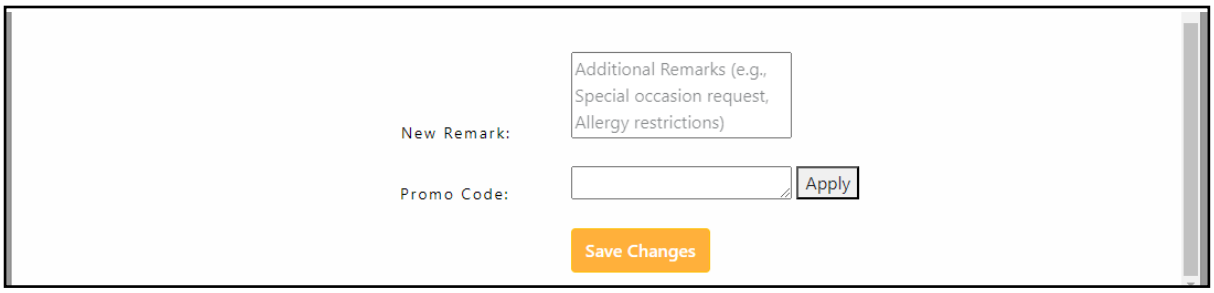

Figure 5.44 Save booking details

If the update is successful, a notification will pop up, alerting users that their booking details have been successfully modified and the respective data will be updated in the database.

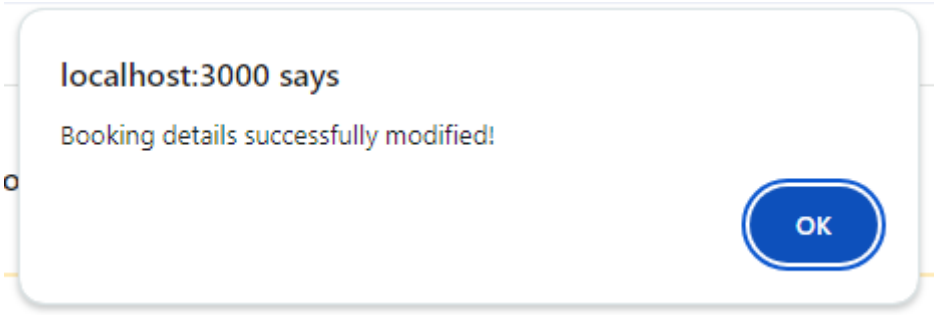

Figure 5.45 Booking modified successfully

However, if there is an error submitting the booking modification form, an error notification will pop up, alerting users that their booking modification has been unsuccessful and prompts them to try again.

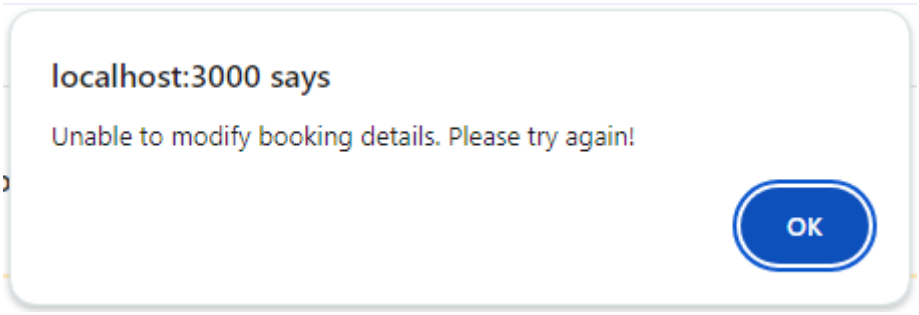

Figure 5.46 Booking modification unsuccessful

To cancel a booking, simply click on the “Cancel Booking” button as shown in Figure 5.41. A confirmation notification will pop up (Figure 5.47), to gain confirmation from users regarding the booking cancellation.

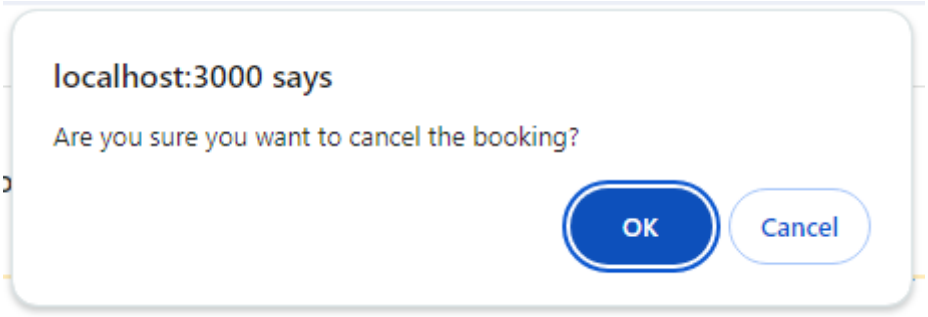

Figure 5.47 Booking cancellation confirmation pop-up

If users click on “OK”, then a notification will pop up, alerting users that their booking is successfully cancelled (Figure 5.48). Moreover, the booking status will also change to “Canceled”. If users click on “Cancel” in the confirmation pop-up, they will be prompted back to their booking details page.

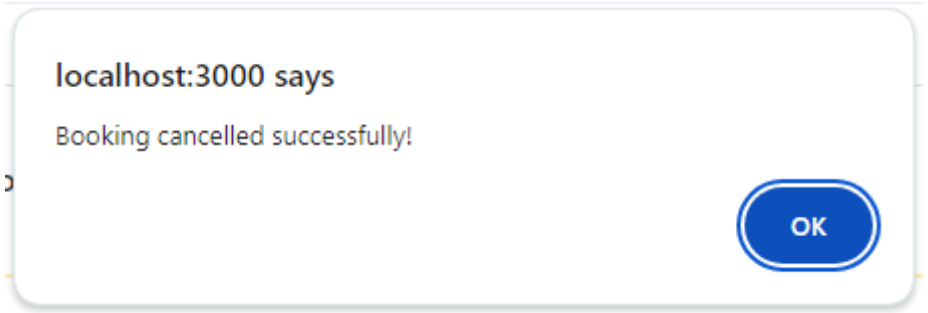

Figure 5.48 Booking cancellation successful notification

5.4.10 Restaurant Admin Dashboard Page

Figure 5.49 shows the restaurant admin dashboard page which only the restaurant accounts can access after logging in. To view the bookings dashboard, the restaurant admin can click on the “Dashboard” tab on the left bar.

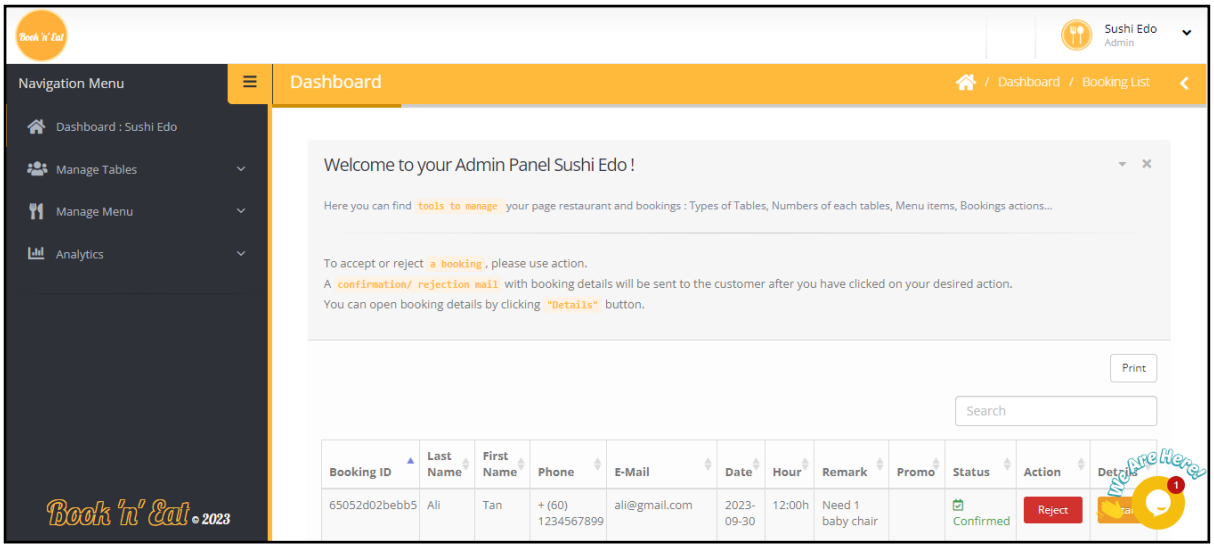

Figure 5.49 Restaurant admin dashboard page

After scrolling down, the booking list will be displayed as in Figure 5.50, listing the booking ID, customer's name, phone number, e-mail, booking date, time, remark, and promotion details. As for the "Status" column in the dashboard, it shows the current status of the booking, for example, pending, confirmed, rejected, or cancelled. Pending means that the restaurant admin had not perform any action on the booking. Confirmed indicates that the booking has been approved by the restaurant, and rejected means the booking has been rejected by the restaurant. Cancelled, on the other hand, indicates that the customer has cancelled the booking on their own, hence, no actions are required from the restaurant.

Booking ID	Last Name	First Name	Phone	E-Mail	Date	Hour	Remark	Promo	Status	Action	Details
65052d02bebb5	Ali	Tan	+ (60) 1234567899	ali@gmail.com	2023-09-30	12:00h	Need 1 baby chair		Confirmed	Reject	Details
650949ed5c92b	Lee	Xiao Min	+ (60) 175283972	leexm@gmail.com	2023-09-28	12:00h			Confirmed	Reject	Details
650a48481e74e	Ali	Tan	+ (60) 1234567899	ali@gmail.com	2023-09-27	12:00h	Need to help store cake for celebrating birthday		Confirmed	Reject	Details
650a89a71b18d	Ali	Tan	+ (60) 1234567899	ali@gmail.com	2023-09-22	14:00h			Pending	Confirm Reject	Details
650a907c209c4	Lim	Kai Yi	+ (60) 175283972	kaiyi@gmail.com	2023-09-26	14:00h	Allergic to seafood		Rejected	Confirm	Details
66011c36d0a54	Lim	Kai Yi	+ (60) 123456789	kkaiyyi@1utar.my	2024-03-13	15:37		20% off	Rejected	Confirm	Details
660129ec97b0e	Lim	Kai Yi	+ (60) 123456789	kkaiyyi@1utar.my	2024-04-13	17:00		10% off	Cancelled		

Figure 5.50 Customer bookings list

The "Action" column allows the restaurant admin to confirm or reject a booking by clicking on the action button. If the booking is confirmed, the system will proceed to send a confirmation e-mail along with a Google Calendar invite containing the booking details (Figure 5.51) to the customers, allowing them to add the event to their Google Calendar to receive reminder notifications.

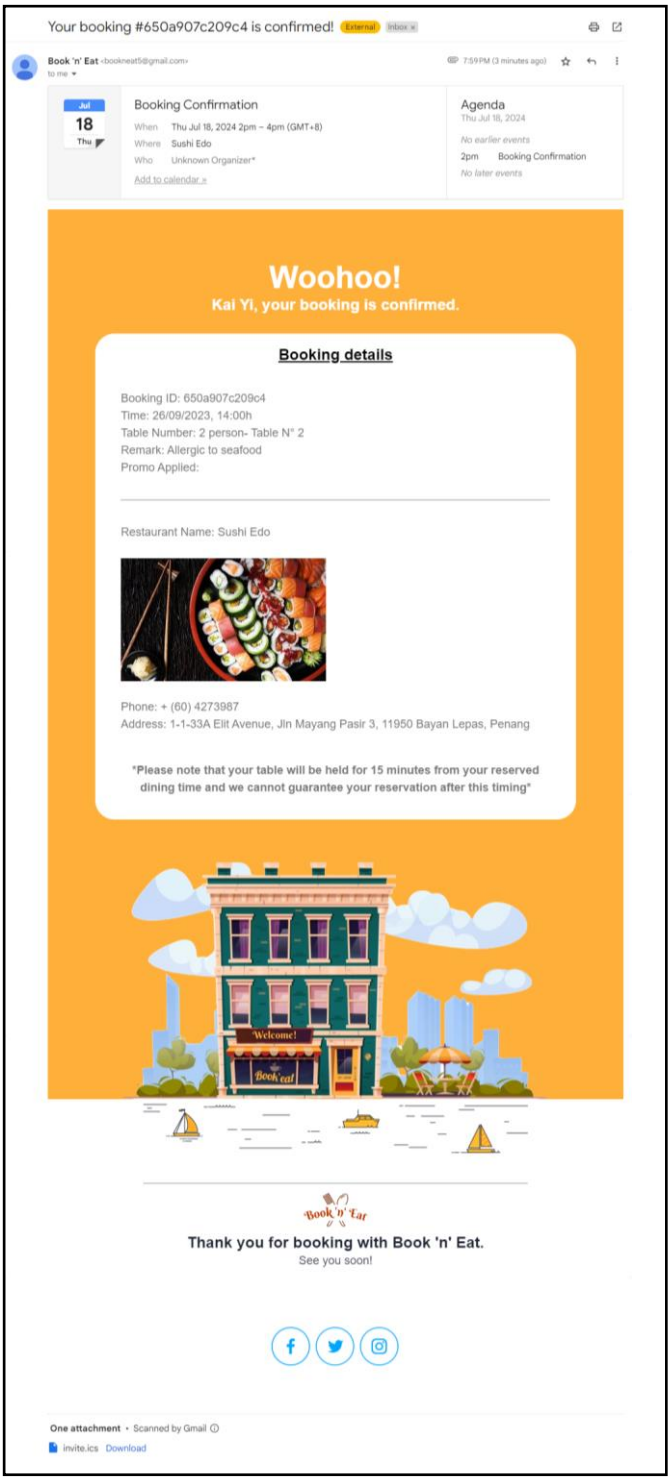

Figure 5.51 Booking confirmation e-mail

Upon clicking the event invite, users can set up the notification reminder preferences and timing, as well as invite other guests to the event by adding their e-mail into the event (Figure 5.52). This way, all of the guests will have a shared event created in their Google Calendars and will be able to receive notification reminders for their booking.

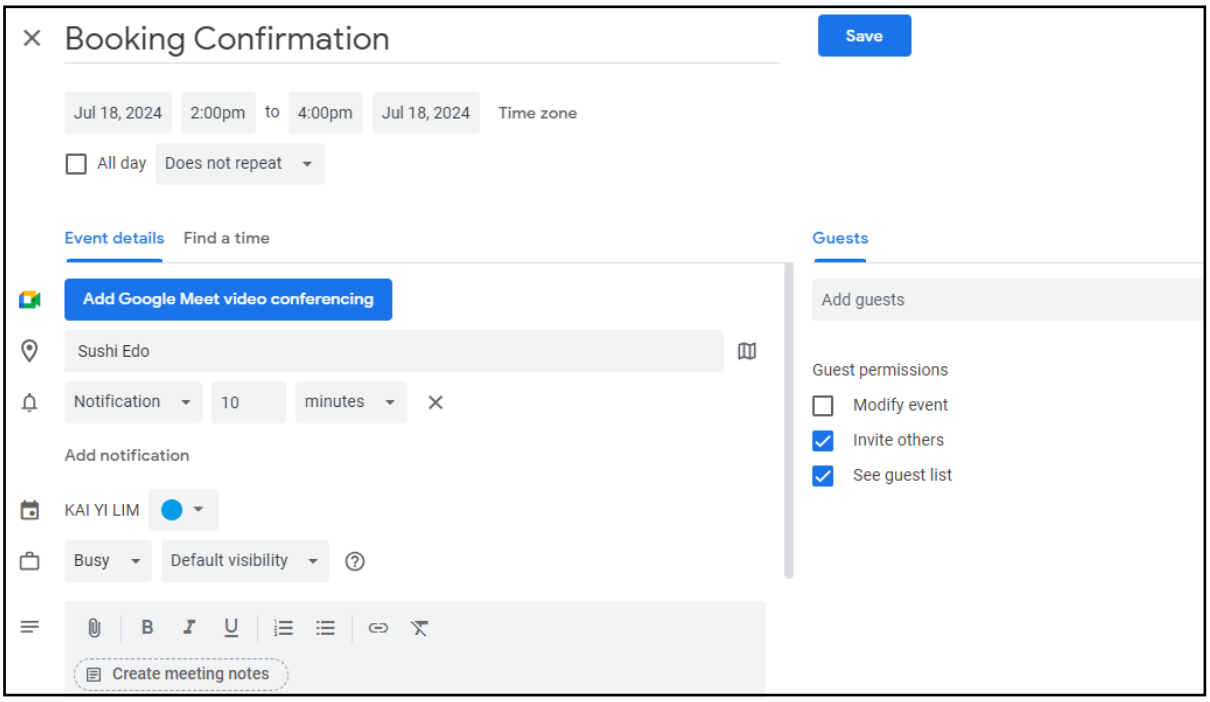

Figure 5.52 Add to Google Calendar event function

After the e-mail is sent, a pop-up notification will appear, alerting restaurant admins that the reservation has been successfully confirmed and the confirmation e-mail is also sent to the customer.

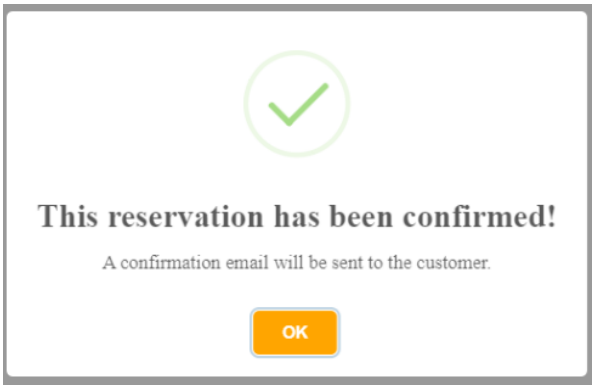

Figure 5.53 Booking confirmed notification

If the booking is rejected, the system will proceed to send a rejection e-mail along with the booking details (Figure 5.54) to the customers, notifying them that their booking has been unsuccessful.

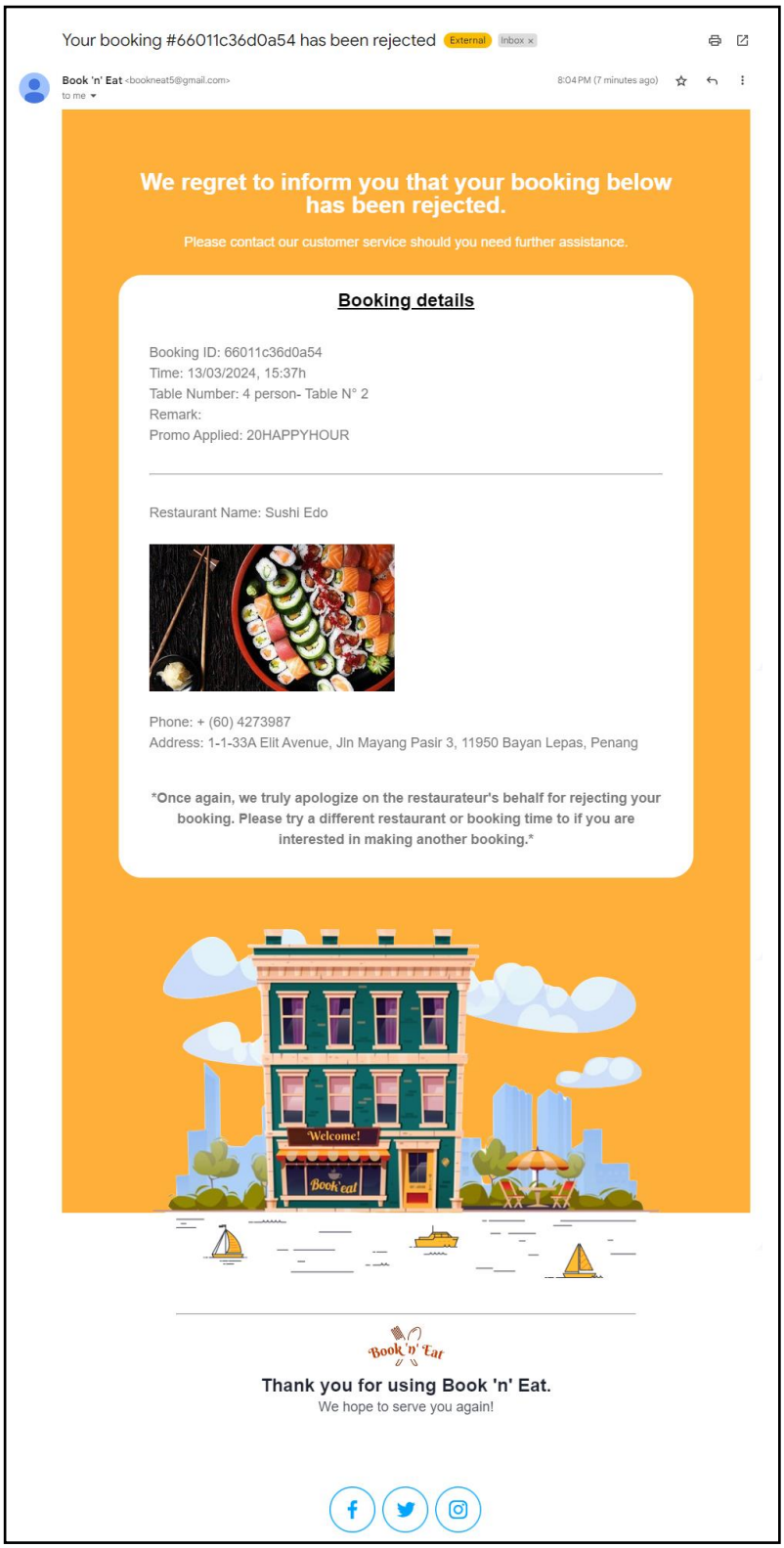

Figure 5.54 Booking rejection e-mail

After the e-mail is sent, a pop-up notification will appear, alerting restaurant admins that the reservation has been successfully rejected and the rejection e-mail is also sent to the customer.

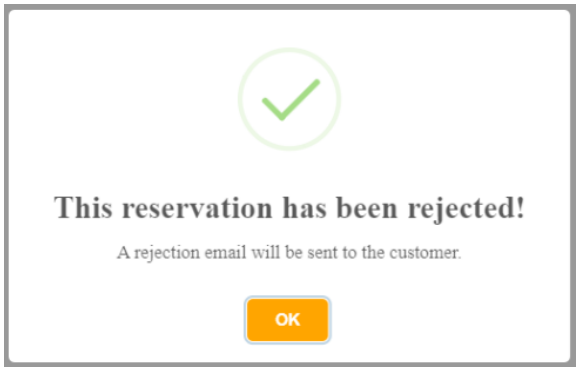

Figure 5.55 Booking rejected notification

To view a particular booking's detail, restaurant admins can click on the "Details" button under the "Details" column as shown in Figure 5.50. This will redirect the restaurant admin to the particular booking details page, where the restaurant, customer, tables, remark, promotions, and booking details are displayed (Figure 5.56).

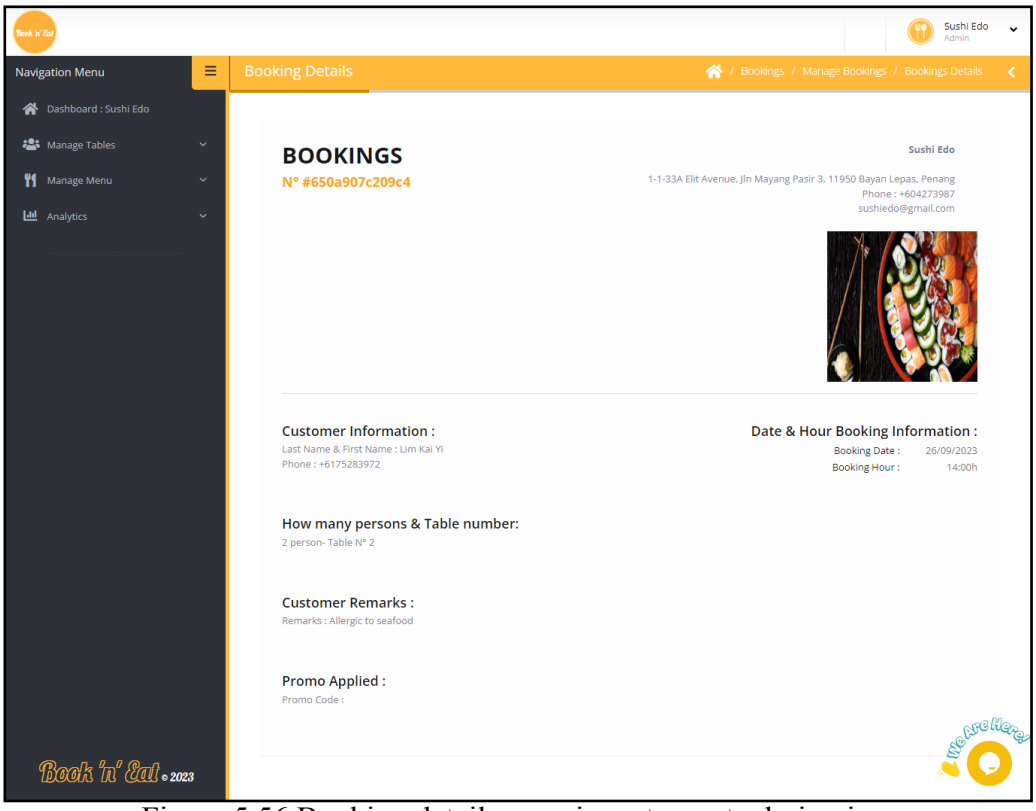

Figure 5.56 Booking details page in restaurant admin view

5.4.11 Restaurant Admin Manage Tables Page

Figure 5.57 shows the restaurant admin manage tables page, which can be accessed by clicking on the "Manage Tables" tab in the left bar. To add a new table, the restaurant admin can click on the "Add New Table" tab on the left bar to access the manage tables page, then click on the dropdown list to select the number of people for the table.

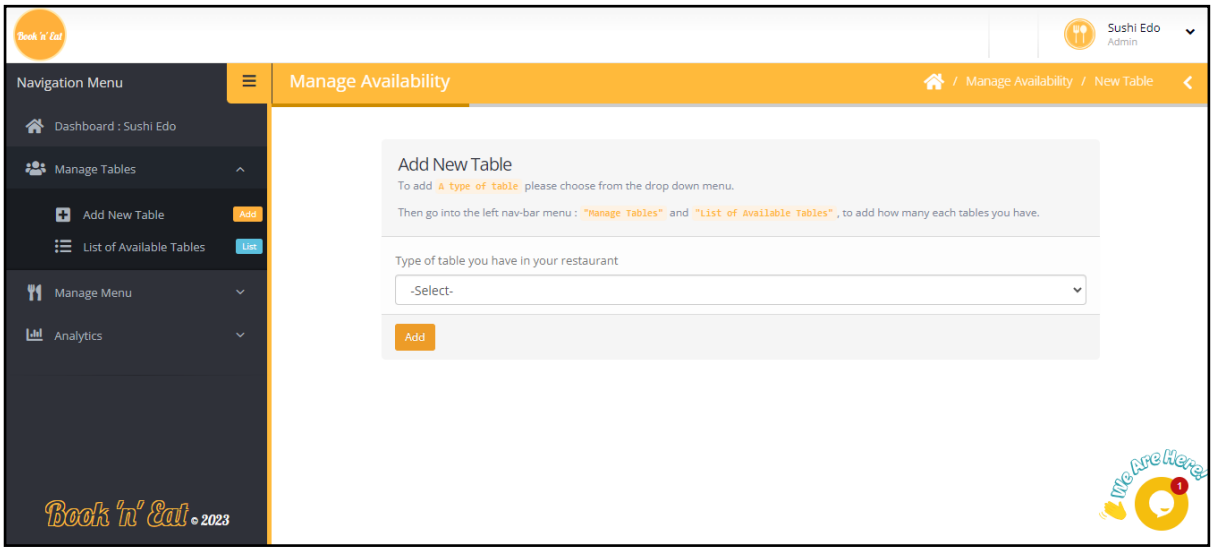

Figure 5.57 Restaurant admin manage tables page

For example, in Figure 5.58, we selected to add a "Table of 6 Persons" to the restaurant table availability. Then, simply click on the "Add" button, and a notification message (Figure 5.59) will pop up, alerting the restaurant admin that the table has been added successfully.

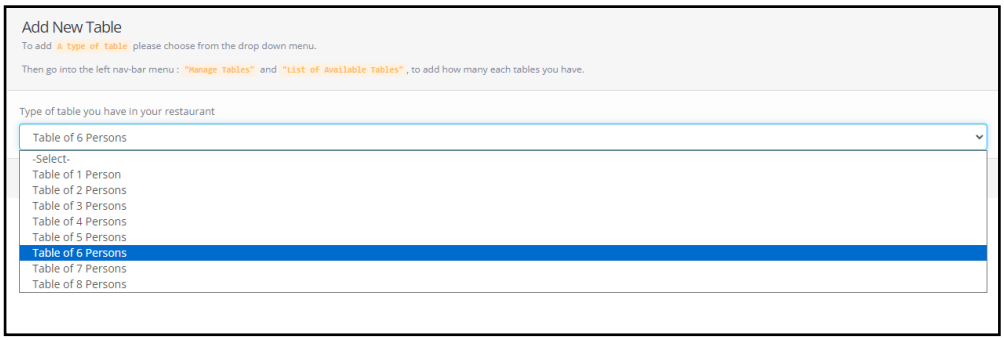

Figure 5.58 Add table dropdown list

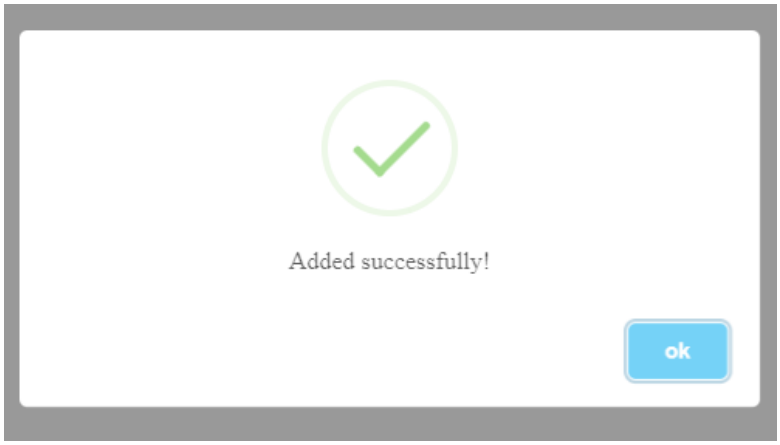

Figure 5.59 Add table successfully notification pop-up

To add the number of tables for each number of people/ table, the restaurant admin may click on the “List of Available Tables” tab on the left bar. The list of available tables page is shown in Figure 5.60, where the restaurant admin can select to add a table number depending on the number of people/ table column.

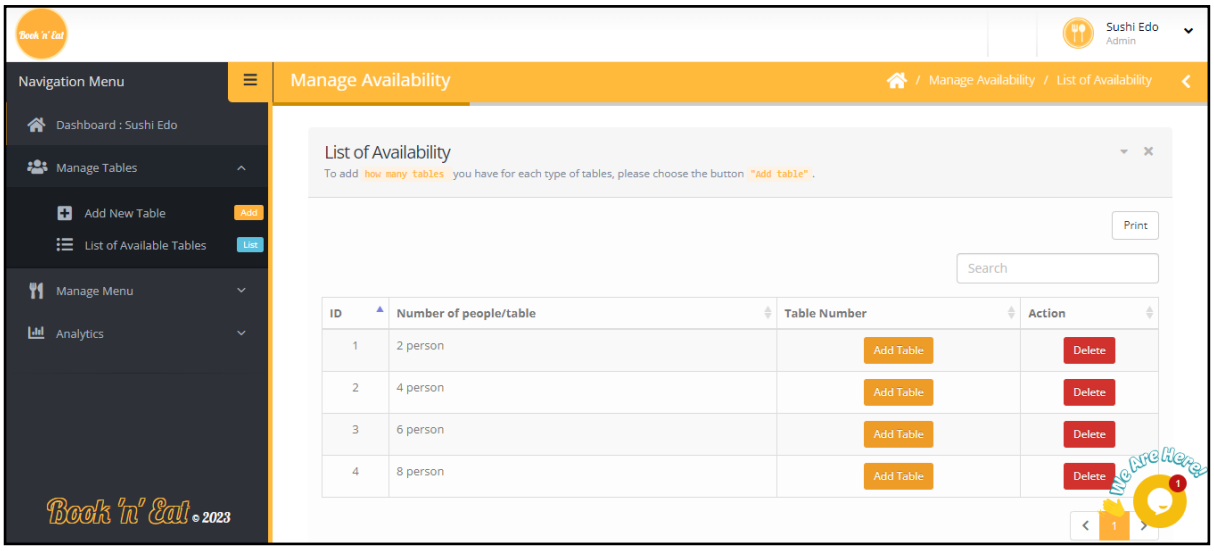

Figure 5.60 List of available tables page

For example, the restaurant admin wants to add more tables to the 2 person table. This can be done by clicking on the “Add Table” button in the “Table Number” column. After that, the page should be displayed as shown in Figure 5.61, where the restaurant admin can just click on the "Add" button, then input the number of tables they would like to add as shown in Figure 5.62.

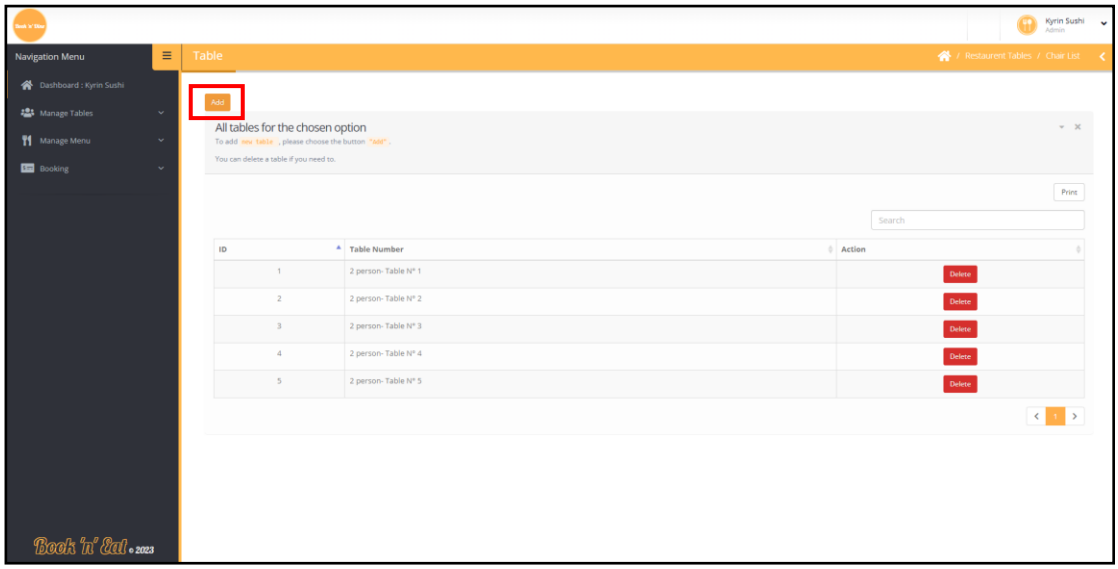

Figure 5.61 Add tables page

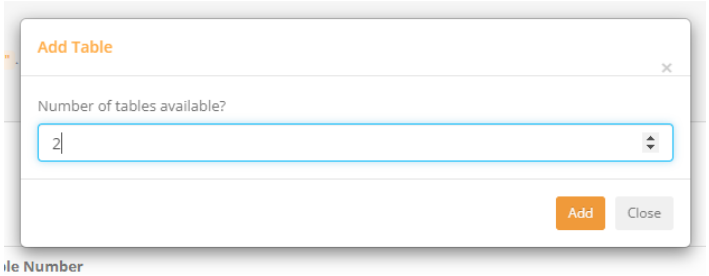

Figure 5.62 Add table input function

After the table numbers are successfully added, a notification message will pop up (Figure 5.63), alerting the restaurant admin that the table numbers have been added to the database.

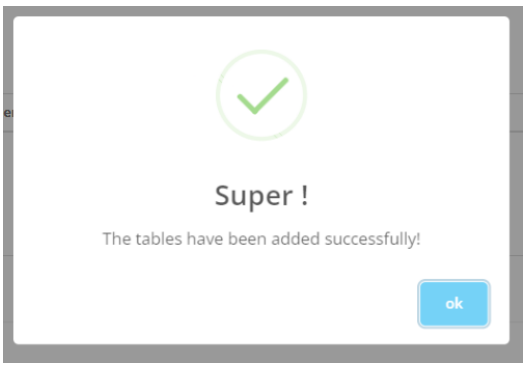

Figure 5.63 Add table number successfully notification pop-up

If the restaurant admin wants to delete a table from the table availability list, they may click on the “Delete” button in the “Action” column. A confirmation message will pop up, asking for confirmation on the restaurant admin's decision to delete the table (Figure 5.64).

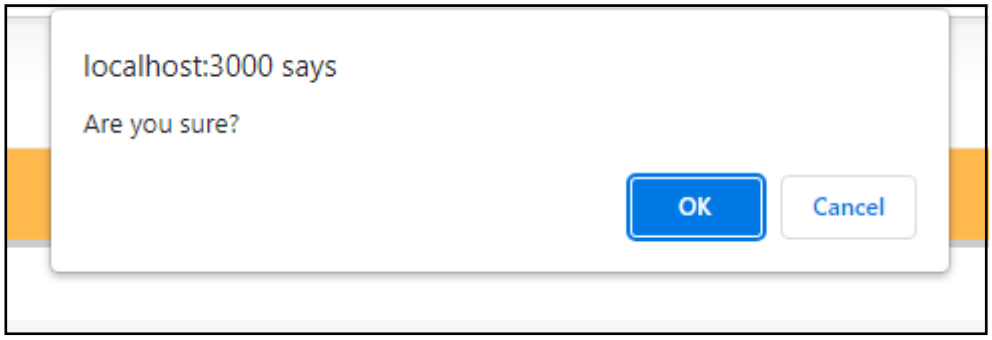

Figure 5.64 Delete table confirmation pop-up

If the restaurant admin wants to proceed with the deletion of tables, then they can click on the “OK” button and will be prompted to a notification message pop-up (Figure 5.65), alerting the restaurant admin that the selected tables have been deleted.

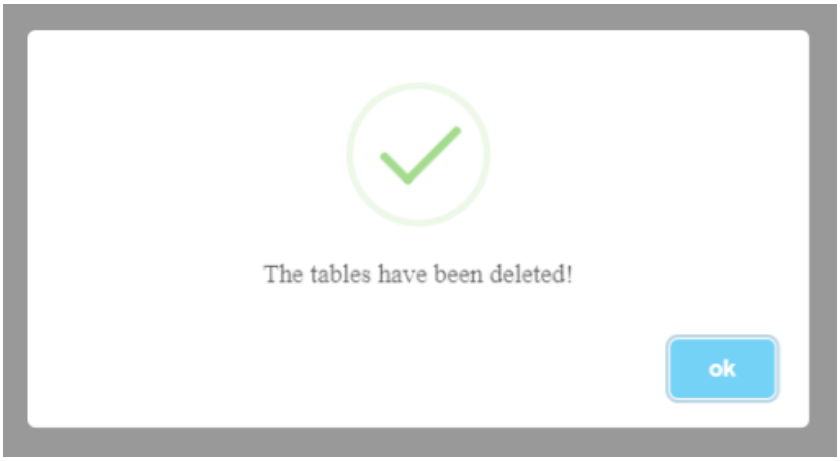

Figure 5.65 Delete table successfully notification pop-up

5.4.12 Restaurant Admin Manage Menu Page

Figure 5.66 shows the restaurant admin manage menu page, which can be accessed by clicking on the “Manage Menu” tab in the left bar. To add a new product, the restaurant admin can click on the “Add New Product” tab on the left bar to access the Add New Dish page, then fill in the details for the new dish to be added to the restaurant menu, such as the product name, price,

category, description, and product image. After entering the new dish details, the restaurant admin can click on the "Add to the menu" button to upload the new dish details to the system database.

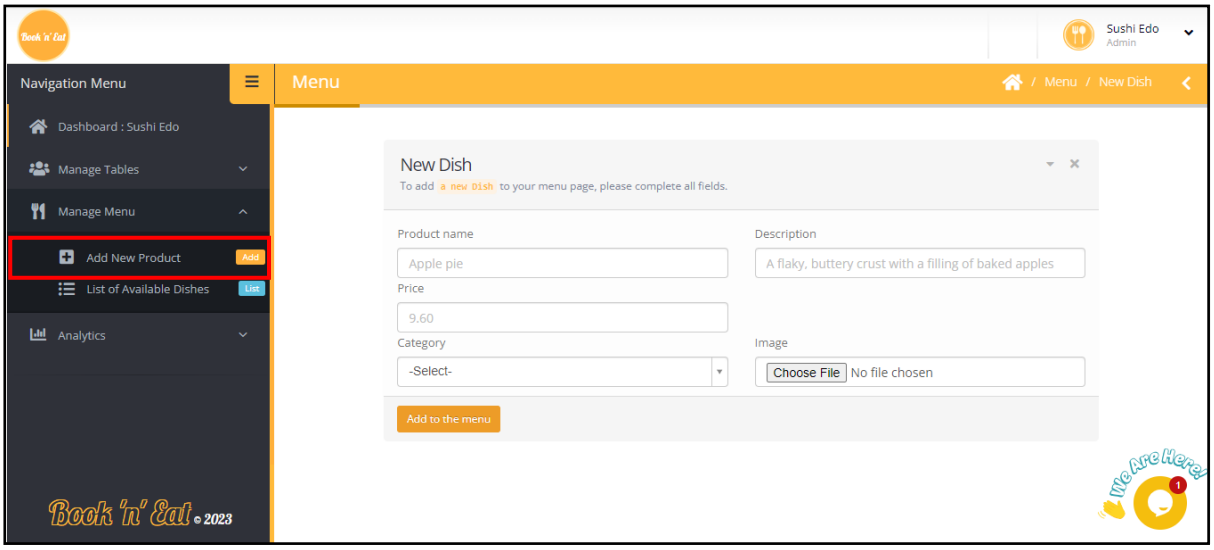

Figure 5.66 Restaurant admin manage menu page

For example, in Figure 5.67, we added a new dish called "Hot Chocolate" priced at RM8, under the category "Drinks", followed by its description and product image.

Figure 5.67 Adding a new dish function

Then, after clicking on the "Add to the menu" button, a notification message will pop up as shown in Figure 5.68, alerting the restaurant admin that the new dish has been successfully added to the menu list.

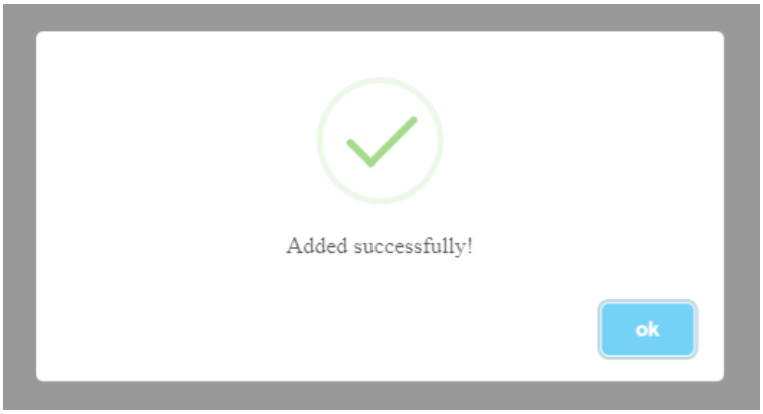

Figure 5.68 Add menu successfully notification pop-up

Figure 5.69 shows the list of dishes dashboard, which can be accessed by clicking on the “List of Available Dishes” tab in the left bar. This page displays all the menu items that have been added. The dish details such as product image, name, description, category, and price are listed. If the restaurant admin wishes to delete a menu item, they can click on the “Delete” button in the “Action” column.

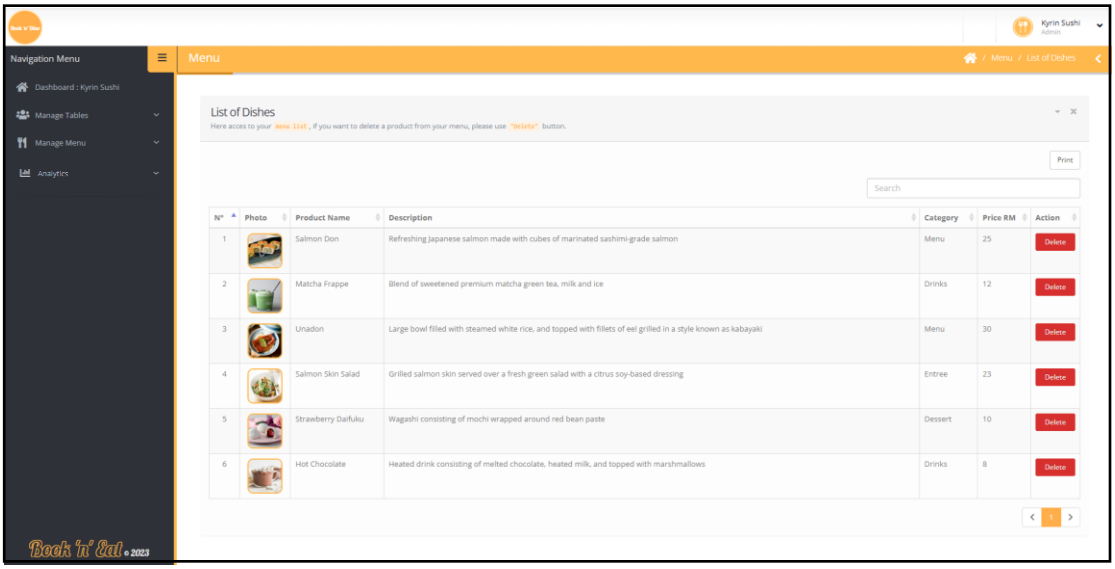

Figure 5.69 Restaurant admin menu list page

After clicking on the "Delete" button, a confirmation message will pop up (Figure 5.70), asking the restaurant admin for confirmation on whether to delete a menu item. If the restaurant admin confirms to delete a menu item, they can click on the "OK" button.

Figure 5.70 Delete menu item confirmation pop-up

Once the product has been successfully deleted from the database, a notification message as shown in Figure 5.71 will pop up, alerting the restaurant admin that the product has been deleted from the menu list.

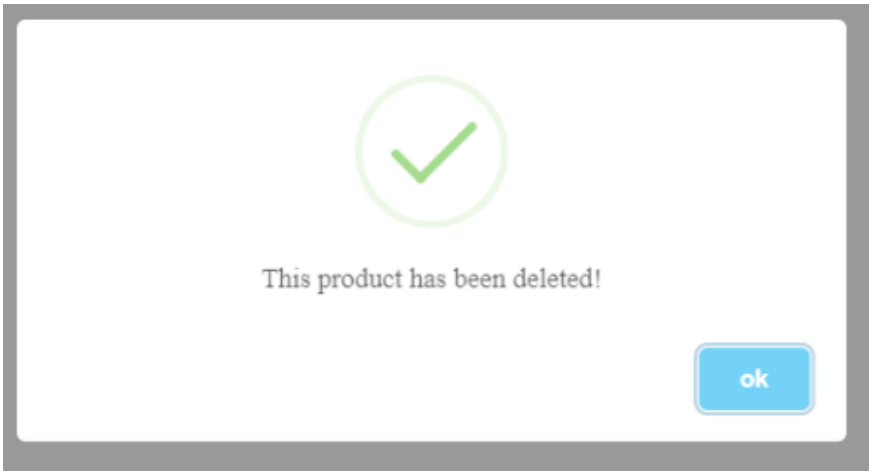

Figure 5.71 Delete menu item successfully notification pop-up

5.4.13 Restaurant Admin Analytics Page

Figure 5.72 shows the restaurant monthly analytics page, which can be accessed by clicking on the "View Monthly Analytics" tab in the left bar. To view the booking analytics for a specific month of a year, select the specific month and year from the drop-down list and click on the "Generate Analytics" button.

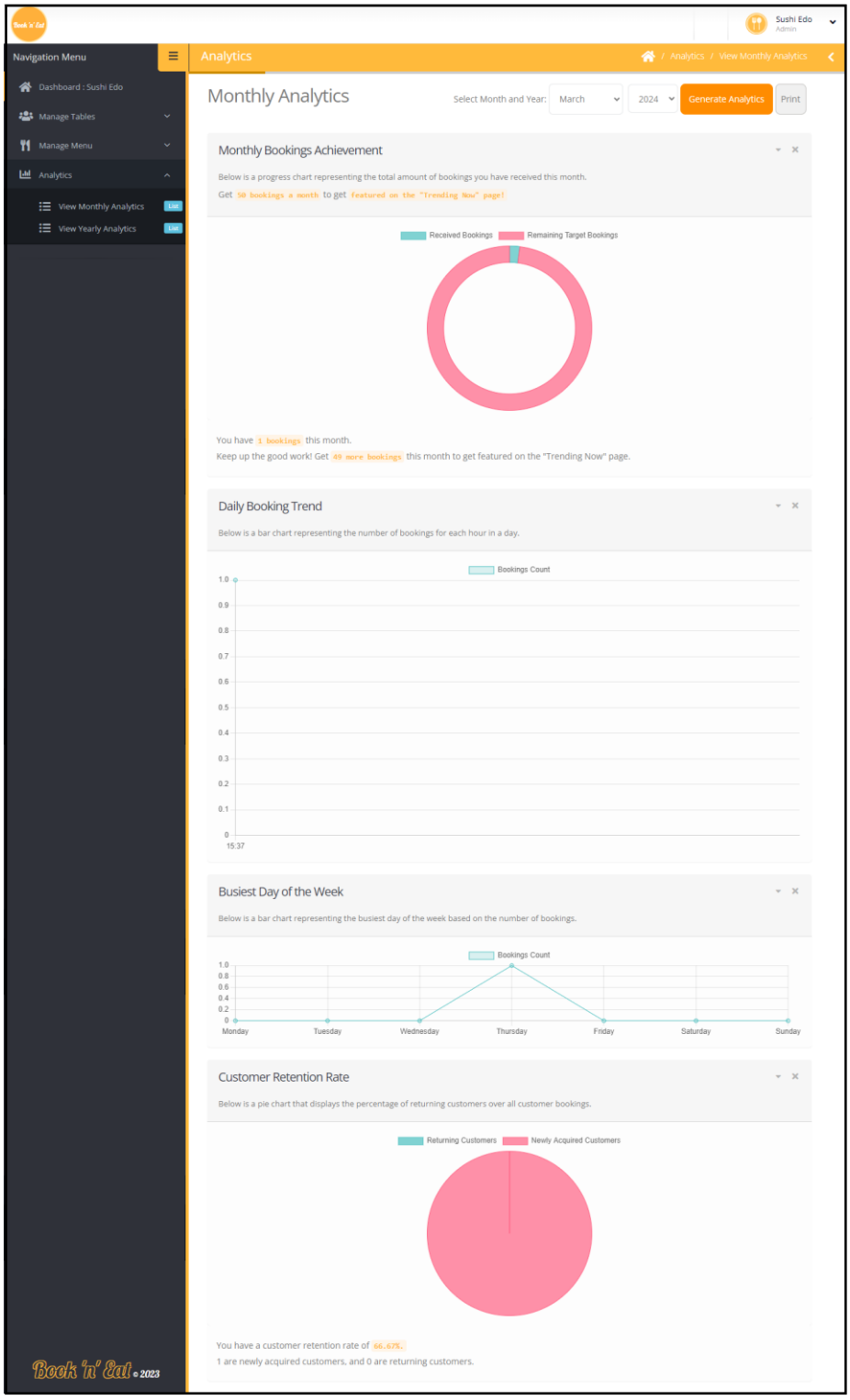

Figure 5.72 Monthly analytics page

As shown in Figure 5.72, it displays the restaurant's booking achievements, daily booking trend, busiest day of the week, and customer retention rate data. For the restaurant's booking achievement section, each restaurant has a target of 50 bookings to achieve in a month.

In this example, the restaurant has only achieved 1 out of 50 bookings, as displayed in the progress chart. If a restaurant manages to achieve more than 50 bookings a month, they will be featured on the customer's home page "Trending Now" section through the utilization of the B-tree algorithm. This motivates restaurateurs to achieve their target bookings as it provides free visibility and marketing for them.

The next section, which is the daily booking trend, displays the number of bookings the restaurant has received for each hour in day. The third section, which is the busiest day of the week illustrates a line chart that represents the restaurant's busiest day of the week based on the number of bookings they have received. The last section is the customer retention rate, which is calculated through the following formula as cited in [68]:

Customer Retention Rate = [(CE – CN)] / CS] x 100

Where:
CE = The number of customers at the **end** of the selected month and year.
CN = The number of **new** customers acquired during the period.
CS = The number of customers at the **start** of the period.

Figure 5.73, on the other hand, shows the restaurant's yearly booking analytics, which can be accessed by clicking on the "View Yearly Analytics" tab in the left bar. To view the booking analytics for a specific year, select the specific year from the drop-down list and click on the "Generate Analytics" button.

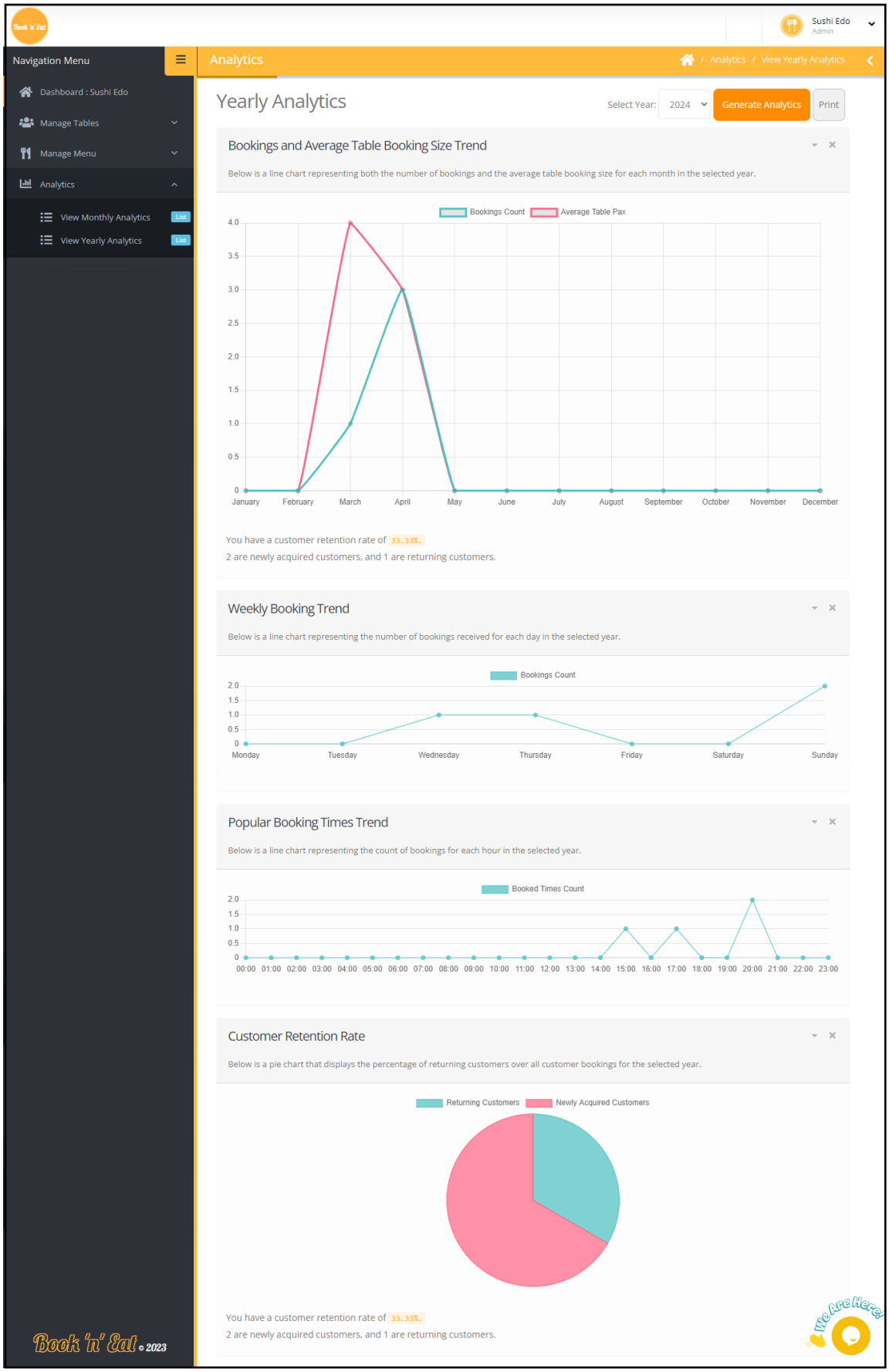

Figure 5.73 Yearly analytics page

As shown in Figure 5.73, it displays the restaurant's bookings and average table booking size trend, weekly booking trend, popular booking times trend, and customer retention rate data. The bookings and average table booking size trend is a line chart that represents both the number of bookings and the average table booking size the restaurant has received for each month in the selected year. The next section, which is the weekly booking trend, displays the number of bookings a restaurant has received for each day in the selected year. The third section, which is the popular booking times trend illustrates a line chart that counts the number of bookings a restaurant has received for each hour in the selected year. The last section is the customer retention rate, which is calculated through the following formula as cited in [68]:

Customer Retention Rate = [(CE – CN)] / CS] x 100

Where:
CE = The number of customers at the **end** of the selected month and year.
CN = The number of **new** customers acquired during the period.
CS = The number of customers at the **start** of the period.

To print a report, click on the "Print" button next to the "Generate Analytics" button (Figure 5.74). This print function is applicable to both monthly and yearly reports.

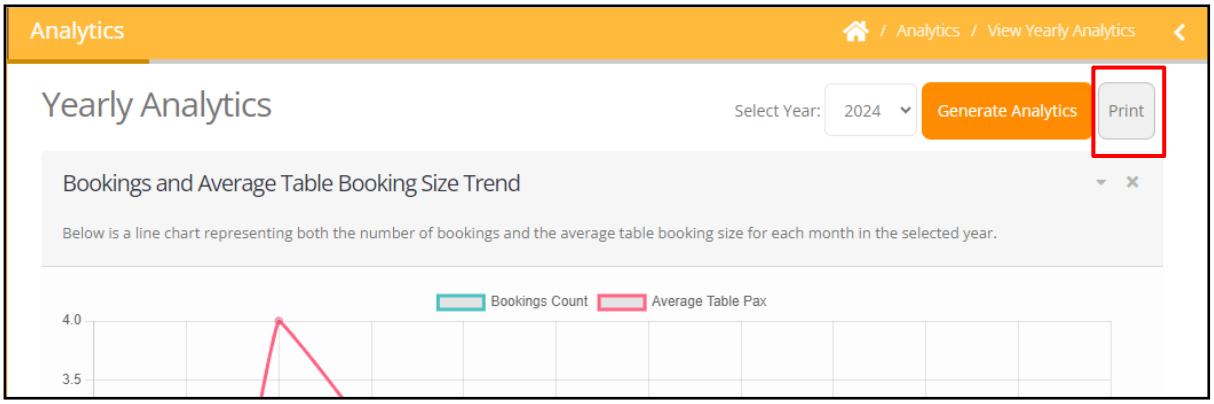

Figure 5.74 Analytics print button

After clicking on the "Print" button, the restaurant admin will be redirected to the print page (Figure 5.75) where they can print the report, or even save as PDF for easy reference.

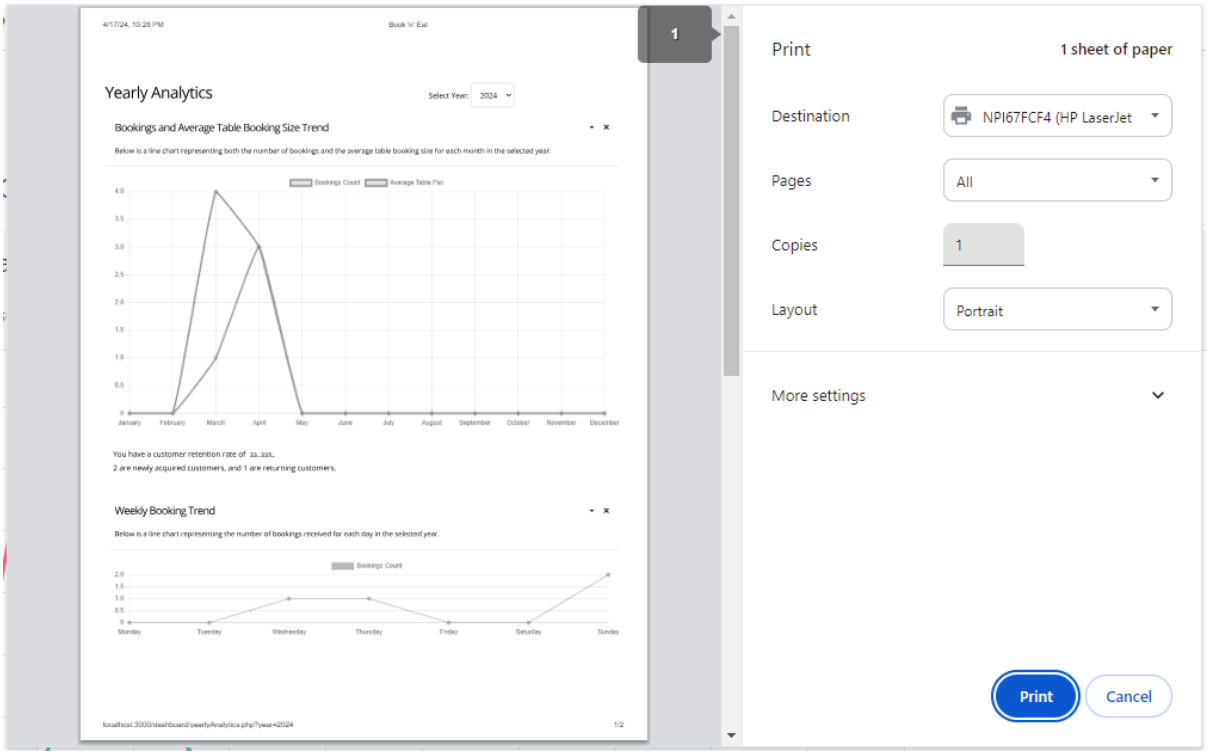

Figure 5.75 Analytics print page

5.4.14 Web Administrator Dashboard Page

Figure 5.76 shows the web administrator dashboard page, which can be accessed only by the web administrator to manage restaurant applications. After the restaurants registered for an account, their account needs to be accepted by the web administrator in order to start using the website. In the dashboard page, the web administrator can view restaurant applications and their details, such as the restaurant name, category, e-mail, phone number, location, business registration number (BRN), and application status.

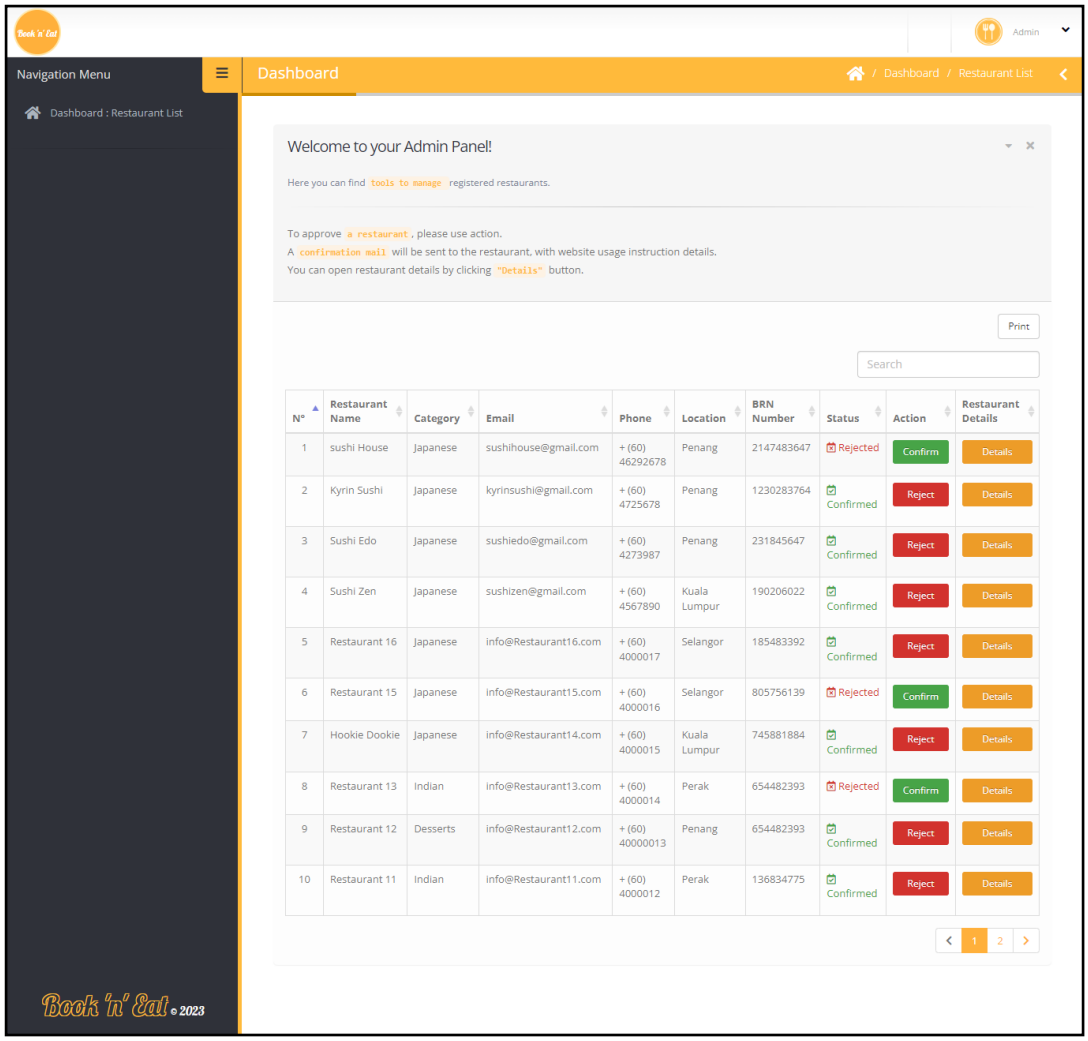

Figure 5.76 Web administrator dashboard page

To accept a restaurant application, the web administrator can click on the “Confirm” button in the “Action” column. Then, a notification will pop up (Figure 5.77), alerting the web administrator that the restaurant application has been accepted.

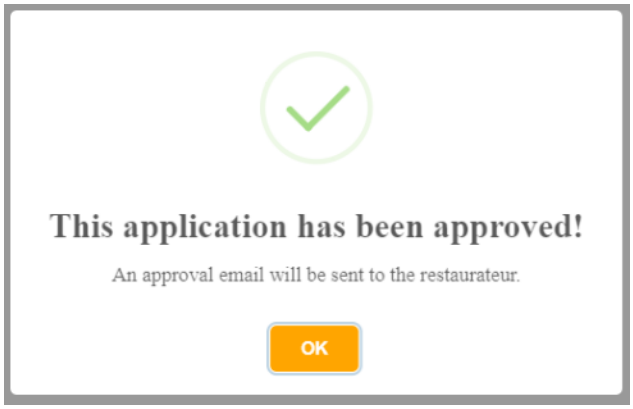

Figure 5.77 Restaurant approved notification

In addition, an approval e-mail will also be sent to the restaurateur to notify them their registration has been successful. The e-mail includes the restaurant name, image, phone number, and address details (Figure 5.78). Moreover, the restaurateurs can also click on the link provided in the e-mail to access the help center, where they can search up information and tutorials to set up and manage their restaurant account.

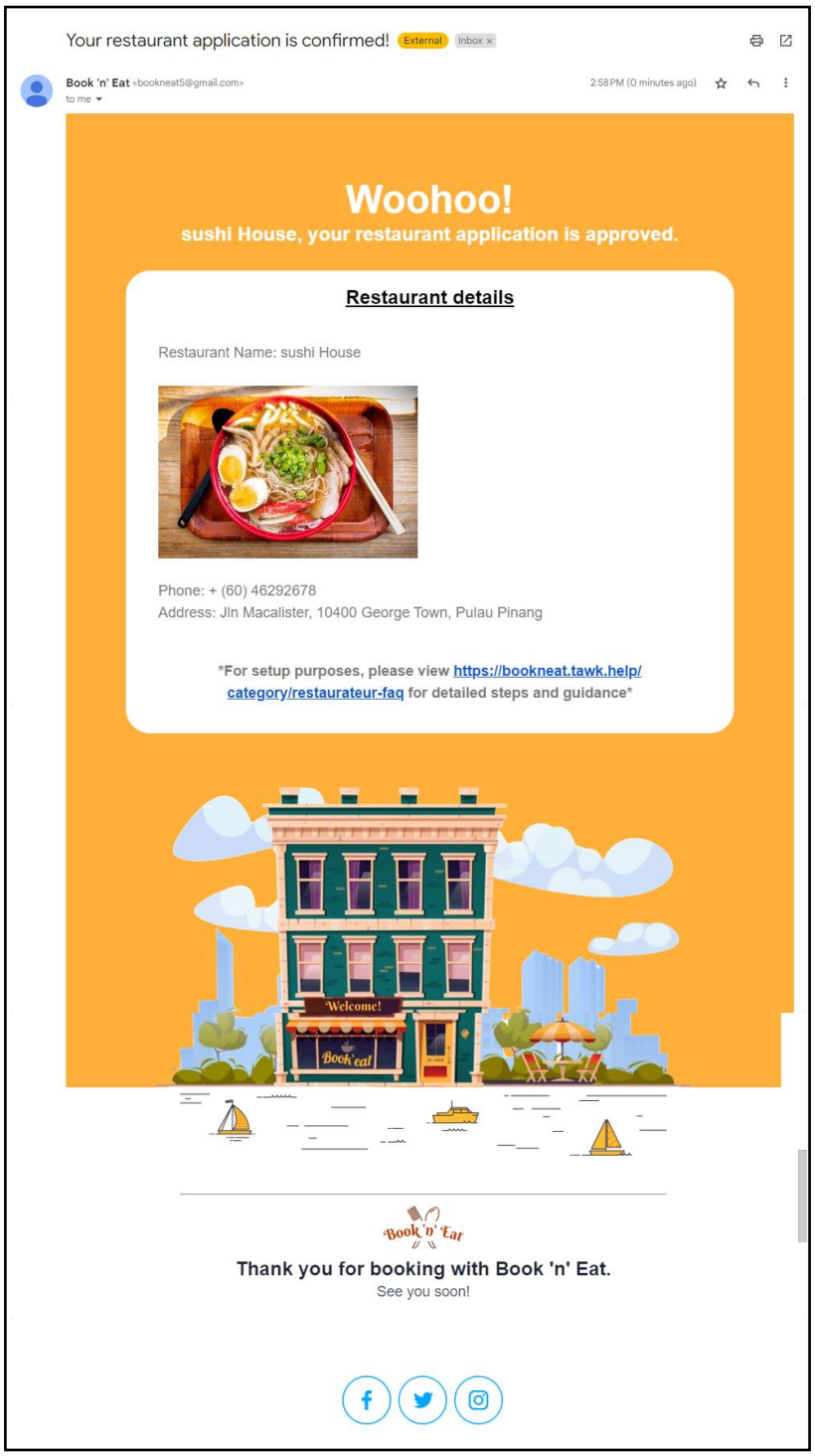

Figure 5.78 Restaurant approval e-mail

To reject a restaurant application, the web administrator can click on the "Reject" button in the "Action" column. Then, a notification will pop up (Figure 5.79), alerting the web administrator that the restaurant application has been rejected.

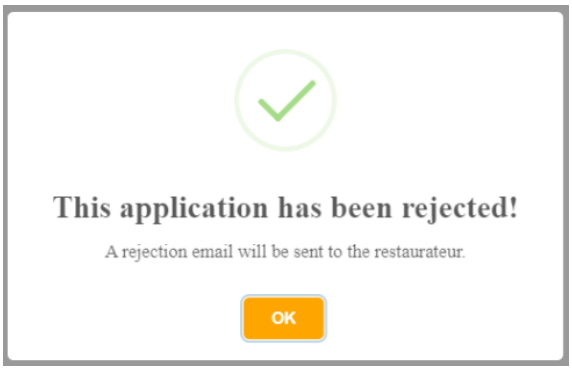

Figure 5.79 Restaurant rejected notification

Furthermore, a rejection e-mail will also be sent to the restaurateur to notify them their registration has been unsuccessful. The e-mail includes the restaurant name, image, phone number, and address details (Figure 5.80).

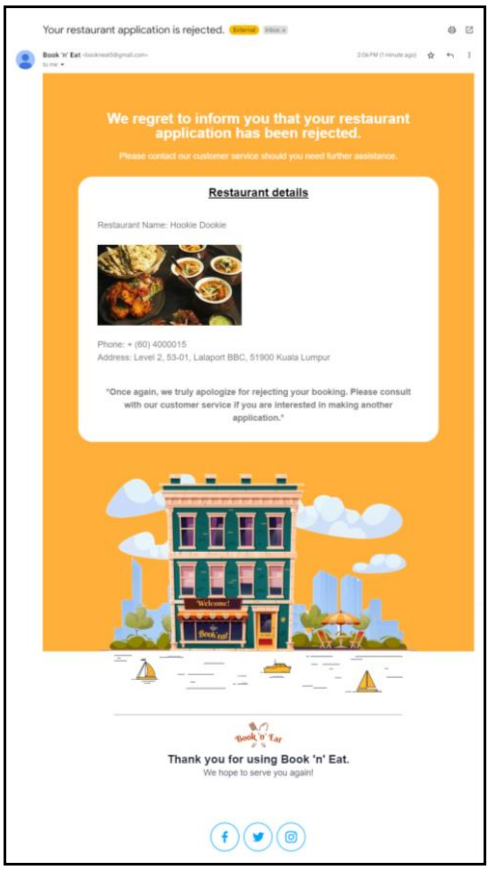

Figure 5.80 Restaurant rejection e-mail

To view a specific restaurant's details, the web administrator can click on the "Details" button in the "Restaurant Details" column. Then, the web administrator will be prompted to the restaurant details page as shown in Figure 5.81, where they can view the restaurant's details such as the name, business registration number (BRN), phone number, e-mail, website, address, cuisine category, and operating hours.

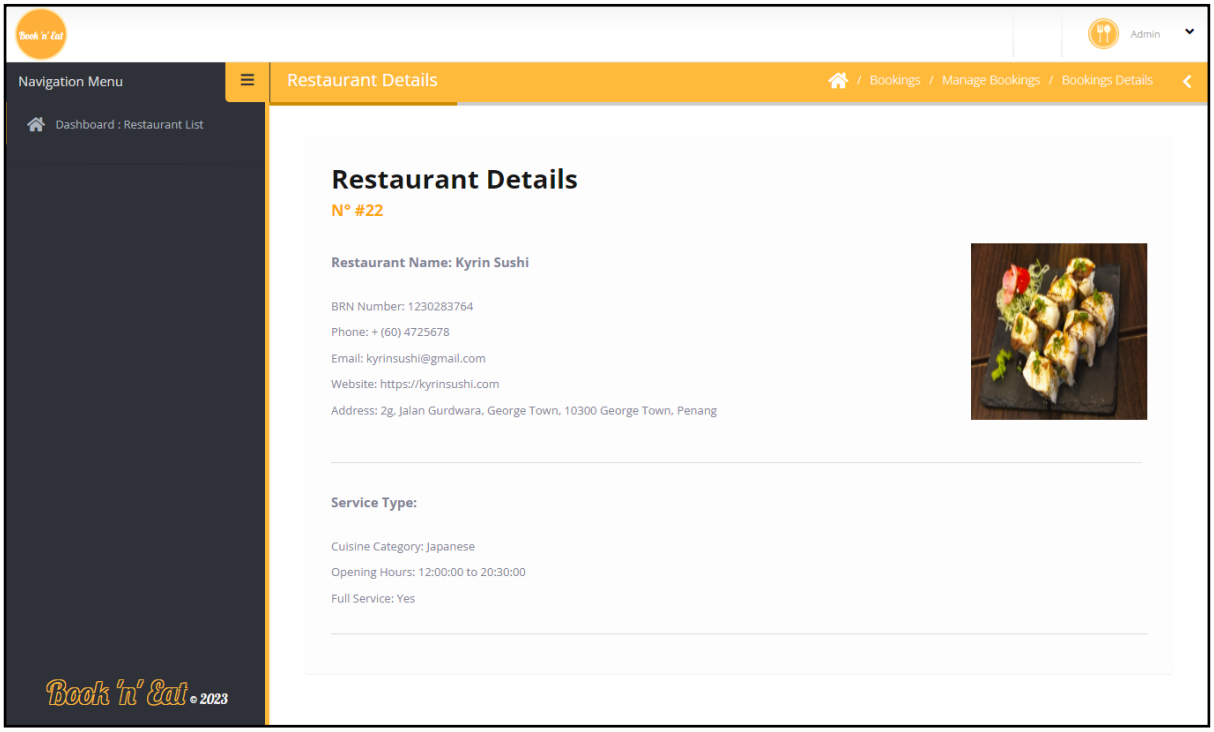

Figure 5.81 Restaurant details page

5.4.15 Chatbot Operation

To build an AI chatbot, it is required to first establish the knowledge base to store all of the relevant data and information to train the machine learning model. Figure 5.82 shows the page to build the knowledge base in the Tawk.to live chat software that is connected to the Book 'n' Eat website through a REST API. Articles can be created to display any information that may be helpful to users browsing through the help center, which will be discussed later in this report.

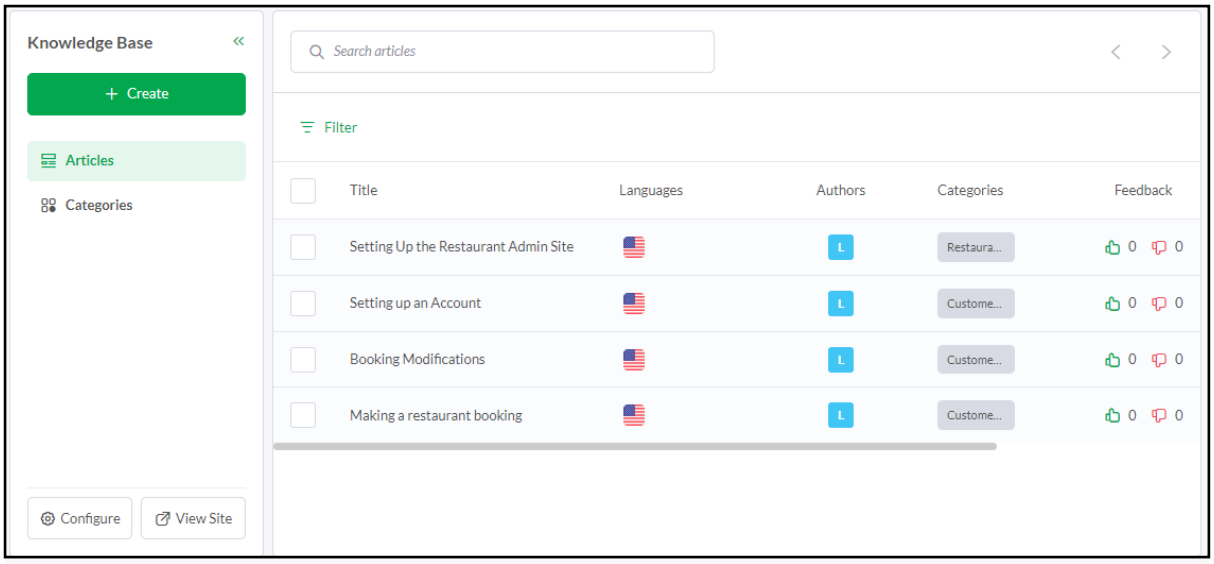

Figure 5.82 Building the knowledge base

As shown in Figure 5.83, categories can be created to store specific articles in it. In this case, two categories are created, which are Customer FAQ and Restaurateur FAQ respectively. The Customer FAQ category is used to store articles pertaining to customer inquiries, whereas the Restaurateur FAQ is used to store articles pertaining to restaurateur inquiries.

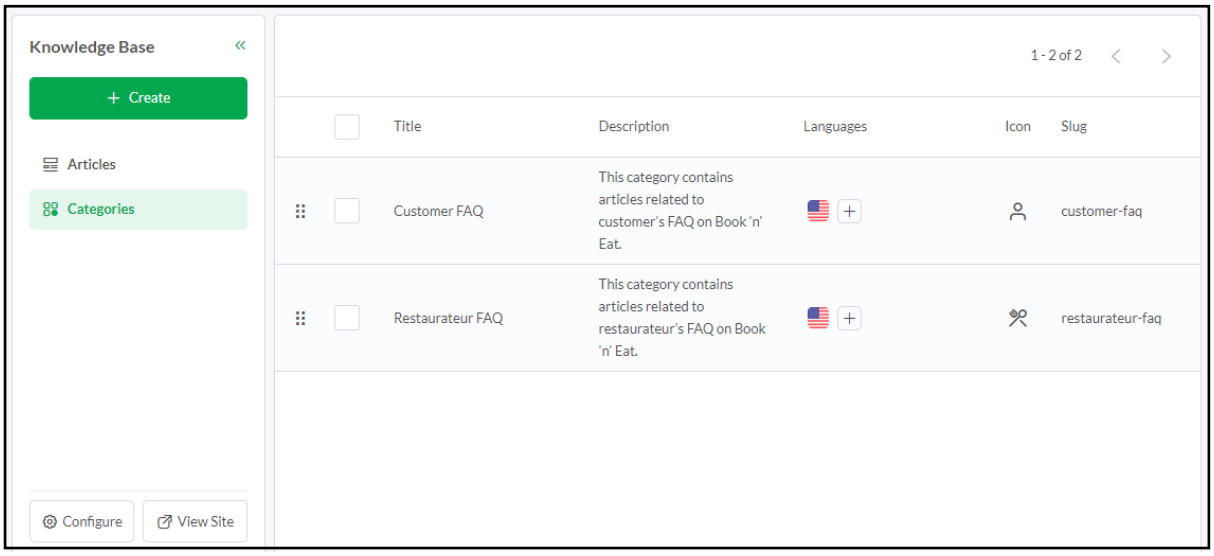

Figure 5.83 Knowledge base categories

To access the chatbot, users can click on the yellow icon as seen on the bottom right corner of the page (Figure 5.84).

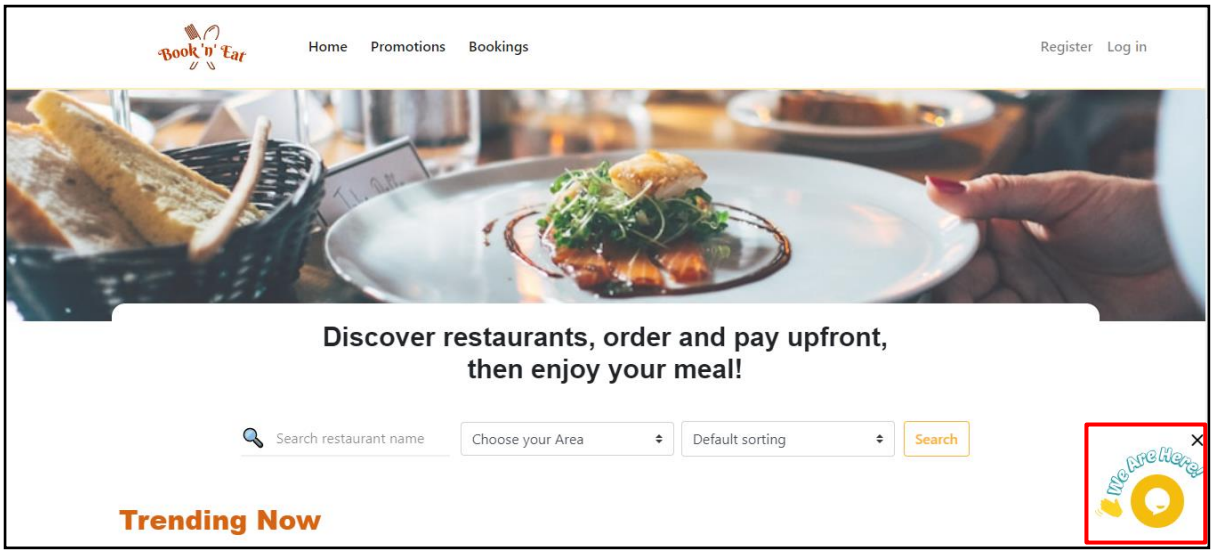

Figure 5.84 Chatbot feature

After clicking on the chatbot icon, the chatbot page will then appear (Figure 5.85), where users can search for information in the help center, or even start a conversation with the AI chatbot.

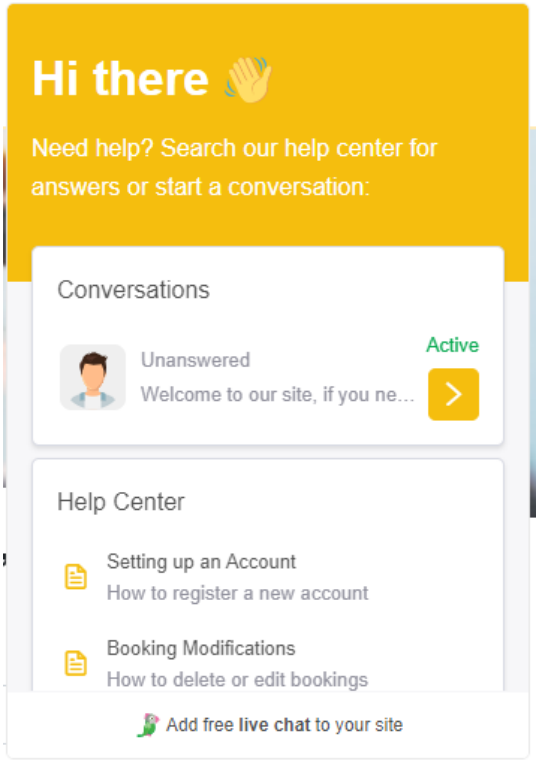

Figure 5.85 Chatbot page

Users can also search for answers by typing the keyword of their inquiry into the search bar, and the page will respond by recommending relevant articles that may be helpful to the users (Figure 5.86).

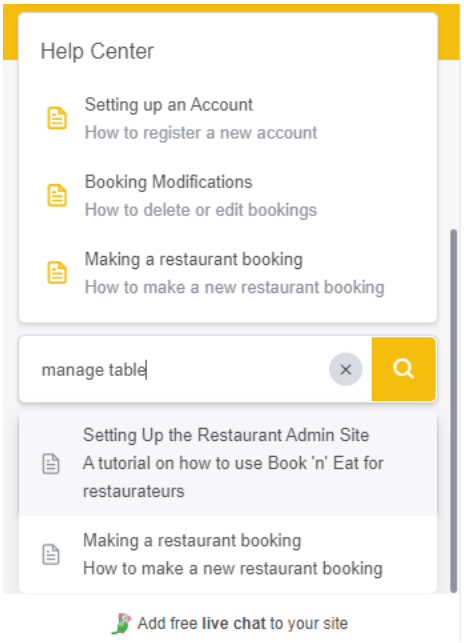

Figure 5.86 Searching the help center

If users want to search for answers manually, they can also select on any articles under the help center in the chatbot page (Figure 5.87) and be redirected to the help center page (Figure 5.88) to view the full article.

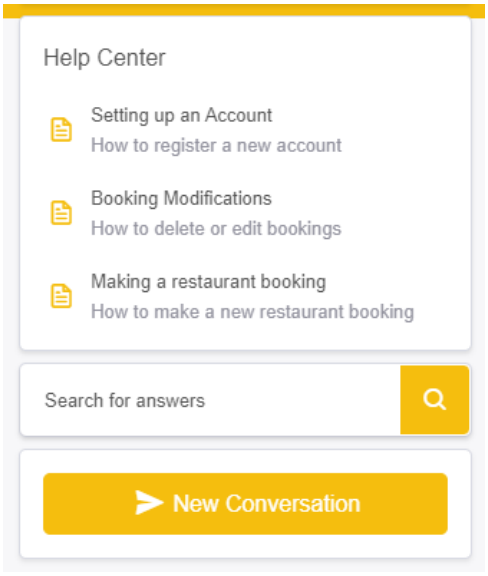

Figure 5.87 Chatbot help center

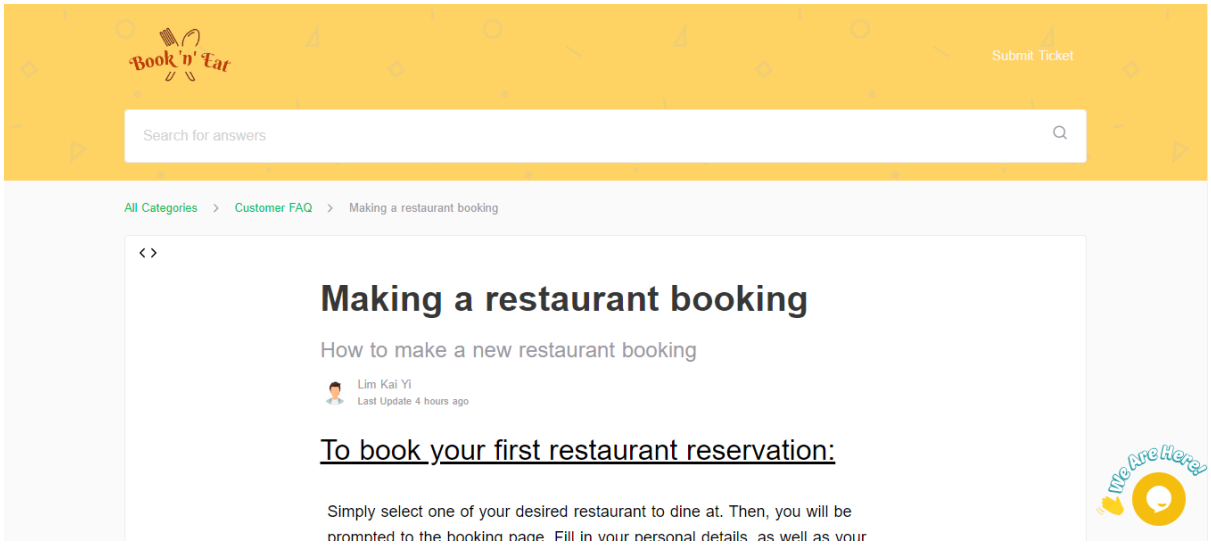

Figure 5.88 Help center article page

Users can also click on the "All Categories" text to be redirected to the home page of the help center. In the home page (Figure 5.89), users can see that there are two different categories, which are the Customer FAQ and Restaurateur FAQ respectively. If users want to view articles pertaining to customer inquiries, they can click on the Customer FAQ category to view the relevant articles. Conversely, if users want to view articles pertaining to restaurateur account inquiries, they can click on the Restaurateur FAQ category to view the relevant articles.

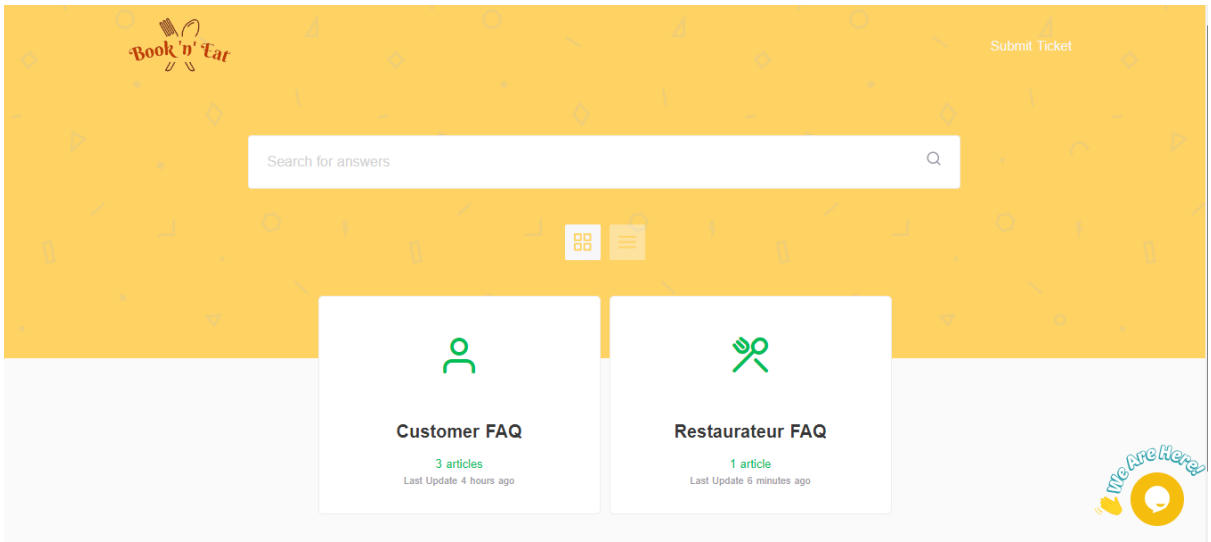

Figure 5.89 Home page of the help center

If users want to submit a ticket, they can click on the “Submit Ticket” text as shown in figure 5.90 and fill out the form (Figure 5.91). After the ticket is submitted, the customer service agent will read it and respond to the user via e-mail.

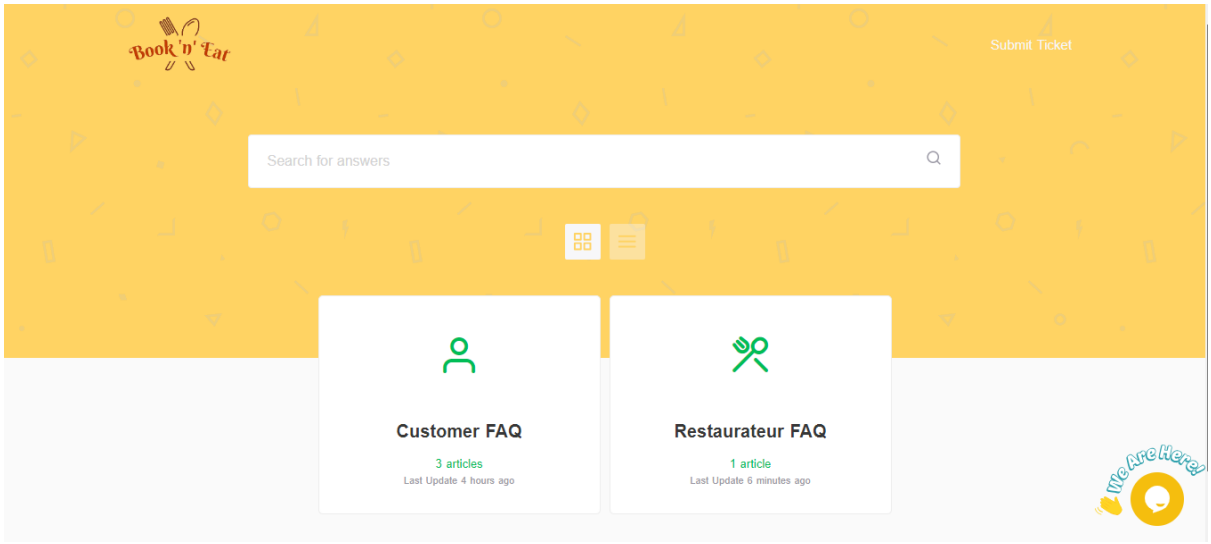

Figure 5.90 Submit ticket feature

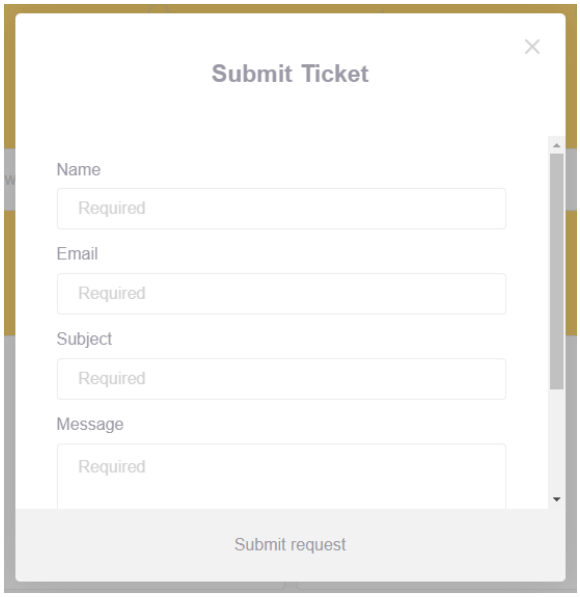

Figure 5.91 Ticket submission form

If users want to obtain immediate and automated replies, they can click on the “New Conversation” button as shown in Figure 5.92 to start a new conversation with an AI assistant.

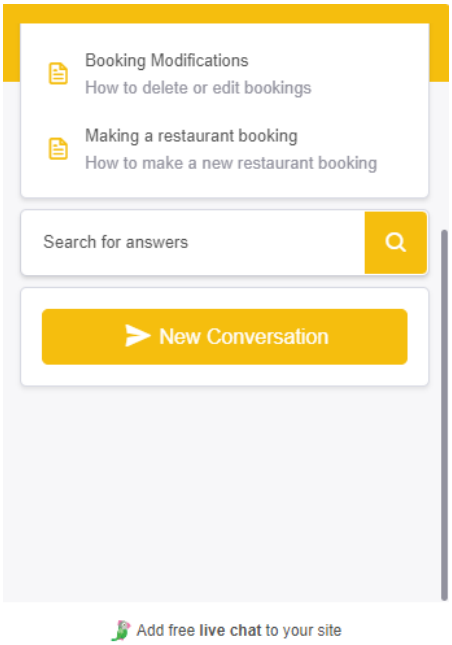

Figure 5.92 Start new conversation with AI assistant

Users can then type their inquiries in the textbox and click on enter to send their message. The AI assistant will reply to the user by first understanding the user's questions, then extract relevant information from the knowledge base through natural language processing (NLP) to automate the responses to users (Figure 5.93 – Figure 5.94).

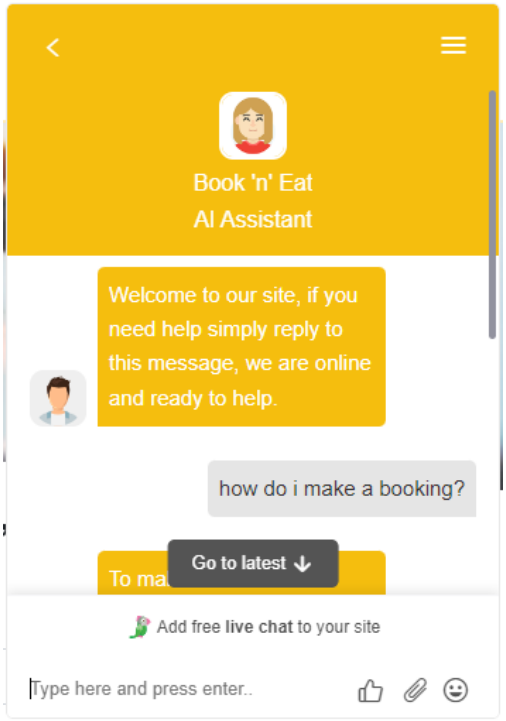

Figure 5.93 Sending messages to AI assistant

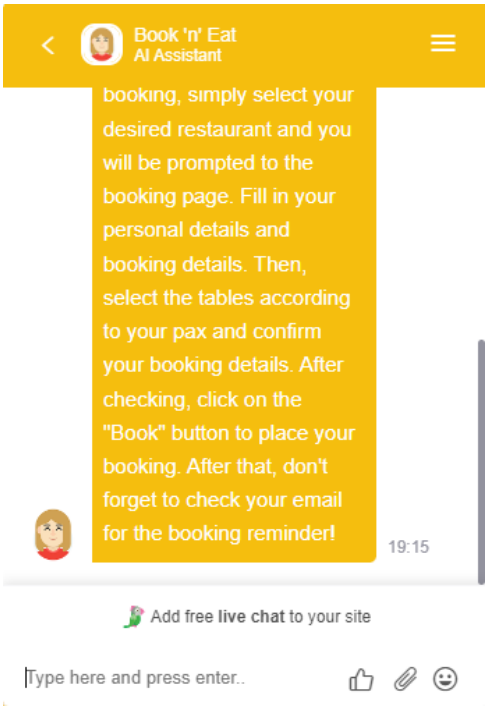

Figure 5.94 Responses from AI assistant

If users want to speak to a live agent, they can request to be transferred to a live agent by sending a message that specifies they want to speak to a live agent (Figure 5.95). The AI assistant will ask the user for confirmation and if the user selects “Yes”, the chatbot platform will request for live agents to join in the chat.

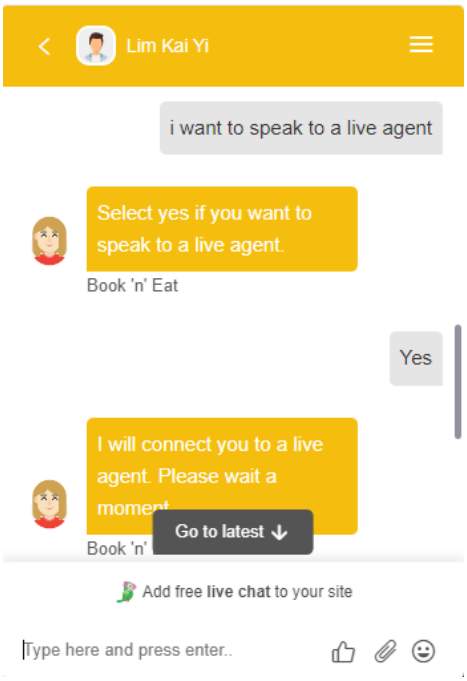

Figure 5.95 Transfer chat to live agent

Figure 5.96 shows the Tawk.to dashboard page where live agents can join in the chat and reply to users. After the live agent joined the chat, they can simply type a reply and hit the green button to send the message.

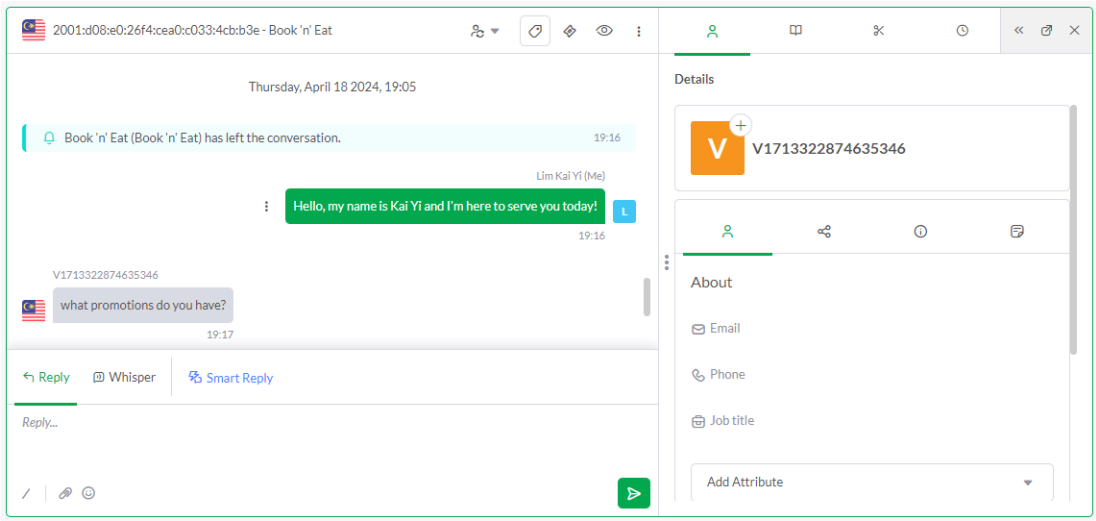

Figure 5.96 Tawk.to live agent transfer page

Figure 5.97 shows the chatbot page where the users can see the live agent's reply. This feature allows users to be able to contact human customer service representatives in real-time especially in cases where users prefer to seek solutions for questions that are more personalized and complex.

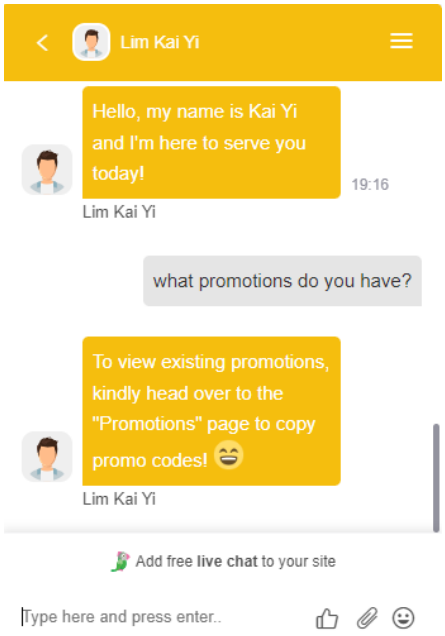

Figure 5.97 Tawk.to live agent reply

Chapter 6

System Evaluation and Discussion

6.1 System Testing and Performance Metrics

System testing is an important part in software development as it ensures the system functions as expected and meets its user requirements. There are several methods for system testing, such as unit testing, system testing, integration testing, and acceptance testing [69].

Unit testing is selected as the testing method for the e-Reservation Restaurant web application as it allows to focus on modular testing, early defect detection, code quality enhancement, support for continuous integration, and reduction of regression issues. By testing the individual components in isolation, developers can confirm that each part works as expected and easily identify and correct any problems or mistakes [69]. This testing method not only promotes code quality and maintainability but also makes it easier to integrate new functionalities or changes thus leading to a reliable and scalable system that meets user needs well.

Additionally, the performance metrics are vital in assessing the system's performance and scalability [70, p. 5798]. Some of the key performance metrics for e-Reservation Restaurant web application include:

1. **Response Time:** This metric measures how long it takes for a system to respond to user activities [71, p. 7] such as loading pages, making reservations and sending e-mails. The faster the response time is, the better it is for both users and their experience [71, p. 31].

2. **Throughput:** This metric assesses whether the system can process multiple requests and transactions at once. Higher throughput allows more scalability and enables better support during peak load times and busy periods [72, p. 590].

3. **Error Rate:** This metric keeps track of how often users come across errors or failures while interacting with the system. The lesser is this rate; the more reliable and stable an application is [73].

4. **Resource Utilization:** This metric monitors availability of resources like CPU, memory, network bandwidth [74, p. 187]. Properly managed resource usage helps avoid resource bottlenecks thus facilitates proper running of operations.

Taking these into account, it would be ideal to have unit testing along with performance metrics monitoring in order to ensure that e-Reservation Restaurant web application remains reliable, functional and operates efficiently under real-world usage scenarios.

6.2 Testing Setup and Result

The primary goal of unit testing is to evaluate the system's functionality in isolation to identify and mitigate any bugs or errors. This testing method simulates real-world usage scenarios and ensures that the system meets the specified requirements. Thus, the test cases for each scenario are described, followed by the input example, expected output of the action, and the actual output of the action. The success of each test case is then determined by "PASS" or "FAIL" in the Action/ Remark column. The following tables are used to show the unit testing results of each component developed in the project.

6.2.1 Test Scenario: Register, Login, and Logout

Table 6.1 Test scenario: Register, login, and logout

No	Test Case	Input	Expected Output	Actual Output	Action/ Remark
1	Customer Register Success	Last Name: Lim First Name: Kai Yi E-mail: kkaiyyi@1utar.my Phone: 0123456789	Customer able to click the "Register" button to register a new account and alert users "New	Able to click the "Register" button to register a new account and	**PASS**

		Password: ky123	account well added!"	alert users "New account well added!"	
2	Restaurant Register Success	Restaurant Name: Sushi House Restaurant Website: https://sushihouse.com.my Restaurant Email: sushihouse@gmail.com Restaurant Phone: 047689043 Restaurant Address: 28 Jalan Prangin, 11800 Georgetown, Penang BRN Number: 991207031298 Password: sushihouse Category: Japanese Area: Penang Opening: 10:00am Closing: 10:00pm Full Time Service: Yes Image: sushihouse.jpg	Restaurant admin able to click the "Register" button to register a new account and alert users "New account well added!"	Able to click the "Register" button to register a new account and alert users "New account well added!"	**PASS**
3	Duplicated Customer Registration	Last Name: Lim First Name: Kai Yi E-mail: kkaiyyi@1utar.my	Display error message that says "Warning! This E-mail already	Display error message that says "Warning!	**PASS**

		Phone: 0123456789 Password: ky123	exists." And redirect user back to register page	This E-mail already exists." And redirect user back to register page	
4	Duplicated Restaurant Registration	Restaurant Name: Sushi House Restaurant Website: https://sushihouse.com.my Restaurant Email: sushihouse@gmail.com Restaurant Phone: 047689043 Restaurant Address: 28 Jalan Prangin, 11800 Georgetown, Penang BRN Number: 991207031298 Password: sushihouse Category: Japanese Area: Penang Opening: 10:00am Closing: 10:00pm Full Time Service: Yes Image: sushihouse.jpg	Display error message that says "Warning! This E-mail already exists." And redirect user back to register page	Display error message that says "Warning! This E-mail already exists." And redirect user back to register page	**PASS**

5	Customer Login Success	E-mail: kkaiyyi@1utar.my Password: ky123	Customer able to click the "Login" button to login to their account and redirected to the customer home page	Able to click the "Login" button to login to their account and redirected to the customer home page	**PASS**
6	Restaurateur Login Success	E-mail: sushihouse@gmail.com Password: sushihouse	Restaurateur able to click the "Login" button to login to their account and redirected to the restaurateur dashboard page	Able to click the "Login" button to login to their account and redirected to the restaurateur dashboard page	**PASS**
7	Web Administrator Login Success	E-mail: admin@bookneat.com Password: admin	Web administrator able to click the "Login" button to login to their account and redirected to the restaurant application management page	Able to click the "Login" button to login to their account and redirected to the restaurant application management page	**PASS**
8	Login Details Incorrect	E-mail: kkaiyyi@1utar.my Password: abc123	Display error message that says "Incorrect password!" or "The mail does not	Display error message that says "Incorrect password!" or	**PASS**

			exist." and redirect user back to register page	"The mail does not exist." and redirect user back to register page	
9	Logout	Click on "Logout" button	User able to click the "Logout" button to logout of their account	Able to click the "Logout" button to logout of their account	**PASS**

6.2.2 Test Scenario: Manage Profile

Table 6.2 Test scenario: Manage profile

No	Test Case	Input	Expected Output	Actual Output	Action/ Remark
1	Update Customer Profile Details	Phone: 0173426736 Password: hello123	Customers able to view their account details and edit the data fields (phone and password) that are set as editable	Able to view their account details and edit the data fields (phone and password) that are set as editable	**PASS**
2	Update Restaurant Profile Details	Phone: 058479273 Category: Dessert Area: Perak Address: Champs Elysees, Bandar	Restaurant admin able to view their account details and edit the data fields (phone, category, area, address,	Able to view their account details and edit the data fields (phone, category,	**PASS**

		Agacia, 31300 Kampar, Perak Opening Hours: 12:00pm Closing Hours: 9:00pm Password: restaurant123	operating hours, and password) that are set as editable	area, address, operating hours, and password) that are set as editable	
3	Save Profile Details without Editing	Click on "Save" button	Display error message that says "A problem has occurred!" and redirect user back to profile page	Display error message that says "A problem has occurred!" and redirect user back to profile page	**PASS**

6.2.3 Test Scenario: Search Restaurant and Make Booking

Table 6.3 Test scenario: Search restaurant and make booking

No	Test Case	Input	Expected Output	Actual Output	Action/ Remark
1	Select restaurant preference	Categories: Japanese, Desserts Locations: Kuala Lumpur	System able to display restaurant according to selected category and location preference	Able to display restaurant according to selected category and location preference	**PASS**
2	Search Restaurant	Search bar: sushi Area: Penang	System able to display the	Able to display the	**PASS**

		Sorting: Default	searched restaurants according to search keyword and area, with its result sorted accordingly based on the restaurant name	searched restaurants according to search keyword and area, with its result sorted accordingly based on the restaurant name	
3	Select Restaurant	Click on the "Book" button	Customer able to select the restaurant they want to book for to view its details	Able to select the restaurant customers want to book for to view its details	**PASS**
4	Display Restaurant Information	None	System able to display restaurant details (restaurant name, image, website, phone number, operating hours, and address) and menu information (name, image, description, and price)	Able to display restaurant details (restaurant name, image, website, phone number, operating hours, and address) and menu information (name, image,	**PASS**

				description, and price)	
5	Sort Menu item	Click on "Side Dish" button	System able to display menu items that are under the selected menu category	Able to display menu items that are under the selected menu category	**PASS**
6	Make booking	Last Name: Lim First Name: Kai Yi Phone: 0123456789 E-mail: kkaiyyi@1utar.my Day: 15/07/2024 Time: 2:00pm Remarks: Need baby chair	Customer able to fill in their booking details and click the "Book" button to book for a restaurant	Able to fill in their booking details and click the "Book" button to book for a restaurant	**PASS**
7	Display Table Availability	None	System able to display real-time table availability for the specific date and time	Able to display real-time table availability for the specific date and time	**PASS**
8	Select Table	Select Table of 2 pax (number 1)	Customer able to select on tables and click on the "Confirm" button to proceed to the booking confirmation page	Able to select on tables and click on the "Confirm" button to proceed to the booking	**PASS**

				confirmation page	
9	Display Booking Confirmation	None	System able to display booking confirmation details (customer name, phone number, e-mail, booking date, time, table number, and remarks)	Able to display booking confirmation details (customer name, phone number, e-mail, booking date, time, table number, and remarks)	**PASS**
10	Apply Promo Code Success	Promo Code: 10HAPPYHOUR	System able to validate the promo code and display "Promo code applied successfully!"	Able to validate the promo code and display "Promo code applied successfully! "	**PASS**
11	Apply Promo Code Fail	Promo Code: HAPPYHOUR	System able to validate the promo code and display "Invalid promo code! Please try again."	Able to validate the promo code and display "Invalid promo code! Please try again."	**PASS**
12	Place Booking	Click on the "Book" button	System able to save the booking to the database and notify	Able to save the booking to the	**PASS**

			users with a "Booking Placed!" notification	database and notify users with a "Booking Placed!" notification	

6.2.4 Test Scenario: Copy Promo Code

Table 6.4 Test scenario: Copy promo code

No	Test Case	Input	Expected Output	Actual Output	Action/ Remark
1	Copy promo code	Click on the "Promotions" tab to access the promotions page and click on the "CODE: 10OFFTOTAL" text	System able to copy the promo code to the clipboard and display "Promo code copied to clipboard: 10OFFTOTAL" notification	Able to copy the promo code to the clipboard and display "Promo code copied to clipboard: 10OFFTOTAL" notification	**PASS**

6.2.5 Test Scenario: Manage Bookings (Customer)

Table 6.5 Test scenario: Manage bookings (Customer)

No	Test Case	Input	Expected Output	Actual Output	Action/ Remark
1	Display My Bookings List	Click on the "Bookings" tab to	System able to display the customer's	System able to display the customer's	**PASS**

		access my bookings page	upcoming bookings and past bookings	upcoming bookings and past bookings	
2	View Booking Details	Click on the restaurant name (Sushi Edo) in the upcoming bookings section	System able to display the specific booking details, such as the booking number, restaurant image, booking status, booking date, time, table, remarks, promo code applied, restaurant address, and the customer information such as customer name, phone number, e-mail, and the restaurant's information such as operating hours, phone number, e-mail, website and google map location	Able to display the specific booking details, such as the booking number, restaurant image, booking status, booking date, time, table, remarks, promo code applied, restaurant address, and the customer information such as customer name, phone number, e-mail, and the restaurant's information such as operating	**PASS**

				hours, phone number, e-mail, website and google map location	
3	Modify Booking	Click on the "Modify Booking" button Insert the following values: New Date: 29/06/2024 New Time: 3:00pm Click on the "Find table" button and select Table of 6 pax (number 1) Click on the "Save Changes" button	System able to update the booking details in the database and display "Booking details successfully modified!" notification	Able to update the booking details in the database and display "Booking details successfully modified!" notification	**PASS**
4	Delete Booking	Click on the "Delete Booking" button	System able to update the booking status to "Cancelled" and display "Booking successfully cancelled!" notification	Able to update the booking status to "Cancelled" and display "Booking successfully cancelled!" notification	**PASS**

6.2.6 Test Scenario: Manage Bookings (Restaurateur)

Table 6.6 Test scenario: Manage bookings (Restaurateur)

No	Test Case	Input	Expected Output	Actual Output	Action/ Remark
1	Display Received Bookings	Click on the "Dashboard" tab on the left bar	System able to display the list of received customer bookings	Able to display the list of received customer bookings	**PASS**
2	Print Bookings List	Click on the "Print" button	System able to print the bookings list or save as PDF	Able to print the bookings list or save as PDF	**PASS**
3	Accept Booking	Click on the "Confirm" button in the Actions column	System able to update the booking status as "Confirmed" and display "This reservation has been confirmed" notification	Able to update the booking status as "Confirmed" and display "This reservation has been confirmed" notification	**PASS**
4	Reject Booking	Click on the "Reject" button in the Actions column	System able to update the booking status as "Rejected" and display "This reservation has	Able to update the booking status as "Rejected" and display "This	**PASS**

			been rejected" notification	reservation has been rejected" notification	
5	View Booking Details	Click on the "Details" button under the Details column	System able to display the specific booking details, which includes the booking number, restaurant name, image, address, phone number, e-mail, the customer's name and phone, table number, remarks, promo code applied, the booking date and time	Able to display the specific booking details, which includes the booking number, restaurant name, image, address, phone number, e-mail, the customer's name and phone, table number, remarks, promo code applied, the booking date and time	**PASS**

6.2.7 Test Scenario: Mailer Function (Restaurateur)

Table 6.7 Test scenario: Mailer function (Restaurateur)

No	Test Case	Input	Expected Output	Actual Output	Action/ Remark
1	Send Confirmation E-mail to Customer	Click on the "Confirm" button in the Actions column	System able to send a confirmation e-mail to the customer that includes the booking details such as the booking number, time, date, table number, remark, promo applied, restaurant name, image, phone, address, followed by a Google event invitation	Able to send a confirmation e-mail to the customer that includes the booking details such as the booking number, time, date, table number, remark, promo applied, restaurant name, image, phone, address, followed by a Google event invitation	**PASS**
2	Add to Google Calendar	Click on the "Add to calendar" button Select and insert the following values:	System able to save the booking event to the customer's Google Calendar and receive	Able to save the booking event to the customer's Google	**PASS**

		Add notification – 10 minutes Click on the “Save” button	notification reminders 10 minutes before the event time	Calendar and receive notification reminders 10 minutes before the event time	
3	Send Rejection E-mail to Customer	Click on the “Reject” button in the Actions column	System able to send a rejection e-mail to the customer that includes the booking details such as the booking number, time, date, table number, remark, promo applied, restaurant name, image, phone, address	Able to send a rejection e-mail to the customer that includes the booking details such as the booking number, time, date, table number, remark, promo applied, restaurant name, image, phone, address	**PASS**

6.2.8 Test Scenario: Manage Tables

Table 6.8 Test scenario: Manage tables

No	Test Case	Input	Expected Output	Actual Output	Action/ Remark
1	Add Table	Click on the "Manage Tables" tab on the left bar and click on "Add New Table" Select Table of 2 persons and click on the "Add" button	After restaurant admin clicks on the "Add" button and select the number of tables to be added, a notification that says "Table successfully added!" will appear	A notification that says "Table successfully added!" will appear after clicking the "Add" button and selected the number of tables to be added	**PASS**
2	View List of Tables	Click on the "Manage Tables" tab on the left bar and click on "List of Available Tables"	System able to display the list of tables added	Able to display the list of tables added	**PASS**
3	Add New Table Number	Click on the "Add Table" button for the 2 person table and insert 3 as the available tables value, then click on the "Add" button	System able to add the respective table numbers into the selected table size	Able to add the respective table numbers into the selected table size	**PASS**
4	Delete Table	Select the table: 2 person – Table N° 1	System able to delete the selected	Able to delete the selected	**PASS**

		and click on the "Delete" button	table number from the tables list	table number from the tables list	
5	Print List of Tables	Click on the "Print" button	System able to print the tables list or save as PDF	Able to print the table list or save as PDF	**PASS**

6.2.9 Test Scenario: Manage Menu

Table 6.9 Test scenario: Manage menu

No	Test Case	Input	Expected Output	Actual Output	Action/ Remark
1	Add Menu	Click on the "Manage Menu" tab on the left bar and click on "Add New Product" Insert the following values: Product name: Green tea Price: 2 Category: Drinks Description: Produced by steeping in freshly boiled water the young leaves and leaf buds of the tea plant.	After restaurant admin clicks on the "Add to the menu" button, the menu item will be added to the database and display a "Added successfully!" notification	After restaurant admin clicks on the "Add to the menu" button, the menu item will be added to the database and display a "Added successfully! " notification	**PASS**

		Image: greentea.jpg Then click on the "Add to the menu" button			
2	View List of Dishes	Click on the "Manage Menu" tab on the left bar and click on "List of Available Dishes"	System able to display the list of dishes added, which includes the image, product name, description, category, and price	Able to display the list of dishes added, which includes the image, product name, description, category, and price	**PASS**
3	Delete Menu Item	Select the Item: Salmon Teriyaki Don and click on the "Delete" button	System able to delete the selected menu item from the menu list and display "This product has been deleted!" notification	Able to delete the selected menu item from the menu list and display "This product has been deleted!" notification	**PASS**
4	Print List of Dishes	Click on the "Print" button	System able to print the menu list or save as PDF	Able to print the menu list or save as PDF	**PASS**

6.2.10 Test Scenario: Generate Analytics

Table 6.10 Test scenario: Generate analytics

No	Test Case	Input	Expected Output	Actual Output	Action/ Remark
1	View Monthly Analytics	Click on the "Analytics" tab on the left bar and click on "View Monthly Analytics" Select the following values: Month: April Year: 2024 Then click on the "Generate Analytics" button	System able to display the analytic results according to the selected month and year	Able to display the analytic results according to the selected month and year	**PASS**
2	Print Monthly Analytics Result	Click on the "Print" button	System able to print the monthly analytics result or save as PDF	Able to print the monthly analytics result or save as PDF	**PASS**
3	View Yearly Analytics	Click on the "Analytics" tab on the left bar and click on "View Yearly Analytics" Select the following values: Year: 2023	System able to display the analytic results according to the selected year	Able to display the analytic results according to the selected year	**PASS**

		Then click on the "Generate Analytics" button			
4	Print Yearly Analytics Result	Click on the "Print" button	System able to print the yearly analytics result or save as PDF	Able to print the yearly analytics result or save as PDF	**PASS**

6.2.11 Test Scenario: Manage Restaurant Applications

Table 6.11 Test scenario: Manage restaurant applications

No	Test Case	Input	Expected Output	Actual Output	Action/ Remark
1	Display Received Restaurant Applications	None	System able to display the list of received restaurant applications	Able to display the list of received restaurant applications	**PASS**
2	Print Restaurant Applications List	Click on the "Print" button	System able to print the restaurant applications list or save as PDF	Able to print the restaurant applications list or save as PDF	**PASS**
3	Accept Restaurant Application	Click on the "Confirm" button in the Actions column	System able to update the restaurant application status as "Confirmed" and display "This	Able to update the restaurant application status as "Confirmed"	**PASS**

			application has been approved" notification	and display "This application has been approved" notification	
4	Send Confirmation E-mail to Restaurateur	Click on the "Confirm" button in the Actions column	System able to send a confirmation e-mail to the restaurateur that includes the restaurant name, image, phone number, address, and a link to the restaurant account setup tutorial	Able to send a confirmation e-mail to the restaurateur that includes the restaurant name, image, phone number, address, and a link to the restaurant account setup tutorial	**PASS**
5	Reject Restaurant Application	Click on the "Reject" button in the Actions column	System able to update the restaurant application status as "Rejected" and display "This application has been rejected" notification	Able to update the restaurant application status as "Rejected" and display "This application has been rejected" notification	**PASS**

6	Send Rejection E-mail to Restaurateur	Click on the "Reject" button in the Actions column	System able to send a rejection e-mail to the restaurateur that includes the restaurant name, image, phone number, and address	Able to send a rejection e-mail to the restaurateur that includes the restaurant name, image, phone number, and address	**PASS**
7	View Restaurant Application Details	Click on the "Details" button under the Details column	System able to display the specific restaurant details, which includes the restaurant name, image, business registration number, address, phone number, e-mail, cuisine category, opening hours, and service type	Able to display the specific restaurant details, which includes the restaurant name, image, business registration number, address, phone number, e-mail, cuisine category, opening hours, and service type	**PASS**

6.2.12 Test Scenario: Chatbot Function

Table 6.12 Test scenario: Chatbot function

No	Test Case	Input	Expected Output	Actual Output	Action/ Remark
1	Search Help Center	Type "make booking" into the help center search bar	System able to display suggest a list of articles with the keyword "make booking" in it	Able to display suggest a list of articles with the keyword "make booking" in it	**PASS**
2	Access Help Center	Click on the "Setting up an Account" article in the help center	System able to redirect user to the "Setting up an Account" article in the help center	Able to redirect user to the "Setting up an Account" article in the help center	**PASS**
3	Submit Ticker	Click on the "Submit Ticket" button Insert the following values into the form: Name: Kai Yi E-mail: kkaiyyi@1utar.my	System able to submit and process the submitted ticket to display it in the customer service portal for review	Able to submit and process the submitted ticket to display it in the customer service portal for review	**PASS**

		Subject: Why can't I update my account name Message: Hello, why can't I update my name in the update profile page? Then click on the "Submit" button			
4	Chat With AI Assistant	Click on "New Conversation" button Insert the text "How do I make a booking?" and hit enter to send the message	System able to receive the message and use data from the knowledge base to automate the relevant response to users	Able to receive the message and use data from the knowledge base to automate the relevant response to users	**PASS**
5	Transfer To Live Agent	Insert the text "Speak to live agent" and hit enter to send the message	System able to prompt users for confirmation to be transferred to a live agent and request for a live agent to join in the chat	Able to prompt users for confirmation to be transferred to a live agent and request for a live agent to join in the chat	**PASS**

6.3 Implementation Issues and Project Challenges

During the development of the project, several challenges and issues were met. Firstly, a significant challenge emerged when trying to configure the automation of Nodemailer, which was Node.js's e-mail sending functions. Nodemailer was initially chosen for this task, however, some errors and complexities arose regarding the SMTP configurations and e-mail template customization, which led to difficulties in achieving seamless e-mail delivery and personalized content. To overcome these challenges, the mailer was switched to PHPMailer, which is a well-known e-mail sending library in PHP. PHPMailer was chosen as the e-mail sending library as it provides a more straightforward solution with comprehensive SMTP support, simplified e-mail template management, and enhanced customization options, which ultimately improves the reliability and effectiveness of e-mail notifications within the e-Reservation Restaurant web application. Hence, with PHPMailer's approach, the project was able to automate the sending of customized HTML e-mails with dynamically changing booking details according to the customer's booking information.

Another project challenge was the integration of REST APIs into the e-Reservation Restaurant web application. This involves seamlessly connecting with external services like Google Calendar API for event reminders and Tawk.to API for AI chatbot support. However, an error occurred when trying to integrate the Google Calendar API into the web application. It was unable to display the booking details on the Google Calendar event dynamically, and this required further troubleshooting and bug fixes. There was an error in handling the data flow and authentication services, thus being unable to call the booking data from the database to create the Google Calendar event dynamically. To solve this problem, thorough testing and debugging were conducted to find the root cause contributing to the problem. Ultimately, the integration issues managed to be solved and the project was able to ensure smooth communication between the web application and external Google APIs.

Another significant challenge is the training of the AI chatbot using REST APIs like Tawk.to to facilitate effective customer support. The implementation of this feature has a steep learning curve associated with training and deploying the system effectively. AI chatbot development encompasses challenging operations like collecting and analyzing vast amounts of data from the knowledge base, implementing sophisticated natural language processing (NLP) algorithms, and continuously refining the bot's responses based on user interactions.

This learning process cannot be completed without a thorough understanding of AI development principles and techniques, which is the greatest barrier faced in the project as the development of the project is unfamiliar with anything regarding AI technologies. In addition to that, providing training to the AI chatbot to enable accurate and meaningful responses to a broad range of questions is also one of the important difficulties that need to be solved. For this challenge to become functional, the process involves refining the knowledge base and training the chatbot to teach it to understand natural language inputs, interpret user commands, and generate relevant responses. To achieve a high level of accuracy and responsiveness in the chatbot's interactions, this requires extensive testing, iteration, and optimization of the machine-learning model. Thus, addressing these challenges and issues requires constant monitoring, feedback collection, and iterative improvements to the chatbot's knowledge base and algorithms.

6.4 Objectives Evaluation

To determine the project's successful development and implementation, the project objectives are evaluated. Hence, this section discusses how the key milestones of each objective were achieved to acquire an enhanced user experience, improved operational efficiency for restaurants, and increased customer satisfaction and engagement within the e-Reservation Restaurant web application. These achievements act as a strong foundation for future developments and enhancements within the platform to ensure continued growth and success in the online restaurant booking domain.

6.4.1 Implement A Personalized Recommendation Feature

The success of the personalized recommendation feature has resulted in increased user engagement and satisfaction. The recommendation system has been successful in simplifying the decision-making process of customers through an extensive study and implementation of industry best practices. The web application proposes a wide range of dining selections by recommending restaurants based on three categories, which are "what's new", "trending now", and "cuisines". In addition, the web application can also offer personalized restaurant suggestions based on specific individual preferences like cuisine types and locations. With this feature, customers have been able to find new restaurants that suit them better. Therefore, the

use of the B-tree algorithm has ensured efficient processing and display of recommendation results, which contributes to a seamless and user-friendly experience.

6.4.2 Implement An "Add to Google Calendar" Event Function for Notification Reminders

The integration of the "Add to Google Calendar" event function is meant to solve a major problem faced by current online restaurant booking systems. With this feature available, the web application allows customers to choose if they want to receive booking reminders sent through their Google Calendar or not. The number of no-shows has thus reduced significantly, leading to improved overall booking rates. Customers appreciate these proactive reminders, as it enables them to have a more organized and hassle-free booking experience. The seamless synchronization with Google Calendar shows how this project aims to utilize technology to enhance customer convenience and satisfaction, which can encourage repeated bookings and help boost sales revenue.

6.4.3 Implement An AI Chatbot with a Help Center Search Engine and 24/7 Availability of Live Chat Support Features

The implementation of the AI chatbot with a help center search engine and live chat system that is available 24/7 has led to the digital transformation of customer support for web applications. The chatbot is available all the time, hence, it has ensured that customers receive immediate assistance from it regardless of the time of the day, which addresses the problem of delayed customer service. Tawk.to's REST API integration has enabled a seamless connection between users and the chatbot, thereby leading to quick resolution of customer inquiries and concerns. Users can independently find answers through the self-service options in the help center, which reduces the workload for customer support staff and increases the process efficiency. Alternatively, customers can also opt to be transferred to live agents to communicate with human customer service representatives who can provide more personalized responses according to the user's unique questions and concerns.

Chapter 7
Conclusion and Recommendations

7.1 Conclusion

In conclusion, the development of the e-Reservation Restaurant web application represents a significant advancement in the online restaurant booking industry. The project was initiated to address key challenges identified in existing systems, including the lack of personalized recommendation features, booking reminders, and comprehensive AI chatbot support with live chat capabilities.

Identified problem statements within current existing systems are thoroughly discussed. Firstly, the lack of a personalized recommendation feature hampers user engagement and exploration, hindering customers from discovering new restaurants and cuisines. Furthermore, the absence of booking reminders will increase customer's risk of forgetfulness, which thereby increases the no-show rates for restaurant bookings. Lastly, the lack of a 24/7 available chatbot with AI capabilities limits customers from receiving real-time assistance and prompt responses. These problems created a functional gap which this project aims to address.

The proposed solutions to these problems require a forward-thinking approach to online restaurant reservations. The application intends to incorporate several innovative features to overcome these challenges. These solutions include a recommendation and restaurant sorting feature that enhances user engagement by leveraging advanced algorithms and user data to offer personalized restaurant suggestions. Additionally, the addition of a "Add to Google Calendar" event function addresses the problem of booking reminders by sending out timely reminders on customers' Google accounts, which lowers the probability of no-shows and improves the customer's booking experience in general. Last but not least, the deployment of an AI chatbot equipped with a thorough help center and round-the-clock live chat support capabilities meets the demand for prompt and efficient customer service. The web application guarantees that users receive timely solutions to their inquiries through the use of AI technology and real-time assistance, resulting in increased customer satisfaction and loyalty.

Therefore, the e-Reservation Restaurant web application project proposes a game-changing solution to the issues prevailing in the online restaurant booking landscape. The project intends to establish a user-friendly, effective, and transparent platform that helps both customers and restaurant owners by identifying key problem statements and bridging the gap through implementing innovative solutions. This application aims to transform the restaurant reservation experience and pave the way for a simpler and customer-centric approach to dining reservations.

7.2 Recommendations

One recommendation to improve the current system's user experience and simplify the booking process is to provide the opportunity for customers to select tables through a clickable layout of the restaurant's floor plan. With this feature, customers will be able to select particular tables according to their needs and preferences by seeing a visual representation of the restaurant's seating arrangement. To avoid double bookings and guarantee a seamless dining experience, real-time updates on table availability and reservations will also be incorporated.

Other than the table selection, a feedback and review system would be another vital component of the platform. With this feature, customers will be able to rate various aspects of their dining experience, including food quality, service, ambience, and overall satisfaction, as well as upload images of their meals and leave detailed comments. In addition to that, a moderation tool is also required to aid in determining review authenticity, which will benefit in creating a trustworthy and informative review system that feedback to both the restaurant and the customers.

Future plans for the project also call for the creation of pre-payment and menu pre-ordering features. To cut down on wait times and improve convenience, customers should be able to browse the restaurant's menu, select items and order in advance. The payment process will be streamlined by integration with pre-payment options, resulting in a seamless dining experience from reservation to payment. In order to provide customers with real-time order status monitoring, order tracking capabilities are also aimed to be integrated.

Moving forward, it is recommended to put more emphasis on user testing and feedback collection aimed at making the platform easy to use and functional. The platform can broaden its horizons through partnering with restaurants, which will increase the number of establishments involved and introduce a variety of menu items to serve all possible preferences. Personalized recommendations will be improved through ongoing algorithmic updates and optimizations, thereby increasing user satisfaction and engagement. Advanced data analytics tools will also be used to keep track of user behavior, preferences and booking patterns to enable targeted marketing strategies and service enhancements.

It is important to keep up with new technology and emerging trends in the industry to incorporate new features and functionalities that further improve the user experience. The e-Reservation Restaurant web application will continue to innovate and offer a cutting-edge platform for online restaurant bookings through these recommendations and future plans.

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FINAL YEAR PROJECT WEEKLY REPORT

(Project II)

Trimester, Year: T3, Y3	**Study week no.: 1**
Student Name & ID: Lim Kai Yi, 21ACB02828	
Supervisor: Cik Ana Nabilah Binti Sa'uadi	
Project Title: e-Reservation Restaurant	

1. WORK DONE

- Modified FYP1 report according to moderator's comments.
- Plan on the FYP2 project schedule timeline.

2. WORK TO BE DONE

- Complete the admin module.
- Create booking analytics dashboard for restaurateurs.

3. PROBLEMS ENCOUNTERED

- No problem encountered.

4. SELF EVALUATION OF THE PROGRESS

- Project is on schedule.

Supervisor's signature

Student's signature

FINAL YEAR PROJECT WEEKLY REPORT

(Project II)

Trimester, Year: T3, Y3	**Study week no.: 2**
Student Name & ID: Lim Kai Yi, 21ACB02828	
Supervisor: Cik Ana Nabilah Binti Sa'uadi	
Project Title: e-Reservation Restaurant	

1. WORK DONE

- Completed admin module.
- Completed 50% of booking analytics dashboard for restaurateurs.

2. WORK TO BE DONE

- Create update and delete functions for managing booking details (customer role).
- Create booking details page in restaurateur's dashboard page.
- Create bookings display page.

3. PROBLEMS ENCOUNTERED

- Need to research on what type of graphs are valuable and useful for gaining business insights.
- Met with syntax error while generating the graphs due to poor processing flow.

4. SELF EVALUATION OF THE PROGRESS

- Slow. Need time to debug and solve errors.

Supervisor's signature

Student's signature

FINAL YEAR PROJECT WEEKLY REPORT

(Project II)

Trimester, Year: T3, Y3	**Study week no.: 3**
Student Name & ID: Lim Kai Yi, 21ACB02828	
Supervisor: Cik Ana Nabilah Binti Sa'uadi	
Project Title: e-Reservation Restaurant	

1. WORK DONE

- Created bookings display page.
- Created booking details page in restaurateur's dashboard page.

2. WORK TO BE DONE

- Create update and delete functions for managing booking details (customer role).
- Create recommendation feature based on customer's preference.

3. PROBLEMS ENCOUNTERED

- No problem encountered.

4. SELF EVALUATION OF THE PROGRESS

- Project is on schedule.

Supervisor's signature

Student's signature

FINAL YEAR PROJECT WEEKLY REPORT

(Project II)

Trimester, Year: T3, Y3	**Study week no.: 4**
Student Name & ID: Lim Kai Yi, 21ACB02828	
Supervisor: Cik Ana Nabilah Binti Sa'uadi	
Project Title: e-Reservation Restaurant	

1. WORK DONE

- Completed 40% of the recommendation feature that displays recommended restaurants based on customer's preference selection.
- Created update and delete functions for managing booking details (customer role).

2. WORK TO BE DONE

- Finish the remaining part of the recommendation feature.
- Create promotions module.

3. PROBLEMS ENCOUNTERED

- Formatting problems in the recommendation pop-up modal.

4. SELF EVALUATION OF THE PROGRESS

- Slow. Need more time to fix the formatting issues.

Supervisor's signature

Student's signature

FINAL YEAR PROJECT WEEKLY REPORT

(Project II)

Trimester, Year: T3, Y3	**Study week no.: 5**
Student Name & ID: Lim Kai Yi, 21ACB02828	
Supervisor: Cik Ana Nabilah Binti Sa'uadi	
Project Title: e-Reservation Restaurant	

1. WORK DONE

- Completed the recommendation feature that displays recommended restaurants based on customer's preference selection.

2. WORK TO BE DONE

- Create promotions module to provide timely discounts to attract customers to place bookings.
- Create booking confirmation HTML e-mail.
- Create an add to Google Calendar function in e-mail.

3. PROBLEMS ENCOUNTERED

- No problem encountered.

4. SELF EVALUATION OF THE PROGRESS

- Project is on schedule.

Supervisor's signature

Student's signature

FINAL YEAR PROJECT WEEKLY REPORT

(Project II)

Trimester, Year: T3, Y3	**Study week no.: 6**
Student Name & ID: Lim Kai Yi, 21ACB02828	
Supervisor: Cik Ana Nabilah Binti Sa'uadi	
Project Title: e-Reservation Restaurant	

1. WORK DONE

- Created booking confirmation HTML e-mail.
- Completed 20% of add to Google Calendar function in e-mail.

2. WORK TO BE DONE

- Complete remaining add to Google Calendar function in e-mail.
- Create promotions module to provide timely discounts to attract customers to place bookings.

3. PROBLEMS ENCOUNTERED

- Faced issues in formatting the CSS of the booking confirmation HTML e-mail.
- Need to learn how to connect Google API to display booking information into e-mail attachment dynamically.

4. SELF EVALUATION OF THE PROGRESS

- Slow. Require more time to fix the formatting issues and learn about Google APIs and integrating them.

Supervisor's signature

Student's signature

FINAL YEAR PROJECT WEEKLY REPORT

(Project II)

Trimester, Year: T3, Y3	**Study week no.: 7**
Student Name & ID: Lim Kai Yi, 21ACB02828	
Supervisor: Cik Ana Nabilah Binti Sa'uadi	
Project Title: e-Reservation Restaurant	

1. WORK DONE

- Completed the remaining add to Google Calendar function in e-mail.

2. WORK TO BE DONE

- Create promotions module to provide timely discounts to attract customers to place bookings.

3. PROBLEMS ENCOUNTERED

- Unable to connect the Google API to fetch data from the database due to connection error.

4. SELF EVALUATION OF THE PROGRESS

- Project is on schedule.

Supervisor's signature

Student's signature

FINAL YEAR PROJECT WEEKLY REPORT

(Project II)

Trimester, Year: T3, Y3	**Study week no.: 8**
Student Name & ID: Lim Kai Yi, 21ACB02828	
Supervisor: Cik Ana Nabilah Binti Sa'uadi	
Project Title: e-Reservation Restaurant	

1. WORK DONE

- Created the promotions landing page in the customer's module.

2. WORK TO BE DONE

- Create AI chatbot for the website.
- Write functions to apply timely discounts on booking orders to attract customers to place bookings.

3. PROBLEMS ENCOUNTERED

- Unsure of the method to implement the promo code verification system.

4. SELF EVALUATION OF THE PROGRESS

- Slow. Require extra time learn how to implement promo code verification system in the customer's booking order page.

Supervisor's signature

Student's signature

FINAL YEAR PROJECT WEEKLY REPORT

(Project II)

Trimester, Year: T3, Y3	**Study week no.: 9**
Student Name & ID: Lim Kai Yi, 21ACB02828	
Supervisor: Cik Ana Nabilah Binti Sa'uadi	
Project Title: e-Reservation Restaurant	

1. WORK DONE

- Created AI chatbot for the website.
- Created a system to apply and verify timely discounts on booking orders to attract customers to place bookings.

2. WORK TO BE DONE

- Continue training the AI chatbot and building the knowledge base.
- Refine the booking processes in the restaurateur and customer page.

3. PROBLEMS ENCOUNTERED

- Unfamiliar with training AI chatbots, need to learn how to setup the knowledge base and train the model.

4. SELF EVALUATION OF THE PROGRESS

- Slow. Require extra time for self-learning on AI chatbot implementation and maintenance.

Supervisor's signature

Student's signature

FINAL YEAR PROJECT WEEKLY REPORT

(Project II)

Trimester, Year: T3, Y3	**Study week no.: 10**
Student Name & ID: Lim Kai Yi, 21ACB02828	
Supervisor: Cik Ana Nabilah Binti Sa'uadi	
Project Title: e-Reservation Restaurant	

1. WORK DONE

- Completed training the AI chatbot and building the knowledge base.
- Completed Chapter 1 to Chapter 3 of the report.

2. WORK TO BE DONE

- Complete remaining part of the report.
- Refine the system to make it more user-friendly and well-structured.

3. PROBLEMS ENCOUNTERED

- Unsure of how to implement the process flow for cancelled customer bookings.

4. SELF EVALUATION OF THE PROGRESS

- Slow. Need to catch up on the report progress.

Supervisor's signature

Student's signature

FINAL YEAR PROJECT WEEKLY REPORT

(Project II)

Trimester, Year: T3, Y3	**Study week no.: 11**
Student Name & ID: Lim Kai Yi, 21ACB02828	
Supervisor: Cik Ana Nabilah Binti Sa'uadi	
Project Title: e-Reservation Restaurant	

1. WORK DONE

- Completed Chapter 4 to Chapter 6 of the report.
- Completed print functions for the analytics dashboard.

2. WORK TO BE DONE

- Complete the report.
- Enhance the system by implementing additional functionalities into it (e.g., implementing auto copy-paste promo codes function and improving the cancelling and approving bookings process flows).
- Conduct system testing.

3. PROBLEMS ENCOUNTERED

- Problems with the HTML structure in the analytics dashboard, causing the print function unable to print the analytics report as desired.

4. SELF EVALUATION OF THE PROGRESS

- Need more effort and better time management skills to be on schedule.

Supervisor's signature

Student's signature

FINAL YEAR PROJECT WEEKLY REPORT

(Project II)

Trimester, Year: T3, Y3	**Study week no.: 12**
Student Name & ID: Lim Kai Yi, 21ACB02828	
Supervisor: Cik Ana Nabilah Binti Sa'uadi	
Project Title: e-Reservation Restaurant	

1. WORK DONE

- Enhanced the system by implementing additional functionalities into it (e.g., implementing auto copy-paste promo codes function and improving the cancelling and approving bookings process flows).
- Conduct testing and evaluation for the system.

2. WORK TO BE DONE

- Complete the report.

3. PROBLEMS ENCOUNTERED

- No problem encountered.

4. SELF EVALUATION OF THE PROGRESS

- Project is on schedule.

Supervisor's signature

Student's signature

FINAL YEAR PROJECT WEEKLY REPORT

(Project II)

Trimester, Year: T3, Y3	**Study week no.: 13**
Student Name & ID: Lim Kai Yi, 21ACB02828	
Supervisor: Cik Ana Nabilah Binti Sa'uadi	
Project Title: e-Reservation Restaurant	

1. WORK DONE

- Completed the development of the system.
- Completed the report.
- Submitted the report.

2. WORK TO BE DONE

- Prepare for presentation.

3. PROBLEMS ENCOUNTERED

- No problem encountered.

4. SELF EVALUATION OF THE PROGRESS

- Project is on schedule.

Supervisor's signature

Student's signature

POSTER

e-Reservation Restaurant

Developed by: Lim Kai Yi
Supervised by: Cik Ana Nabilah Binti Sa'uadi

Abstract

This project introduces an innovative e-Reservation Restaurant web application aimed at addressing limitations in existing online restaurant booking systems, offering personalized recommendations, "Add to Google Calendar" reminders, and an AI chatbot for enhanced user experience and reduced no-show rates.

Project Objectives

- To implement recommendation and sorting features to match user preferences and provide personalized recommendations.
- To enable notification reminders for each confirmed booking.
- To incorporate a 24/7 AI chatbot with a help center for immediate customer assistance.

Methodology:

Agile Methodology

Software/ Tools

VS Studio

phpMyAdmin

XAMPP

MySQL

Results & Discussion

1. Implemented a **personalized restaurant recommendations** feature to improve user engagement and exploration, allowing customers to discover new dining options based on their preferences.
2. Integrated an **"Add to Google Calendar"** function to reduce the risk of forgetfulness and no-show rates by sending timely reminders to customers' Google accounts.
3. Implemented an **AI chatbot with 24/7 live chat and live agent support, and an interactive help center** that provides prompt and efficient customer service, to enhance overall user satisfaction and loyalty.

Conclusion

The significant advancement and solutions provided by the e-Reservation Restaurant web application addressed key challenges in existing online restaurant booking systems, enhancing user engagement, reducing no-show rates, and improving customer satisfaction through innovative features such as personalized recommendations, booking reminders, and AI chatbot support.

Future Recommendations

The future plan of this project aims to enhance the current system's user experience by implementing features like table selection through a clickable floor plan layout, a comprehensive feedback and review system, pre-payment and menu pre-ordering capabilities, and ongoing improvements based on user testing, feedback, and data analytics to ensure a seamless and advanced dining reservation experience.

Universiti Tunku Abdul Rahman
Bachelor of Information Systems (Honours) Business Information Systems

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Signature of Supervisor

Name: Cik Ana Nabilah Binti Sa'uadi

Date: 22/4/2024

Signature of Co-Supervisor

Name: _____

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